The transnational focus of this anthology on the cross-border flow of goods, capital, people and the institutions involved in the Rhine economy adds new insights to existing knowledge of national and local histories. Both the history of the Central Commission for Navigation on the Rhine (CCNR) and contributions on environmental issues show that the manifold problems of the riparian Rhine states could, and can, only be solved through international and transnational collaboration. As an early example of transnational collaboration, the CCNR is one of the institutional explanations for the long-term successful economic development of the region. On the other hand, private industry, multinational companies and entrepreneurs played a major role in both the development of the economy along the Rhine and the transnational interdependencies of its core regions. Despite wars and the nationalistic economic policies of governments, these private agents created a long-lasting cross-border economic region.
Wirtschafts- und Sozialgeschichte des modernen Europa
Economic and Social History of Modern Europe

edited by
Prof. Dr. Jan-Otmar Hesse
Prof. Dr. Christian Kleinschmidt
Dr. Alfred Reckendrees, Associate Professor
Prof. Ray Stokes, Ph.D.

Volume 4
Ralf Banken | Ben Wubs [eds.]

The Rhine:  
A Transnational Economic History

Nomos
Dedicated to the memory of our colleague, friend and fellow contributor to this volume,

Chris Kobrak (1950-2017)
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1. Introduction
The Rhine: A Transnational Economic History.

Ralf Banken, Ben Wubs

The first Transnational Rhine Conference (called RHIN(e) since 2014) was held at the World Museum in Rotterdam in November 2009. The organizers, Ralf Banken and Werner Plumpe, Hein Klemann and Ben Wubs, based at Goethe University in Frankfurt and the Erasmus University of Rotterdam, respectively, aimed to bring together scholars from various disciplines and establish a genuine multidisciplinary venture. In particular, they endeavoured to build a transnational network of economic and business historians, technology historians, and economists and economic geographers, initially from the countries along the Rhine and its delta, i.e. Switzerland, Germany, France, Belgium and the Netherlands. The first conference explored different aspects of the long-term economic development of the Rhine economy from five different, sometimes overlapping, perspectives: geographical, macro-economic, institutional, business historical and technological. After the kick-off meeting in Rotterdam, RHIN(e) conferences were held in Frankfurt am Main (2010), Bochum (2011), Rotterdam (2013), Mainz (2014) and Rotterdam (2016). Initially involving scholars from countries along the Rhine and its delta, this transnational network gradually expanded to include academics from other parts of the world, such as Japan, China and the US. It now also aims to compare its research results with studies of other river systems like the Yangtze and the Danube.¹ The following collection of articles is, to a certain extent, a summary of the first five RHIN(e) conferences and provides an overview

¹ The Transnational Rhine Conference (RHINe) is an initiative of the Erasmus University Rotterdam and the Goethe Universität Frankfurt. We are grateful for the financial support of the City of Rotterdam, Deutsche Forschungsgemeinschaft (DFG), Erasmus Trustfonds, the Erasmus School of History, Culture, and Communication, Erwin-von-Steinbach Stiftung, the Foundation for the History of Technology, the Goethe Universität Frankfurt, Leiden University, the Maritime Museum Rotterdam, the NW Posthumus Institute, the Netherlands Organisation for Scientific Research (NWO), and the Rotterdam Port Authority. We would also like to thank all the participants for their contributions as well as Matthias Kemmerer and Christiane Borchert, Frankfurt am Main, for their support during the editing pro-
of the various themes that have been discussed in these years. An anthology like this can, however, never be comprehensive – in the meantime, more than 70 papers have been delivered and several of these have been published elsewhere. Nevertheless, we will discuss in this volume a wide variety of topics, time periods and perspectives to demonstrate the fruitfulness of the chosen transnational approach thus far.

1. The River Rhine

In the Middle Ages and the Early Modern period, the lower and middle Rhine in particular was probably one of the busiest waterways in the world, meaning that the co-evolution of the division of labour and an accumulation of wealth, trade and city growth set in that was connected to the North Sea and the Baltic economic regions via the Rhine estuary. Along the Rhine, trade mainly consisted of food, wine, timber and finished goods from South and Southwest Germany. The rise of the Low Countries since the 16th and 17th centuries made the cities of the Rhine delta the most important ports for the trade in colonial products, and they remained the primary destinations for German raw materials, food, wine and commercial goods. The Rhine provided the pivotal technical and economic momentum that enabled the international division of labour: only the river ensured that transport costs stayed below a level that would, more or less, have prohibited trade, and even the numerous tolls (and staple rights) could not completely eliminate the cost advantages of water transport. When many tariff barriers fell in the second half of 19th century and the Upper Rhine was regulated, the Rhine economy experienced another economic and technical boost.

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2 For the reports on the Rhine conferences, see: http://www.hsozkult.de/conferencereport/page (keyword "Transnational Rhine conference"). For examples of published contributions of the first five conferences, see: Spaulding, Changing Patterns (2013); Roelevink/Schenk, Challenging times (2012); Klemann/Wubs, River Dependence (2014); Boon et al., Outport and Hinterland (2012); Banken/Stokes, Entstehung (2014).

3 Braubach, Vom Westfälischen Frieden (1976), 311-322.

The economy of the Rhine was not limited to its namesake, but even in pre-industrial times also included its tributary rivers and thus integrated an economic area that stretched from Northwest Switzerland along the valleys of the Upper, Middle and Lower Rhine to the Dutch river delta, including the catchment areas of Moselle and Main. The existence of this economic transport network in connection with the fertility of the surrounding agricultural areas helped to create a density of cities, populations and interconnected commercial centres which, at that point, had no equal in Europe.

Industrialization in the 19th century marked the start of a new phase in the history of the Rhine economy. The new production technologies spreading from Britain and later Belgium, and the expansion of energy consumption that followed, suddenly raised the value of the coal deposits along the Rhine or in its catchment area, the extent of which had generally been known about since the Middle Ages. Early smelting technology consumed massive amounts of energy, as about three times the amount of fuel was needed to smelt a certain amount of iron ore. In order to exploit the coal deposits of the Ruhr effectively, however, both an economical supply of ore and reasonable rates for the transport of the finished or semi-finished products were needed.\(^5\)

The traditional division of labour between the Middle and Upper Rhine on the one hand and the Lower Rhine, including the Netherlands, on the other was gradually complemented, and finally replaced, by a trade in coal, iron ore and products of heavy industry. Rotterdam became the outlet of the Ruhr, just as the Ruhr became the factual hinterland of Rotterdam. This division of labour became more differentiated by the emergence of an industrial cluster in Rhineland and Westphalia, where mechanical engineering and the chemical industry soon joined heavy industry. The German Ruhr area developed into the most important industrial centre in Europe from the 1870s onwards, which was an expansion that would have been impossible without the Rhine. The same can be said for the development of Rotterdam’s ports and the surrounding urban centres into the most important deep sea port in Europe.\(^6\) Nevertheless, the Netherlands and the

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5 Fremdling, Technologischer Wandel (1986); Fremdling, Foreign Trade Patterns (1983).
6 Laspeyres, Rotterdam und das Ruhrgebiet (1969); Van de Laar, Port Traffic in Rotterdam (2003); de Goey (Ed.), Comparative Port History (2004); Klemann/Wielenga, Die Niederlande und Deutschland (2009), 13.
Ruhr alone were not the only areas forming part of the 19th century coal-based Rhine economy, which stretched further and included the Rhine-Main and Rhine-Neckar regions and the industrial cluster around Basel.

Over the last one and a half centuries, the Rhine River became the foremost inland waterway in Europe. The tonnage per kilometre moved on this river was greater than on any other waterway in the world. This commercial highway from the North Sea to Switzerland, which was only navigable along the full distance from Rotterdam to Basel from the early 19th century onwards, went through the parts of Europe that developed into the most highly industrialized region.7 Fuel and by-products from coking, which served as raw materials for the chemical industry, arrived via the Rhine, and the river itself served as a necessary source of fresh water as well as a drain. Finished products were shipped back downstream. The existence of the major chemical corporations, Bayer, Hoechst, BASF and Ciba/Geigy, would have been inconceivable without the Rhine.8

The heavy industrial phase of the Rhine economy lasted from the mid-19th century until the 1960s, meaning that the technical structures and the division of labour created during this phase have determined the shape of the Rhine economy and the increasingly polluted river for more than a century. Only the structural change that began in the 1920s, which culminated in a crisis of heavy industry and the rise of the petro-chemical industry, prevented the Rhine’s complete ecological collapse. The river played only a minor role as a factor in production in the new economic structures and became primarily a means of transport again from the 1970s onwards. The low transport costs and the fact that consumers were concentrated around its course also endowed the Rhine with unbeatable economic advantages in the new economic structures. The transport of raw materials nonetheless declined and is still on the wane. The Port of Rotterdam, however, continues to be Europe’s centre for handling mineral oils, ethylene and other petrochemicals, which have been sent through pipelines since the 1950s. Container shipping has become an important mode of transport, along with road haulage and rail freight, for industrial products in the Rhine region and for the commodities of global trade that reach millions of customers via the waterways of the river network and Rotterdam and Antwerp.

2. The Rhine region

From the 1990s onwards, regions began to again play an important role in academic research and debates on geography, international relations, history and economics, among others. At the same time as the rise of globalism, the changing position of national and the rise of supra-national states has meant that the regions have returned to the research agendas of several scholarly disciplines. Moreover, on a practical policy level, the region has become an important area of aggregation and concern. In 2004, the European Commission stated that, for example, the improvement in regional competitiveness across the European Union (EU) ‘will boost the growth potential of the EU economy as a whole’.

Michael Porter’s study *The Competitive Advantage of Nations* has shaped national policy in many countries since its publication in 1990. According to Porter, the national environment affects the competitive position of firms, and analyzing it will produce fundamental insights into how competitive advantages at the firm level are created and sustained. Furthermore, Porter introduces the concept of clusters, which he defines as groups of interrelated firms, suppliers, related industries and specialist institutions in certain fields that are present in particular locations. This agglomeration of firms has long been recognized in economic geography, but not in relation to national competitiveness.

According to Paul Krugman, however, national competitiveness is a contentious concept. At the firm level, it is often taken to mean a company’s ability to create, retain and expand its market share, but at a national and aggregate level the concept is rather elusive and difficult to measure. Some regions, nonetheless, perform better than others. Geography as a science has long researched spatial disparities, but has not thought of these in terms of competitiveness. It is not geographers, but economists like Michael Porter and Paul Krugman, who have led a new discourse on regional competitiveness. In 2001, Porter stated that the drivers of prosperity

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are based sub-nationally and, therefore, the locus of analysis should move from the national to regional and local levels.\(^{15}\)

Core regions, which are central in Krugman’s work, are more diverse and larger than Porter’s clusters. New economic geography, in which Krugman is prominent, started by observing that economic activity concentrates in agglomerations, and concentration can only be explained by their competitiveness.\(^{16}\) Agglomerations were, nevertheless, there, and as some regions became core regions and others peripheries, this needed an explanation that is not provided by neo-classical economics.\(^{17}\) Krugman identifies two primary interrelated sources of regional competitiveness: regional fundamentals and regional external economies. The former are rooted in key regionally embedded characteristics such as the level of education, a culture of entrepreneurship, infrastructure, natural surroundings and an intentional public policy, while the latter are the result of a region’s economic development – in Porter’s terms environment – arising as a consequence of geographical concentrations of clusters. A close spatial agglomeration of similar or related firms enables these to benefit from locally embedded externalities, e.g. access to specialist labour, spill-overs of technology and knowledge, networks of trust, and shared business cultures and practices. Economists and geographers alike now argue that these regional externalities are to be recognized as an important basis for regional success.\(^{18}\)

Clearly, the Rhine region was a great regional success for more than a century, but probably much longer. This brings us to the main questions of the RHIN(e) project: what exactly is the Rhine region or Rhine economy and what are its spatial dimensions? What are its borders and have these changed over time? To what extent was the Rhine Valley one economic core region, or did the region consist of multiple core regions? How and why did this regional economy become and remain one of the most competitive economic regions in the world over such a long period? To what extent was the River Rhine the structuring element of the region?

\(^{15}\) Porter, *Regions* (2001), 139-152.
\(^{16}\) Fujita et al., *The Spatial Economy* (1999), 1-12.
Starting from the region concept used and developed by scholars like Rainer Fremdling, Sidney Pollard, Toni Pierenkemper and Richard Tilly\textsuperscript{19} during the 1970s, which aimed to produce an understanding of the process of regional industrialization, we define an economic region as simply a spatial entity that has: a homogenous economic structure that is clearly distinguishable from its surroundings; economic sectors that are closely intertwined through mutual deliveries; and interregional ties that must be stronger than the ties to its direct surroundings\textsuperscript{20}.

When we apply these three criteria to the transnational economic region located between Basel and Rotterdam, the area apparently does not qualify as one economic region, because it never had a homogenous economic structure. Instead, several economic regions exist within this spatial dimension, such as the Ruhr district, the Rhine-Neckar region, or the Greater Rotterdam area, all of which have a completely different economic structure. Nevertheless, these single economic regions were, and are, closely linked, for example, either directly through transport flows over the Rhine and other means of transport, or indirectly through the intertwinement of companies in this transnational region. Both of these links have been explored in various papers during the RHINe conferences.

If we accept that the criterion of interdependence between the different sub-regions is the defining feature of the Rhine economy, it will be possible to determine whether a particular sub-region should be included in this greater economic space or not on the basis of more or less intensive trade or investment flows between the different sub-regions. At the moment, this observation cannot be based on firm quantitative research, however desirable, but on the existing literature and estimated guesses, from which we already have an idea of which areas belong to the Rhine region and which do not. If, for example, we examine the Swiss case, it is clear that Basel and its surroundings belong to the Rhine region, but the Zürich area does not, because the latter is much more focused on the Swiss internal market, Italy and France.


Of course, much more research must be conducted if definitive conclusions are to be reached, but whatever the outcome of our future research on which regions belong to the Rhine economy and which do not, the spatial dimensions of this economy are clearly not, and never were, static. In the Early Modern period, for example, part of Franconia was closely linked with Holland through its timber trade over the Main and Rhine, while in the 19th century this region did not have trade relations of a similar level of importance with the Rhineland or the Netherlands. As a result, our definition of the spatial dimensions of the Rhine economy greatly depends on the concrete economic relationships between regions in certain periods of time.

3. A transnational and long-term project

Ever since the Middle Ages, a river economy has emerged along the Rhine that favoured the development of self-confident cities, long-distance trade and the accumulation of great fortunes, in turn enhancing the economic potential of the region in a co-evolutionary process. From the distant past to the present day, the Rhine region has been the real economic central axis of at least Western Europe and an essential part of the so-called ‘Blue Banana’. This contested concept was developed by the French geographer Roger Brunet in 1989, who referred to a banana-shaped urban corridor of industry stretching from London to Milan.\textsuperscript{21} The actual and eminent economic fact, however, is the river itself, which is, according to Fernand Braudel, the unchanging and hardly changeable natural condition that shaped the lives, habits, mentalities and everyday routines of the Rhenish people.\textsuperscript{22} If measured against these conditions and structures of the \textit{longue durée} and their shaping force, singular events, wars and political borders had little real importance. Seldomly, there were serious consequences for the economic structures in the long run, even if the events themselves happened on a dramatic scale. Instead, the Rhine economy was constituted by its geographic realities and the patterns of its exploitation, especially the various ways in which major and significant groups of economic actors put the natural opportunities to their use, expanded them, and thus created

\begin{thebibliography}{99}
\bibitem{}\textsuperscript{22} Braudel, \textit{Geschichte und Sozialwissenschaften} (1976).
\end{thebibliography}
a complex and interwoven economic structure. If these actors and their actions thus shaped the Rhine economy, then we should give them most of our attention.

Rivers are often seen as being part of a static natural condition. They are, however, neither static nor just a particular natural condition. Societies constantly transform rivers through major innovations, because they use them for diverse purposes, including shipping, drinking, refreshment, fishing, as a sewer, irrigation, as cooling water, and as a source of hydroelectric power. Living alongside a river constantly demands finding compromises between the diverse functions of the stream and looking for new technological and institutional solutions. As the Rhine flows through a number of nations, international or regional conflicts of interest arose easily. Research into the first transnational organization in the world, the Central Commission for Navigation on the Rhine (CCNR), for example, helps us to understand how exceptionally the Rhine region developed in a way that was advantageous to all, and this could partly explain the competitiveness of the region. Furthermore, this RHIN(e) project focuses on the economic actors in the Rhine region, i.e. companies, entrepreneurs and institutions. Moreover, it does not simply map trade and capital interdependencies on a macro and regional level statistically and quantitatively, because this too often leads to outcomes on decreasing or increasing economic interdependencies between regions or countries. In-depth analyses on a micro level, however, will also produce additional explanations of macroeconomic developments, as several papers at the RHIN(e) conferences have shown thus far.

As well as our focus on the company level, it is important to mention that this is not a traditional regional history project, which means that its intention is not just to look into the question of which regions trade with one another. Our approach is interregional and transnational. Although no-one doubts the close interrelationships that exist between the diverse centres of economic activity along the Rhine, the traditional national approach in historiography almost completely blocks the cross-border regional and, as a consequence, transnational approaches that are badly needed. Johan Schot and Jan-Pieter Smits argue that the globalization literature provided historians with a new transnational research agenda that focuses on the study of cross-border flows of goods and people, the organizations involved, new spaces constructed, and the influence of these flows on na-
Of course, nation states play a role, and in some periods even quite a substantial one, but these roles were not as decisive as the traditional, often nationalistic, historiography suggests. According to Patricia Clavin, who aims to define transnationalism as a historical concept, it is ‘best understood not as fostering bounded networks, but as creating honeycombs, a structure that sustains and gives shapes to the identities of nation-states, international and local institutions, and particular social and geographic spaces.’ Yet Clavin warns transnational historians not to lose the connection with the question of human agency. ‘As transnational history is given life and sustained by the people who make the connections, societies matter.’ Consequently, apart from markets and modes of transport that support transnational relationships, this transnational project also analyzes companies, entrepreneurs and organizations.

The RHIN(e) project mainly focuses on the late 19th and 20th centuries, because most associated scholars do their research in this period. However, this is not to say that we have lost our interest in the Early Modern and Early Industrialization periods. Indeed, it is only through the inclusion of the Early Modern period that it will be possible to show the real meaning of Braudel’s longue durée for the Rhine economy. In other words, the economic region has certainly adapted itself according to the forms of economic activity in several periods of time, determined by its political and social conditions. Simultaneously, however, this economic region shows remarkable continuity in terms of the concentration of economic activity from the Middle Ages to today. The 5th RHIN(e) Conference, for example, focused on the long-term and Early Modern development of the Rhine and how capitalism as an economic system found its way to continental Europe by using the river. Indeed, a new research project financed by the Deutsche Forschungsgemeinschaft (DFG) focuses on the 18th century trade relationships in the lower Rhine area.

25 Clavin, Time, Manner, Place (2010), 635-636.
26 Klemann/Wubs, River Dependence (2014), 219-245.
27 The 5th Transnational Rhine Conference took place in Akademie der Wissenschaften in Mainz from 30th October to 1st November, 2014.
28 Ralf Banken, Werner Plumpe, Das kapitalistische Tor zur Welt. Die Handelsbeziehungen zwischen Westdeutschland und den Niederlanden 1740-1806/ The capitalist gate to the world: trade relations between Western Germany and the Nether-
When it comes to our thematic approach and methodology, we aim to keep this project open. If an author wants, as a subproject, to conduct a network analysis or look, more classically, into trade flows, cartels or capital relationships between separate companies in different regions using a quantitative approach, this will be a decision for the decentralized research group based on the researcher’s own interests and abilities. In addition, the project aims to combine all the different levels of economic historical research, i.e. micro, meso and macro. Its multi-disciplinary approach is also well reflected through the contact that we seek with other disciplines, with the aim being to learn from their expertise either by inviting them to deliver papers during our conferences, or by asking geographers, economists, sociologists and others to participate in our subprojects. This thematic and methodological pluralism and openness may look somewhat problematic at first sight. We believe, however, that this is the best way to involve as many colleagues as we can in the overall project in order to secure its future development and create as much knowledge as possible on the multifaceted economic evolution of the transnational Rhine region.

4. The book’s contributions

The book is organized according to several of the themes that have been covered during the first five RHIN(e) conferences that took place from 2009 to 2014. After this Introduction, the first sections address the role of institutions and regions. Hein Klemann explains how the French liberalized Rhine navigation and limited the tolls and taxes on barging during the last few years of the 18th century. To guarantee free navigation on the river after the fall of Napoleon, the Congress of Vienna set up the still existing Central Commission for Navigation on the Rhine (CCNR). The article raises the questions of why governments along the Rhine invested heavily to normalize the river and what role the CCNR played. Ralf Banken provides an overview of the development of the Upper Rhine coal markets. His contribution not only uncovers new insights into the basis for regional industrialization between Mannheim and Basel, but also reveals the signif-

lands, 1740-1806, financed by the German Research Foundation (DFG) 2016-2019.
The significance of this industrialization for the development of the Ruhr and Saar regions in the early 19th century. Furthermore, it explores the impact of the transport infrastructure, especially the role of steamship navigation, on the competition between Saar and Ruhr coal.

The second section explores the role that private enterprises and cartels played in the development of the Rhine economy. Ben Wubs’s article shows why the four most important Dutch multinationals, Unilever, Royal Dutch, Philips and AKU, invested so heavily in Germany in the interwar period, and which spatial strategies they pursued. The paper concludes that, initially, these four companies were part of a transnational Rhine region. Meanwhile, WWI created competitive advantages for all four Dutch multinationals in the German part of the Rhine region. In the interwar period, all of these companies were forced to adopt a more national spatial strategy in Germany. The article by Eva-Maria Roelevink and Dieter Ziegler aims to define the relationship between cartelized Ruhr coal and the state between 1893 and 1945. The Rhenish-Westphalian Coal Syndicate (RWKS) was regarded as the most influential, and also the most powerful, cartel within German industry. Previous research assumed that the RWKS turned into a state-regulated organization after WWI, but this article questions this one-sided view.

The third section combines articles on three completely different sectors and clusters in the Rhine region. Laura Rischbieter and Mark Jakob investigate the long-term development of the Rhine as a principal gateway for colonial goods destined for the German market since the Early Modern period. The cases of coffee and tobacco show how entrepreneurs over the course of the 19th century deepened and diversified value chains in response to economic and political change, and that, despite shrinking economic distances between world regions, hubs of manufacturing and distribution did not necessarily lose their importance. Boris Gehlen’s article (supported by Hendrik Fischer) shows that the development of the Rhenish lignite industry, from the poor production of a poor fuel for poor people in the last quarter of the 19th century to the most profitable mining industries in Germany in the 20th century, can be seen as a textbook example of institutional economics. Over time, Rhenish lignite thus became a serious competitor in the coal markets and particularly in terms of the supply of electricity. The late 19th century profits were a crucial pre-condition for the successful development of Rhenish lignite in the next century. Christopher Kobrak’s article is designed to suggest how some long-standing and recent strengths of the Rhine banking community contributed to our cur-
rent transnational financial architecture. Kobrak describes today’s financial configuration, explaining why the existence of Euro-markets (offshore markets) are so important to it, and then highlights the role played by Rhine Valley-based banks in the creation of the Euro-market from 1950 to 1980.

The fourth section combines two articles on the role of infrastructures and ports in the Rhine economy. Marten Boon’s paper investigates the development of crude oil pipelines in the Rhine region in the period 1955-60. Multinational oil companies proposed a transnational pipeline system as a rational and efficient solution. However, the fragmented political landscape of pre-integration Europe created uncertainty about the feasibility of the trans-European pipeline. The crude oil pipeline system that was actually constructed consisted of a number of regional pipelines divided into a northern section extending from the North Sea ports and a southern section originating in Marseille. The two sections were never integrated and divided the Rhine region in two. The first objective of Antoine Beyer’s article is to present a survey of land consumption for port use or urbanization and the specific forms that this takes in the Rhine Valley. The objective is to see the extent to which Rhenish port areas have really shrunk (in absolute and relative terms) in the past 15 years. His second objective is to devise a typology that presents the different developmental paths followed by the Rhine cities, with a general model and its different variations. His research focuses on the detailed analysis of several variables that could explain local differences.

The fifth section explores transport relations and interdependencies in the Rhine region in the 20th century. Jeroen Euwe argues – by means of an analysis of transport flows – that a German Rhine economy existed on the eve of WWI. The volume of traffic and the cohesiveness of its ties to the Netherlands, Belgium, Luxembourg and Switzerland – and after the war, the Alsace and Lorraine in France – suggest that the region was part of a transnational Rhine economy. Following an examination of the structure of the transport flows within the Rhine region, Euwe considers the effects of the war on the cohesion of the Rhine economy and the postwar recovery of transport flows within this region. Theo Notteboom, meanwhile, deals with the historical and present relationships between the Rhine and the gateway ports in the Rhine-Scheldt delta. His focus is on the inland waterway transport of containerized cargo, and he provides a detailed historical analysis of barge connectivity between the seaport system and the Rhine Basin. The recent stagnation in barge volume growth on the Rhine...
has shifted the focus of market players to improving the logistics quality of barge connectivity.

The sixth and final section deals with the environmental aspects of the history of the Rhine region, canalization and pollution. Uwe Lübken shows that from an ecological perspective, there is a certain irony in framing the transnational dimension of the Rhine economy as a river’s history, because in order for the Rhine to become the great European highway connecting agricultural, industrial and urban areas, it had to cease being a river. The size of the floodplain has been sharply reduced, biodiversity extremely diminished, and pollution significantly increased. His chapter focuses on the transformation of the river into a mere canal, the perennial problem of flooding, early attempts to conserve and protect Rhenish landscapes, and more recent initiatives to restore at least parts of the river to a more or less natural state. Nil Disco explores the attempts to clean up the River Rhine from the Chemicals Convention to the Rhine Action Plan, 1970-1990. By the early 1970s, postwar industrialization and urbanization had so polluted the Rhine that its biological death seemed imminent. Data on Rhine pollution levels show that enormous improvements in water quality in fact antedated the Rhine Action Plan by at least a decade. Disco’s article focuses on the efforts of BASF in Ludwigshafen to clean up the river by reconstructing its wastewater system and purifying its effluents prior to discharge into the Rhine. In view of the enormous costs involved, questions are raised concerning BASF’s motives and the possible role of German state and federal water laws.

Although this collection of articles does not provide a complete overview of the research results of the RHIN(e) project, and only gives a partial impression of the variety of themes that have been explored thus far, a few general and preliminary observations can be made. Our transnational focus on cross-border flows of goods, capital, people and the institutions involved in the Rhine economy have added new insights into existing knowledge of national and local histories. Klemann’s contribution to the CCNR, as well as the articles by Lübken and Disco on environmental issues, show that the manifold problems of the riparian Rhine states could, and can, only be solved through international and transnational collaboration. The establishment of the CCNR in the 19th century as an early example of transnational collaboration might even be one of the institutional explanations of the long-term successful economic development of this region. The economic interdependencies between the different core regions have been clearly demonstrated in the articles of Jeroen Euwe, Boris Ralf Banken, Ben Wubs
Gehlen, Mark Jakob and Laura Rischbieter. These different regions within the Rhine economy complemented each other by deliveries of complementary goods and services – despite competition, as shown by Theo Notteboom and Ralf Banken. Several other contributions (Boon, Roelevink, Ziegler, Kobrak and Wubs) prove how important (multinational) companies and entrepreneurs were for the development of the Rhine region and its transnational interdependencies. Despite all national wars and nationalistic economic policies, these private agents created, out of self-interest of course, a long-lasting, cross-border economic region.

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2. Origins
Abstract: Traditionally, local rulers and towns along the Rhine taxed Rhine shipping, regulated and monopolized it, and so caused an almost prohibitive increase in costs. Only the French liberalized Rhine navigation and limited tolls and taxes on barging during the final years of the 18th century. After the fall of Napoleon, it was feared that the old approach would return. As no one thought this was a good idea, the Conference of Vienna tried to regulate navigation on international rivers in general, and on the Rhine in particular, in a liberal manner. To guarantee free navigation on the river, the Congress founded the still-existing Central Commission for Navigation on the Rhine (CCNR). Rivalry between its then two most important members – Prussia and the United Netherlands – threatened this organization, but when Prussia became dominant from the 1830s onwards, liberalization was achieved. This was not, however, enough in this period, as Rhine navigation had to compete with another mode of transport, the railways. As a result, to keep barging intact, the complete normalization – the common term for canalization – of the Rhine was required. It was only after that, that the Rhine could be used for transport on a scale that made it possible to compete with rail transport. This article concerns the question of why the governments along the Rhine invested the enormous amount of money required to normalize the river and the role the CCNR played in this.

1. Introduction

In the 19th century, the Central Commission for Navigation on the Rhine (CCNR) evolved into a supranational agency that liberalized Rhine navigation and stimulated canalization. The CCNR created opportunities for inland navigation in a period when everywhere else railroads became dominant. The resulting low freight rates in the Northwest European transport markets improved the competitiveness of German industry along the
Rhine, Ruhr and Main rivers and strengthened the Port of Rotterdam in its competition with the Antwerp and German ports.¹ The question that arises concerns how it is possible that a supranational agency became so influential in the century of the nation state. According to Luuk van Middelaar, it is essential for such an organization that sovereignty is handed over by introducing majority decisions. This will prop up the new state formation, which will act as a check on the anarchistic character of international politics.² As majority decisions were only accepted on administrative topics within the CCNR, it failed as a supranational organization according to van Middelaar’s thinking. Robert Keohane, however, writes that there is no place for supranational institutions in a Realist world. The question of why they exist is ‘unanswerable if institutions were seen as opposed to, or above the state, but not if they were viewed as devices to help states accomplish their objectives.’³ Power struggles dominate international relations, but supranational agencies create ‘the capability for states to cooperate in mutually beneficial ways’, thus ‘reducing the costs of making and enforcing agreements.’⁴ They are therefore not a step towards new state formation, but tools with which to: make international politics more efficient, and economize on transaction costs. Supranational organizations do not change the division of power, but the decision-making process. As the member states need these organizations, they are bound by their regulations. This changes the process of international relations and thus its outcomes.⁵

The question here concerns which theory best explains why, in a period when nationalism seemed to be prevailing, the CCNR became influential. Accordingly, whether the member states tried to diminish political insecurity by handing over authority must be considered. If they did, weak, fearful members should be supporters of this organization. If, however, the CCNR was fortified by the more powerful member states, it should be regarded as an instrument with which to rationalize the decision-making process in international relations. As the CCNR archives on the period are lost, it is only possible to consider these issues by examining earlier publi-

cations, newspapers and published documents. The first century of the CCNR can be divided into three periods: the first, lasting until 1830, which was characterized by rivalry and a struggle for power, ended with the Act of Mainz (1831); the second, from 1831-1871, was defined by a growing Prussian influence and great efforts to liberalize the river from protectionist regulations and natural obstacles with German unification; and the third, from 1871-1914, was characterized by harmonic relations under German/Prussian dominance with the Great War.

2. Rhine shipping before 1815

If we are to understand why the CCNR was founded, the pre-1815 problems of Rhine shipping must be understood. Ever since the Peace of Westphalia (1648), German princes and city-states – the former always needing money, the latter claiming preferences – increased their autonomy. Consequently, taxation, regulation and discrimination broke up the most important inland transport route in Europe. Tolls, local regulations, discrimination and staples undermined traffic. In Cologne and Mainz, it was compulsory to sell all cargo sailing the river and use barges of local guilds on the next track. The legal basis for such obstacles and tolls was disputable, but the Reich was too weak to prohibit them. Every few years, the electors of the Rhine Valley – the bishops of Trier, Mainz and Cologne and the Count Palatine – sent representatives to a barging chapter – Schiffahrtskapitel – to discuss these problems. They could not resolve them, however, if only because they were just as greedy as their lower-ranked colleagues. Some contemporaries blamed Bremen, as using barges along the Weser and, from there, carts to Cologne, was cheaper than barging from Amsterdam or Dordrecht. The success of such inefficient routes was only explainable by taxes and obstructions. As a result, liberalizing Rhine shipping was already a topic at the Peace of Westphalia (1648), Rijswijk (1697) and Bas-

8 Gothein, Zollkongresse (1895), 363.
tadt-Baden (1714), but local interests counterbalanced good intentions. In 1699, in a conference of all the riparian states, liberalizing barge traffic again proved to be impossible, as tolls were a major source of income for many of them.\(^9\) Returning transport to the Rhine again by also introducing road tolls failed as well, as there were too many alternative routes. In any event, such tolls increased freight rates even more. As a consequence, horse-drawn carts not only became 15-35% cheaper than barging, but Rhineland products lost their competitiveness and French wine displaced its Rhine counterpart, to give just one example.\(^10\) Barge traffic continued, but according to Dutch sources, only 60 barges a year crossed the border in the upstream direction in the late 18th century.\(^11\) This is probably incorrect because, according to German sources, 1,300 Dutch ships were active in the lower Rhine area, sending colonial products worth 100 million guilders to Cologne annually. As total Dutch exports were worth over 100 million from only the mid-19th century onwards, this seems to be an exaggeration. As some contemporaries have written, very little is known about Rhine shipping in this period. It is a fact, however, that it faced many obstacles, but never completely collapsed.\(^12\) Indeed, the situation only changed after the French Revolution.

According to the 1792 verdict of the revolutionary Conseil Exécutif, any obstruction of trade was against natural law. Consequently, after the 1794 conquest of the left bank, diplomats from revolutionary France begged for the liberalization of barge traffic. After the 1802 collapse of the Second Coalition, Paris used its power to realize these principles and, in 1804, the waning German Empire was forced to accept a charter that handed authority over Rhine navigation to a General Director with supranational influence. This General Director would collect a new tax that replaced all tolls between the Swiss and Dutch borders.\(^13\) Eliminating the staples in the now French-ruled cities of Mainz and Cologne was out of the question, however, as that would result in serious opposition. More-

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9 Wolterbeek, Proeve (1854), 15-16, 25; Elix, Echte stukken (1826), xi-xiii; Gothein, Zollkongresse (1895), passim.
10 Gothein, Zollkongresse (1895), 372-373.
11 Elix, Echte stukken (1826), xiii-xiv.
12 CBS, Tijdreksen (2001), 48; Wolterbeek, Proeve (1854), 52; Gothein, Zollkongresse (1895), passim.
13 Gothein, Zollkongresse (1895), 25-26; Schawacht, Schiffahrt (1973), 17-18; Meidinger, Ströme (1861), 3; Haak/Savornin Lohman, Procederen (2008), 3f.
over, Paris did not want to support the Dutch ports. Indeed, new French canals dug in Northern France and recently acquired Belgian territories were intended to circumvent the Netherlands. As a result, shipping duties were two and half times as high between the Dutch border and Cologne as on the upper-Rhine tracks. Moreover, as the staples survived as Stations de navigation, Dutch barging was limited to Cologne. There, it was no longer compulsory to sell, but it was to still tranship, all the cargo sailing on the river, thereby splitting the Rhine into a collective German-French track as well as a Dutch version.\textsuperscript{14} Nonetheless, shipping became cheaper. After Napoleon’s absorption of the Netherlands, a lower tax also replaced the tolls on the track to the sea in 1811.\textsuperscript{15} Nonetheless, times were hard for barging, as the Continental System undermined overseas contacts.\textsuperscript{16}

According to the 1804 charter, the river was a common French-German waterway. Barging was regulated by a supranational organization, and an international court dispensed justice in cases of conflict.\textsuperscript{17} In 1815, after Bonaparte’s collapse, the banks of the Rhine were again split between eight sovereign states, and it was feared that old obstacles would return. The Vienna Congress, however, attempted to protect the liberal principles of the 1804 charter. Accordingly, the CCNR was expected to regulate navigation without discrimination, keep tolls low and guarantee that the riparian states would maintain tow paths and channels in a good condition. Two hundred years later, the CCNR’s objectives are somewhat similar: it must uphold free navigation without discrimination and monitor uniform technical regulations.\textsuperscript{18} In 1815, however, the member states – Bayern, France, Nassau, Baden, the Grand-Duchy of Hesse, Prussia and the Netherlands – feared for their sovereignty or needed Rhine tolls to balance their budgets. Consequently, it took some time before these principles were accepted.\textsuperscript{19}

\textsuperscript{14} Wolterbeek, Proeve (1854), 39-41; Soénius, Selbstverwaltung (2009), 152f.
\textsuperscript{15} 4 Oktroivertrag, 25 augustus 1804, 15 August 1804; 7.2. Februar, 11. Mai 1805; Meidinger, Ströme (1861), 3.
\textsuperscript{16} Hashagen, Rheinlande (1917), 30; According to Spaulding, shipping flourished in Düsseldorf however; see Spaulding, Patterns (2013).
\textsuperscript{17} Thiemeyer/Tölle, Supranationalität (2011), 180f.
\textsuperscript{19} There were two Hesses: the Grand-Duchy, also referred to as Hesse-Darmstadt, and the electorate, also known as Hesse-Kassel. Only the Grand-Duchy was a Rhine state, while Hesse-Kassel bordered the Main, not the Rhine.
3. The long way to Mainz (1815-1831)

In 1813, just after his arrival in the country, the Sovereign Prince (later King) of the Netherlands, William I, re-introduced all pre-1811 tolls. To prevent a general return to a regime modified by minor princes and local interests, the 1814 Paris Peace Treaty ordered that barging should be free from where the river became navigable to the sea. Taxation should also be limited to the costs of maintaining channels and tow paths. The Vienna Congress was to decide how to implement these principles. As a result, the Congress Commission for Free River Navigation invited all Rhine states to participate. In the same period, the Congress gave Westphalia and Rhineland to Prussia. At the time, this seemed to be more of a burden, as these territories were not only Catholic and strongly influenced by revolutionary ideas, but also made Prussia a buffer against France. It was only when industry crystallized around its coal-fields that the new provinces proved to be major booty. A few days after these decisions were made, the River Commission terminated the staples of Mainz and Cologne. Prussia accepted this and similar regulations on the Moselle without worrying about the interests of its new citizens. Württemberg did the same on the Neckar, while the Netherlands promised not to increase tolls until an agreement was signed. Liberalism thus seemed to be in the air, but the Dutch King was not serious about this, and Berlin soon sidelined reformers like Wilhelm von Humboldt (who played a major role in the Commission).

In Vienna, Dutch diplomats had already emphasized that their King only regarded the Lek, which was the least navigable of the Dutch Rhine branches, as an affluent of this river. In the delta, where the Rhine and Meuse flow together and split up again, it is difficult to determine which branch is part of which river, but the Waal was always considered to be part of the Rhine. According to an 18th century treaty, hydraulic works

22 42, Akten der Wiener Flußkommission, 23. Februar 1815, Rheinurkunden I, 51.
23 Ibidem 24. und 28. Februar 1815, 52.
were expected to guarantee that it acquired two thirds of all Rhine water.\textsuperscript{24} After the split, the Lek lost another third to the IJssel and was barely navigable. Nonetheless, the King was obstinate, mainly in opposing the Congress when it came to reducing his sovereignty.\textsuperscript{25} As this sovereignty was primarily based on the Congress’s decisions, it was difficult to protest while it lasted, although he found an ally in the Count of Nassau, who needed a free hand in Rhine matters because a significant part of his budget came from tolls. In Vienna, the two tried to limit the damage, thereafter undermining unwelcome decisions by pettifogger discussions and chicanery. As a consequence, Dutch diplomats claimed that: the Lek was the only extension of the Rhine; and the articles stating that navigation should be free du point ou il déviant navigable jusqu’ à la mer (from the point where it became navigable until the sea) meant ‘to’ and not ‘into’ the sea. The King claimed a free hand and raised transit taxes from where the tide was measurable, which was quite some distance from the sea.\textsuperscript{26}

As the Dutch King pretended to be a liberal and Prussian reformers were still influential, it seemed that only some minor points still needed to be discussed. The Congress therefore established a Central Commission, with its mission being to resolve these issues before starting its controlling duties. To guarantee that the tow paths were maintained, Prussia supported France when it proposed introducing majority decisions and giving the CCNR supranational authority in matters of navigation. As this would also strengthen the positions of these major powers, the Netherlands and Bavaria, as well as the non-Rhine state members of the River Commission – Britain and Austria – hesitated, while the smaller Rhine states opposed the idea. As a consequence, the CCNR just became a diplomatic council, meeting once a year to organize a police regime and control the freedom of navigation and the maintenance of the tow paths.\textsuperscript{27} Initially, it was expected to resolve some remaining constitutional issues, although this was not considered to be a problem.\textsuperscript{28} In fact, rivalry between the United Netherlands – a combination of Belgium, the Netherlands and Luxem-

\textsuperscript{26} Nusteling, \textit{Rijnvaart} (1974), 1-5.
\textsuperscript{28} Wolterbeek, Proeve (1854), 58-60; Götz, \textit{Epilogue} (2009), 252; Spaulding, \textit{France} (2011), 220f.
bourg – and Prussia blocked an agreement until 1831. Officially, Luxembourg – the present Grand-Duchy and the Belgian province together – was independent, but as the Dutch King was its Grand-Duke and it was ruled as a Dutch province, and because the King’s will was decisive in both countries, this seemed to be academic. As part of the German Confederation, Luxembourg even gave the Dutch King a significant position within that Bund.\textsuperscript{29} With this arrangement, Britain’s foreign secretary, Lord Castlereagh, hoped to encourage Prussia and the Netherlands to cooperate and form a bloc against the still potentially dangerous France. As, however, Castlereagh’s military advisor, the Duke of Wellington, was pessimistic about Dutch military skills, it was decided that the strategic Luxembourg citadel should be a German stronghold manned by federal, i.e. Prussian, soldiers.\textsuperscript{30}

With 30 million inhabitants, France was larger than Prussia or the Netherlands, but for the former the Rhine was a border river. Improving its navigability was not in France’s interests, as it would reduce the competitiveness of transport from Le Havre to Southern Germany. In any event, France was beaten, and the rest of Europe was alert to any signs of new French ambitions. As a consequence, Prussia, with over 10 million inhabitants, hoped to become dominant in the region, although the Dutch King had similar aims. His Kingdom only had 5.5 million inhabitants, but it regained most of its pre-1795 colonies, was wealthier than Prussia and, as a local power, was not involved in all the conflicts in Europe. In Vienna, the two Kingdoms strengthened their position, but were disappointed, nonetheless. Berlin had hoped to acquire the Netherlands, but this was unacceptable for Castlereagh, who did not want any North Sea ports in Prussian hands. Accordingly, Berlin claimed the East Meuse bank in order to get a direct connection to France for the trade of its new territories, but this also went to the Dutch. Notwithstanding these successes, the Dutch King was dissatisfied, as he had hoped to obtain all the territory west of the Rhine and north of the Moselle, including Cologne. The two countries therefore waited for an opportunity to correct the Congress’s decisions.\textsuperscript{31}

\textsuperscript{29} Deutsche Bundesakte vom 8. Juni 1815.
In May 1815, Prussia’s finance minister, Count Hans von Bülow, thought that a trade-agreement with the Netherlands was necessary, as Dutch transit taxes would otherwise destroy the exports to France that had already suffered greatly due to British competition after the end of the Continental System. By making the abolition of compulsory transhipment in Cologne (as agreed in Vienna) dependent on new Dutch concessions, the Netherlands would be hard-pressed, and so von Bülow wrote to Chancellor von Hardenberg. As Bonaparte was on the loose again, Berlin could even make use of the Dutch need for Prussian protection. After Waterloo, von Bülow complained that a trade agreement would expire, giving the Dutch a free hand to raise transit taxes. He, therefore, proposed using the soldiers hunting the last Napoleonic troops to pressure the Dutch into accepting a territorial swap.

In Dutch Court circles, it was understood that Berlin considered them to be an obstacle, isolating Prussia from the sea. In 1829, a court official therefore expressed the fear that an energetic Prussian King, accepting that the Belgian provinces would fall into French and the colonies into British hands, would conquer the Netherlands to give the Hohenzollerns everything they always wanted: capital, trade, shipping and a stable border. More limited ambitions involving Luxembourg and the Eastern Meuse bank were also feared, but the Dutch King had other goals. As Prussia was involved in all the conflicts in Europe, it could get into trouble easily, giving the Netherlands an opportunity to get rid of the Luxembourg regime, obtain free Rhine navigation, and possibly even absorb all the territories west of the river. Prussia and the Netherlands wanted to improve their position, and tensions increased, as both claimed that their neighbour dishonestly refused to implement the Vienna decisions.

Soon after the Vienna Congress, most Rhine states were unsure whether the Congress’s decisions implied that navigation should be free into the sea. As a result, Berlin asked its member on the River Commission, Wil-
helm von Humboldt, to discuss this with his British colleague, Lord Clancarty. Just like the lawyers of the Cologne Chamber of Commerce, these men regarded the Vienna articles as an extension of the 1804 charter to Dutch territory, meaning that its range was limited to the river itself.\textsuperscript{35} It should be understood, however, that by this time Clancarty was an ambassador in the Netherlands, where it was his mission to supervise and support the new Kingdom.\textsuperscript{36} In any event, Berlin did not initially attempt to get rid of the transit taxes, but only demanded a reduction in their level. As the conflict was not a juridical dispute, but a struggle for power, and because Cologne was no longer the economic centre of a tiny Prince-Bishopry, but the prime trading centre of a major power, the question was not who was right, but who would succeed. In addition to free shipping into the sea, Prussia demanded the regulation of coastal shipping and fishing and a trade agreement. It was only when the Dutch government emphasized that it did not want to discuss all of this within the CCNR context that Berlin claimed that transit taxes would be contrary to the Vienna principles.\textsuperscript{37} Accordingly, the Dutch King invited his brother-in-law to send a diplomatic mission to discuss the problems bilaterally. This was accepted, and a diplomat was appointed, although he never turned up. Berlin found that it had something to offer with respect to Rhine matters, but was empty-handed in trade negotiations. As it did not accept being outmanoeuvred, it simply refused to implement the Vienna agreements for as long as the Dutch levied transit taxes.\textsuperscript{38}

Prussia hoped to use the remains of the Cologne staple again in future negotiations, while the Dutch raised transit taxes. Conflicts concentrated on Rhine matters, but they were in fact a struggle for power in which Prussia seemed to be stronger, while the Dutch were the champions of the smaller Rhine states. As is normal in such a struggle, both parties avoided making concessions, as it was difficult to calculate whether these would result in an unfavourable change in power relations. The two governments did not hesitate in undermining earlier agreements and were supported by

\begin{itemize}
\item Koch, \textit{Koning Willem III} (2013), 228-230; Sas, \textit{Bondgenoot} (1985), 44.
\end{itemize}
interest groups who thought they were right and their rival was being deceptive. After 1813, Dutch nationalists, as well as the King, hoped to revive staple markets, making the Netherlands a centre of trade again. The Amsterdam and Rotterdam lobbies demanded that the government not give in to ideas on free trade. Transit using Dutch ports and rivers, but not involving merchants or financiers, should be checked. As prohibition was out of the question, because it would violate the Vienna agreement and cause serious conflict with Britain (whose industry needed the Rhine for its exports to Germany), transit was taxed, increasing transport costs on the Dutch Rhine far above the level on comparable Prussian tracks. The late-19th century historian Heinrich von Treitschke, who thought that all the problems of Rhine navigation resulted from the greed of Dutch shopkeepers, exaggeratedly claimed that these costs were 13 times as high. Whatever its consequences, the Dutch policy was in vain, as German trade had not really needed Dutch merchants since the 18th century, because agents could do the job instead. Taxes could not prevent this. In Rhineland and Westphalia, transit taxes were therefore seen as an old-fashion instrument for supporting privileged groups. Treitschke believed that this was the cause of the CCNR’s failure to act, but Prussian chicanery was just as obstructive.

In a similar way to their Dutch colleagues, Cologne businessmen encouraged their government to not give in. As long as the Congress’s decisions were not implemented, Cologne’s staple obstructed Dutch Rhine shipping beyond that city, while the high Napoleonic taxes on barging between Cologne and the Dutch border undermined its competitiveness on that track. Cologne businessmen were convinced that Dutch chicanery undermined their right to free access to the sea, and Prussia would be empty-handed in negotiations if it implemented the Congress’s decisions. As a result, nothing would change as long as the Rhine states failed to settle their disputes. Moreover, Cologne barge-boatmen claimed protection and a

41 The complete quote gives an impression that very much exaggerated the reality of the situation. Treitschke, *Deutsche Geschichte* (1885), 470; Berger, *Harkort* (1891), 228.
monopoly on the track to Mainz. The Cologne Chamber of Commerce kept these interests in line by blaming the Dutch for everything and encouraging anti-Dutch sentiments. In the 1820s, this inspired the Westphalian parliament to propose a canal to the German coast, circumventing the Dutch ports in a way that was similar to what the French had tried to do. Nothing would come from this, but Cologne’s businessmen rightly thought that it was only by breaking the Dutch monopoly that trade could be liberalized. Railways seemed to be an option, but it was only in the 1840s that the Netherlands was circumvented by rail. Until then, taxes and staples remained. Consequently, Rhine freight rates were high and, as in the ancien regime, road transport came into use again as an alternative.

In the Dutch-Prussian conflicts, most Rhine states backed the Netherlands, not only because of the staple, but also because Prussia was feared. A compromise was only reached in 1829, but because of the 1830 Belgian revolt, its implementation was delayed. From a Rhineland perspective, this revolt seemed to be a solution, and liberal Cologne circles around David Hansemann even proposed a Prussian-Belgian customs union. Berlin feared, however, that an independent Belgium would be easy prey for France. Moreover, Antwerp only had an indirect connection with Cologne over Dutch territory that could not be used as long as The Hague considered Belgium to be a rebellious nation. In the Dutch press, Belgian railway plans were feared, however, as Belgian railway construction was not a spontaneous process, but a well-planned instrument in strategic nation building. In Cologne liberal circles, a railway to Antwerp was considered to be an effective step against the Dutch monopoly. It was therefore a

47 39, Maandbericht over Juli 1821 van de Handelskamer te Keulen, 1821, Augustus 2. Posthumus III, 49.
48 Gerloff, *Grundlinien* (1918), 159-161.
major triumph when this opened in 1843, but when negotiations had come to a halt in the 1820s, the Dutch were still able to refuse free access to the sea. Now, hatred of the Netherlands became so entrenched that, according to some, only King Frederic-William III prevented war. It was stated that the Prussian sovereign did not want to open hostilities with his brother-in-law, but this is not convincing; inbreeding in royal families seldom prevented armed conflicts.50

As, contrary to the agreement, Prussia refused to abolish compulsory transhipment or monopolies, the other riparian states felt victimized, and Baden, Bayern and Nassau moved to the Dutch side.51 In 1822, to win them back, Berlin sent a proposal for a treaty to the CCNR, but this only repeated the demand for a package deal and claimed that the river should be free from where it became navigable into the sea.52 This recycling of already rejected proposals was unacceptable, and now even France started to favour the Dutch, albeit probably only because it considered this to be the best way to obstruct any agreement.53 Prussia therefore tried to exploit its international contacts and asked the non-riparian members of the Vienna River Commission to explain to the Dutch King that his policy was unacceptable. Britain’s foreign secretary, George Canning, immediately explained to the Dutch envoy that some transit taxes were against British interests. After this was settled, though, Whitehall lost interest and advised the Dutch to ‘adopt measures in relation to the navigation on the Rhine in concert with other powers bordering on that river, which may have the effect of carrying into execution the treaty of Vienna on this subject.’54 Strengthening Prussia was not in British interests and in 1825, when Berlin asked for its support again, London did not react.55

As the two countries had opposing ambitions, and because both could block an agreement, implementing the liberal Vienna principles seemed

50 Berger, Harkort (1891), 228. 
51 Stuart, Jaarboek (1823), 66-70. 
53 Van Eysinga, Geschichte (1994), 32; According to others, France already did so in 1818. Stuart, Jaarboek 1818, 66-70. 
further away than ever. Berlin wanted to keep the Dutch under pressure, although the other Rhine states agreed that transit taxes were not their jurisdiction and insisted that Berlin and Darmstadt should terminate compulsory transhipment in Cologne and Mainz. Hesse used the situation to prolong its staple, hoping to develop Mainz into a major Rhine port. The Netherlands and Prussia had serious disputes, and there were very few attempts to resolve them. Indeed, discussions came to a halt for years and delegations never met. In fact, between 1825 and 1829, no Prussian commissioner attended the CCNR meetings. The Prussian King even demanded that the CCNR terminate all its activities. Although the other Rhine states continued to meet, the attempt to rescue the Napoleonic Rhine policy seemed to have failed. Consequently, Nassau and Bayern raised their tolls in 1828. According to the Vienna agreement, tolls should be spread more evenly to correct the Napoleonic anti-Dutch policy; along the Prussian lower Rhine, they should be lowered, while they could be raised elsewhere. As a result, Nassau and Bayern were allowed to increase their tolls, but Prussia was first expected to lower them, as tolls overall were not to be raised. Berlin, nevertheless, refused to implement the Vienna agreements, and Nassau and Bayern increased the costs of barging to the advantage of land transport. In reaction, Prussia threatened to check all ships sailing the river, which was in conflict with the principle that the Rhine did not fall under any national jurisdiction.

As long as the Dutch and Prussians feared that every concession could strengthen their rival’s position, the problems seemed to be insurmountable. Negotiations only started in 1828, but at that time the two parties were still more or less equals. In 1829, however, when a Prussian-Hessian customs union was founded, Prussia became so much stronger that concessions in Rhine matters could no longer change this. As a consequence, the courts agreed in 1829 to send a common proposal to the CC-

59 Algemeen Handelsblad, 9-7-1828; Ibidem, 7-2-1829.
60 ’s Gravenhaagsche Courant, 31-07-1826, Dag.
61 Angelow, Der Deutsche Bund (2003), 63.
NR that became the Rhine Act of Mainz of 1831. This limited Dutch transit levies and transferred them in a droit fixe, lowered tolls, terminated monopolies and the remains of the staples of Mainz and Cologne, and recognized the Waal as part of the Rhine.\textsuperscript{62} Furthermore, the CCNR’s position was strengthened, as it got the task of initiating improvements in navigation whenever there were opportunities to do so. As the new freedoms were not limited to certain types of ship, these principles had enormous implications.\textsuperscript{63} As long as the Netherlands and Prussia were struggling for regional dominance, the CCNR seemed to be a complete failure. Immediately thereafter, however, when it was clear that Prussia was the most powerful Rhine state, the position of the CCNR was strengthened.

4. \textit{Steam power and railways, 1831-1866}

In June 1816, newspapers contained sensational articles on a ship without sails or masts moving on the Rhine at an unprecedented speed.\textsuperscript{64} Steam boats increased competition on the river from the 1820s onwards, especially when, by tugging barges, steamers entered the market for good transport.\textsuperscript{65} Prior to the introduction of steam, a trip from Rotterdam to Cologne (200 km; 125 miles) took 10-20 days, while a barge tugged by a steamer took only three to five days. The main problem with the former mode of transport was that towing-horses were often unavailable at the border. Accordingly, to remain competitive, Rotterdam’s boatmen reorganized the horse-stations, reducing the journey time to five to six days, although on the Middle- and Upper-Rhine the boatmen were less shrewd and had to retire or ask for protection. During the 1848 revolution, boatmen, line-riders (horsemen towing boats) and owners of pubs near horse-stations even shot rifles at steamers and tried to obtain army canons.\textsuperscript{66} In reaction, a proposal was discussed within the CCNR to refuse to award

\textsuperscript{62} Wolterbeek, \textit{Proeve} (1854), 86-87; Meidinger, \textit{Ströme} (1861), 3-4.
\textsuperscript{63} Wolterbeek, \textit{Proeve} (1854), 102-103.
\textsuperscript{64} Schawacht, \textit{Schiffahrt} (1973), 133.
\textsuperscript{65} Weber-Brosamer, \textit{Weltordnung} (2007), 94.
\textsuperscript{66} Weber-Brosamer, \textit{Weltordnung} (2007), 101ff.; 204, De Kommissaris bij de Centrale Kommissie voor de Rijnvaart Travers aan de Minister van Buitenlandse Zaken Schimmelpennick, 6 april 1848, Rijksgeschiedkundige Publicatiën (RGP), Bescheiden betreffende de Buitenlandse Politiek van Nederland, 1948-1919, 1.1. 1848 – GS 139 (The Hague 1972); 205, Ibidem 3 mei 1848, idem 141.
After the 1843 opening of the Cologne-Antwerp railway, Belgian competition made it clear that railways were the main threat to barging. Nonetheless, for Dutch ports without rail connections to the hinterland, steam-tugged barges seemed to be their only hope.

Current, wind or muscle power has been used for traction ever since Roman times. As the wind was not strong enough for upstream traffic along major parts of the Rhine, the size of barges was limited by the strength of a horse. It was only in the lower Rhine regions, where the current was not fast and the wind relatively strong, that larger ships were in use, but there were circa 3,000 towing-horses exploited along the Rhine in the mid-1800s. A strong horse on a well-kept path could tow a ship of 50 metric tons, cargo included. Compared with road transport, this was enormous; a horse on a well-paved road could pull only 1.5 tons. Nonetheless, barges were small, and could not increase in size before the link between their size and the strength of a horse was cut. This was not enough, however. The channel also needed to be adapted to larger and deeper barges. That this was achieved is unique; almost everywhere else, railways became dominant. This had enormous consequences, as the companies that owned the railways did not allow others to use them, thereby creating monopolistic transport markets. Waterways, however, are state-owned, for general use and thus encourage competition. In the mid-19th century, railways had a scale advantage and were cheaper because they could reach final destinations more easily. Transporters could thus economize on transhipment. Barging therefore needed large price advantages per ton/km to compete with railways. This became possible when the Rhine became navigable for large-scale trains of barges towed by steam tugboats. The CCNR got the task of promoting and supervising the adaptation of the infrastructure that would cause the costs of Rhine shipping to nose-dive by 75% between 1890 and 1914. In that same period, Dutch rail freight costs increased, those in Germany fell a little, and the general price level was

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67 Leydse Courant, 11-08-1848, Dag.
68 398, Minister van Buitenlandse Zaken Bentinck aan de Kommissaris bij de Centrale Kommissie voor de Rijnvaart Travers, 8 Augustus 1848, in: RGP, Bescheiden betreffende de Buitenlandse Politiek, 1.1. 1848 – GS 139, 387; 399, Ibidem, 8 Augustus 1848, Idem 388.
69 Meidinger, Ströme (1861), 73.
70 Kurs, Schiffahrtsstraßen (1895), 664.
more or less stable. In the entire 1860-1913 period, Dutch rail freight costs fell by 17%, while those of Germany and the Rhine decreased by 55% and 82%, respectively.  

Steaming was used in Rhine shipping even before the Act of Mainz, but it was only when railways were introduced in the region that barging was completely transformed. Developments took place when the 1843 opening of the Cologne-Antwerp railway destroyed the monopolistic position of the Rhine and Dutch ports. Indeed, between 1840 and 1860, the number of German railways multiplied 30 times and the extent of rail transport over 500 times, while the costs per ton/km fell by 56%. Railways now became the prime mode of inland transport, but this had unforeseen implications. One of these was that trains need stable bridges. Up to the mid-19th century, downstream from the medieval bridge in Basel, the Rhine could only be crossed by ferries or pontoon bridges. In the 1850s, Prussia started to build a railway bridge, the Dombrücke, just behind Cologne Cathedral. As this was an initiative of a rail company, the design threatened navigation, leading to protests by boatmen, steamer companies, chambers of commerce and most other Rhine states. Accordingly, an extra CCNR meeting was held in 1858. Some opponents of the bridge went to the German Confederation, but as this Bund could not bind the non-German Rhine states, it was decided that it had no jurisdiction over Rhine matters. As a result, a CCNR technical commission was asked to adapt the design of the bridge, but this did not produce a solution. Prussia, however, offered to raise the roadway by five feet (1.57 metres) and compensate the boatmen who had to adapt their barges. Clearly, in the late 1850s, keeping the CCNR together was a major Prussian interest. As building activities on other railways crossing the Rhine or Moselle had started already, many other bridges were needed. Until 1875, each was discussed within the

74 Middelburgsche courant, 19-01-1858, Dag.
75 Notizen über die neue Rhein-Brücke bei Köln zusammengestellt aus den Geschäftsberichten der Director der Köln-Mindener Eisenbahn-Gesellschaft und andere veröffentlichten Berichten (Köln 1859), 3-17; Opregte Haarlemsche Courant, 31-03-1958, Dag; Ibidem, 08-04-1858.
CCNR. CCNR permission then took on the character of a building licence.\textsuperscript{76}

Competition by railways motivated the CCNR to adapt the river to steam-shipping from the 1850s onwards. This led to a revolution in hydraulic engineering. Traditionally, this focused on protecting river banks from floods, and was considered to be a task for individual Rhine states. The CCNR only mediated if there were conflicts about tow paths. Traditional barges were small, and did not need deep channels, but it was practical when it was wide enough to tack. As steamers and steam-tugged barges were large and deep, wide and shallow tracks needed to be transformed into deep and narrow channels. As trains of steam-tugged barges were altogether 400 metres long at the end of the century, the track also needed to be straightened. This required enormous investment, but it became clear from the 1840s onwards that this was the only chance to survive. In the Netherlands, rail transport from Germany to Antwerp caused some panic, as it grew much faster than Rhine transport, while Dutch ports had no rail connections. The Hague therefore did everything it could to improve the competitiveness of barging and offered to terminate shipping rights and transit taxes. It also demanded railway connections with Germany.\textsuperscript{77} In 1847, the Dutch government even proposed removing all tolls.\textsuperscript{78} Under the pressure of competition, The Hague became liberal, but the Germans were not now in a hurry. In order to defend its position in 1851, the Dutch even unilaterally removed all tolls and taxes, but this had little impact.\textsuperscript{79} Barging seemed to be doomed and, in 1853, traders, boatmen and steamship companies together sent petitions to the CCNR asking it to speed up the liberalization of Rhine transport.\textsuperscript{80} Most Rhine states were in favour of liberalization, but Hesse and Nassau needed their tolls.\textsuperscript{81} In the 1860s, shipping and insurance companies, interested individuals and representatives of chambers of commerce from all Rhine states met to

\begin{thebibliography}{99}
\bibitem{OverijsselscheCourant} Overijsselsche Courant, 18-10-1844, Dag; Algemeen Handelsblad, 10-3-1845, Dag; Handelingen van de Tweede Kamer der Staten-Generaal 1844-1845, 30 april 1845.
\bibitem{AlgemeenHandelsblad} Algemeen Handelsblad, 30-8-1847.
\bibitem{Klemann} Klemann, \textit{Vlissingen als haven} (2012), 27-47, 27-29; Dagblad van Zuidholland en ’s Gravenhage, 9-10-1861, Dag; Opregte Haarlemsche Courant, 26-04-1852, Dag.
\bibitem{DeGrondwet} De Grondwet, 04-10-1853, Dag; Nieuwe Rotterdamsche Courant, 30-05-1856, Dag.
\bibitem{OpregteHaarlemscheCourant} Opregte Haarlemsche Courant, 24-12-1857, Dag.
\end{thebibliography}
form a committee to promote their interests.\textsuperscript{82} As Rhine politics became transnational, a transnational lobby organization was needed. At that time, the German Rhine states – by then all members of the Zollverein – also met, while the Prussian House of Representatives demanded that pressure be put on Nassau and Hesse. It was only in 1861 that tolls and levies were lowered.\textsuperscript{83} This was, however, too little, too late, and even the Dutch removing all tolls and duties was not enough;\textsuperscript{84} railways simply reduced their freight rates in response. Rhine shipping kept the transport markets competitive, but as this seemed doomed, it could not last.\textsuperscript{85} In the 1850s, however, the Prussian government became interested in Rhine shipping as a way to guarantee cheap and easy transport for its new industrial centres along the Ruhr and Rhine.

5. Canalization

People living on the banks of the Rhine had adapted the river to their needs since ancient times, but it was only in the 19th century that the river was transformed from a more or less natural waterway containing salmon and sturgeon, and full of sandbanks, rapids, meandering tracks, rocks, floating quicksand, and periods of ice and low water, into a canalized river adapted to the needs of barging. Protecting the banks remained important, but the primary target was to create a straight and deep channel.\textsuperscript{86} As a consequence, by the early 1900s, it became possible to use trains of four iron barges (together 400 metres in length) with a loading capacity of 6,000 tons and tugged by a steamer of 1,300-1,500 hp. Around the 1840s, when the first steam-tugged trains of barges emerged, steamers had a capacity of only 50-100 hp and its barges of 600 tons. In the same period, the coal consumption of barge trains fell by 66\% as a result of the great efficiency of iron barges, propellers, compound engines and tubular boil-

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\item\textsuperscript{82} Nieuw Amsterdamsch handels- en effectenblad, 14-06-1860, Dag; Nieuwe Rotterdamsche Courant, 21-07-1860, Dag.
\item\textsuperscript{83} ‘Economische Kronijk, 3 Junij.’ De Economist, 1860, 192; Nieuw Amsterdamsch handels- en effectenblad, 14-11-1860, Dag.
\item\textsuperscript{84} ‘Economische Kronijk, 20 Februarij.’ De Economist, 1861, 88-142.
\item\textsuperscript{85} Dagblad van Zuidholland en ’s Gravenhage, 09-10-1861, Dag.
\end{itemize}
\end{footnotesize}
ers. Speed more than doubled. As a consequence, barging could not cope with the demand for the enormous quantities of bulk transport generated by the industrial centres on the Rhine’s shores, but nevertheless became highly competitive. The CCNR also played a major role in transforming the river.

Even in the 1831 Act of Mainz, it was agreed that CCNR technicians would regularly examine navigability, although it never did this. Indeed, it was only in 1847 that the Prussian commissioner initiated an inspection just after Rhine shipping was wiped out on the Basel-Strasbourg track. He was fearful of the future and wanted to improve the river’s competitiveness. After the 1849 inspection, the commissioners of Prussia, Nassau and Hesse wrote a memo on the terrible condition of the Dutch track. In Germany, it was still generally believed that The Hague tried to limit its overseas contacts. In fact, as a result of the character of the delta, the amount of water in each Dutch Rhine branch was much less than on the German track, while the slow current and floating ice – winters were cold – caused sediment to settle and the bottom of the river to rise. It was only by raising the height of the dikes that water was kept out of the land, although this nonetheless produced water levels that were higher than the surrounding land whenever ice prevented a quick flow, causing massive floods. Canalizing projects in upper-Rhine regions only increased these problems. According to The Hague, the technical issues could not be solved, but Germany simply did not believe this. In fact, the channels of the Dutch river branches were in terrible shape. At certain points, the Waal – the main shipping route – was little more than a metre, while the Port of Rotterdam could only be reached from the sea side during high water. In some German states, the river was in a similar condition, but this was not the point that Prussia wanted to make. It needed a smooth channel from its developing industrial areas to the sea and demanded that the Dutch cooperate; for Berlin, it was unacceptable that, after its track was normalized, the river would end in a swamp. Accordingly, in 1850, the year after the inspection report, the Dutch minister Rudolf Thorbecke bowed his head.

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87 Clapp, *Rhine* (1911), 44.
and initiated the building of dikes and groins to limit the width and increase the depth of the rivers.\textsuperscript{93}

After 1849, the CCNR organized regular inspections, producing reports on how to improve navigability. In 1861, technicians from all Rhine states set uniform targets for the entire river. When the water was low (1.5 metres at the gauge of Cologne), the depth of the channel was expected to be: one and a half metres at least on the track from Strasbourg to Mannheim; two metres from Mannheim to Koblenz; two and half metres from Koblenz to Cologne; and, from there, three metres to the sea. As the Strasbourg-Mannheim track was ignored to keep France at arm’s length, when finished, large barges could sail from Rotterdam to Mannheim without any transhipment, obstacles or locks. Complicated engineering projects were needed to remove the remaining bottlenecks.\textsuperscript{94} Accordingly, a CCNR technical committee regularly controlled the steps taken by the member states responsible for execution. Prussia took the lead in this in 1851 by founding its \textit{Rheinstrombauverwaltung}, which was an agency to organize the engineering projects to transform the Rhine into an easily navigable waterway. From then on, it put pressure on the other Rhine states to normalize their tracks.\textsuperscript{95} Apart from the Netherlands, the problems were most severe in Nassau, which held the left bank of one of the most problematic tracks, near the Binger Loch; a granite mountain wall there left only a narrow passage. Prussia held the left bank. Removing this obstacle was a major problem. Everyone agreed that something should be done, but it was only in an 1856 special CCNR meeting that what this precisely was was agreed. A committee of engineers now had the authority to make decisions whenever new problems arose. As Prussia was the initiator of canalization, the CCNR, which supervised it, seemed to be the executor of the Prussian plan.\textsuperscript{96} Indeed, Prussia used this supranational agency to obtain what it needed in territories outside its jurisdiction, although the example of the Cologne railway bridge made clear that, for Berlin, the CCNR was so important that it was prepared to make concessions to keep it going.

\textsuperscript{93} Van Heezik, \textit{Strijd} (2007), 87ff.
\textsuperscript{94} Nasse, \textit{Schifffahrt} (1905), 32.
\textsuperscript{95} Nasse, \textit{Schifffahrt} (1905), 58; Van Heezik, \textit{Strijd} (2007), 22-35.
\textsuperscript{96} Van Eysinga, \textit{Geschichte der Zentralkommission} (1994), 81-84.
For both Prussia and the Netherlands, improving the Rhine was vital economically, but complex negotiations were needed to convince the smaller Rhine states to invest the giant sums required. They did not, however, have the money to do so and their interest in Rhine navigation was limited. In the case of Nassau, even Prussian pressure could not resolve the ongoing problems, as it needed its tolls and could not pay for its part of the project. In 1866, the situation changed completely, however, when Berlin used its military victory in the Austro-Prussian war to reorganize and liberalize navigation once and for all. Initially, it annexed Nassau, the Hesse electorate, Frankfurt and parts of the Grand-Duchy of Hesse. With Nassau, this destroyed a principality that had opposed centralization and the liberalization of navigation since the Vienna Congress. Prussia also used the peace negotiations to dictate a new Rhine regime to the other German Rhine states, which all fought on the Austrian side. They thus had to accept that navigation would become completely free and that the CC-NR would supervise normalization.97

The Dutch and French, who were not involved in the 1866 war, feared Berlin, because, as Thorbecke wrote ‘Prussia uses the new nationalistic principle, for conquests according to old traditional power politics’.98 Napoleon III wanted to be compensated for not supporting Austria, for instance by way of Bismarck giving France permission to annex Belgium, and he was unsatisfied with Bismarck’s offers. Rumours claimed that the Prussian Prime Minister and French Emperor discussed dividing the Low Countries, but it is possible that Bismarck spread such conjecture to give the minor powers the idea that they were dependent on his whims.99 In 1868, Prussia’s representative in the CCNR tried to persuade France and the Netherlands to accept the regulation of Rhine navigation, as agreed in the Peace of Prague. During the Mannheim negotiations that followed, fear ensued when The Hague refused to accept the fact that, in future, every Rhine state could control all of its hydraulic engineering activities related to Rhine water, as this would involve the Holland Water Line, giving Prussia information about this cornerstone of the Dutch defence system.

97 Schmitt, Prussia’s Last Fling (1975), passim.
98 Doedens, Nederland (1973), 18; Thorbecke, Briefwisseling (2002), 487.
99 The Times, 16 November 1866; Nieuwe Rotterdamsche Courant, 13-08-1866, Dag; Nieuwe Rotterdamsche Courant, 17-08-1866, Dag.
Furthermore, the foreign minister, Count Jules van Zuylen van Nyevelt, opposed the idea of extending CCNR police control to other waterways, as he feared that these would be executed by Prussia behind a CCNR mask. He therefore withdrew the delegation from the negotiations. As a result, Berlin mobilized the press, and more or less official Prussian newspapers suggested that the Netherlands had tried to cut off Germany’s access to the sea again in a by-the-way manner when discussing the need for an independent Dutch Kingdom in modern Europe. Just as during the Luxembourg crisis of 1867, Dutch newspapers were pessimistic about Prussia’s ambitions. The Hague, meanwhile, was intimidated. Indeed, the minister would be blamed in parliament for endangering Dutch independence. Bismarck’s known willingness to use force made the Netherlands accept Berlin’s demands, and this led to the Mannheim Convention of 1868. As Dutch panic seemed to be in Prussia’s interests, this was carefully manipulated.

In its first century, the CCNR had to deal with political rivalry, cumulating in Prussia’s absorption of Nassau in 1866 and French territories bordering the Rhine in 1871. Apart from this, it had to answer the problems raised by industrialization on the Rhine’s banks and the transformation of inland transport. Prussia and Germany dominated the Rhine from 1871 because, apart from the Netherlands, all CCNR members were part of the Prussian-dominated Kaiserreich. By then, its emotional period was over. The Netherlands and the German member states agreed on the need to canalize the river, remove obstacles and keep it free from tolls or taxes. In 1886, C. Bloys wrote in *De Economist*, a Dutch academic journal, that it had been the main target of the Rhine policy to get a straight, deep channel. As that project was almost complete, the author expected the river to become the prime transport route of one of the most important industrial areas in Europe. In upstream transport, iron ore and cereals were already dominant and, so Bloys thought, in the future coal would become an im-

100 Dagblad van Zuidholland en ’s Gravenhage, 30-8-1868.
101 Handelingen Tweede Kamer der Staten-Generaal 1868-1869, 5 Maart 1869, 973-975; Bredasche courant, 3-09-1868; Dagblad van Zuidholland en ’s Gravenhage, 30-8-1868.
102 Dagblad van Zuidholland en ’s-Gravenhage, 25-08-1868, Dag; Dagblad van Zuidholland en ’s-Gravenhage, 9-10-1861, Dag; Algemeen Handelsblad, 5-09-1868, Dag; Nieuwe Rotterdamsche Courant, 30-08-1868, Dag.
103 Handelingen Tweede Kamer der Staten Generaal, 1868-1869, 5 Maart 1869, 973-975.
portant return cargo, further increasing the competitiveness of barging.\textsuperscript{104} The target to deepen the Cologne-Rotterdam track to three metres, as decided in 1861, was almost achieved. In this regard, between 1852 and 1882, Prussia spent 20 million guilders and the Netherlands 35 million.\textsuperscript{105} After the Rhine was canalized, the scale of Rhine shipping could increase. Large Ruhr companies built fleets of steam-tugged iron barges, as they needed enormous quantities of ore, coal and wood, and often used the Dutch flag for fiscal reasons. As Rhine shipping became extremely cheap just before WWI, almost a quarter of all German trade (in tons) crossed the German-Dutch border on Rhine barges.\textsuperscript{106}

Rhine canalization and liberalization was successful, but opposed by some German interests, nonetheless. As long as the costs of rail transport per ton/km were 50-150\% higher than those of Rhine shipping, the railways could compensate for this by using other advantages. In 1883, however, the cost of German rail transport was suddenly 228\% higher; this figure was 452\% in 1901 and 659\% in 1913.\textsuperscript{107} As a result, in Prussian industrial centres along the river and its subsidiaries, it became cheaper to use overseas cereals than rye from Prussia’s eastern territories. Agrarian protectionism substantially raised food prices, but not enough to overcome the differences in price and transport costs between rye and wheat from Eastern Germany and cereals from the US or Ukraine.\textsuperscript{108} It became easy for nationalists to blame the Rhine. The ports of Hamburg, Bremen and Emmerich recognized a dangerous competitor in Rotterdam, and industries not connected to the river network complained that waterways were subsidized and railways taxed.\textsuperscript{109} Agriculture, railway, port and some industry lobbies demanded the reintroduction of tolls. A railway manager expressed the view that it was unfair to tax railways and subsidize waterways, as this improved the position of regions near waterways at the ex-

\textsuperscript{104} Bloys, \textit{Verkeerswegen} (1886), 1011-1032, 1018-1020.
\textsuperscript{105} 84a, Nota behorende bij de brief van Waterstaat, Handel en Nijverheid van 19 maart 1887, 38, Waterstaat A. RGP, Bescheiden betreffende de Buitenlandse Politiek, 2.4, 1886-1890 – GS 126, 119-120.
\textsuperscript{106} Klemann/Schenk, \textit{Competition} (2013), 841.
\textsuperscript{109} Rabius, \textit{Aachener Hütten-Aktien-Verein} (1906), 69-75; Wirminghaus, \textit{Wiedereinführung} (1905).
pense of unconnected regions. Similar arguments were used by a steel company in Aix-la-Chapelle that was confronted with rising transport costs, while the tax it paid was used to improve the facilities of its competitors.

The taxation of Rhine shipping was not just against the Act of Mannheim, but also the constitution of the Kaiserrreich, which stated that tolls on barging were only allowed when used to maintain the waterway. Taxes on Rhine barging were, however, against the interests of the most industrialized parts of Germany. Recent research shows that, by not paying for its infrastructure, Rhine shipping obtained indirect subsidies of circa 11%. After 1885, the tolls or levies needed to compensate for this would be negligible in comparison to the differences between rail and Rhine freight rates. It was not only indirect subsidies, but also the organizational activities of Prussia and the CCNR that made Rhine shipping competitive again. Even so, industries along the Rhine and Ruhr set up a lobby to oppose plans to reintroduce tolls. At the same time, the Netherlands demanded that Berlin should not forget its obligations and should keep the Rhine free. It was now economic interests and not power politics that dictated the situation. For Germany, Rhine transport, and with that the Netherlands, became so important that it even influenced high politics.

In 1902, a prominent Dutch politician concluded that, notwithstanding the aggressive tone in some nationalist circles, the Netherlands had nothing to fear from its dominant neighbour. An independent Netherlands was of more importance to Germany than an annexed country. His reasoning was comparable with that of Helmuth von Moltke who, in 1909, adapted the strategic plans of his predecessor as Chief of the General Staff, Alfred von Schlieffen, to attack France in the case of war through the Low Countries. Moltke thought that after Germany attacked Belgium, Britain would use the indignation of public opinion to enter the war. He therefore concluded that the Netherlands was safe from any British attacks, as this would be unacceptable to the British public if London, just after it entered

110 Mees, *Rijn* (1898); Algemeen Handelsblad, 5-11-1909, Avond; Algemeen Handelsblad, 8-11-1909.
114 Wirminghaus, *Wiedereinführung* (1905); N.N., *Progrès* (1900).
115 Nieuwsblad van Friesland: Hepkema’s Courant, 13-09-1902, Dag.
the war to save one small country, attacked another. Consequently, Moltke thought it was better to keep the Dutch out. In a one-to-one war, the Dutch army was no match for the Germans, but in a European war its modern fortifications would be a problem on its northwestern flank. Apart from strategic considerations, Moltke hoped that a neutral Netherlands would allow Germany to trade. The Netherlands ‘should become the windpipe we can breathe through.’ In 1909, when he wrote this, the major powers of Europe had just agreed the Declaration of London. It was the intention of this Declaration, which was never ratified by Britain, that in a time of war, apart from trading arms, international trade should continue as far as possible. It would only be by blockading an iminical port that a power was allowed to cut off the trade relations of the enemy under siege. As Rotterdam was a neutral port, Britain could not do that. For this reason, the German general hoped that, at least during the first period of war, Germany’s trade would continue as long as it used Rotterdam as its port. In 1913, the progressive-liberal German MP Georg Cothen made comparable remarks when he said that, as the Dutch provided Germany with all it needed from its overseas trade, the fact that it was not a part of Germany was not just not a problem, but was even favourable; in the case of war, it was better for its overseas trade to be organized by a neutral power. 

Such ideas were, however, rather general. In the summer of 1914, Reich Chancellor Theobald von Bethmann Holweg did not therefore hesitate in guaranteeing Dutch neutrality to the British ambassador, although he refused to do so for Belgium. In the pre-1914 years, English, but especially French and Belgian newspapers, wrote that the Dutch had become too dependent on Germany, and that its ports were so important to its dominant neighbour that the country would be the first target of German aggression. Apart from the propaganda element, this was an expression of fear of the growing German influence. Some British press publications opposed these ideas, however. The Times had actually already written in the late 19th century that, as Germany had got everything it could from the Dutch without interference, its neutrality was in its favour, as it guaranteed

116 Moeyes, Buiten schot (2001), 81.
117 Nieuwsblad van het Noorden, 09-05-1913, Dag.
119 The Times, March 10, 1903; Nieuws van den Dag, 15 Augustus 196; The Times, February, 1900.
the continuation of at least some of its trade.\footnote{The Times, January 31, 1882; The Times, 19 November 1891.} As a result, Germany would keep the Netherlands out of any European conflict, as the Dutch envoy in Berlin also concluded in 1907.\footnote{115, De Gezant te Berlijn Gevers aan Koningin Wilhemina, 19 November 1907, RGP, Bescheiden betreffende de Buitenlandse Politiek, 3.3, 1904-1907 – GS 106, 165-166; 116, De Gezant te Berlijn Gevers aan Minister van Buitenlandse Zaken Tets van Goudriaan, 19 November 1907, Idem 166-167.} Notwithstanding German nationalists making a great fuss over the Dutch not paying taxes for their defence by the German army, and despite their demand to press this nation of shopkeepers to fight for the side where its interests lay, the Dutch were kept out in 1914.\footnote{See, on such German nationalists: 23, 45, De Gezant te ’s-Gravenhage Pourtalès aan Rijkskanselier von Bülow, 18 maart 1902. RGP, Bescheiden betreffende de Buitenlandse Politiek, 3.6 1899-1914 – GS 128, 71 ff.} The Netherlands had little to fear from Germany militarily because, with free trade and cheap transport, it gave the Kaiserreich everything the Germans could demand. The Rhine Commission that organized and guaranteed free Rhine navigation, and the fact that Rotterdam became the dominant German sea port, played a vital role in this. Military interference could only be damaging for Germany’s relations with the Dutch.\footnote{See McDonald, Peace (2004), passim.} Free Rhine navigation was only one aspect of this, but as the intense economic relationships started with free Rhine transport, it was an essential element.

7. Conclusion

In the first few decades after the Vienna Congress, the circumstances within the Rhine region could be understood within a Realist framework, as there was a struggle for power going on between the United Netherlands and Prussia. This struggle between two states of comparable size almost destroyed the liberal regulation of Rhine shipping that was implemented during the period of French dominance. The attempts of the Congress of Vienna to consolidate this with the unique experiment of handing authority for the river over to an international commission, the CCNR, seemed to have failed. Prussia and the Netherlands were both determined to not make any concessions to the other, as they both feared that, by doing so, they would strengthen their rival’s position more than their own. The

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\cite{120,121,122,123}
Dutch were in a strong juridical position when they demanded the ending of Cologne and Mainz as *Stations de Navigation*, and were backed by the smaller Rhine states. Prussia, however, which was the more powerful state, did not accept being outmanoeuvred and simply refused to end compulsory transhipment in these cities for as long as the Dutch raised transit taxes on the track to the sea. As both were calculating the relative gains for each concession, the Dutch could only give in when it became undisputable that Prussia was stronger. Then, after 1828, bilateral negotiations resulted in a draft version of the Mainz Convention of 1831.

As this led to Rhine shipping becoming free and there were no limits on particular types of ship, steam shipping now got a free hand. As a result, traditional boatmen felt endangered and tried to defend their position by organizing the horse-stations better, but also by attempting to convince governments that they needed protection. As the mid-19th century railways were threatening Rhine shipping by then, they had no chance of success; for both the Netherlands and the vastly industrializing Prussian territories along the Rhine and Ruhr, the survival of barging was too important to back their weak position. Prussia needed cheap transport for its new industry, particularly because this industry developed well away from any seaport. When railways became dominant, monopolistic transport markets with high freight rates would be the result. Therefore, it was vital for this industry, and thus for Prussia, that barge shipping, characterized by more competitive markets, survived. It was also the only chance for the Dutch ports to restore their competitiveness after Belgium opened a railway from Antwerp to Cologne. Barging needed to become cheap and competitive again. The Dutch wanted to liberalize barging from governmental and organizational obstacles, but Prussia thought that this was not enough. Natural obstacles that hindered large-scale steam-tugged barge-trains should be removed as well, but after King Willem I’s prolonged war against Belgium, the Dutch had no money to finance the necessary hydraulic engineering projects. Therefore, it was Prussia in 1847 that started a systematic policy to canalize the Rhine, using the CCNR as an instrument to achieve this in parts of the river where it lacked the authority to do so itself. The growing dominance of Prussia within the region made it possible to press all the Rhine states to participate, but the small Nassau, and to a lesser extent Hesse-Darmstadt, remained obstacles. These states not only needed the income from their tolls, and thus opposed complete liberalization, but they could also not afford to canalize their tracks. In the second period, lasting to 1866, Prussia used its power to control the CCNR and transform
it into an instrument to get what it wanted without escalating conflicts. When, in 1866, internal German conflicts escalated nonetheless, it used the post-war situation to get all it wanted in Rhine matters from the German Rhine states. Nassau, which had proved to be a lasting problem, was simply absorbed. To further improve its position, Prussia, pressed by the annexation of a substantial number of small states, intimidated the Netherlands into accepting the 1868 Treaty of Mannheim. France, which was Prussia’s only remaining rival in the region, was isolated from the river in 1871, with the autocratic Prussia using its power to obtain what it wanted, if not by peaceful means then by force and threats.

In the final period, the only members of the CCNR were the Netherlands and the German states that were part of the Kaiserreich. The Kaiserreich itself was not a member. The CCNR now became a technical organization controlling and coordinating the agreed policy on regulating the river, managing building activities and administering Rhine police regulations and its court. The canalization process was almost over in the 1880s, and the entire river from Rotterdam to Mannheim was canalized. New plans were then made to canalize the track to Strasbourg. This caused some internal German friction, but by then Prussia’s influence was decisive. In any event, as the CCNR created an opportunity to regulate international problems on Rhine shipping in an efficient, cheap and peaceful way, keeping this organization intact became vital, not just for the small Netherlands, but also for Germany and its prime member state Prussia. It was thus essential that the rules agreed between the members were kept in place.

As a result of canalization, cheap bulk transport became possible on an ever larger scale, with trains of steam-tugged barges causing a spectacular reduction in freight rates. For bulk transport, Rhine shipping had very little competition; Rotterdam could now develop into the most important port in Europe, which was essential for its main industrial regions. This port, Rhine barging, and the interests of the industries along the Rhine and Germany’s subsidiaries became so important that lobbies by German ports, railways, farmers and industries well away from the waterway could not change the liberal German policy or convince Berlin that tolls were needed again. Rhine shipping was, and remained, free, because it was not in Germany’s interests to undermine the CCNR or the Act of Mannheim, or to get into conflict with the Dutch. The Netherlands was even kept out of the war in 1914, because of the central position of its port in German trade. Indeed, it was crucial to Berlin that a substantial and essential part
of its trade went through a neutral port. The Rhine and the liberal transport regulations on this river thus not only influenced low, but also high, politics.

The CCNR increasingly became an instrument of the most important Rhine state, Prussia, from 1831 onwards. Prussia used it to obtain what it needed – the canalization and liberalization of the river without constant conflicts with other Rhine states. The Rhine was thus liberalized and canalized, and the only major conflicts within the region – the wars and the danger of war between 1866 and 1871 – concerned the formation of the German nation state, not primarily Rhine navigation. Rhine politics was only indirectly involved when, in 1866, after Prussia won the war with Austria that was backed by the other German members of the CCNR, it used the opportunity to get immediately what would otherwise have taken more time. Berlin thus created a cheap transport network in a period when, almost everywhere else, inland water navigation was replaced by monopolistic railways. It could do this without any major conflicts by using the CCNR as its instrument. As long as Prussia was not the dominant state, the CCNR was ineffective; when it became dominant, the CCNR became its tool, making Rhine politics more efficient for Prussia, but also safer and less fearful for its smaller neighbours. The supranational agency was primarily an instrument that the most powerful state could use to achieve its international ambitions in a cheap and efficient manner. Nevertheless, this created a situation in which it became essential, including for this powerful state, to keep the relationships with the other members intact.

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The Coal market between Mannheim and Basel: The Competition between the Saar and Ruhr Coal in the Middle and Upper Rhine Valley 1850-1914.

Ralf Banken

Abstract: Unlike the North and Middle German coal markets, sales and outlet regions in Southwest Germany have not attracted the attention of economic historians. Yet the Ruhr mining industry sold relatively large amounts of coal very early to South Germany, and this demand stimulated growth in the Ruhr area, even as early as the start of the 19th century. This article seeks to provide a first overview of the development of the Upper Rhine’s coal markets, and uncovers new insights into the energy basis for regional industrialization between Mannheim and Basel.

1. Introduction

The focus of German economic history on matters relating to production is apparent in the extensive body of literature that exists on the West German coal-mining industry: other than studies on cartels, there is little specific treatment of the coal trade or the distribution and sale of coal. The development of the North and Middle German coal markets has been unique in its prominence in the literature, for example its treatment in Rainer Fremdling’s highly regarded dissertation, due perhaps to the significance of the competition between English, Upper Silesian and Ruhr coal.¹ In contrast, sales and outlet regions in Southwest Germany have, until now, barely attracted the attention of economic historians, although contempo-

¹ Fremdling, Eisenbahnen (1975), 164-166. Another exception is the new study of the Dutch coal market by Eva-Maria Roelevink: Roelevink, Organisierte Intransparenz (2015), 341-349. For the general development of Rhine inland navigation, see: Kunz, Statistik (1999); Looz-Corswarem/Mölich, Verkehrsweg (2007).
rary economists and geographers have studied these developments frequently and in detail.  

This direction is still in existence: despite the fact that the Ruhr mining industry sold relatively large amounts of coal to that area very early; and despite the importance of South Germany’s desire to stimulate growth in the Ruhr area, even as early as the start of the 19th century. This article seeks to provide a first overview of the development of the Upper Rhine’s coal markets and considers the relevance of coal as the new energy basis for regional industrialization between Mannheim and Basel. It also raises the question of what the significance of the Southwest German regions was for the economic development of the Ruhr and Saar areas, as each of these coal-mining districts relied on South and Southwest Germany as significant outlets for their goods. The close economic links between the economic regions up to Basel were also significant in a business context, which will be highlighted by reference to a few salient examples. Finally, by examining the southern and southwestern coal market, it is also possible to uncover the different factors that influence competition between Saar and Ruhr coal, for instance, the role of improved transport infrastructures.

2. The emergence of the Ruhr coal trade in the Upper Rhine Valley up to 1850

By the time the first railway tracks were laid, the Rhine was already being used as a trade channel for Ruhr coal. Coal began to be shipped on the Rhine as soon as the Ruhr became navigable in the 1780s, although it was initially only shipped as far south as Cologne, as the high costs of haulage uphill made it difficult for Ruhr coal to remain competitive south of Cologne when faced with competition from coal from the Saar region and the mining district near Aachen.

2 See, for example: Degen, Bedeutung (1923); Overlack, Ruhrkohlenschifffahrt (1934); Eckert, Rheinschifffahrt (1900); Ebner, Kohlenhandel (1909); Reinhardt, Binnengüterverkehr (1969); Schröder, Entwicklung (1922); Velke/Landgraf, Rheinschifffahrt (1892).
3 Fessner, Steinkohle (1998), 280-295; Overlack, Ruhrkohlenschifffahrt (1934), 47-52.
This changed, however, with the introduction of steam tugboat navigation at the start of the 1830s. This innovation was pioneered by two coal traders, Franz Haniel and Mathias Stinnes, along with newly established steam navigation joint stock companies. Around 1848, these firms operated a total of 23 tugboats as well as 102 iron and 519 sailing vessels made of wood.\(^5\) Up to 1855, the number of tugboats on the Rhine increased to 46 and the transportation of goods amounted to 1.1 million tons in 1850 (Figure 1).\(^6\)

**Figure 1:** The development of Ruhr coal shipping on the Rhine, 1828-1913


These numbers show the great impact that inland navigation had on early industrialization in West Germany until 1860. This influence cannot be overestimated, even in comparison with the much better researched economic contribution of the new railways. It was only after 1855 that the new

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6 Overlack, *Ruhrkohlenschiffahrt* (1934), 85-86. See also: Eckert, *Rheinschiffahrt* (1900), 286.
form of public transit transported more freight than inland water vessels, but it did grow more rapidly and therefore won an increasing market share (see Table 1).  

Table 1: Freight traffic in Germany, 1840-1910, in million tons per kilometre

<table>
<thead>
<tr>
<th>Year</th>
<th>Inland water vessel</th>
<th>Railways</th>
<th>Share of railways’ German freight traffic in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1840</td>
<td>750</td>
<td>3</td>
<td>0.4</td>
</tr>
<tr>
<td>1845</td>
<td>850</td>
<td>51</td>
<td>5.7</td>
</tr>
<tr>
<td>1850</td>
<td>900</td>
<td>302</td>
<td>25.1</td>
</tr>
<tr>
<td>1855</td>
<td>1,200</td>
<td>1,095</td>
<td>47.1</td>
</tr>
<tr>
<td>1860</td>
<td>1,350</td>
<td>1,675</td>
<td>55.4</td>
</tr>
<tr>
<td>1865</td>
<td>1,550</td>
<td>3,672</td>
<td>70.3</td>
</tr>
<tr>
<td>1870</td>
<td>1,650</td>
<td>5,876</td>
<td>78.1</td>
</tr>
</tbody>
</table>

Source: Fremdling, Eisenbahnen (1975), 86.

Although the share of inland navigation shrunk after 1850, the transportation of goods on the Rhine still grew substantially, as the example of the Rhenish Steam Navigation Company shows (see Table 2).

Table 2: Transportation of passengers and goods via the Rhine, 1827-1865

<table>
<thead>
<tr>
<th>Year</th>
<th>Volume of total transportation, in Mio. Ctr. (up- and downstream)</th>
<th>Volume of transportation of the Prussian-Rhenish Steam Navigation Company</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Koblenz</td>
<td>All Rhine harbours</td>
</tr>
<tr>
<td>1827</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1830</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1836</td>
<td>3.1</td>
<td>17.9</td>
</tr>
<tr>
<td>1840</td>
<td>5.5</td>
<td>25.4</td>
</tr>
<tr>
<td>1845</td>
<td>9.5</td>
<td>37.0</td>
</tr>
<tr>
<td>1850</td>
<td>11.9</td>
<td>47.0</td>
</tr>
<tr>
<td>1855</td>
<td>16.3</td>
<td>60.3</td>
</tr>
<tr>
<td>1860</td>
<td>21.3</td>
<td>81.3</td>
</tr>
<tr>
<td>1865</td>
<td>28.2</td>
<td>76.4</td>
</tr>
</tbody>
</table>

Source: Eckert, Rheinschifffahrt (1900), 332-333, 339.

Fremdling, Eisenbahnen (1975), 164-166.
The new railway lines became a strong competitor of steamboats after they started to follow the same routes. This was the case in 1859 on the Middle Rhine between Cologne and Mainz (and on the Upper and Lower Rhine even earlier), when the railway on the left bank of the river was completed; the operation of the railway line on the right bank, meanwhile, started in 1871. The opening of these new railway routes was the reason why the transportation of packaged goods and passengers moved from steamboats to the railways, leaving only bulk goods to be transported by ships on the Rhine.

Further south, inland water navigation by steamboats on the barely navigable route ended after the state of Baden opened a railway in 1844 from Mannheim to Basel. However, even though steamboats were the fastest and cheapest mode of transport for only a short period of time, their contribution to the early industrialization of West Germany was crucial to the southern regions near the Rhine, Main, Moselle and Neckar rivers. The first and most important effect of the introduction of steamboats was the reduction in transport costs, which allowed the transport of bulk freight like coal to regions upstream and far away for the first time.\(^8\) The second effect was the increase in speed. Instead of taking the 10 to 20 days of the traditional sailing and towing ships, the tugboats needed only three to five days for the route from Rotterdam to Cologne. They were also able to tow four to six barges containing a total of 1,075 tons of goods from Duisburg-Ruhrort to Cologne in 24 hours. As well as the cheaper, faster and safer transport of goods and passengers, there were also other important effects like the development of a ship-building industry in West Germany.\(^9\)

Finally, steamboat navigation also stimulated external economies, with examples being the development of the German capital market and the spread of the joint stock company as a new legal form (see Table 3). It was not by accident that most steamboat navigation firms were organized as joint stock companies. No sole trader besides the financially sound coal merchants Haniel and Stinnes could afford the cost of a tugboat (between 48,000 and 87,000 Taler), which is why several joint stock companies were founded to raise the required sums. The Preußisch-Rheinische Dampfschiffahrt-Gesellschaft, for example, had a capitalization of 240,000 Taler, while a founding committee budgeted about 250,000

\(^8\) Klemann, Schenk, *Competition* (2013), 826-847.

Guilders for the joint stock of the Badische Rhein-Dampfschifffahrtsgesellschaft in 1823. In total, the value of the Rhine tugboat companies was estimated in 1848 to be about 1.9 Mio. Taler.\textsuperscript{10}

\textbf{Table 3: Founding of steamboat navigation companies on the Rhine, 1841-1856}

<table>
<thead>
<tr>
<th>Year</th>
<th>Company Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1841</td>
<td>Kölner Dampfschleppschiffahrtsgesellschaft</td>
</tr>
<tr>
<td>1842</td>
<td>Mainzer Dampfschleppschiffahrtsgesellschaft</td>
</tr>
<tr>
<td>1843</td>
<td>Matthias Stinnes</td>
</tr>
<tr>
<td>1843</td>
<td>Mannheimer Dampfschleppschiffahrtsgesellschaft</td>
</tr>
<tr>
<td>1843</td>
<td>Ludwigshafener Dampfschleppschiffahrtsgesellschaft</td>
</tr>
<tr>
<td>1844</td>
<td>Frankfurter AG für Rhein- und- Main Schiffahrt</td>
</tr>
<tr>
<td>1845</td>
<td>Franz Haniel</td>
</tr>
<tr>
<td>1846</td>
<td>Rheinschlepp-Schifffahrts-Gesellschaft Ruhrort</td>
</tr>
<tr>
<td>1847</td>
<td>Main Dampfschleppschiffahrts-Gesellschaft, Würzburg</td>
</tr>
<tr>
<td>1847</td>
<td>Düsseldorfer Dampfschleppschiffahrtsgesellschaft</td>
</tr>
<tr>
<td>1853</td>
<td>Dampfschleppschiffahrtsgesellschaft für den Nieder- und Mittelrhein</td>
</tr>
<tr>
<td>1856</td>
<td>Mülheimer Dampfschleppschiffahrtsgesellschaft</td>
</tr>
</tbody>
</table>

Source: Pierer's Universal-Lexikon, Bd. 14, 100-106.

The shipment of coal on the Rhine in particular promised such good business opportunities that shipping companies also began to establish steamboat navigation firms on the river in order to offer regular scheduled services, with the Mannheim Dampfschiffahrtsgesellschaft (established in 1843) being a case in point. The expansion of Rhine ports, in particular the Mannheim port from 1828 onwards, can also be attributed, among other things, to the coal trade, as the shallow water depths beyond Mannheim made the shipment of goods up the Rhine beyond there considerably more difficult and expensive.\textsuperscript{11} Until the 1850s, and in collaboration with shipping companies, traders of Ruhr coal were able to expand the market along the Rhine up to Mannheim. In particular, the demand rose for coke coal for the new railways (and their locomotives) that were being built si-

\textsuperscript{10} Eckert, Rheinschiffahrt (1900), 201-203; Gottwald, Ruhrorter Hafen (1991), 83, 85 a., 104-105.

\textsuperscript{11} Rings, Mannheim (2003), 67-82.
multaneously in Southern Germany, which initially regarded coke as the most important fuel (see Table 4).

Table 4: Coke deliveries on the Rhine for the new southwestern railways in 1848

<table>
<thead>
<tr>
<th>Railway line</th>
<th>in Ctr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taunusbahn (Frankfurt am Main-Wiesbaden)</td>
<td>36,000</td>
</tr>
<tr>
<td>Main-Neckar-Bahn (Frankfurt am Main-Heidelberg)</td>
<td>65,000</td>
</tr>
<tr>
<td>Frankfurt am Main-Hanau</td>
<td>10,000</td>
</tr>
<tr>
<td>Pfälzische Ludwigsbahn (Ludwigshafen-Saarbrücken)</td>
<td>9,000</td>
</tr>
<tr>
<td>Württembergische Staatsbahnen (Ulm-Stuttgart-Heilbronn,)</td>
<td>40,000</td>
</tr>
<tr>
<td>Total</td>
<td>160,000</td>
</tr>
<tr>
<td>In addition: deliveries of coke to the Moselle steam navigation company</td>
<td>20,000</td>
</tr>
</tbody>
</table>

Source: Overlack, *Ruhrkohlenschifffahrt* (1934), 117

In the process, coal from the Saar region, which had previously been shipped via the Saar, Moselle and Rhine rivers up to Bonn, as well as up the Rhine to Mannheim, was largely squeezed out from these areas, as there was a failure to compete with Ruhr coal shipped on the Rhine. State coal-mining pits on the Saar could now only distribute their coal in the Alsace region via the Rhine-Marne canal, which was newly constructed in 1838 and was accessible by road from the Saar coal district (see Table 5).12

Table 5: The distribution of the Saar coal of the state-owned enterprise in the Saar region, 1820-1850 in tons

<table>
<thead>
<tr>
<th>Year</th>
<th>Distribution on the River Saar</th>
<th>Distribution to France</th>
<th>Distribution on the River Saar to Koblenz</th>
<th>Saar coal turnover in the inland port of Koblenz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1820</td>
<td>16,350</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1831-33</td>
<td>27,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1835</td>
<td>58,749</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1837</td>
<td>14,125</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1840</td>
<td>103,876</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1841</td>
<td></td>
<td></td>
<td></td>
<td>16,100</td>
</tr>
</tbody>
</table>

Ralf Banken

<table>
<thead>
<tr>
<th>Year</th>
<th>Distribution on the River Saar</th>
<th>Distribution to France</th>
<th>Distribution on the River Saar to Koblenz</th>
<th>Saar coal turnover in the inland port of Koblenz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1842</td>
<td></td>
<td></td>
<td></td>
<td>12,800</td>
</tr>
<tr>
<td>1843</td>
<td></td>
<td></td>
<td></td>
<td>36,000</td>
</tr>
<tr>
<td>1844</td>
<td></td>
<td></td>
<td></td>
<td>28,900</td>
</tr>
<tr>
<td>1845</td>
<td>124,998</td>
<td>3,349</td>
<td></td>
<td>27,400</td>
</tr>
<tr>
<td>1846</td>
<td>105,969</td>
<td>60,200</td>
<td></td>
<td>26,300</td>
</tr>
<tr>
<td>1847</td>
<td>119,659</td>
<td>85,044</td>
<td>25,012</td>
<td>25,000</td>
</tr>
<tr>
<td>1848</td>
<td>106,569</td>
<td>73,668</td>
<td>4,025</td>
<td>15,000</td>
</tr>
<tr>
<td>1849</td>
<td>104,098</td>
<td>71,199</td>
<td>4,050</td>
<td>4,050</td>
</tr>
<tr>
<td>1850</td>
<td>128,952</td>
<td>89,833</td>
<td></td>
<td>4,050</td>
</tr>
</tbody>
</table>


3. The dominance of Saar coal in the Upper Rhine Valley, 1850-1890

The construction of various railways between Strasbourg and the Lower Rhine changed the situation instantly and fundamentally. Indeed, the opening of a line between Saarbrücken and Ludwigshafen in 1852 had a significant impact, giving the freight of Saar coal to Southern Germany a competitive edge.\(^{13}\)

The transport of Saar coal in the Rhenish Palatinate by horse-drawn carriages and the shipment of coal via the Saar, Moselle and Rhine rivers were suddenly no longer cost effective alternatives in light of the developments accompanying the dawn of rail transportation (see Table 6).

Table 6: The distribution of Saar coal and how it was transported in tons, 1850-1910

<table>
<thead>
<tr>
<th>Year</th>
<th>Railway</th>
<th>Water transport</th>
<th>Transport by ground</th>
</tr>
</thead>
<tbody>
<tr>
<td>1850</td>
<td>4.1</td>
<td>28.1</td>
<td>67.9</td>
</tr>
<tr>
<td>1852</td>
<td>21.8</td>
<td>26</td>
<td>52.3</td>
</tr>
<tr>
<td>1854</td>
<td>51.9</td>
<td>14.9</td>
<td>33.2</td>
</tr>
<tr>
<td>1856</td>
<td>58.8</td>
<td>9.9</td>
<td>31.3</td>
</tr>
<tr>
<td>1858</td>
<td>63.7</td>
<td>5.1</td>
<td>31.2</td>
</tr>
</tbody>
</table>

\(^{13}\) Banken, *Take-Off-Phase* (2003), 139.
As a result of the considerably improved transport conditions, it was now also possible to distribute coal from the Saar beyond the Rhenish Palatinate to South and Southwest Germany, as well as to the southern Alsace and northern parts of Switzerland. The Moselle and Main rivers could now roughly be regarded as the outer edges of the Ruhr and Saar’s spheres of influence and markets for coal distribution. There were, however, fluid crossover points depending on the railway companies’ specific route plans and tariff arrangements.

Moreover, the quality of the type of coal played an important role. While the coal from the Saar was, in terms of content, rich in gas and therefore particularly well suited for use in gas works, coal from the Ruhr lent itself for use as coke in boilers, as a result of its firmness and high calorific value. This made it an attractive option for many consumers, despite its higher transport costs. Overall, until 1870, the Saar coal district was able to considerably expand the reach and scope of its markets as a result of the impact of the new railway lines from Saarbrücken to the Rhine and beyond. Prussian state-owned coal pits were able to sell their coal on markets as far north as Giessen, as far east as Nuremberg and Munich, and as far south as Geneva.14

The sales of the Ruhr coal pits also started to increasingly shift towards and revolve around railways. Newly opened railway routes in Rhineland and Westphalia began to draw larger quantities of transport, especially short distance transport, away from the Rhine and Ruhr as early as the 1840s. By 1850, only 18% of all the coal being transported up the Rhine to Cologne was being shipped. However, the amount of transport of Ruhr coal by water was increasing sharply, but only remained competitive with transport by rail in areas north of Cologne and, in particular, north of

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<table>
<thead>
<tr>
<th>Year</th>
<th>Coal distribution in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1860</td>
<td>71.9 5.3 22.8</td>
</tr>
<tr>
<td>1870</td>
<td>66.5 16.8 16.8</td>
</tr>
<tr>
<td>1880</td>
<td>76.3 13.5 10.2</td>
</tr>
<tr>
<td>1890</td>
<td>79.8 10.4 9.8</td>
</tr>
<tr>
<td>1900</td>
<td>83.6 8.6 7.8</td>
</tr>
<tr>
<td>1910</td>
<td>90 5 5</td>
</tr>
</tbody>
</table>

Koblenz along the Rhine up to Mainz. However, in the Rhine/Main and Rhine/Neckar regions and further along, the Rhine Ruhr coal could barely compete with coal from the Saar, with coking coal being the exception.\textsuperscript{15}

4. The Ruhr recaptures the coal markets of the Upper Rhine Valley, 1890-1914

While the construction of new railway routes in the 1850s and 60s had a positive impact on Saar coal’s competitive position, the situation slowly began to change from the 1870s onwards. The construction of further routes and the expansion of the north-south route to two tracks had, admittedly, little effect on the coal markets on the Upper Rhine until the 1880s. The Ruhr coal-mining industry, however, was able, as a result of the reduction in tariffs to one Pfennig per ton per kilometre, to withstand competition from the Saar in Lorraine and in the Rhine/Main region.\textsuperscript{16}

Figure 2: A coal dumper in the Port of Duisburg-Ruhrort

Source: Businessarchive Franz Haniel & Cie GmbH, Duisburg-Ruhrort.

\textsuperscript{15} Banken, \textit{Take-Off-Phase} (2003), 173-177.
\textsuperscript{16} Fremdling, \textit{Eisenbahnen} (1975), 55-60; Schulte, Rheinschifffahrt (1905), 312-361; Overlack, Ruhrkohlenschifffahrt (1934), 65-70.
In contrast, the conquering of the coal market up the Rhine north of Mannheim was due to transportation by ship. Similar to the developments with the railways, and thanks to numerous technical improvements, boatmen were able to provide transport for much more competitive prices. Productivity gains were improved as a result of better loading and unloading techniques (coal dumper, harbour cranes, coal sorting machines, chain boats), as well as through the use of stronger tugboats and larger barges.\textsuperscript{17}

Figures 3 and 4: The Binger Loch, an important shallow and bottleneck.

\begin{center}
\includegraphics[width=0.5\textwidth]{figures/binger_loch.png}
\end{center}


The steady elimination of dangerous navigational areas in the Middle Rhine, for example those at Bingen Loch, had an even greater impact (see figures 3 and 4).\textsuperscript{18} The regulation of the Upper Rhine from Mannheim to

\begin{itemize}
\item Tümmers, \textit{Rhein} (1999), 241-245; Fremdling, \textit{Eisenbahnen} (1975), 105.
\end{itemize}
Strasbourg between 1895 and 1918 was even more important, however. In the period up to 1913, various measures succeeded in boosting depths from 0.7 to 2 metres, with the result being that inland water transport between the two cities increased 55-fold between 1893 and 1913.\textsuperscript{19}

**Figure 5: The development of the shipping of Ruhr coal on the Upper Rhine (upstream Mannheim), 1893-1913**

![Graph showing the development of the shipping of Ruhr coal on the Upper Rhine (upstream Mannheim), 1893-1913](image)


The bulk of this rapidly growing traffic on the upper upstream Mannheim Rhine could be attributed to the transport of coal (see Figure 5). This is also apparent in the import and export statistics for Strasbourg’s port, built in 1882, where coal and coal products made up, in total, more than 56\% of the incoming and 47\% of the transhipped goods (see Table 6).

**Table 6: The turnover of the inland port of Strasbourg, 1913**

<table>
<thead>
<tr>
<th>Arrival in tons</th>
<th>In t</th>
<th>In %</th>
<th>Shipping in tons</th>
<th>In t</th>
<th>In %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Hard coal, coke, briquettes etc.</td>
<td>934,586</td>
<td>56.5</td>
<td>1. Metal goods and half-finished products made of iron</td>
<td>102,723</td>
<td>30.9</td>
</tr>
<tr>
<td>2. Grain</td>
<td>516,799</td>
<td>31.3</td>
<td>2. Potash and potash products</td>
<td>71,182</td>
<td>21.4</td>
</tr>
</tbody>
</table>

\textsuperscript{19} Hansen, *Rheinregulierung* (1931), 587-589.
Arrival in tons  | In t  | In %  | Shipping in tons  | In t  | In %  
---|---|---|---|---|---
3. Miscellaneous | 177,668 | 10.7 | 3. Wood and railway-sleepers | 42,625 | 12.8 
4. Petroleum | 24,231 | 1.5 | 4. Soda | 35,337 | 10.6 
5. Chemical products | | | | 29,720 | 8.9 
6. Miscellaneous | | | | 28,687 | 8.6 
7. Wine, tobacco, paper and other industrial products | | | | 12,917 | 3.9 
8. Chalk, cement | | | | 6,576 | 2.0 
9. Grain u. crop | | | | 2,005 | 0.6 
Total | 1,653,283 | 100.0 | Total | 332,772 | 99.7 

Source: Hansen, Rheinregulierung (1931), 592-593. See also: Petersilie, Schiffahrt (1908), 21-42.

Despite the sharp increase in coal traffic on the Upper Rhine, the Mannheim and Rheinau port, which was established in 1873 south of Mannheim, remained the most important port for the transportation of coal to South and Southwest Germany. Thanks to combined transportation, i.e. low-priced transport by ship on the Rhine to Mannheim and then onward transportation by railway, Baden, Württemberg and Bavaria were able to access Rhine coal from these ports.20 Other ports, such as those at Frankfurt or Mainz-Gustavsburg, also played a role in the distribution of coal, in this case to Frankish Bavaria. Finally, coal was also distributed from Strasbourg to the southern Alsace.21

Transport by water, however, was not the only significant factor in Ruhr coal’s penetration of Southern Germany; railway companies’ policies on tariffs also played an important part. The Badisch State Railway’s special tariffs in particular were crucial in facilitating the distribution of Ruhr coal from Mannheim to Switzerland and Northern Italy. Cheaper railway tariffs also benefitted Saar coal, which lost shares in the market in South and Southwest Germany, although it was not completely pushed out. This was also due to the different qualities of the different coal types: gas works again preferred the gas-rich Saar coal, while the qualities of Ruhr coal meant that it was better suited to other uses.22

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21 Bauer/Koch, Osthafen (2012), 24-40; Hansen, Rheinregulierung (1931), 593-596.
22 Banken, Take-Off-Phase (2003), 145-147.
The market for Saar coal shrank between 1880 and 1913. To the north, the Moselle River and the Hessen-Nassau province remained the outer limits for the distribution of Prussian state Saar coal. To the east, coal continued to be supplied to the Rhenish Palatinate and the Grand-Duchy of Hessen up to Offenbach, while in the south, Baden, Württemberg, the Alsace and Switzerland remained traditional areas for distribution. This reduction in the Saar coal-mining district’s market was not, however, only down to the transport infrastructure and transport tariffs, but also to the qualities of the Saar coal which, in contrast to Ruhr coal, could be used for any purpose. Additionally, the sales policy of the Prussian state’s pits on the Saar was very conservative and relatively inactive, and price concessions in the more hotly contested markets in Southern Germany were only made very reluctantly. Furthermore, Prussian state coal-mining in the Saar region failed to build any coal depots in remote distribution areas, in contrast to the policy of the Ruhr coal trade; the Rhenish-Westphalian coal syndicate, for example, began to build numerous coal storage areas on the Upper Rhine from 1895 onwards.23 Furthermore, the major coal traders in the Ruhr began to take over numerous coal-trading firms in Southern Germany around the turn of the century; for example, Gutehoffnungshütte acquired the company Vereinigte Frankfurter Rhederei in 1914.24

23 Banken, Take-Off-Phase (2003), 158-162.
As a result, in 1913, coal from the Saar had market shares of only 39.1% in Baden, 47.3% in Württemberg and 21.7% in Bavaria (see Figure 6). This was in sharp contrast to the 1850s, when coal from the Saar region almost exclusively supplied numerous key South German markets. In the meantime, the proportion of Ruhr coal in circulation in these three regions had increased across the board by almost 50%. Switzerland was the only place where Saar coal retained considerably larger shares in the market than Ruhr coal, due to a slight competitive edge the former had regarding freight costs.²⁵

5. Conclusion

The development of the Upper Rhine coal market in the 19th century, outlined only briefly here, quite clearly reveals that the concept of the Rhine economy, i.e. the economic interconnectedness of economic areas between Rotterdam and Basel, holds the promise of considerable potential insights. The history of the coal markets, previously neglected in economic history, is very revealing, illuminating, for example, that the demand for coal in regions between Mainz and Basel had a significant impact on the growth

²⁵ Banken, Take-Off-Phase (2003), 158-162.
of Saar and Ruhr coal-mining districts in the 19th century. This was because a large share of the coal extraction of both coal-mining districts before 1860 was transported via the Rhine to consumers.26

Furthermore, South Germany’s demand for coal and coke can be seen to have had a considerable impact on early industrialization and the emergence of a modern coal-mining industry and coal trade, as well as a modern transport infrastructure. The relationship between these different phenomena was based on numerous business relationships and connections that were built from the 1830s onwards, and laid the foundation for numerous trade and industry fortunes very early on, as had been the case with Haniel and Stinnes, for example.

On the other hand, the industrialization of Southwest Germany was largely based on the cheap supply of Ruhr and Saar coal, which was clear, above all, in the emerging industrial regions of the Upper Rhine and Main, particularly in the growing chemical industry (e.g. Hoechst was founded in 1863 near Frankfurt and BASF in 1865 in Mannheim).27

The reason for the development of several new chemical works from Wiesbaden to Mannheim and Ludwigshafen, and from Mainz to Offenbach, was essentially the possibility of a cheap coal supply via the Rhine. This is also shown by the fact that, for example, the chemical company Christoph Heinrich Boehringer shifted its production from Stuttgart to Mannheim in 1872. Along with the chemical companies, a lot of metalworking firms and other industrial branches in the Rhine-Main- and Rhine-Neckar regions also benefitted from the cheap coal supply via the Rhine before 1900. This is evidenced by the fact that Mannheim and Mannheim-Rheinau became the most important inland port besides Duisburg-Ruhrort in the 19th century. Mannheim was the central hub for coal transport by rail to all South Germany’s territories (Baden, Württemberg, Bavaria) and Northern Switzerland.28

26 The share of Ruhr coal transported on the Rhine between 1826 and 1870 fluctuated between 30 and 58%. Overlack, Ruhrkohlenschifffahrt (1934), 6. See also: Adam, Produktion (1933), 92; Schöne, Wettbewerb (1923), 43-47.
28 Eckert, Rheinschifffahrt (1900), 331-333; Becker, Kohlenhandel (1903), 99; Wickert, Rhein (1903), 33; Petersilie, Schiffahrt (1908), 21-42; Beyerhaus, Rhein (1902), 81-91; Zerr, Kohlenversorgung (1926), 25.
The development of coal markets in the 19th century depended on several factors. First, and most importantly, was undoubtedly the development of the transport infrastructure, i.e. the emergence of railways and the improved state of water transport on the Rhine and its tributaries. Second, the distribution of coal was also influenced by railway company tariff policies, technical developments across different modes of transportation, the sales policies of the coal and trade businesses, and the qualities of the individual types of coal.

Similar trends were not observed in the competition between the Saar and Ruhr mining districts. Meanwhile, coal from the Ruhr initially profited from the advent of steam tugboat navigation and the Saar mining districts from the emergence of railway routes. Further improvements of the transport infrastructure and the falling costs of transportation then altered the situation in favour of businesses dealing in Ruhr coal. These changes were, above all thanks to Ruhr transport being able to gain a larger market share than the Saar mining industry. What becomes clear, however, is that the dominance of Ruhr or Saar coal was increasingly contested in the different coal markets. As transport improved, the number of undisputed market areas fell, as competition also intensified from other coal-mining districts. This was, for example, the result of the emergence of Belgian pit coal, pit coal from Aachen and Rhenisch brown coal, whose significance for the coal markets on the Upper Rhine could not be explored in depth here.

In conclusion, the competition between the different coal-mining districts, and between different transport companies, had a significant impact on the supply of energy to the coal-poor regions south of Mainz and along the Main. The industrialization of the Southwest German regions, in particular those close to the Rhine, had its roots, above all, in the economic ties with the two important German coal-mining districts of Saar and the Ruhr in the coal-based Rhine economy, which also benefitted from the demand in South West Germany after the 1830s.

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3. Enterprises
Dutch Multinationals in Germany in the Interwar Period: from the Rhine Region to a National Focus.

Ben Wubs

Abstract: Germany became an extremely important host country for Dutch multinationals in the 20th century. This paper aims to: discover why the four most important of these firms invested so heavily in the country in the interwar period, and identify the spatial strategies they pursued. Did these companies have specific competitive advantages, and to what extent did geography play a role? The paper concludes that, initially, Unilever, Royal Dutch and AKU were part of a transnational Rhine economic region: all three expanded as a result of the industrialization of West Germany. Philips was the odd one out: its expansion was closely related to the development of the international oligopolistic market for electronic products, and it changed its position towards the major German electronics firms after WWI. The war also created competitive advantages for all four Dutch multinationals in Germany. Indeed, during the 1920s, all of them chose a more national focus on German subsidiaries.

1. Introduction

In the late 19th and first half of the 20th century, cross-border direct investment became important for large Dutch industrial companies. Compared to other countries, the Netherlands began to play an important role in foreign direct investments (FDI). Indeed, in 1914, it occupied fifth place in the ranking of countries with the largest share of FDI, and climbed to third place by 1938.¹ Along with the colonies, in particular the Dutch East Indies, Germany became an extremely important host country for Dutch firms. In fact, for most large industrial multinationals, like Philips, AKU and Unilever, the Netherlands East Indies did not play a decisive role; only Royal Dutch Shell originated as a freestanding company from the Dutch

colony.² In Germany, however, Unilever had become the single largest foreign direct investor in the late 1930s, and was almost as large as all US direct investments taken together (see Table 3.1).³ Other Dutch firms like Royal Dutch, AKU, Philips, SHV, C&A Brenninkmeyer, Hoogovens and Noury van de Lande had also made important investments in their neighbouring country in the interwar period. This paper focuses on the German investments of the four biggest Dutch multinationals at the time: Royal Dutch, AKU, Philips and Unilever.

Table 1: Total Dutch FDI compared to total US FDI in Germany, and Unilever compared to the largest US investors in Germany in 1939, in US$

<table>
<thead>
<tr>
<th>Country/company</th>
<th>Origin data</th>
<th>Investment in $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands total</td>
<td>Bloemers, Archives Committee for Dutch Industrial Interests in Germany</td>
<td>532 million</td>
</tr>
<tr>
<td>USA total</td>
<td>Wilkins/BEA – Dep. of Commerce</td>
<td>206 million</td>
</tr>
<tr>
<td>MVU (Unilever)</td>
<td>Wubs Unilever/ BArch</td>
<td>167 million</td>
</tr>
<tr>
<td>DAPG (Standard Oil)</td>
<td>Reich National Archives</td>
<td>65 million</td>
</tr>
<tr>
<td>Opel (General Motors)</td>
<td>Reich National Archives</td>
<td>54 million</td>
</tr>
<tr>
<td>Woolworth GmbH (Woolworth Co.)</td>
<td>Reich National Archives</td>
<td>25 million</td>
</tr>
</tbody>
</table>

Sources: Bloemers, De financiële verhouding (1951), 10; Wilkins, The Maturing (1974), 185; Reich, Corporate Social Responsibility (2004); Wubs, International Business (2008), 41.

An underlying assumption of most theories on international business is that multinationals need ownership (competitive) advantages over local rivals in order to overcome the disadvantage of their foreignness.⁴ The most important examples of ownership advantages are: access to superior technology, management, organization and cheaper capital than their local rivals; and market power as a result of economies of scale. In addition, locational factors within a host economy are used to explain why a company should undertake FDI rather than just export its products. An important lo-

³ Wubs, Interests (2008), 40-42.
⁴ Jones, Multinationals (2005), 8.
cational factor, which applies at least in certain periods in the German case, was protectionism and the existence of tariffs. An alternative explanation of the growth of multinationals (or large firms) is sought by the transaction cost theory.\(^5\) Production can be organized through markets or firms. If transactions can be carried out cheaper through companies than through the market, they will be internalized and undertaken by the firm itself. John Dunning’s eclectic paradigm combines both the advantage and internalization approaches and seeks to explain international production.\(^6\) Other theories try to describe and explain the incrementally increasing commitments of multinationals to host countries. Johanson and Vahlne’s model, for example, describes an incremental process of entering foreign markets: companies progressed from exporting, to selling through local agents, to setting up warehouse and sales facilities, to selling subsidiaries, and to eventually manufacturing abroad.\(^7\)

None of these approaches, however, explain why multinationals make decisions to invest in a particular region. The current multiple case study, however, aims to: discover why the four most important Dutch multinationals invested so heavily in Germany in the interwar period, and uncover the spatial strategies they pursued. Did these strategies vary over time and respective fields of business? Did these Dutch firms have specific competitive advantages, and to what extent did geography, i.e. their position in the German hinterland, and the position of Rotterdam and the Rhine, play a role? In other words, to what extent were these Dutch investments part of a transnational economic Rhine region?

2. *Van den Bergh, Jurgens, Schicht and Unilever’s Margarine-Verkaufs-Union*

The direct investments of the forerunners of the largest Dutch multinational in Germany date back to the late 19th century. In 1888, Jurgens set up a margarine plant just across the border in the German town of Goch on the Lower Rhine after the Bismarck administration levied a tariff on the pro-

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duct.\footnote{Wilson, \textit{History} (1954), 190.} Demand for the cheap butter substitute had been huge in the ever-growing industrial regions of the country, like the Ruhr district.\footnote{Busch, \textit{Unilevertrust} (1937), 21.} Soon, Van den Bergh, Jurgens main competitor in the margarine business, also set up a plant in Germany (Cleves is also just across the Dutch border and near Goch). From there, the two companies built large empires. The new factories established by Jurgens and Van den Bergh had brought the first basic alteration in the position of the German margarine industry since 1888. Indeed, for the first time, the production of margarine on an industrial scale was made possible in factories that had a relatively high capacity and which were equipped in a very modern way. Through economies of scale, Van den Bergh and Jurgens ensured a cost advantage over their smaller competitors. Aided by their experiences in the Netherlands and Britain, they were able to not only improve the quality of margarine considerably, but to also standardize it to a much greater extent. In combination with up-to-date marketing methods, the total turnover of margarine in Germany, and Van den Bergh and Jurgens’s share of it, increased considerably.

During the 1920s, other reasons for FDI had become important: competitive behaviour, market attraction, the acquisition of competitors and mergers.\footnote{For the reasons for FDI, see: Jones, \textit{Origins} (1986), 8.} Up to 1927, both Van den Bergh and Jurgens had obtained additional margarine factories either by building them or by acquiring competitors. In particular, at the start of 1920s, both Van den Bergh and Jurgens acquired various German companies in the margarine business with the strong Dutch guilder compared to the weak German mark.\footnote{UAR, Annual report Hovema, 1919. According to Van den Bergh’s Hovema annual report: ‘As a result of the strong currency position of our country compared to almost all other countries in Europe we were able to acquire various [foreign] companies.’ See also: Klemann, \textit{Ontwikkeling} (2007), 308-309.} Such acquisitions had then been accompanied by the reconstruction and modernization of the factories obtained in this way. Alternatively, in some cases, the factories acquired had been shut down and only competing brands and market shares were utilized. Due to their more up-to-date methods of production, economies of scale and scope, and greater experience in the marketing of branded products, Jurgens and Van den Bergh had, in effect, become the leading margarine manufacturers in Germany.
In 1928, the two firms merged to form the Margarine Unie. In the same year, Centra and Schicht, leading companies in the oil, fat and soap business in Central Europe, also joined the merger. In 1929, the margarine and meat company Hartog of Oss, which had also started up margarine factories in Germany, also joined the merger, increasing Margarine Unie NV’s interests in the country further. In addition, in 1929, the company acquired 50% of the share capital of two large German margarine corporations: Fritz Homann A.G. in Dissen (Lower Saxony) and Schmitz & Loh A.G. in Duisburg. Nonetheless, the Margarine Unie did not participate in the management of these companies. Also in 1929, a merger contract was signed with the largest British soap producer Lever Brothers. As a result, on 1 January 1930, the Anglo-Dutch firm Unilever was established, and was the largest merger ever.

By 1930, following various acquisitions, mergers and joint ventures, Unilever’s share in the margarine industry in Germany stood at about 69%. Indeed, in Germany alone, it had 25 margarine factories in operation. Although Unilever was in a dominant position in the German market, there were still other (smaller) producers around. In 1935, there were 122 independent producers in Germany (compared to 200 10 years before) and, by then, Unilever’s share had fallen to 60%. In addition, margarine was not the only edible fat. Indeed, the greater part of fat consumption in Germany was accounted for by competing animal fat products like bacon, lard, cooking fats and butter. In the 1928-32 period, margarine’s share of total fat supplies in Germany amounted to 27%. In the 1933-39 period, when domestic butter was favoured by the Nazis, margarine’s share would even fall to 24.6%. In conclusion, Unilever was big in margarine in Germany, but there was still competition, mainly from the animal fats produced by German farmers.

After WWI, Jurgens and Van den Bergh had also integrated vertically in Germany. They had acquired and operated their own oil mills, refineries and hardening plants ever since the 1920s in order to secure a regular supply of raw materials at reasonable prices. Some of these facilities were a physical part of their margarine factories, while others had supplied a greater or smaller part of their outputs to these factories or other independent producers. Accordingly, after its formation in 1930, Unilever owned

12 UAR, Dir 23, file 348.3, 6.
13 UAR, Unilever paper for private purposes, 5872; Schüttauf, Margarine (1978), 2.
14 UAR, Dir 23, file 348.3, 11.
refineries that were part of its margarine factories in Hamburg, Mannheim and Cleves. It also owned an oil mill in Spyck, a refinery and hardening plant in Emmerich on the Rhine and a hardening plant in Brake on the Weser.\textsuperscript{15} In addition, Unilever had majority interests (of about 90\%) in companies that operated oil mills and refineries in Hamburg (Thörl), Mannheim (V.D.O.) and Bremen (B.B.O.). The capacity of the processing resources was enough to provide outputs of finished products to meet the needs of peak periods. Insofar as the production of these facilities was not required for Unilever’s own margarine factories, the product was sold on the market in and outside Germany.\textsuperscript{16}

The German factories were not operated as branches of the Dutch parent firm for administration, taxation and other reasons, but by specially established German holding companies whose shares were held by the Dutch firm. In 1920, Jurgens had organized its German interests into Deutsche Jurgens Werke AG in Hamburg, while Van den Bergh had combined its German companies into Generaldirection Van den Bergh AG (Gediva) in Berlin (its name was changed to Van den Bergh Margarine AG in 1924).\textsuperscript{17} The transfer of the ordinary shares of Jurgens and Van den Bergh to the Margarine Unie NV in 1927 meant that all the factories and other interests in Germany that were directly or indirectly held by the Dutch parent companies passed in their entirety into the ownership of Margarine Unie NV in Rotterdam.

In June 1929, in addition to the existing companies, a new German firm was established in Berlin to enable more direct control of its German interests: Jurgens-Van den Bergh’s Margarine-Verkaufs-Union GmbH (abbreviated to MVU). In May 1939, its name was changed to Margarine-Verkaufs-Union GmbH. MVU had two functions: it was a holding company that controlled an important part of Unilever’s interests in Germany; and it was an operating company that managed all its German oil and margarine plants centrally.\textsuperscript{18}

\textsuperscript{15} UAR, Dir 23, file 348.3, 16.
\textsuperscript{16} By 1939, the output of Unilever’s oil mills, refineries and hardening plants in Germany amounted to 173,000 tons of crude oil, which was about 35\% of total oil production at the time. B-Arch., R87-5930, 1721, Hauptbericht über das Deutsche Geschäft des Unilever-Konzerns, 19.
\textsuperscript{17} Bundes Archive Berlin, R87-5930, 1721, Hauptbericht über das Deutsche Geschäft des Unilever-Konzerns.
\textsuperscript{18} UAR, 5872; Schüttauf, Margarine (1978), 7.
Compared to Unilever’s prominent position in the British (50-60%) and Dutch (40-45%) soap markets, the company was not a major player in the soap business in Germany during the 1930s. Jurgens and Van den Bergh had not gone into soap in Germany before the merger; it had only been through the merger with Georg Schicht AG in 1928 and Lever Brothers in 1929 that Unilever had acquired the soap interests of these companies. As a result, by 1930, Unilever owned two soap factories in Germany: Sunlicht AG in Mannheim, producing mainly hard soap (Sunlicht Seife), and Parfümerie Elida in Hamburg, producing toilet soaps and cosmetics. The two companies’ market positions were some distance behind that of Henkel. Unilever’s soap interests in Greater Germany were held and managed by a single holding company, Sunlicht A.G. in Berlin.

The crisis in the 1930s reinforced the company’s further diversification. The German market for edible fats, in particular margarine, shrank, as Nazi economic policies favoured butter. Furthermore, German currency restrictions reduced the feasibility of transferring profits to the parent company in Rotterdam, although bilateral clearing deals between Germany and the Netherlands and special ship-building deals between the company and the regime made partial transfers possible. Withdrawal from or divesting in Nazi Germany, although considered, was not within the bounds of possibility. As a result, Unilever had to look for other areas to invest in in Germany, which were often far removed from its core business. After the Nazi takeover, the company had decided ‘to swim with [the] Aryan current’, albeit to a limited extent, because it had been impossible to get its enormous investments out of the country. Accordingly, Unilever had made various business deals with the new regime, and had been closely associated with the British economic appeasement movement towards Germany. The company chose to accommodate in order to safeguard its assets, which had grown into the largest FDIs in Germany.

Turning to Unilever’s spatial strategies, margarine and oil factories were initially all located in the Rhine delta, but later also in Hamburg and Bremen, near to deep water, and strategically in the Elbian hinterland. This became increasingly important when the Schicht company from Bo-

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19 In 1937, Henkel sold about 227,000 tons of detergent in Germany, which was roughly 50% of the market share. In that same year, Unilever’s sales amounted to 27,000 tons, which was equivalent to a market share of only 6%. UAR, HIS 114, 1091, Detergent Sales in European Countries in Metric Tons, 1913-1948.
hemia – with headquarters in Aussig (now Usti and Labem) on the Elbe – was increasingly being integrated into the Dutch, and later Anglo-Dutch, trust. Of course, for administrative reasons, Van den Bergh, and later Unilever, chose to have their holding companies, which managed and combined all their German interests on a national basis, in the German capital Berlin. Moreover, when the German government’s economic policy became more and more nationalistic and even autarkic, Unilever was increasingly forced to manage its assets in Germany on a national basis. In fact, Unilever became a German company with little control left for the Dutch parent firm in Rotterdam.

3. Royal Dutch Rhenania-Ossag

Royal Dutch originated from various freestanding companies that tried to create an oil industry in the Dutch East Indies after the 1860s. According to Mira Wilkins, freestanding firms operated exclusively or mainly abroad without any prior domestic business. Royal Dutch, however, attracted capital on the Dutch capital market for the capital-intensive oil industry in the Dutch East Indies. Nevertheless, even before the merger with the British Shell Transport and Trading Company, the Dutch oil firm had also opened a refinery in Rotterdam in 1902. A year later, it entered the most attractive German gasoline market, as it started a production unit in Düsseldorf: Bezine Werke Rhenania. The refinery was set up just across the Dutch border on the Rhine to refine gasoline brought by lighters from storage tanks in Rotterdam. The shipping operations were organized by the Rotterdam shipping company Phs. Van Ommeren. The German gasoline cartel now adopted Royal Dutch as its exclusive supplier and abandoned Standard Oil. By 1904, Rhenania already controlled 90% of the rapidly growing German gasoline market. In effect, Royal Dutch seriously challenged Standard Oil’s dominant position on the European market and forced it to reach agreements on the division of this market. After the merger between Royal Dutch and Shell Transport in 1907, the Group, as it was called, became Standard’s only serious rival.

23 The information on Royal Dutch Shell is entirely based on the commissioned history of the company. Jonker/van Zanden, Challenger (2007), 79.
In 1909, Rhenania had set up a factory in Reisholz near Duisburg. After the break-up of a cartel agreement with Vereinigte Benzinefabriken in 1913, it had strategically erected gasoline refineries in Hamburg and Regensburg on the Danube to supply the entire German market. In the same year, the Group began lube oil operations as a separate company in Monheim on the Rhine. In 1917, the gasoline refineries, the lube oil works and various separate bulk installations in Germany were combined in the Mineralölwerke Rhenania AG. Despite, or as a result of, WWI, the Group’s subsidiaries in Germany had expanded their activities rapidly.  

During the 1920s, Royal Dutch Shell became one of the leaders of the international oil industry, and expanded exploration and production worldwide, including in Germany. In 1925, the Group acquired the Stern-Sonneborn lube oil works in Hamburg (Ossag) and subsequently merged with its German subsidiary in Düsseldorf, forming Rhenania-Ossag Mineralölwerke. A little later, the Group also entered into talks with Jersey Standard and IG Farben concerning IG’s hydrogenation patents. In 1929, Jersey Standard bought the global rights (with the exception of Germany) to these patents. Shortly thereafter, Standard offered to license these patents to the Group. This enabled the Group to buy a pilot factory for coal hydrogenation from IG Farben in 1930. The hydrogenation deal between Jersey Standard and the Group fitted perfectly within the collaborative atmosphere in the global oil industry of the 1920s, which had culminated in the famous 1928 Archnacarry cartel agreement on market shares and prices. As a result, the gasoline market in Germany also fell into the hands of a price cartel, which was led by the two largest suppliers, Rhenania-Ossag and Deutsch Amerikanische Petroleum Gesellschaft (DAPG), which was Jersey Standard’s German subsidiary. Germany had become the Group’s second biggest market in Europe and the fourth largest in the world, although the German degree of motorization was, compared to Britain and France, still rather low. Rhenania-Ossag’s manufacturing consisted mainly of the manufacturing of gasoline, diesel, lube oils and asphalt. Imports of raw materials and intermediates via Rotterdam and the Rhine supplied the western parts of Germany, Hamburg the northern parts, while the southern parts were supplied via Regensburg.

with Romanian oil. Although plants in the Rhine area were still important, the export business of lube oil boomed during the late 1920s. In 1930, Rhenania-Ossag’s headquarters were relocated from Düsseldorf to a new and modern building in Hamburg.²⁸

The Royal Dutch Shell group faced the same threats as the Unilever group in Germany during the 1930s. Royal Dutch Shell had to respond to the disastrous economic circumstances and mounting difficulties. The Group’s CEO, Deterding, looked at Nazi Germany with great admiration. Nevertheless, his public support for Germany’s new regime and subsequent conflicts with the board brought about his resignation in June 1936.²⁹ Meanwhile, Rhenania-Ossag had adapted to the new order and grew handsomely, increasingly presenting itself as a German company and showing its importance as a contributor to the German economy.³⁰ It had solved its major currency problems in Germany by making special shipbuilding deals and using bilateral clearing agreements. In addition, increasing exports of lube oil enabled Rhenania-Ossag to earn foreign currency with which to pay for its own imports. As the profits could not, however, be transferred to the parent companies, it had ample cash for additional investments in Germany.³¹

In 1938, the Group became involved in the Pölitz project near Stettin in Prussia (now Szczecin in Poland) for the production of synthetic gasoline at a total cost of RM 150 million. The capacity of this very big plant – 700,000 tons annually – exceeded even IG Farben’s largest hydrogenation plant in Leuna near Leipzig.³² The project was funded by the joint shareholders, with Jersey Standard and the Group contributing RM 27.5 million each, IG Farben RM 20 million and Deutsche Gasoline RM 5 million. In 1940, the plant finally came into production at a total cost of RM 270 million, which meant that the Group had almost doubled its financial commitment to the project.³³ It also meant that the Group’s total direct investment position in Germany had increased enormously just before the outbreak of war.

³⁰ Jonker/van Zanden, Challenger (2007), 470. See the advertisement: Shell und Deutschland:.Wir sind auf unserem Gebiet der grösste Arbeitgeber Deutschlands.’.
³² Stokes, IG Farben Fusion (2004), 278.
Prior to WWI, the Group had mainly invested in the Rhine region, setting up refineries and oil works in Düsseldorf, Reisholz and Monheim on the borders of the Rhine. By 1913, however, the Group began to pursue a more national-oriented spatial strategy in Germany to serve the entire German market by building gasoline refineries in Hamburg and Regensburg. After the acquisition of the Stern-Sonneborn lube oil works in Hamburg in 1925, this location became more important to the Group in Germany, eventually leading to the relocation of its German holding company’s headquarters (Rhenania-Ossag) from Düsseldorf to Hamburg. In addition, when a nationalistic economic policy conquered Germany, the Group was forced to bring its spatial strategy in line with this. On the eve of war, it became deeply involved with Germany’s autarky policy through a large synthetic gasoline joint venture in Stettin in Prussia, well away from the Rhine region.

4. AKU’s Glanzstoff

In 1911, chemist J.C. Hartogs set up the Nederlandsche Kunstzijdefabriek (Enka).34 The second founder and major financier of Enka was the coal merchant F.H. Fentener van Vlissingen, who was Chairman of the Board of Steenkolenhandelsvereniging (SHV).35 Another financier was his companion in the coal business, the German citizen J. Balthazar, who had also been involved with the establishment of Vereinigte Glanzstoff Fabriken A.G (VGF) in Wuppertal.36 The two men had been interested in artificial silk, because its energy intensive production methods were based on coal.

During WWI, Enka profited from a huge demand for artificial silk (later called rayon) and exported to Germany in particular. After the war, Enka and VGF reached an agreement on the exchange of patents and set up a small holding company in the Netherlands. Next to the big players on the world market for rayon, the British Courtaulds, the German VGF and the US Viscose Company, the smaller Dutch Enka was able to increase its production, mainly for exports, during the first half of the 1920s. As rising tariffs in various export markets were threatening Enka’s position, it set up an international holding company called Maekubee (society for the exploi-
This firm took over two factories in Italy and set up new ones in Britain and Germany. The latter was a joint venture with VGF, and was established in Breslau (now Wroclaw in Poland) in 1927. In 1929, after the patents of the US Viscose Company had expired, Enka also set up an important factory in the US, the American Enka Corporation.

Enka started negotiations at the end of the 1920s with IG Farben about a merger. Hartogs was in favour of this step, but Fentener van Vlissingen preferred an amalgamation with VGF. Although VGF’s strength in Germany had been interrupted by the implementation of the Treaty of Versailles, whereby it lost foreign assets and its position in foreign markets, it had been able to regain its strong position on the German market and rebuild its foreign relations, and was even able to take over other foreign companies.

Indeed, in 1925, VGF had formed a joint venture with the British firm Courtaulds, which contributed 50% of the capital and was one of the strongest players on the world market for viscose.

In 1929, VGF, which was one of the largest viscose manufacturers in the world, got into major financial trouble. The smaller, but financially strong, Enka, which lagged behind in terms of technology, acquired all the shares of the dynamic, but highly indebted, VGF. Deutsche Bank played a major role in the establishment of a new holding company, Algemene Kunstzijde Unie (AKU). The joint German-Dutch firm controlled both Enka and VGF, and was formed through an exchange of shares. The AKU board consisted of four delegates of the Dutch group, four of the German group, and one neutral member. In addition, each group received 22 priority shares, while Courtaulds, which also had a stake in the new merger, received four. During the 1930s, however, the German side of the company became highly indebted to the Dutch side and, as a result, an ever greater part of the firm fell into Dutch hands.

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37 Maekubee means Maatschappij tot Exploitatie van Kunstzijdefabrieken in het Buitenland.
38 Dendermonde, Nieuwe tijden (1961), 64-67.
39 Heinz, Boeddinghaus (1931), 53.
40 Sluyterman/Wubs, Over Grenzen (2009), 105-107.
41 Kleinschmidt, Americanised company (1998), 172-173.
42 Jones, Courtaulds (1986), 122.
43 James, Deutsche Bank (1995), 315-318.
Most of AKU’s production was located in Germany. Its output amounted to 60% of Germany’s total viscose production in the early 1930s, and it had become a more important artificial fibre manufacturer than its competitor IG Farben. As a result of the crisis, the autarkic policy of the Nazi regime and monetary problems, production in the Dutch plants in Arnhem and the nearby Ede was cut back and employment fell dramatically. The total AKU staff in the Netherlands fell from 8,000 in 1929 to only 2,000 in 1936, while at the same time employment in Germany increased spectacularly. In 1939, the VGF group, including its subsidiaries in Germany, Spinnfaser, Kuag, Glanzstoff-Courtaulds and Bemberg, employed over 26,000 staff.\textsuperscript{44} The National Fibre Programme of 1934 led to a huge increase in German outputs of artificial fibres, but not as much as the Nazi regime was planning.\textsuperscript{45} Total outputs, not only of rayon, but also of tyre-corduroy, in German factories increased six-fold between 1933 and 1941. Synthetic fibre manufacturers benefitted from the import restrictions on cotton and wool under Schacht’s ‘New Plan’.\textsuperscript{46} Indeed, by 1939, Germany was the world’s leading producer of staple fibre.\textsuperscript{47}

As soon as the Nazis had come to power, they began to ask questions about the multinational nature of the company and the Dutch ownership construction. In 1937, Göring’s ‘Four Year Plan’ asked the German side whether it intended to nationalize the company. The German board members responded that it would be tactically wrong to do so at the time. The firm had to appear to be non-German owned with a majority Dutch involvement to avoid retaliation from US subsidiaries. Göring was not, however, convinced, and replaced all four German delegates (against the wishes of their Dutch colleagues) with four new, more reliable, board members, including Hermann Abs of Deutsche Bank. Until the German occupation of the Netherlands, AKU remained a German-Dutch group and a private firm.\textsuperscript{48}

In terms of the spatial strategy of Enka and AKU, the viscose industry was clearly part of the transnational Rhine economy before WWII. Not only were Enka’s main plants in Arnhem next to the Rhine, but VGF’s plants were also located in the Rhine delta, near the rivers Rhine, Wupper

\textsuperscript{44} Langenbruch, \textit{Glanzstoff}, Appendix: Belegschaft der Glanzstoff-Gruppe.
\textsuperscript{45} Buchheim/Schermer, \textit{Role} (2006), 399.
\textsuperscript{46} Kleinschmidt, \textit{Americanised company} (1998), 172-174.
\textsuperscript{47} Harrop, \textit{Growth} (1968), 79.
and Main, as the manufacture of viscose relied heavily on the cheap transport of coal. VGF’s plants were located in Wuppertal-Elberfeld, all three of Oberbruch’s in North Rhine Westfalia, and Obernburg and Kelsterbach’s in Hessen. Enka’s internationalization strategy, however, depended not so much on spatial considerations, although these must have played a role, but on Enka’s financially sound position compared to that of VGF, which allowed for the take-over.

5. Deutsche Philips

Philips & Company was established by the electrical engineer Gerard Philips in Eindhoven in the south of the Netherlands in 1891. Although the light bulb company was well organized technically, it incurred great losses until Gerard’s younger brother Anton, who had trained as a financial specialist, joined the company in 1895. The combination of Gerard’s technical skills combined with his brother’s sales talent proved to be a success. The company began to sell lamps all over the Netherlands, and soon across the border in Germany in Westphalia and the Rhineland. By 1900, Philips & Company was able to pay back its original loans. Then, in 1912, the company was incorporated and named N.V. Philips Gloeilampenfabriken.49

Prior to WWI, however, Philips was excluded from an agreement between major German electrical firms like Siemens & Halse and AEG (organized in the Patentgemeinschaft – patent pool) and the American General Electric (GE). The purpose of this global entente was an exchange of patents and to carve out spheres of influence. In 1913, Philips was forced by the German bloc to sign a contract which limited the company’s sales in Germany and other European nations to below its production capacity. As a result, Philips significantly expanded its exports to the US, which directly affected GE’s sales on its home market. In 1916, GE therefore started negotiations with Philips about including the Dutch company in its network of licence holders if it stopped the export of incandescent lamps to the US. The ‘Principal Agreement’, as it was called, was signed in 1919 and brought Philips into the global inner circle of incandescent lamp ma-

nufacturers.\textsuperscript{50} In addition, GE agreed to take a stake of 20\% in Philips.\textsuperscript{51} As the Philips historian Heerding states: ‘The agreement with General Electric was one of the cornerstones of the consolidation of Philips’ post-war position within the international electric lamp industry.’\textsuperscript{52}

Another cornerstone was the end of the dominant role of the \textit{Patentgemeinschaft} as a result of WWI. In the Allied countries, agreements with the patent pool had become invalid. Factories belonging to Siemens in Britain and France and AEG in Italy had been sequestrated as enemy property. Similar measures had been taken against German patents. In the major belligerent countries, there had been hardly any innovation in the manufacture of incandescent lamps. Moreover, German companies had lost a big part of their export markets.\textsuperscript{53}

Philips, on the other hand, had shown formidable growth, as the German competition had fallen away during the war. War-time conditions had forced the Dutch incandescent lamp manufacturer on the road towards vertical integration. Before the war, it had been dependent on foreign technology, raw materials and semi-manufactured goods. In 1914, it had set up its own physics laboratory (NatLab), which developed in a short period of time into an important centre of knowledge for the company.\textsuperscript{54} In the course of the war, Philips had also set up its own factories for noble gases and glass bulbs. In addition, the war had proved that working through local agents had made the export organization vulnerable. Philips, therefore, created its own sales organization abroad.\textsuperscript{55} All of these developments, in combination with the company’s strong financial position at the end of the war, put the Dutch incandescent lamp manufacturer in an extremely favourable position. According to Swope from GE, which had just taken a 20\% stake in Philips: ‘their company grew beyond all bounds at the time’.\textsuperscript{56}

The Germans reacted with collusion and concentration. At the end of 1919, AEG, Deutsche Auergesellschaft and Siemens & Halske formed a single German incandescent lamp manufacturer, Osram GmbH. However,

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\textsuperscript{51} Blanken, \textit{Gloeilampenfabrieken} (1999), 58.  
\textsuperscript{52} Heerding, \textit{History} (1988), 335.  
\textsuperscript{53} Blanken, \textit{Gloeilampenfabrieken} (1999), 12.  
\textsuperscript{54} Boersma, \textit{Tensions} (2003), 73.  
\textsuperscript{56} Quoted in: Blanken, \textit{Gloeilampenfabrieken} (1999), 21.
\end{flushleft}
strong international competition, and in particular Philips’s expansionist policy on foreign markets, forced the newly established German company towards an international incandescent lamp cartel. This fitted perfectly with the aim of GE to protect its US home market. Both the Americans and the Germans realized that such an agreement would not work without the expansion-oriented Philips. The latter chose stability over cut-throat competition. A little later, French and British manufacturers joined the agreement. As a result, at the end of 1924, all the major companies in the world ratified the ‘General Patent and Business Development Agreement’ in Paris, which later became known as the ‘Phoebus’ cartel.\textsuperscript{57} This appeared to be one of the most successful inter-war cartels and lasted until the outbreak of WWII.

Peace on the incandescent lamp market proved to be extremely favourable to Philips, as it offered new opportunities. Due to its excellent financial position, it was able to diversify into new products and markets. In the early 1920s, Philips began to invest abroad, including in Germany. It had not been allowed to produce incandescent lamps for the German market since the Phoebus cartel agreement. As a result, the company diversified in other directions and began to challenge the largest German electro-technical firms, Siemens & Halske and AEG, with new products on their own home market.

The start of radio broadcasting in a number of European countries in 1923-24, including the Netherlands, provided a powerful impulse to the development of a radio industry. Philips reacted quickly to the rise in demand for radio valves, using its know-how from incandescent lamp manufacturing. Concentrating on the mass production of good quality radio valves soon put the company in a strong competitive position. In 1925, RCA tried to stop the expansion of Philips on its home market of the US and offered the Dutch company a licensing contract for various European countries if it stopped its expansion in America. A few months later, Telefunken, an AEG-Siemens subsidiary in Berlin that specialized in radio products, also signed a contract with its most important rival on its German home market. Philips and Telefunken agreed that the Dutch firm would not sell radio valves in Germany under its own name, but under Telefunken’s. In return, Philips received a stake of 10% of the German mar-

\textsuperscript{57} Its members had set up a company with this name in Geneva to manage the daily affairs of the cartel, i.e. Phôbus S.A. Compagnie industrielle pour le développement de l’éclairage. Luxbacher, Massenproduktion (2003), 364-365.
ket. After it acquired C.H.F. Müller (Müller) in Hamburg in 1927, which was a manufacturer of x-ray machines, it also now owned a radio valve company under the name Valvo, which had been set up by Müller in 1924. As a result, Philips’s market share for radio valves in Germany increased to more than 30%.

Philips also challenged Telefunken’s parent company Siemens on its home market for X-ray tubes. Philips had been in patent exchange negotiations with Müller in Hamburg since the early 1920s, and had taken a financial stake in the German company. Despite its efficient marketing organization, the firm fell into financial difficulties. As a consequence, Philips acquired Müller and continued to use its name in Germany and abroad. Philips’s X-ray products manufactured in Eindhoven were also sold in Germany under this brand name. Shortly after the take-over, Philips decided that research into X-ray technology should be continued in Eindhoven, but that the manufacturing would be carried out in Hamburg. This division of labour never materialized completely, but it clearly demonstrates Philips’s internationalization strategy at the time.

In 1931, Deutsche Philips GmbH, a subsidiary established in 1926 in Berlin, started negotiations in Aachen with Telefunken on an international market agreement for radio valves. Philips GmbH had begun as a production unit in Berlin, the centre of Germany’s electro-technical industry, for the production of goods like speakers and rectifiers, but over the course of time it also began to function as a German holding company. The agreement between Philips and Telefunken followed the example of the Phoebus cartel, which divided the world into ‘home countries’ and ‘common territories’. The USA and Canada were excluded from this cartel agreement. The contracting parties agreed on world-wide contingents for radio valves for a period of 15 years and a mutual exchange of licences. The manufacture of radio-sets was not involved in the valve agreement.

A second contract between the two parties, called the ‘Equipment Agreement’, was signed in the same year and provided for the exchange of licences for various markets. In 1928, Philips had also entered the field of radio-set manufacturing, as it had acquired the German firm Lorenz AG, which was located in Berlin. Telefunken had tried to buy Philips out from this attractive part of the German market, but the Dutch firm refused to

58 Luxbacher, Massenproduktion (2003), 442-443.
59 Boersma, Tensions (2003), 82-83.
60 Luxbacher, Massenproduktion (2003), 441-447.
sell. In the Equipment Agreement, Telefunken allowed Philips to manufacture and sell radio-sets from September 1934 on the German market. The Dutch company received a quota of 15% of Telefunken’s turnover. In addition, Philips was not allowed to take government contracts in the field of radio equipment. Telefunken also arranged a ‘construction permit’ from the German Radio Industry Association, officially an independent organization, but in reality completely dependent on Telefunken’s patents.\textsuperscript{61}

In 1934, Philips started a radio production unit in a rented factory in Aachen. The provisional approach had been the result of the Nazi regime in Germany, which created difficulties for foreign investors. Currency restrictions, export and import controls, bilateral clearing agreements and ASKI accounts, among other measures of economic control, reduced the investment position of foreign multinationals in Germany. Paradoxically, however, investments by Dutch companies like Philips, Unilever, AKU and Royal Dutch in Germany increased during the 1930s. This was the result of, on the one hand, increasing sales in a booming German market, and, on the other, currency restrictions, which made profit transfers to parent companies difficult. Foreign firms were therefore forced to reinvest part of their German profits. Moreover, a company like Philips did not even consider leaving the German market and losing its recently acquired strong position to its German rivals.\textsuperscript{62}

The economic nationalism of the 1930s forced multinationals like Philips to rethink their organizational structure. In 1937, the Philips board in Eindhoven discussed the reorganization of its international activities: power and functions were to be transferred to the various national organizations, which had to be given the greatest possible autonomy.\textsuperscript{63} The reorganization of Philips’s international structure took place between 1937 and 1940 in several countries, including Germany. In November 1939, the Allgemeine Deutsche Philips Verwaltung Gesellschaft mbH (Alldephi) was set up to control all the German and Austrian subsidiaries.\textsuperscript{64} The German reorganization, however, was not only the result of the plans of the Philips board in Eindhoven, but was also the consequence of pressure from the Nazi government, which endeavoured to achieve the Germaniza-

\textsuperscript{61} Blanken, \textit{Under German Rule} (1999), 49-51.
\textsuperscript{62} Blanken, \textit{Under German Rule} (1999), 61.
\textsuperscript{63} Blanken, \textit{Under German Rule} (1999), 91.
\textsuperscript{64} Philips Company Archives (PCA), 882, Alldephi 1939-, 10 November 1939, Notariele akte van Alldephi Verwaltung Gesellschaft ondertekent door O.M.E. Loupart.
tion of the Dutch firm; as a major electronics company in Germany, Philips was too important to Nazi war plans to leave it in Dutch hands.

In terms of Philips’s spatial strategy, the firm had crossed the German border to sell incandescent lamps, in particular in Westphalia and the Rhineland, at the end of the 19th century, but was soon forced to limit its sales in Germany. After WWI, the company began to invest in Germany at a time when economic nationalism already played an important role. As a result, it was immediately forced to adopt a more national approach. Moreover, Philips faced world players like Siemens and AEG as direct competitors on the German market, and had to adapt immediately to its rivals’ rules of the game. This particular situation also influenced its decision to set up a factory in Berlin in the centre of the German electronics industry. In addition, Philips’s internationalization strategy of acquisitions (Müller) instead of green-field investments brought it to the city of Hamburg. During the 1930s, however, prudence led to it returning to a rented factory in Aachen near the Dutch border. Philips’s investment strategy in Germany depended much more on the behaviour of its German competitors than its pursuit of an independent spatial strategy.

6. Conclusion

The Dutch market was too small for large industrial companies like Enka, Philips, Unilever and Royal Dutch Shell; all four of them had to expand abroad to grow. The German market offered huge opportunities just from its sheer size. In addition, Germany was close geographically, culturally, technologically and economically. As a result, the big four used all possible internationalization strategies when they expanded in Germany, i.e. green-field investments, acquisitions, joint ventures and mergers. But why were they so successful there? Did they have competitive advantages over their local rivals, like access to superior technology, management, organization, cheaper capital, and market power than their local rivals as a result of economies of scale?

WWI clearly created competitive advantages for all four Dutch companies in Germany. Through its close business relations with GE and the development of its own physics laboratory, for example, Philips got access to superior technology. Coming from a neutral country meant that, unlike its German rivals, the company’s development was not hampered by Allied restrictions. Moreover, becoming a member of the international Phoebus
cartel gave Philips the opportunity to diversify in other directions, including on the German market. The fast growing market for radio valves and radio sets opened up new possibilities on the German market, particularly during the 1930s, and thanks to regulatory agreements with the German competition.

Good financial results during and right after the war made international expansion possible for all four companies. In addition, at the start of the 1920s, the national currency of the Dutch multinationals was a great advantage compared to the weak mark of their German rivals. After the mark’s depreciation, the Dutch took over several German rivals. Van den Bergh and Jurgens bought oil mills and other margarine factories, but also expanded in other directions into the production column in Germany in this period. Philips was able to acquire an important X-ray equipment manufacturer, which led to a huge technological leap forward for the electronics firm. Royal Dutch acquired a major lube oil manufacturer, which gave it a great opportunity to export from Germany. The Dutch big four also had access to cheaper capital than their local rivals via the Amsterdam and London stock exchanges and the expansion of the Dutch banking system during the 1920s. German acquisitions were mostly financed through the Dutch capital market.

Economies of scale also mattered when the Dutch became big in Germany. Jurgens and Van den Bergh developed enormous market power and became leading companies in the German edible fats market. After 1929, Unilever eventually had over 60% of the market. The same applied to Royal Dutch Shell which, together with Jersey Standard, dominated the German market for mineral oil products. After the merger between VGF and Enka, the Dutch-German group had more than 60% of the viscose market. Economies of scale evidently prohibited the entry of new German rivals.

Whether the Dutch big four had access to superior management is debatable and has not been researched well until now. Obviously, the Dutch business system was more liberal than the German system, which could mean, hypothetically, that the Dutch were tougher capitalists in the sense that they closed down acquired factories and rationalized their businesses in Germany more easily than their local rivals. On the other hand, the Dutch big four largely adapted to German conditions, and hired many German staff, particularly at higher management levels.

Nationalist Nazi politics created problems for all four multinationals. However, the economic boom as a result of Nazi war preparations simulta-
neously offered great market opportunities. Currency restrictions forced the Dutch to reinvest their profits in their German businesses, and often far beyond. As a result, the four Dutch multinationals grew tremendously during the 1930s. On the eve WWII, the Netherlands had become the most important foreign direct investor in Germany. Indeed, the direct investments of the Dutch big four outnumbered those of hundreds of US multinationals in Germany.

Before WWI, Dutch investments had mainly been made in the Rhine region. The expansion strategy of the big four had been based on regional competitiveness and agglomeration effects of the dynamic industrial regions in the western parts of Germany. After WWI, and even more so during the 1930s, a national focus became more important for the Dutch multinationals in Germany. Unilever, as well as Philips, set up German holding companies in Berlin, but AKU and Shell also pursued national-oriented strategies over the course of time. In addition, Hamburg became more important as a sea port for mineral and non-mineral oils and fats. Indeed, Hamburg and its Elbian hinterland grew in importance for Unilever as Schicht of Bohemia joined the Margarine Unie.

Unilever, Royal Dutch and AKU were, nonetheless, clearly part of a transnational economic Rhine region: all three expanded as a result of the industrialization of West Germany and used the Rhine as a cost-efficient mode of transport. Philips’s exports to Germany were restricted by its German competitors before WWI. As a result, it could only start to invest after the war when its position towards the major German players changed radically. The expansion of the Dutch electronics firm in Germany was therefore closely related to the development of the international oligopolistic market for electronic products, rather than being the result of a spatial strategy.

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Ben Wubs

Archives

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- Unilever Company Archive (UAR)

Eva-Maria Roelevink, Dieter Ziegler

Abstract: This paper aims to define the relationship between cartelized Ruhr coal and the state in the period 1893 to 1945. In its day, the Rhenish-Westphalian Coal Syndicate (RWKS) was regarded as the most influential and powerful cartel within German industry. Research has previously assumed that the RWKS became a state-regulated organization after WWI. Private business interests united in the syndicate were thus subject to a state-directed coal economy. By examining RWKS records, this paper aims to question the one-sided assumption of state regulation by assessing the complex relationship between state organizations and industry more closely. This approach enables individual stages and phases of change to be identified.

1. Introduction

Coal was the most important commodity by far to be transported on the Rhine for more than 100 years after the mid-19th century. Most of the coal being shipped up and down the Rhine originated from the Ruhr district.1 On the banks of the Rhine, the Ruhr area not only developed into the largest German coalfield and steel producing region, but at the end of the 19th century was also the cradle of probably the most significant and long-standing cartel within German economic history. Founded in 1893 in Essen, the Rhenish-Westphalian Coal Syndicate (Rheinisch-Westfäliche Kohlen-Syndikat, RWKS) became the prototype organization for many other branches setting up cartels. Meanwhile, the Prussian state secured its influence over the German coal industry by operating state-owned mines for fiscal purposes. This is because, as in the Saarland for example, it proved to be impossible for the Prussian state to push through its own interests in

the Ruhr region via pit ownership alone. The sheer existence of the RWKS required additional measures to gain influence and secure interests.

The question of the relationship between state and industry is not only one of the oldest, but also probably one of the most significant issues in economic history. Nonetheless, little is known about the dynamics of the relationship between the state and the cartelized industries of the Ruhr, although cartels are recognized as being an important factor in the state of the German economy between the 1870s and 1945, and were thus a favoured contemporary research topic in the fields of economics and political science. This aside, more recent research in the field of business history has only rarely focused on the relationship between the state and the Ruhr coal cartel, and this reflected the general fall in interest in cartels as a research subject in Germany following the anti-cartel law of 1957. As a result, economic history research has, to date, paid little attention to records of the RWKS compared to the consideration given to government documentation.

Given this one-sided focus of research, the reactions of the companies united in cartels to the sometimes erratic behaviour of the state has been neglected. As a result, the influence of the state has been overestimated and, correspondingly, the effectiveness of the cartels and their scope for action underestimated. The general development of the political and economic framework in Germany since the 19th century is characterized by stages, moving from a liberal state via more regulation to an authoritarian interventionist state. Against this backdrop, it will be argued here that the changing relationship between the cartelized Ruhr mining industry and state institutions can only be partially explained by these stages. Of course, this is grounded in the special significance of the coal industry as the most important fuel provider for both household and industrial use, and the peculiarities of mining production. An examination of 1) the fundamental shifts in the relationships of power between state intervention

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3 For more details, see: Jovović, *Deutschland und die Kartelle* (2012).
5 On the about-turn in the German policy on cartels after 1945, see Murach-Brand, *Anti-Trust* (2004).
and state interest, and 2) the cartelized Ruhr mining industry from the Wilhelmine Empire during the Weimar Republic to the Third Reich is not only worthwhile because it provides a deeper understanding of the Ruhr syndicate, but particularly because the overall picture of a linear development leading to state intervention is contradicted in individual cases.

2. Excluding ‘unhealthy competition from the coal market’, 1893-1914

In February 1893, the RWKS was successfully set up following a series of failed attempts to form a cartel. It was joined by 98 of the 160 active coal mines in the region, involving the pits known as ‘pure mines’. These supplied the coal market alone and were not linked within the same company to coal-consuming industries, as in the case of the so-called ‘Hüttenzechen’. In juristic terms, the RWKS was defined as a dual organization formed by two contracts. The syndicate agreement bound individual mine owners to the RWKS and formulated the aim of ‘excluding unhealthy competition from the coal market’. The rules set down in the syndicate agreement empowered and defined an entire series of ordinary committees, and, among other things, defined the basic framework for the allocation of production quotas (“Beteiligungsziffern“) and price-fixing. The joint-stock company RWKS, which was also established in parallel in 1893, dealt with coal sales and represented the syndicate in external affairs.

During this formative phase, the creation of the institutional and binding regulatory body was not influenced by the state, and nor was it regulated in any other way. Indeed, the RWKS continued to expand its own system of control and regulation independently. By the end of the century, the syndicate already fulfilled three main functions for its members. The production quotas controlled and centralized the outputs of mines belonging to the RWKS, while committee price-fixing provided the basis for its infamous ‘moderate’ price policy. After 1896, the RWKS further ex-

8 Quoted from the preamble to the first syndicate agreement: Syndikatsvertrag vom 16./19.2.1893 (valid from 1.3.1893), in: N.N., Die Syndikatsverträge, o.S.
9 Ibid.
10 Ibid., A, B, C § 1-§ 5.
12 Transfeldt, Die Preisentwicklung der Ruhrkohle (1926).
panded its influence over what had previously been an independent coal wholesale industry. With the foundation of its first syndicate-wholesaler (Syndikatshandelsgesellschaft), the wholesale coal business became bound to sales areas defined by the RWKS and to its regulations. In return, these ‘servants’\textsuperscript{13} of the RWKS gained what were known as exclusive sales rights for the sales area it defined. Wholesalers were forbidden from trading with any coal other than that that was under the control of the syndicate. This push forward into wholesale was the most important expansion step undertaken by the RWKS insofar as it made its influence on the coal markets visible beyond the simple organization of producer interests.\textsuperscript{14} One of the most important syndicate-wholesalers became the Steenkolenhandelsvereeniging NV, which had sold the RWKS’s Ruhr coal on the Dutch market since 1896. In 1903, the syndicate-wholesaler Rheinische Kohlenhandel- und Rhederei GmbH (Kohlenkontor) was founded and furnished by the RWKS with the right to organize Rhine transportation.\textsuperscript{15} The two syndicate wholesalers were particularly important for the export of Ruhr coal. While the RWKS exported 7,114,000 tons of coal in 1896, this figure rose to 23,242,000 tons in 1913.\textsuperscript{16} To fulfil its three functions, the syndicate required a huge administrative apparatus in which a growing number of employees ensured the full compliance of its associated mines in the areas of production, prices and sales.\textsuperscript{17} Within the contemporary economic debate on cartels, the development of the syndicate merely provoked various attempts at interpretation.\textsuperscript{18} During this phase, the Prussian state did not formulate any claims on regulation.

It was only in reaction to the ‘coal shortage’ of 1899/1900, which was an economically provoked bottleneck in coal supplies to industry, that the Reichstag decided to set up a commission of enquiry (Enquête-Ausschuss)...

\textsuperscript{13} ‘Prior to the age of the syndicate, individual collieries were made to feel the strength of commerce, which has now been turned into the servant of the relations of production’, in: Wiedenfeld, \textit{Das Rheinisch-Westfälische Kohlensyndikat} (1912), 30.
\textsuperscript{14} Schleuning, \textit{Entwicklung des deutschen Kohlenhandels} (1936), 73-94.
\textsuperscript{15} Roelevink, \textit{Organisierte Intransparenz}, 11-21, 87-93; Böse, \textit{Kohlensyndikat} (2016), 159-167.
\textsuperscript{16} Muthesius, \textit{RuhrKohle} (1943), 211.
\textsuperscript{17} Kroker/Ragenfeld, \textit{RWKS 1893-1945} (1980), IX. Around 1900, the RWKS already employed more than 100 members of staff; in 1935, nearly 1,000 employees worked in the administration and organization of the syndicate.
\textsuperscript{18} Blaich, \textit{Kartell- und Monopolpolitik} (1973).
on the question of cartels. This was supposed to supply information on the
impact of cartelization on the German economy and operated between
1902 and 1905. Essentially, the commission did not argue in favour of the
state control of cartels in any form. The main focus of the debate was
more on general issues relating to the national economy and theoretical
considerations about the influence of cartels on this.¹⁹ The RWKS was the
first cartel to be investigated formally by the commission, apart from gen-
eral discussions of possible ‘profiteering’ ²⁰ due to its dominant market
position. Nevertheless, the questioning of syndicate representatives re-
mained uncritical, and the statements made by its members – predomi-
nantly those from the coal business, but also from the coal-consuming in-
dustries – were mainly favourable. The survey had no consequences for
the RWKS, although a growth in parliamentary interest with respect to
questions of the economic order was discernible. The possibility of a state
supervisory board for cartels was the only aspect actually discussed. As a
consequence, the talks produced no real findings.

Accordingly, the challenge facing the RWKS during this phase did not
entail warding off interventionist claims of the state, but instead concerned
the absorption of the ‘Hüttenzechen’ into the syndicate. Until 1903, the
Hüttenzechen of the Ruhr, that is the collieries with tied-in coal-consum-
ing works, had not become syndicate members; up to this point, the coal
not used in their own works had represented considerable competition to
the RWKS. As a result, the negotiations on the admission of the Hütten-
zechen involved an extension of the syndicate’s previous role. The produc-
tion quota, which had previously only related to market output, was now
complemented by a ‘non-sale quota’. Non-sale consumption included all
the coal used onsite by the Hüttenzechen, which was now associated with
the syndicate. The concomitant introduction of a ‘transport quota’ had the
purpose of enabling the syndicate-wholesaler to employ the collieries’
means of transport. This represented a further extension of the RWKS’s
functions.²¹ In general terms, the syndicate agreement of 1903 created
such stable relations that it did not need to be renewed early, and nor did

¹⁹ Jovović, Deutschland und die Kartelle (2012), esp. 258f. See also: Köster, Kartell-
debatte der Nationalökonomie (2014), 215-217, and Blaich, Die Kartellenquete
(1974), 775-786.
²⁰ Lucae, Außenseiter (1929), 3.
²¹ Syndikatsvertrag vom 15.09./1.10./29.12.1903 (gültig ab 30.9.1903), Supplement
1909, in: Die Syndikatsverträge (1933), o.S.
the state feel compelled to intervene in the syndicate’s operation of the coal industry. It even seemed that any state assistance with the regulation of competition was unnecessary ‘as modern economic laws tend to only curtail a few egoistic excesses (…)’: thus, on all sides, endeavours are being made to replace general competition with an emphasis on common interests, to replace the economic anarchy of battle with organized competition.’

During this phase, it may even have seemed as if the state positively objected to fencing in the cartel with regulations and legal restrictions. Yet the state did become active: in 1902, the Bergwerksdirektion Recklinghausen was established as a state mining company. As was already the case in the Saarland and Upper Silesia, the Prussian state now also became a mining operator in the Ruhr. The foundation and expansion of state mines for fiscal purposes was intended to ensure the state’s own powerful influence on Ruhr coal. However, the attempt to take over the Hibernia mine, which was one of the largest ‘pure mines’ in the Ruhr district affiliated to the syndicate, failed in the face of the collective opposition of Ruhr industrialists that was organized by the RWKS. Even so, both the takeover attempt under the guise of breaking the syndicate’s ‘profiteering’ and the buying up of coalfields by state fiscal mining companies also revealed that, while the Prussian state was still inferior to the Ruhr barons in terms of a direct show of force, its involvement was less an intervention in terms of economic regulation, but more as a competing mining operator. As in the case of the Saarland coal district, the strategy of the state was to gain influence through active participation in the coal industry. The fiscal mines joined the RWKS for a short period in 1910/11, effectively as a trial run. Nevertheless, with its extra demands, freely interpreted trading, sales freedom and special price regulations, the fiscal company failed in the syndicate’s arena; after only brief membership, the fiscal mines left in 1911 and the RWKS was confronted with a strong independent competitor. At the same time, the cartelized mining industry of the Ruhr remained unregulated and unlimited by legislation.

22 Quote from Wiedenfeld, *Das Rheinisch-Westfälische Kohlensyndikat* (1912), 1.
3. *In the interest of war: intervention in the coal industry, 1914-1918*

On the outbreak of WWI, the position of the state changed radically. The demands of war made a stronger influence on the coal industry inevitable. A series of so-called ‘war corporations’ (Kriegsgesellschaften) were set up during the war, which placed the issue of raw materials under the control of state and military authorities.\(^{25}\) Although the coal industry was classified as being essential to the war-time supply of raw materials, a war corporation was not set up in this district. Indeed, the state authorities regarded cartels and syndicates as a lever for state intervention where necessary. Accordingly, the effort involved in restructuring the coal industry as a war corporation was initially unnecessary.

Some members of RWKS sensed that the outbreak of war presented great opportunities for higher profits, but all the more so without the rigid body of regulation represented by the syndicate. Applications to this effect – concerning modifications to sales agreements and production quotas – provoked a fierce debate within the RWKS on how the approaching renewal of the syndicate agreement should be formulated. On the one hand, some syndicate members wanted to push through a substantial relaxation of syndicate regulations while, on the other, a similar number of mines refused to agree to change the rules.\(^{26}\) When the 1903 agreement then expired, and RWKS members seemed to be unable to reach any agreement in 1915, the syndicate seemed close to collapse. At this point, the state made the unprecedented decision to intervene in the cartelized framework of the Ruhr coal industry.

Now at war, the state was not in favour of releasing individual Ruhr mines and effectively losing the RWKS as an instrument of regulation, because this would, in turn, have made the state regulation of individual mines necessary. In this context, a Bundesrat (the upper house of parliament) decree\(^{27}\) made it possible for regional state authorities to unite in future individual companies operating within the same coal district, even without their agreement. Dissolution of the RWKS was thus no longer a possibility. Now, the relevant question was only whether the mining companies would be able to reach an agreement voluntarily or whether they

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\(^{26}\) See Stenogramme der Beiratssitzungen 1914 and 1915, in: BBA 33/67 and BBA 33/68.

\(^{27}\) *Bundesratsverordnung* (1915), 427-430.
would be forced to unite in a compulsory syndicate. In either case, the RWKS would remain responsible for the regulation of outputs and sales. That being said, the state did intervene in price regulation, which had previously been freely practised by the RWKS. In future, the prices set by the syndicate’s assembly of mine owners had to be approved by the regional government authorities, which in this way gained a right of veto with regard to RWKS price regulation. Nevertheless, this legislation did not allow any intervention in the practice of output regulation through production quotas, nor in the control and organization of sales by the syndicate-wholesalers.

Another aspect of the Bundesrat decree was of particular importance for the future relationship between the state and the Ruhr coal industry: it was stipulated that at least 97% of production within one mining district had to comply with the new syndicate agreement; otherwise, a compulsory syndicate would be set up on the authority of regional governments. For the members of the RWKS, this meant that only an agreement with the fiscal mines of the Ruhr could prevent the creation of a compulsory syndicate; by this point, these Ruhr mines produced more than 3% of hard coal in the Ruhr region. Clearly, the Prussian state had learnt from the temporary syndicate membership of its mines. While the membership of the fiscal mines in 1910/11 had principally failed because the RWKS had not accommodated the special conditions demanded by mining operators, the Bundesrat decree now stipulated directly that the coal produced by the fiscal mines could be sold straight to the rationing boards; these supplies were not to be subject to any restrictions on the part of the RWKS.

By this point, the syndicate mines were in fact in such conflict that the renewal of the syndicate agreement was difficult to negotiate; the version still in force was literally renewed at the last minute on September 15, 1915. The form of the new agreement was a continued source of dispute well into the second half of the war. State intervention in price regulation

28 Bundesratsverordnung (1915), § 1, 427.
29 Bundesratsverordnung (1915), § 5, 429.
30 Bundesratsverordnung (1915), § 9, 430.
31 Bundesratsverordnung (1915), § 6, 429.
32 Sitzung des Ausschusses f am 14.10.1916, Bl. 41f., in: BBA 33/79. The syndicate in fact chose the intermediate form, ‘temporary syndicate’ (‘Übergangssyndikat’), which prevented compulsory union. The contract in question was initially agreed for the period 1.1.1916 to 31.3.1917 and on the basis of the contract of 14.10.1916 repeatedly being renewed up to 31.3.1922.

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was perceived to be an affront to the RWKS. In the relevant committee meetings, the complaint was repeatedly heard that the minister had warned against ‘setting prices too high’. Nevertheless, the RWKS was able to achieve significantly higher profits than in the pre-war years by, for example, modifying the rules on the syndicate-wholesaler. Moreover, the RWKS also changed tack in its approach to government authorities, given that the Bundesrat decree did not provide the state with any comprehensive authority to intervene in the syndicate’s system of intervention, with only price regulation placed under the immediate influence of the regional state authorities. The organization of outputs and sales remained exclusively in the hands of the RWKS, which was a situation the latter could turn to its advantage; while it was highly probable that the syndicate would have collapsed without the Bundesrat decree, the position described above meant that this was no longer possible.

The syndicate soon learnt to deal with the problem that prices on the domestic market were now subject to state control. While exports had had to be subsidized by a levy on – then significantly higher – domestic prices prior to 1914/15 due to British competition, the neutral export markets now proved to be a real pot of gold. The RWKS responded to the restrictions on profits within the domestic market due to the state control of price regulation by deciding to make the biggest possible gains in foreign markets. ‘Patriotic considerations’, such as the limitation of exports in the interest of dwindling domestic coal supplies, became increasingly irrelevant during the course of the war. In turn, sales returns from the syndicate’s mines developed so favourably that it was able to totally abstain from imposing the levy on domestic prices on competitive markets. While the RWKS board had repeatedly found it necessary to apply for an increase in contributions prior to the war, in 1916 it was then even able to announce large refunds, which were drawn from profitable foreign sales. Nevertheless, this was not supposed to be made public, and it was in fact

33 Beiratssitzung, 29.7.1915, Bl. 2, in: BBA 33/68.
35 Sitzung des Ausschuss f), 24.11.1915, Bl. 11-19, in: BBA 33/77.
37 Niederschrift über die Vorstandssitzung, 20.4.1916, Bl. 2, in: RSW/4012.
possible to keep this shift secret from the state authorities for a long period of time.\textsuperscript{39}

In addition, some RWKS members developed a way of bypassing the highest effective prices on the domestic market. This involved increases in transport charges, which were set and refunded by the syndicate, while sale prices for coal remained at the level approved by the state. In this way, the RWKS undermined the targets pursued by state regulation and rightly feared that this policy would provoke new forms of intervention. As a preventive measure, the RWKS board decided to seek greater proximity to crucial political and military offices, and set up a representative bureau in January 1916 in Berlin, which had the exclusive aim of preventing further state involvement in its business.\textsuperscript{40}

The Berlin bureau soon proved to be an extremely helpful institution during the latter half of the war when the provision of coal supplies to vital war-time industries became critical. This led to the establishment of the Office of the Reich Coal Commissioner in February 1917. The intention was to gain a stronger influence over coal movements, that is to say on the allocation of coal.\textsuperscript{41} The Coal Commissioner reported directly to the Reichskanzler, meaning that the regulation of the coal industry had effectively been removed from the jurisdiction of the Prussian regional government. In addition to the Bundesrat decree, the Office of Coal Commissioner was granted the power to help itself to RWKS coal, i.e. to regulate coal allocations according to war-time needs. Thanks to its Berlin bureau, the RWKS was able to manoeuvre some of its own candidates into the Coal Commissioner’s department, and, as in the case of the Bundesrat decree, was even able to take some advantage from the establishment of the Office of Coal Commissioner. It was now no longer the case that the RWKS could be held responsible for coal shortages; criticism voiced by both the public and military authorities about inadequate coal supplies was now directed at the Coal Commissioner’s department.

During the war, the RWKS was able to block a total reorganization of the coal industry by the state. Particularly with the help of the Coal Commissioner, this demand, which was popular in military circles, was thwart-

\textsuperscript{39} Sitzung des Ausschuss f), 6.04.1916, Bl. 34f., in: BBA 33/78.
\textsuperscript{40} Sitzung des Ausschusses f, 17.1.1916, Bl. 83ff., in: BBA 33/78.
\textsuperscript{41} Bekanntmachung über Regelung des Verkehrs mit Kohlen (24.2.1917); Bekanntmachung über die Bestellung eines Reichskommissars für die Kohlenverteilung (28.2.1917).
ed. Instead of dominating the RWKS, the Coal Commissioner increasingly served as a buffer between proposals that became caught up in state institutions and the RWKS, which continued to enjoy the greatest possible freedom in terms of its sales organization, which was at the heart of its order.\textsuperscript{42}

4. ‘Nationalization’ and the ‘cooperative economy’: the first coal statute

After the Armistice, the RWKS was subjected to greater state control than during the war.\textsuperscript{43} During and after the revolution of 1918/19, the demand for nationalization – of the entire economy and primary industry at least – had been very popular.\textsuperscript{44} Nevertheless, the Reich government and the Ruhr barons found the notion of changes to ownership rights, whatever their form, unappealing and played for time. While the motivation of the industrialists was obvious, the young government feared experimenting with the political order in the face of demobilization, the reintegration of soldiers into the civilian labour market, and the transition from a war-time to a peace-time economy. Moreover, the argument was raised that a nationalized (as opposed to private) coal industry would facilitate Allied interventions.\textsuperscript{45} Despite totally opposing interests, the revolutionary government and the RWKS closed ranks in a way that would not have been possible during the war. Public pressure led to the creation of a so-called Nationalization Commission, which was to investigate the opportunities for such a re-shaping of the economy.\textsuperscript{46} Its political weight was, however, limited, despite the demand of miners for the ‘immediate nationalization of the mines.’ Within the RWKS, the danger of mine nationalization was thought to be unrealistic\textsuperscript{47} because, instead of making proposals for funda-

\textsuperscript{42} Sitzung beim Reichskohlenkommissar, 2.5.1917, o.S., in: BBA 55/406.
\textsuperscript{43} Storm, \textit{Geschichte} (1927), 102.
\textsuperscript{44} Besprechung in der Reichskanzlei über das Kohlensyndikat, 16.1.1919, in: [BArch] R 43-I/2170, Bl. 2ff.
\textsuperscript{46} Wulf, \textit{Sozialisierung} (1977), S. 48ff., cit. S. 97.
mental and decisive changes, as was its mandate, the Nationalization Commission focused its energy on coolly ‘taking the sting out’ of the nationalization movement in the common interests of both the state and industrialists.48

In this setting, two items of legislation were introduced in March 1919 which aimed mainly to reassure the public. First, the law on nationalization (Sozialisierungsgesetz)49 suggested a transition to a ‘cooperative economy’ (“Gemeinwirtschaft”). However, it remained unclear how such an economy would be possible on the basis of only a nationalized mining industry or without any changes in ownership. In fact, the law lacked any powers to introduce concrete steps towards nationalization. This was also unnecessary for ‘the sub-field of the coal industry’, given that, on the very same day, ‘a statute on the regulation of the coal industry’ was passed which provided for a ‘cooperative’ coal industry without changes in ownership.50 In this way, the law on nationalization had no consequences for the RWKS.

In addition to the Nationalization Commission, the Economics Ministry also looked into the demands for nationalization, setting up a commission that had worked on a ‘national energy law’, the Coal Statute (Kohlenwirtschaftsgesetz, KWG). Within the RWKS, the only concern was that the Office of Coal Commissioner may become permanent, but otherwise it was felt that there was nothing to fear.51 The Coal Statute, which became law at the same time as the legislation on nationalization, was indeed similarly vague in its announcement of the ‘cooperative organization of the coal industry’, and postulated that all coal-producing regions should now unite in ‘associations’.52 The form that the so-called ‘cooperative organization of the coal industry’ was actually supposed to take only became clear in August 1919, when the requirements for the implementation of the Coal Statute were issued.53 It was now stipulated that all coal-mining districts not only had to set up ‘associations’, but also ‘syndicates’, by

48 Besprechung in der Reichskanzlei, 17.1.1919, in: R 43-I/2170, Bl. 7ff. Robert Wilbrandt, a member of the Nationalization Commission and highly acclaimed economist, commented as follows: ‘In this way it would be possible to simply take the sting out of the movement without bloodshed.’, Ibid., Bl. 45.
49 Sozialisierungsgesetz (1919), 341ff.
50 Sozialisierungsgesetz (1919), § 2, 342.
51 Willi Huber an Ernst [Kramer], 1.2.1919, o.S., in: BBA 55/360.
52 Kohlenwirtschaftsgesetz (1919), 342-344.
53 Ausführungsstimmungen Kohlenwirtschaftsgesetz (1919), 1449-1472.
September 1920. If the implementation was found to be lacking, the Economics Ministry was entitled to enforce unions. As set down by the requirements for implementation, the syndicates were to be organized along the same lines as the RWKS. Newly created supervisory bodies, the Coal Council (Reichskohlenrat) and the Coal Parliament (Reichskohlenverband), were responsible for supervising the syndicates. The Coal Council was charged with controlling imports and exports according to the principles of the cooperative economy and was empowered to set down guidelines. It also had the right to look into the fuel balance of the regional syndicates. On the other hand, the Coal Parliament was supposed to act as the highest supervisory authority by monitoring individual syndicates and making sure that the guidelines set down by the Coal Council were adhered to. The Coal Parliament and Coal Council were also given the power to either approve or reject the domestic coal prices suggested by the syndicates. In this way, they were successors to the regional government authorities that had approved prices under the Bundesrat decree. The role of Coal Commissioner, meanwhile, was not abolished by the Coal Statute.

Although the Coal Statute enforced permanent ‘government dictation’ (‘Zwangswirtschaft’), it did not in any way annul the RWKS as a self-governing body. The main reason for this was that Ernst Herbig, who was closely associated with the Ruhr industry, ‘drew up the statute for the Economics Minister’, as was laconically commented on within the RWKS as the Coal Statute came into force. In reward for his loyal service, Herbig was appointed to the board directly in 1919. The Coal Council, as the authority charged with the control of the entire coal industry, was also very much under the influence of the RWKS in terms of personnel. Eugen

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54 Ausführungsbestimmungen Kohlenwirtschaftsgesetz (1919), § 5, 1450.
55 Ausführungsbestimmungen Kohlenwirtschaftsgesetz (1919), § 48, 1458.
56 Ausführungsbestimmungen Kohlenwirtschaftsgesetz (1919), § 57, 1460.
57 Ausführungsbestimmungen Kohlenwirtschaftsgesetz (1919), § 133, 1471.
58 After studying mining, Herbig started work in the Saar district, where he remained between 1904 and 1907, and so he neither gained his qualifications in the Ruhr district and nor did he belong to the RWKS ‘society’. In 1917, it was Herbig who built up the Office of Reich Coal Commissioner. This brought him to the attention of the RWKS. In 1919, while working on the wording of the Coal Statute at the behest of the Economics Ministry, he was appointed to the RWKS board. He retained this post until 1938; see Hülsen, Herbig (1969).
Kleine was appointed chairman in 1919. As managing director of Harpener Bergbau AG, and thus the representative of the most influential ‘pure mine’ within the RWKS, it was very evident that someone working in the RWKS’s interests and a defender of the syndicate vision had been chosen. Within the Coal Parliament, the strength of the RWKS was also overpowering due to the allocation of seats according to output. This meant that the RWKS had little reason to openly oppose these new authorities. On the contrary, the regional syndicates and the predominance of the RWKS meant that syndicate management was able to promote the long sought after cartelization of all coal districts and thus not only prevent competition between the Ruhr mining companies, but also between the mining regions.

Although the German coal industry was subject to more state control under the new authorities of the Coal Council and Coal Parliament than, for example, during WWI, effective rules and regulations pertaining to the organization of the RWKS were again not established. The legislation prevented the dissolution of the syndicate, linked prices to the approval of the Coal Parliament and established certain quantity regulations. The hurried laws failed to empower these authorities to intervene in the RWKS’s sales organization, which continued to gain in importance.

Nonetheless, aside from the state and the syndicates, a third actor that was able to have at least an indirect influence on the pricing policy of the syndicates emerged after the revolution: the miners and their trade union. After the war, the miners expected to earn wages that were enough to provide food for themselves and their families, and to work hours that would enable their working ability to slowly return to pre-war levels. Especially in comparison to industrial workers, miners felt that they were disadvantaged. The introduction of the eight hour day represented only a relatively modest revolutionary gain for the Ruhr miners; the reduction in working hours in their case represented only a half instead of a full hour. After December 1918, strikes for a six hour shift were repeatedly held. With the help of the miners’ trade unions, management tried to divert this demand into one for higher wages in order to prevent a further drop in coal production in Germany. While the employers’ association for the coal industry of the Ruhr was thus principally open to demands for higher wages, the trade unions were – due to their representation on the Coal Council – obliged to

60 Mariaux, *Gedenkwort* (1956), 281.
61 Lüthgen, *Kohlensyndikat* (1926), 54.
actively work in favour of the additional cost burden on companies being compensated for by price increases. This wage/price package was to fundamentally shape the relations between employer and employee representatives in the hard coal industry during the years that followed and up to the start of hyperinflation in 1923. In the context of excess demand, which dominated the coal markets up to the currency stabilization of 1924, such price increases were carried by the market and the state. The latter could have intervened in the interest of coal consumers, but rarely did, although the influence of the Social Democratic, and later especially Catholic, trade union leaders on the respective governments was not an insignificant factor.\footnote{For more detail, see: Tschirbs, \textit{Tarifpolitik} (1986), 121ff.}

The start of hyperinflation marked the breakdown of the silent consensus between employers and the trade unions on wages and prices. Despite its politically strengthened position, the syndicate’s freedom to set prices remained limited: during the ‘golden’ 20s, the state repeatedly intervened through compulsory arbitration in autonomous wage bargaining to the benefit of the trade unions, which were weakened by falling membership numbers and unemployment. That higher coal prices would compensate for the prescribed wage increases was no longer certain. During the Depression and thanks to Brüning’s policy of deflation, employers were again able to push through wage cuts in return for the pledge of the syndicates to keep coal prices stable.

5. \textit{From coal surplus to coal scarcity in the arms economy and under the autarky policy in the Third Reich}

As a consequence of the economic crisis, conflicts between the syndicates became more extreme when fuel demands dropped significantly, not only throughout German industry, but in neighbouring economies too. In order to cushion a 7\% wage cut for miners in the Ruhr, the government announced at the end of 1931 that it was prepared to suspend both employer and employee social insurance payments for two months and cover the difference. As this indirect subsidy was only applicable to the mines in the Ruhr region, the measure provoked harsh criticism from syndicates in oth-
er mining districts.\textsuperscript{64} However, unlike the Ruhr region, these sold almost all of their coal on the domestic market, while the RWKS had to carry the substantial costs involved in promoting the sale of coal from the Ruhr in highly competitive export markets. Given that the state interest in the foreign exchange balance made the maintenance of exports essential, subsidizing coal from the Ruhr with social insurance contributions seemed to be a legitimate measure.\textsuperscript{65}

In former years, the RWKS had largely managed to balance out the financial contribution to exports through higher domestic prices, but these were difficult to maintain during the years of crisis. Apart from the fact that price increases had to be approved by the Coal Council, the RWKS was unable to impose a division of the domestic market. This meant that the so-called contested markets – such as in the south of Germany – were marked by a bitter price war despite cartelization. The small coal-mining region of Aachen in particular profited from this situation for a long time. The Aachen Coal Syndicate, as set up under the Coal Statute, had only four members. As voting agreements were easy to make, it was able to maintain prices at significantly lower levels than those of its main competitor, the RWKS, meaning that production limitations could be avoided by the syndicate members.\textsuperscript{66}

Given its proximity to the Ruhr region, the Aachen Coal Syndicate could be regarded as a RWKS outsider. From the perspective of the Ruhr coal industry, the policy of the Aachen Coal Syndicate contradicted the spirit of the Coal Statute of 1919, which forced outsiders into syndicates in order to uphold syndicate prices in the market. The anti-monopolistic price controls simultaneously introduced by the Coal Council were then intended to guarantee that syndicates could not set their prices higher than the fictional market price. In the case of price cuts by other syndicates, however, the RWKS was unable to rely on the Coal Council, because the latter regarded them as an indication of healthy competition. So, from the end of the 1920s onwards, the RWKS repeatedly attempted to persuade the Aachen Coal Syndicate to join it. The Aachen group did not refuse in principal, being aware that the request from the Ruhr was in the spirit of the Coal Statute, and so feared intervention by the Economics Minister.

\begin{footnotesize}
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\item[\textsuperscript{64}] Tschirbs, \textit{Tarifpolitik} (1986), 416.
\item[\textsuperscript{65}] Banken, \textit{Reichsberggesetz und Einzelmaßnahmen} (2006), 71-120.
\item[\textsuperscript{66}] Bruch, \textit{Die Neuordnung} (1936), 13; Schunder, \textit{Geschichte des Aachener Steinkohlenbergbaus} (1968), 276.
\end{itemize}
\end{footnotesize}
Nevertheless, its delaying tactics successfully warded off all approaches from the Ruhr during the years of crisis and thereafter.

In addition, brown coal had developed into a dangerous competitor to hard coal after WWI, given the substantial and easily accessible deposits of lignite in Western, Central and Eastern Germany. While the coal industry in the Ruhr had only just returned to pre-war production levels prior to the crisis, the production of lignite by the three big syndicates – including the Rhine Brown Coal Syndicate in the direct neighbourhood of the Ruhr district – had continuously increased since the war.

In the opinion of the RWKS board, neither Aachen coal nor Rhenish lignite could be fought by means of competition alone. Instead, it set on state regulation, which seemed to function after the Nazi takeover: in 1933, Erich Winnacker, former head of the mining group Hamborn of the Vereinigte Stahlwerke, was appointed Special Plenipotentiary for Coal at the Ministry of Economics (Sonderbeauftragte des Reichswirtschaftministerium für Kohlefragen). Winnacker was a National Socialist, which secured his appointment to the ministry, and his former employer, Vereinigte Stahlwerke, was the biggest coal producer in the Ruhr.

In the summer of 1933, Winnacker had already presented the draft of a new coal statute that was supposed to replace the first one from the early days of the Weimar Republic. It proposed that the RWKS and the Aachen Coal Syndicate should be united, as should the Central German and East Elbian Brown Coal syndicates. This was seen as the basis for the real aim of the reform: the allocation of all coal sales in Germany. The Coal Statute of 1919 had still permitted competition between syndicates. The shift in market shares to the benefit of lignite and to the detriment of hard coal that occurred thereafter would otherwise not have been possible. Winnacker’s view (and that of the RWKS) was that the whole of the German coal industry should be united in one central cartel – eliminating ‘unhealthy competition’. This would have made a further expansion of lignite to the detriment of coal significantly more difficult.

From the perspective of the Ruhr coal industry, the cartelization of all German coal sales had another advantage, too. Coal exports were very important to the German foreign trade balance, but came almost exclusively from the Ruhr. This provided the basis for the RWKS argument that the

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67 On the following: Entwurf für ein Gesetz zur Regelung der Kohlenwirtschaft (undatiert, Sommer 1933), in: BBA 33/944.
burden should be shared by the other coal regions, too, namely those that mainly had domestic sales and thus benefitted from cartel prices to a greater extent. The ministry and Winnacker found this argument to be plausible in light of the country’s foreign exchange shortage. Getting the other coal-producing regions to share the burden incurred through the export of Ruhr coal was proposed by the RWKS as follows: a levy was to be imposed on all syndicates with domestic sales, which was to be passed on to the exporting syndicates, i.e. to the RWKS. The height of the levy was, on the one hand, to correspond to the necessary subsidy requirements and, on the other, to the market share of each syndicate in total sales.\textsuperscript{68}

While the RWKS was rather pleased with this draft, the brown coal syndicates in particular opposed the plans. In their opinion, an allocation of coal sales was fundamentally unacceptable. Such reform would have dramatically hampered opportunities for future growth in the brown coal industry. Nevertheless, with an eye to blocking the further expansion of this industry through the allocation of coal sales, most of the other hard coal mining regions were basically in favour of Winnacker’s draft proposals, despite the export levy to which they would have also had to contribute.\textsuperscript{69}

The union of the RWKS and the Aachen Coal Syndicate was in fact the only one of these plans to be realized. This represented an immediate end to the growth in the significance of Aachen coal.\textsuperscript{70} All other plans involving lignite mining were successfully rejected by the brown coal syndicates. The maxims of the economic policy pursued by the Nazi government had radically changed with the appointment of the new Economics Minister Hjalmar Schacht, and Winnacker had lost his influence, which had been essential to the coal industry.\textsuperscript{71} Schacht now no longer wanted to limit lignite mining (which was comparatively profitable) in favour of hard coal, but to use the former to expand economic autarky by dealing with the issue of foreign exchanges. Schacht forced the entire German

\textsuperscript{68} Ausarbeitung ohne Autor und Datum, in: BBA 33/944.
\textsuperscript{69} Aktennotiz (Janus), 14.9.1933, in: Ibid.
\textsuperscript{71} Shortly after Schacht’s appointment, Winnacker was replaced by Heinrich Schlattmann, the former’s representative in the mine administration. Although Schlattmann originally came from the Ruhr area, too, like ‘Beamte’ he had no real affinity to the RWKS and was last employed in the Oberbergamtsbezirk Breslau. See: Farrenkopf, \textit{Schlattmann} (2007).
brown coal industry into a compulsory union in order to set up an enterprise for lignite hydrogenation, then known as Braunkohle-Benzin AG (Brabag). Up to this point, the hard coal industry had always been able to point to its significance to Germany’s foreign trade balance due to the export of Ruhr coal. The brown coal industry was now able to catch up in terms of its importance to the national economy – at least that was the contemporary understanding – due to its part in the Nazi policy of autarky. The development of German petrol plants based on domestic brown coal was also beneficial to the German foreign exchange balance, as a reduction of mineral oil imports was thus possible.

Moreover, by the end of 1934 at the latest, the imminent incorporation of Saarland coal into the RWKS absorbed the complete attention of the mining department in the Economics Ministry and the RWKS board. The two sides were convinced that the outcome of the planned referendum on the reunion with the Saarland coal district (which had been separated from the German Reich by the Treaty of Versailles) would be in favour of Germany and that a further 10 million tons of coal would thus have to be sold on the domestic market. During negotiations, which began in July 1934, the Economics Ministry insisted that the RWKS should absorb all coal from the Saarland no longer bought by France, so that not a single Saarland miner would lose his job. In return, the RWKS demanded a division of the burden among the other syndicates (the so-called Saar-sacrifice, “Saaropfer”) and, at the same time, attempted to use the question of the Saarland as a lever to impose a general allocation of coal sales in Germany.72

While the incorporation of the Aachen coal industry further strengthened the significance of the Ruhr coal cartel within the domestic coal market, the incorporation of Saarland coal initially had no effect on the market order. By way of their contribution to the ‘Saar-sacrifice’, the Upper Silesian and Lower Silesian coal syndicates withdrew completely from West Germany and totally abandoned the region to the benefit of the RWKS. Nevertheless, the syndicates had still not been able to reach comprehensive agreements on sales areas.

It was not before early 1936 that Winnacker’s successor, Heinrich Schlattmann, returned to his predecessor’s initiative after the takeover of

the Saarland coal districts from the French state, and after a state-owned company, Saargruben AG, had been set up on the German side and incorporated into the RWKS. Schlattmann demanded that the syndicates finally put an end to the ‘unhealthy competition between different coal types and mining districts’ and draw up suitable suggestions. Nonetheless, the brown coal syndicates again managed to block an agreement.73

During Winnacker’s era, negotiations had still been carried out under the shadow of the continuing sales crisis of the early 1930s that still had to be overcome. The hard coal syndicates essentially wanted to 1) limit the then drop-off in prices, and especially any price falls in future sales crises from the start; and 2) face up to the loss of market shares to brown coal. In contrast, by the beginning of 1937, sales of hard coal had not only recovered but, as it emerged, Ruhr coal production was to exceed the previously maximum level of 1929 for the first time. From the point of view of the Economics Ministry, and even more so from the position of the administration of the rival Four Year Plan under Hermann Göring, it was no longer a question of stabilizing the coal market, but of guaranteeing the power demands of a national economy working at full steam.

The guarantee of power supplies was an important precondition to the arms production and autarkic economic policy targets pursued by the Nazi regime. Within only a few years, a coal surplus had turned into a coal shortage again. Given their recent experience, however, the syndicates saw no need to expand capacities. Indeed, the politically determined coal price provided no incentive to make significant investments in expanding capacity. Given that contemporary calculations for a new mine were assumed to take up to 10 years from planning to first production, the coal shortage could only be combated in the short-term by intensifying labour. Yet miners were in great demand: the expansion in iron ore mining, driven by the policy of economic autarky, led to large numbers of miners being lured away from hard coal mining regions. Indeed, the job of being a coal miner had lost much of its appeal after WWI, as other occupations had caught up or even overtaken miners in terms of wages and working hours.74

74 Wisotzky, Der Ruhrbergbau (1983), 129-130.
As a result, the only way of increasing coal production was to also increase working hours. The Ministry of Labour had already made earlier attempts to do so, but the coal industry was able to successfully block such plans with the help of the Labour Front (DAF). The motives of the parties involved were very different. While the DAF primarily feared opposition from the miners, the employers expected a further drop in labour productivity accompanied by a disproportional increase in shift work rates, which would have resulted in a marked rise in the cost per ton of coal outputs. In fact, Hermann Göring picked up this point and met the misgivings of the DAF by decreeing disproportional wage premiums in March 1939 in return for an increase in working hours from 8 to 8.75 hours.\footnote{Mason, \textit{Arbeiterklasse und Volksgemeinschaft} (1975), Document 87, 575; Wisotzky, \textit{Der Ruhrbergbau am Vorabend} (1982), 443-447.}

Increased working hours were not, however, a real solution to the problem, because of the expected cyclical fall in labour productivity per head and working hour. The situation was such that, in April 1939, even Göring felt compelled to restrict coke consumption in the iron and steel industry despite the latter’s special significance for arms production.\footnote{Gillingham, \textit{Industry and Politics in the Third Reich} (1985), 60.} As the situation remained tense in the summer of 1939, Göring blamed the coal industry’s policy of wait-and-see. Certainly this was not entirely unjustified: syndicates and employers had indeed expected that, after what they perceived to be unqualified state intervention in labour relations, they would regain their former freedom of action. This, however, failed to come about. Shortly before the outbreak of war, Göring appointed a Plenipotentiary for Productivity Increases in the Coal Mines (Reichsbeauftragten für die Leistungssteigerung im Bergbau). He soon made it clear that his target was nothing less than that of breaking the power of the syndicates in the German coal industry. These had not, however, initially taken this newly appointed figure seriously. As a former official of the DAF, Paul Walter was not at all familiar with the central issues involved in the coal business.\footnote{Priemel, \textit{Macht der Syndikate} (2006), 164-172; Seidel, \textit{Der Ruhrbergbau} (2010), 83.}

Nevertheless, the syndicates soon had cause for alarm: Walter secured his position in a contest with the Coal Commissioner (who was jealous of Walter’s influence) by having the former removed from this position and...

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all powers transferred to himself.\textsuperscript{78} In the face of this new and clearly powerful opponent, the lignite and hard coal industries not only overcame their negative relationship of two decades, but even joined ranks with Paul Pleiger, the founder and managing director of the state-owned Hermann Göring Works (Reichswerke Hermann Göring). Pleiger had only recently confiscated iron ore fields in the Salzgitter region from several Ruhr companies through dispossession, lured numerous miners away from the Ruhr and, even after the outbreak of war, bitterly fought with the RWKS about the conditions for the supply of coking coal to its refineries in Salzgitter.\textsuperscript{79}

After the outbreak of war, the issue of supplies continued to become more serious. While the syndicates blamed the overburdening of the transport infrastructure for the situation, Walter insinuated that they lacked a willingness to adapt coal-mining capacities to the demands of the war economy. The conflict escalated when Walter hinted to the press that the coal-mining industry could be nationalized and openly threatened to deal with any opposition to his orders by syndicate leaders by removing decision-makers. This threat was soon put into practice: at the start of 1941, he dismissed the managing director of the East Elbian Brown Coal Syndicate from his role as the head of the coal distribution office (Kohleverteilungsstelle) and, at the same time, placed all other syndicates directly under his jurisdiction.\textsuperscript{80}

In the process, however, Walter got in Pleiger’s way. The Reichwerke had developed into the most significant coal and steel company in Europe under Pleiger’s direction, with numerous collieries in the Ruhr district and Upper Silesia. Pleiger did not want his only recently won influence on the German coal industry to be jeopardized by the Coal Commissioner. Retaliation soon followed in a concerted action led by the RWKS involving the entire coal industry and the syndicates and associations. The syndicates declared that they were prepared to coordinate production data and distribution in a type of self-governing body and to thus take over the additional functions acquired by Walter upon his assumption of the role of Coal Commissioner. This body was to be led by Göring’s confidant Pleiger. The

\textsuperscript{78} Aktenvermerk zur Regelung der Kohlewirtschaft bei Kriegsbeginn, 26.10.1955, in: BBA 33/1567.
\textsuperscript{79} Schreiben Dr. Holle an Janus (RWKS) v. 7.11.1938 and Aktennotiz über Besprechung Kellermanns (RWKS) mit Pleiger v. 20.11.1938, in: BBA 33/903; see also Riedel, \textit{Eisen und Kohle} (1973), 277f.
\textsuperscript{80} Priemel, \textit{Macht der Syndikate} (2006), 174.
scheme was safeguarded by contacts established with the Economics Min-
istry, the party and the military.\textsuperscript{81}

In this way, the last attempt to break the power of the syndicates was
warded off too; it was not until after WWII that an attempt was successful
when made by the Allied occupying powers. For the first time, the coal
syndicates could not have hoped for a more assertive champion than
Pleiger with his party-book career. Yet Pleiger’s undisputed leadership
role in the coal industry during the second half of WWII was not based on
his part in Walter’s fall, but on the facts that 1) he did not question the
syndicates’ regained self-governing powers, and 2) his leadership style
was – by his standards – exceptionally co-operative. Moreover, he protect-
ed the hard coal industry from unrealistic demands from the Arms Min-
istry under Albert Speer, and even dared to personally point out to Hitler
that the coal industry only had limited opportunities to increase produc-
tion.\textsuperscript{82}

\section*{6. Conclusion}

It cannot be denied that mining companies, especially the operators of the
coal business in the German Reich, were restricted more by the state in
terms of their autonomy than was the case for other sectors after WWI.
This state intervention was not, however, in any way motivated by particu-
lar principles of political order. Contemporary political science was over-
whelmingly convinced that a cartelized market was the right political an-
swer to the problem of the allocation of raw materials. Accordingly, inter-
vention did not comply with a particular concept of the state, but occurred
whenever necessary in order to solve the problem of fuel supplies. In this
respect, it is hardly surprising that the world wars, and in the case of
WWII even its preparatory phase, were accompanied by particularly pro-
nounced phases of state activity.

During WWII, the Prussian state united the mining companies within
one district into compulsory cartels. This can only be explained by the
state’s recognition of the fact that the syndicates could better secure the
distribution of scarce coal resources according to the demands of the war

\textsuperscript{81} Gillingham, \textit{Industry and Politics} (1985), 114; Priemel, \textit{Macht der Syndikate}
economy than any state apparatus. In return, the authorities showed relatively little interest when, for example, the Ruhr Coal Syndicate made exorbitant profits by exporting coal to neutral countries – at least so long as the proceeds could be used to import food to stabilize the ‘home front’.

The Coal Statute of 1919 can also be explained by: 1) the coal shortage, due to the loss of a substantial part of the coal districts in Upper Silesia, the Saarland and Lorraine, as well as to strikes and reductions in working hours in the remaining mining districts, especially in the Ruhr; and 2) the demand for the nationalization of the mining industry, which was extremely popular among coal miners. With the ‘compromise’ of ‘cooperative’ regulation, tripartism could develop between the companies and syndicates, and the state and the trade unions, which only more or less successfully reduced the power of the syndicates.

Even though the RWKS complained about ‘government dictation’ fairly openly during the Weimar Republic for restricting its entrepreneurial freedom and that of its members, it remains the case that from the syndicates’ perspective, and in the light of the historical situation in 1918/19, ‘cooperative’ regulation was probably the least bad of all the possible options at the time. This may also be partly explained by the fact that successful lobbying enabled the RWKS to repeatedly gain influence over decisions made by government authorities and even over those made by the legislature.

An amendment to the Coal Statute nearly became the masterstroke of this strategy. After the Nazis seized power, it was probably only prevented by the mutual blockade resulting from the irreparable clash of interests between the hard coal and brown coal syndicates. Nevertheless, as far as the RWKS was concerned, the overall balance of the early years of Nazi rule was mainly positive. From the state’s perspective, a marked improvement in the basic framework was gained by: 1) the suppression of the trade unions and the concomitant reduction of tripartism to only two actors, and 2) the transfer of power away from the institutions of ‘cooperative’ regulation. Yet by imposing compulsory membership on the Aachen Coal Syndicate and, a little later, the Saarland mining industry, the state created the basis for the elimination of ‘unhealthy competition’ among at least the hard coal regions in West Germany and thus in the catchment area of the Rhine.

From the syndicates’ perspective, however, the price demanded by the state for the improvement in the basic framework would have seemed, at least in the mid-term, barely smaller than the price they had to pay for...
their survival after the war. The marked expansion in the capacities of coal-consuming industries put the RWKS under significant pressure to increase production. Nevertheless, at the time, there was no question of expanding capacities given the experience of the Depression and the expectation that the economic boom driven by arms production and the policy of economic autarky would not last forever. However, in order to not jeopardize the targets set by the preparation for war, an increase in coal production could only be secured through an intensification of the production factor of labour. Here, the syndicates had a high price to pay in terms of disproportionate bonuses for shift work accompanied by a cyclical fall in labour productivity. Aside from this, the ‘state economy’ (‘Staatswirtschaft’), with its state-owned Reichswerke, Hermann Göring made itself comfortable in a way last attempted by the Prussian state at the start of the 20th century during the ‘Hibernia Crisis’.

In the Hibernia case, the RWKS had been able to block the interference into one of the largest private mining companies by temporarily forgetting the many conflicts of interest between its members and taking joint action. This was not possible in the case of the Reichswerke. Nonetheless, the syndicates under the leadership of the RWKS were again able to successfully ward off the attack on their power instigated by Walter who, as Coal Commissioner, was vested with substantial authority on the outbreak of war. In the process, the Ruhr coal industry had to form a coalition with Pleiger, the managing director of the Reichswerke and a figure loathed by its representatives. His aggressive approach became more moderate once he had won the acceptance of the Ruhr barons, and he then emerged as one of the most influential lobbyists for the hard coal industry in the war economy of the Third Reich. So, did the Reichswerke triumph over traditional Ruhr coal and steel? In his history of the Reichswerke, August Meyer suggests that this was indeed the case, taking Arms Minister Speer’s characterization of Pleiger from 1942 (‘Coal Pope’) at face value. Nonetheless, as our examination of the RWKS has revealed, this was not the case.

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4. Sectors and Clusters

Mark Jakob, Laura Rischbieter

Abstract: The Rhine was a principal gateway for colonial goods destined for the German market from the Early Modern period to the mid-19th century. In the course of that century, however, changing patterns of world trade eliminated established connections and forced merchants and manufacturers to adopt new business strategies that no longer relied on the transport cost or proximity advantages that the Rhine had provided. The cases of coffee and tobacco show how entrepreneurs deepened and diversified value chains in response to economic and political change, and that despite shrinking economic distances between world regions, hubs of manufacturing and distribution did not necessarily lose their importance.

1. Introduction

Researchers have been pointing out for quite some time that globalization is not a phenomenon that only began in the late 20th century, but that the emergence of worldwide market integration, commodity and capital flows, and migration can also be observed in earlier historical eras.1 The period between 1850 and 1914 in particular is marked by close trade links and a high degree of capital and labour mobility, and economic historians have argued that this was the time in which a globalized world economy truly developed for the first time. A dramatic fall in transportation costs, a spectacular rise in the speed of intercontinental communication, and the liberalization of trade and labour markets are commonly regarded as the driving forces behind this process. Food markets played a prominent role within this first wave of globalization: comestibles like sugar, coffee, grain and meat accounted for a much larger share of the volume of world trade

1 For example, Foreman-Peck, History (1995); Federico, Growth (2004); Obstfeld/Taylor, Global (2004); Torp, Weltwirtschaft (2004); Jones, Firms (2014).
in the 19th century than industrial commodities.\textsuperscript{2} Colonial goods like coffee and tobacco were consumed in ever larger quantities and by a wider customer base well away from their tropical origins. Moreover, the ways in which they were traded and processed changed dramatically in the latter part of the 19\textsuperscript{th} and first half of the 20\textsuperscript{th} centuries.

In our paper, we explore the significance of the Rhine as a geographical factor in the trade of colonial goods and the importance of the Rhine region's entrepreneurial heritage to related manufacturing in the 19\textsuperscript{th} century. The economic region along the Rhine hosted firms that initially pioneered the trade in exotic commodities, but later found themselves exposed to external pressures that required them to adapt organizationally and commercially. The economic distance between overseas producers and European manufacturers and consumers was reduced. As the transport and communication revolutions of the 19\textsuperscript{th} century were able to extend the potential market range of enterprises from local or regional to national and international scales, the transport cost advantages that the Rhine provided to businesses in its catchment area became relatively less important. This development is usually summarized as a time-space compression that, in the long run, was supposed to break up the older industrial model and enable the formation of a post-Fordistic, flexible production regime that was largely independent of location.\textsuperscript{3}

We discuss the cases of coffee and tobacco, respectively, and will show that global market integration processes changed the advantages that local businesses had. The firms dealing with these two commodities were not only agents who helped to bring the globalized modern world into being, but in the same movement were also forced to re-invent themselves because of changes in their political and economic environment.\textsuperscript{4} From this perspective, we argue that, although the first wave of globalization was marked by a reduction in economic distances, the location of economic centres did not automatically become less important when proximity to the Rhine failed to translate into transport cost advantages; indeed, the importance of these centres lay as much in the accumulation of immaterial assets in the long history of trading and manufacturing in the Rhine econo-

\textsuperscript{2} O’Rourke/Williamson, \textit{Globalization} (1999); Findlay/O’Rourke, \textit{Commodity} (2005), Nützenadel/Trentmann, \textit{Food} (2008); Magee/Thompson, \textit{Empire} (2010).
\textsuperscript{3} Harvey, \textit{Condition} (1990).
\textsuperscript{4} Jones, \textit{Merchants} (2000); Cooper, \textit{Concept} (2001).
mic region, of which the foremost of these was the profound knowledge of business networks of commodities, markets, and customers.

2.1 Coffee

As one of the world’s most valuable internationally traded commodities, coffee underwent a transformation in European countries from a luxury product to a staple of mass consumption. Indeed, at the end of the 19th century, coffee was described for the first time in terms of sustenance rather than extravagance. The introduction of luxury foods into European society, particularly coffee, has been the topic of several studies, but surprisingly we still know very little about how the accelerated spread of globally traded goods at the end of the 19th century changed local and regional trade patterns relationally. In contrast to the previous organization of trade, the end of the 19th century saw a greater division of labour, and most firms operated with respect to only one function among the many along the value chain. New technologies and their related opportunities did not, however, automatically democratize access to the markets. Innovations in transport and communication triggered changes in the local organization of trade. From this point of view, there are two perspectives on the importance of the Rhine in the history of the coffee trade: the first, beginning in the 1870s, is the story of the decline of wholesale dealing among Middle and Lower Rhine-based businesses. What the businesses concerned had in common was their specialization in the importation of raw coffee from Amsterdam into the German territories. The second story, beginning in the 1890s, concerns the rise of the Prussian Rhineland province to become the European centre of coffee refining.

Europe’s demand for coffee from the late 17th century to the 1870s had been met by European wholesalers travelling three or four times a year to London or Amsterdam to trade. This made the Lower and Middle Rhine one of the most important pathways for coffee to Germany, France and Switzerland. With three to five auctions a year alone, Amsterdam’s mer-

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5 For example, Habermas, Strukturwandel (1971); Hattox, Coffee (1985); Sandgrub-ber, Genüsse (1986); Topik, Integration (1998); Menninger, Genuß (2004).
chants were able to sell off all the varieties of coffee arriving from their colonies (that is, the majority of available goods) by way of commission or consignment systems. Producers or exporters delivered their products to the Amsterdam stock depot, which is where they remained until being sold. The importers did not function as an independent dealer, but as a consignment agent or consignee in the trade between supplier and buyer. The negotiation of deals between importers and exporters (commission or consignment rights) was the sole right of the Nederlandische Handel-Maatschappij (NHM) in Amsterdam. Indeed, between 1830 and 1860, trade regulations and its monopoly on transportation allowed the NHM to dominate the European coffee market; it was only coffees from Central America and Brazil, which were slowly making their way onto the Amsterdam market, that could go directly from the exporter to a non-Amsterdam wholesaler. This type of direct trade increased further in the wake of independence movements in Latin America during the 19th century.

In summary, in a highly abstract sense, both the commercial forms, as well as the organizational structures, of wholesale coffee were determined by an oligopoly of middle-men concentrated in two locations well into the 1860s. As a choke point between supply and demand, the London and Amsterdam wholesalers, functioning as commission agents or consignees, were the beneficiaries of a low-risk system of coffee wholesaling. For Rhineland wholesalers, this meant that being in the right location was the best thing they could do for their businesses. Above all, it was the geographical proximity to Amsterdam and the Rhine as a transport route that produced transaction cost advantages. This was something that wholesalers in the North German port cities could only enjoy in a limited sense, while their counterparts in East Germany did not benefit at all.

The mid-19th century saw the development of a new organizational structure in global wholesale trade. The typical businessman at the start of the century combined the functions of shipper, wholesaler (trading both at home and abroad, on both his own account and those of others) and warehouse keeper. Nevertheless, starting in the 1880s, most companies gener-

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7 Driel, Middlemen (2010); Claver, Dutch (2014), 73-131.
8 Booth, Indonesian (1990); Wenzelhuemer, Coffee (2008).
9 Schöffer, Beitrag (1905), 9-12; Day, Policy (1904); Eickmeyer, Entwicklung (1935), 25-26.
ally restricted their operations to only one of these functions.\textsuperscript{11} As a result, by the end of the 19\textsuperscript{th} century, a new division of labour had become the norm for overseas trade.\textsuperscript{12} This applied just as much to the exchange of goods as to financing, storage and transportation.\textsuperscript{13} By the 1880s at the latest, however, the conditions of the global coffee trade had shifted: the states of South and Central America had begun producing more than 90\% of the coffee traded worldwide (cf. Figure 1).

\textbf{Figure 1 : Areas of coffee production in percentage terms, 1870-1900}

![Figure 1: Areas of coffee production in percentage terms, 1870-1900](https://example.com/figure1.png)


Brazil alone exported 71\% of all internationally traded coffee from 1900 onwards. At the same time, a fungus on the Indian subcontinent (Hindustan, Ceylon and the Dutch East Indies) and in the Asian coffee-growing areas decimated coffee production there.\textsuperscript{14} Amsterdam lost its significance as an intermediary trading post with this shift in the geography of coffee production; the primarily Asian coffee (Java) that was traded there increased in price dramatically in comparison to the Brazilian varieties Brasilia or Santos, costing up to 2.6 times as much. Java coffee, despite its

\begin{thebibliography}{9}
\bibitem{12} Simon, \textit{Banken} (1909), 23; Hellauer, \textit{System} (1910); Sonndorfer, \textit{Technik} (1889).
\bibitem{13} Christen, \textit{Kaffee-Einzelhandel} (1935), 18.
\end{thebibliography}
moderate quality, cost just as much as the best variety, Mocca, from 1875 onwards, and was even more expensive after 1902.\textsuperscript{15} This development can also be seen from the importation figures of Imperial Germany. In the past, the German states had drawn as much as 40\% of their coffee imports from the Netherlands and Great Britain. Starting in the 1880s, however, this figure fell progressively to under 1\%. Indeed, the share of coffee imports from the Netherlands to Germany plummeted from just under 31\% in 1851 to 0.1\% in 1913.\textsuperscript{16} At the same time, the sources that Rhineland and Southern Germany drew upon shifted to the port cities of Northern Germany.

Hamburg, with its long tradition of trade with Brazil, rose to become the new centre for coffee imports in Europe (cf. Figure 2). Social community based ties and the actual presence of key actors at the private coffee exchange in Hamburg generated trust and knowledge, lowered transaction costs, and improved access to goods, capital and information. Furthermore, the profitable futures trade in Germany was monopolized by members of the organization ‘Verein der am Kaffeehandel beteiligten Personen’ (founded in 1886), who presented themselves as ideal agents for the futures trade for outside parties who were not interested in effective commodities alone. Only a small number of people even had the opportunity to participate in futures trading; the majority could not enjoy its advantages and only experienced its negative effects.\textsuperscript{17}

As early as 1891, a study of futures trading by Carl Johannes Fuchs revealed that traders who were not organized on the local futures exchanges had much less access to pertinent information. This meant that they were excluded from the benefits of futures trading. The majority were ‘not in a position to evaluate the situation on the futures markets at any given moment.’\textsuperscript{18} The wholesalers who were not organized on the futures exchanges, let alone the retailers, were in no position to take on the enormous expense of obtaining information in the way that those organized on these exchanges could. Indeed, without the continuous and timely information on price developments that the futures markets provided, any larg-

\textsuperscript{15} Rischbieter, \textit{Mikro-Ökonomie} (2011), Figure 16.
\textsuperscript{17} Rischbieter, \textit{Wer nicht wagt} (2013), 86-92.
\textsuperscript{18} Fuchs, \textit{Waren-Terminhandel} (1891), 49, 90.
er stock on the spot market meant too great a risk. In contrast, the combination of local businesses, shipping businesses and futures trading in Hamburg made it possible to balance differences in supply and demand. Futures trading was a sort of security instrument to protect against future price developments for transactions carried out on an enterprise’s own account. It also made it possible to conduct business relatively independently of location, salesperson and buyer. Auctioneering in Amsterdam and London was a fairly simple mechanism providing a link between supply and actual demand. In contrast, the futures trade distinguished itself through its capacity to respond on a global level. A single telegraph message concerning the crop outlook in Brazil could raise or lower prices by itself. The way in which wholesalers in Hamburg were able to shape new mechanisms of the global futures trade at the local level (for their own benefit) represents a shift in the power relationship within the commodity chain: importers and exporters now profited much more than domestic traders. German retailers turned away from the former six centres of the domestic wholesale coffee trade in Düsseldorf, Cologne, Berlin, Magdeburg, Leipzig and Frankfurt am Main, turning instead to the importers in Hamburg.

Under these conditions, the River Rhine as a transport route, and the location of the Lower and Middle Rhine territories in the centre of Europe, no longer provided trading houses with sufficient cost advantages. For the domestic wholesalers there, neither direct imports from the countries of production nor the option of warehousing were viable means of resisting their growing dependence on the supply from Hamburg’s wholesalers. In this regard, nothing changed for the rest of the existence of Imperial Germany. In 1917, one Rhineland coffee merchant spoke of ‘…a successful resistance against the overwhelming power of the Hamburg importers over the domestic wholesalers’, which was described as being something he ‘could not imagine.’ The domestic coffee trade had arrived at a situation in which reliance on old business practices and fields of enterprise was no longer profitable.

19 Börsen-Enquete-Kommission, Bericht (1893), 90. See, also: Börsen-Enquete-Kommission, Stenographische Protokolle (1893), 2064, 2081-2, 2211, 2218-9, 2237.
20 Tapolski, Kaffeterminhandel (1896).
21 Schönfeld, Kaffee-Engroshandel (1903), 73; Findeisen, Kaffeehandel (1917), 84.
22 Findeisen, Kaffeehandel (1917), 84; Wiedenfeld, Börse (1903), 270, 293.
So much for the story of the decline. Now we proceed to the second tale: the birth of the coffee-processing branch. The domestic traders' new dependence on wholesalers (primarily from Hamburg) and their Brazilian coffee deliveries led to a reduction in profit margins and difficulties in sales for all German coffee wholesalers. This was due to the kinds of coffee being delivered, their quality and changing tastes among consumers. Imports of Brazilian coffee grew continuously from 1890 onwards, eventually comprising some 78% of all the imports to Imperial Germany and achieving a market-controlling dominance. (cf. Figure 2).

Figure 2: Imports to Imperial Germany per thousand tons, 1885-1913

![Graph showing imports to Imperial Germany per thousand tons, 1885-1913.]


The expert could differentiate between two types of Brazilian coffee, Santos and Rio, which had six and eight sub-types, respectively. Generally, however, the majority of sub-types were considered to be ‘markedly hard, carbolic-like sharp-tasting’ or ‘always sharp, often musty, earthy’ or as having a ‘musty flavour.’\(^{23}\) Up to this point, retailers had satisfied the different regional preferences of consumers by mixing coffees from different provinces. Now, however, they were faced with several problems: their dependence on the Hamburg market, the fluctuating quality of the harvests, the general decline in the quality of the natural product, and ever more discriminating consumer tastes. Mixing together coffees of different qualities and origins could no longer solve these problems, due in signifi-

\(^{23}\) Müller, Kaffee (1929), 77; Ciupka, Taschenbuch (1931).
cant part to the increasing dominance of the Santos and Rio coffees on the German market.\textsuperscript{24} It was thus not possible to achieve any significant change in flavour profiles. In addition, German consumers were increasingly demanding ‘soft’ coffees.\textsuperscript{25}

If a trader wanted to remain in the coffee business as a domestic wholesaler, survival was only possible by way of a strategy where ‘….the wholesaler builds expensive roasting and refining facilities.’\textsuperscript{26} The integration of machine roasting offered a solution: it made it possible for raw coffee, with its differences in appearance and taste, to become a finished consumable. Mixing, roasting techniques and grinding made producing a product that, according to the manufacturer, was standardized in both its appearance and flavour achievable. With this control over the processing of the raw product, domestic trade was able to realize a certain independence from the varieties supplied by Hamburg. Refining raw coffee does not, of course, change its ‘base quality.’ The number of different steps involved in processing do, however, allow for a product that is standardized according to the requirements of a manufacturer. Different varieties and, thus, qualities of coffee had to be mixed to achieve this, with staining, polishing and glazing with sugar being typical steps for changing (and standardizing) the appearance and taste of the whole bean. When the processed coffee was then ground as well, consumers no longer noticed the outward quality characteristics of the individual beans. The processing of raw coffee thus resulted in some independence from the available coffee suppliers, as it meant the mixing of different varieties in order to standardize their outward appearance and taste.

The turning away from pure intermediate trade in favour of coffee processing required an initial investment in new machines. At the same time, however, it opened up a new field of business that could secure a company’s livelihood. Large roasting machines eliminated the differences between green coffee traders and roasters, and accelerated the production process for ready-to-use coffee. These efficiencies finally led to the shipping of raw and roasted coffee in 500 g packages by mail, and to the establishment of branch stores by major coffee roasters. The majority of coffee-processing enterprises produced coffee for a regional circle of buyers and could thus tailor their production to their customers’ preferences. Up

\textsuperscript{24} Börsen-Enquete-Kommission, \textit{Stenographische Protokolle} (1893), 2079-2082.
\textsuperscript{25} Börsen-Enquete-Kommission, \textit{Stenographische Protokolle} (1893), 2229, 2258.
\textsuperscript{26} Findeisen, \textit{Kaffeehandel} (1917), 84.
to 100 different varieties of roast coffee, with varying degrees of quality, taste and price – along with numerous additions and accessory products for coffee consumption – made it possible for a single commodity to yield an entire world of coffee products and specialist coffee businesses. Not only did this mean a distinguishable range of product offerings, but also different sales strategies. Distribution innovations, such as the shipping of mixtures and the development of large retail chains specializing in the processing and sale of coffee, are impressive examples. Apart from the integration of wholesaling and processing, coffee enterprises also sought to expand their retail businesses.\textsuperscript{27}

Enterprises like Kaiser’s Kaffeegeschäft (Kaiser’s Coffee Shop) are an example of how quickly (within a few years) vertical integration also revolutionized retail business. Kaiser’s was the biggest retailer in the food industry before the start of WWI, and is an example of the new form of operation and marketing: mass branch stores. In 1880, through mixing and roasting and offering products at fixed prices, the company’s founder, Josef Kaiser, began to produce a steady quality of coffee in his father’s colonial goods store in Viersen in the Lower Rhineland (20 km from the Netherlands). By 1896, he had 75 stores all over the Rhineland, and by 1914 had achieved a presence throughout the entire German Empire, with 1,420 branches, whose number grew further to 1,490 by 1932. Their trademark was the company logo across the entire store front, vertical enamel signs describing the most important products, and the omnipresent company symbol: a laughing coffee pot. The customer retention of his stores was essentially established by image building, quality merchandise and financial incentives, such as a system of rebate stamps. The scale effect of retail chains not only produced cost savings, but new forms of sales and customer loyalty as well.\textsuperscript{28}

In this way, a new field of business opened up, bringing the domestic trade of the Rhineland into competition with the Hamburg wholesalers.\textsuperscript{29} As Julius Hirsch put it in 1913, it was ‘…the conquest of industry by the merchant’\textsuperscript{30} that offered the coffee wholesalers of the Lower and Middle Rhine a new chance to stay in business. Now, it was no longer cost advan-

\textsuperscript{27} Rischbieter, Geburt (2014), 39-53.
\textsuperscript{28} Hirsch, Filialbetriebe (1913), 27-67; Spiekermann, Basis (1999), 325-330; Rischbieter, Geburt (2014), 39-53.
\textsuperscript{29} Schönfeld, Kaffee-Engroshandel (1903), 74.
\textsuperscript{30} Hirsch, Filialbetriebe (1913), 17.
tages alone, like geographic location, that mattered; knowledge of the goods and markets were now the significant factors in securing a successful entry into the world of coffee refining. Moreover, as regional distribution demonstrated, it was regions like the Rhineland and the Hanseatic cities, which had both traditionally been strong in coffee wholesale, that entered the business of coffee processing (cf. Figure 3).
Figure 3: Regional distribution of coffee refining, 1882-1907


https://doi.org/10.5771/9783845284736

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From the perspective of German domestic trade, it was the changed mechanisms in the international coffee trade that inspired this turn to the refinement of raw coffee. Coffee processing industries were born from mercantile enterprises, and the various methods of processing raw coffee offered consumers an ever more varied range of products. A new profit level emerged from within the coffee commodity chain, and vertical integration meant a new possibility of a livelihood for the domestic trade.

2.2 Tobacco

There are two immediately conspicuous differences between the history of coffee as outlined above and that of tobacco. First, whereas coffee merchants became manufacturers when world trade patterns and consumer demand forced them to reformulate their business strategy, in the case of tobacco, trade and manufacture usually went hand in hand in the Early Modern period and well into the 19th century. Second, tobacco trade and manufacturing were marked by the succession and, for quite some time, the co-existence of finished products that differed considerably with respect to trade routes, manufacturing techniques and costs, and transportability. Pipe tobacco and snuff were the earliest tobacco products, and did not need substantial capital investment. Meanwhile, tobacco merchants also ran tobacco mills of varying sizes from the 17th century onwards. The finished product could be transported easily at a relatively low cost, leading to Rhenish tobacconists in the 18th century complaining about direct competition from Dutch goods. The consumption of snuff and pipe tobacco declined when smokers turned to mass-produced cigars in the 19th century, and the cigar became the dominant, most convenient smoking article from about 1830 onwards. Cigar making involved much higher labour costs in relation to the costs of raw materials and means of production than snuff or pipe tobacco, and the fragile and space-consuming

31 Cf. Hirsch, Filialbetriebe (1913), 78.
33 In the Early Modern period, pipe smoking was widespread in all social classes, while taking snuff was a fashionable custom of the aristocracy and upper classes. Merchants, therefore, often established snuff manufacturers. The family firms of Bolongaro in Höchst near Frankfurt a. M. and Boehninger in Dusiburg are good examples from the Rhine region, cf. Wustmann, Einbürgerung (2002), and Terpoorten, Arnold Böninger (1928).
cigars were not as well suited to economic forms of transport. Finally, around 1900, cigarettes gradually began to replace cigars in Germany in a drawn-out development that truly only ended after WWII. Only the cigarette is said to have really industrialized the tobacco business, because of its potential for mechanized production and economies of scale. According to the period between the mid-19th and mid-20th centuries saw the succession of two dominant tobacco products with distinct value chains and manufacturing structures. Rhenish tobacco merchants and manufacturers, who had profited from their proximity to the Dutch markets, therefore had to cope with changing consumer demands and decide between products that determined manufacturing and cost structures.

In the case of tobacco, the decline of the Rhine connection can be dated even earlier than the case of coffee. The Netherlands was the main supplier for Germany and other European countries from the mid-17th century into the first third of the 19th century. The Dutch began to cultivate tobacco at the start of the 17th century in the provinces of Zeeland and Utrecht, where Amersfoort emerged as the centre of cultivation, and substantially increased their outputs in the following decades. Apart from the tobacco cultivated in Germany and the Netherlands, Brazil and the British colonies in North America also emerged as the main producers of tobacco leaves between 1700 and 1771, with the North American harvests dwarfing those of other cultivation areas. Amsterdam and Rotterdam became both the most important European tobacco ports on the continent as well as markets for re-exporting the massive outputs of the British Chesapeake colonies in the 18th century, with the two cities handling about half of continental imports.

German consumption of snuff and pipe tobacco began during the Thirty Years War, and the cultivation of the tobacco plant was introduced into Germany at roughly the same time as in the Netherlands. The Lower and Middle Rhine became the trade hub for other parts of Germany. In the 17th and 18th centuries, Cologne emerged as the first German centre for the trade of imported American tobacco and that grown domestically in West-

36 Cf. the graphs in Goodman (1993), Tobacco in history, 145.
ern Germany. Cölégne’s tobacco merchants and manufacturers, who largely originated from the Netherlands or the Lower Rhine region, established trade connections with the Ruhr area and the Bergische Land soon after the new commodity had been introduced. By 1750, they had extended their trade routes and ran a profitable trade and transport business in tobacco between the Dutch ports and the commercial centres of the Middle Rhine region, Frankfurt and Mainz, trading imported tobacco leaves and products from the Netherlands for tobacco leaves from South Germany. Around 1800, German tobacco was exported to the Netherlands, England, Spain, and even America. At the same time as the expansion of the tobacco trade, the manufacture of snuff and cut tobacco also emerged around the German centres of trade and domestic cultivation.

The French occupation during the Napoleonic wars and the building of tariff barriers along the banks of the Rhine led to the decline of the Cologne tobacco trade, which lost its traditional sales areas east of the river and faced barriers to its trade with the Netherlands. After the Rhineland became part of Prussia, Cologne imported tobacco for its own manufacture, but never again regained its role as the central hub along the river. Mannheim had become the centre for the trade of domestic tobacco leaves by the early 19th century, owing largely to the early cultivation of tobacco in the Palatinate on the right bank of the Rhine, and remained so into the 20th century. The importation of North and South American tobacco had moved to Bremen and, to a lesser extent, Hamburg. Bremen had replaced Amsterdam as the main import harbour for Germany by 1840, and sold to Russia, the Baltic rim, and Scandinavia. In the wake of Bremen’s increasing trade volumes, cigar making expanded there and quickly became the most important new industry by far. Cologne’s manufacturers now bought at the new markets, particularly tobacco from the Palati-

41 Boerner, *Tabakhandel* (1912), 23.
42 Zimmermann, *Tabakindustrie* (1931), 11.
44 Boerner, *Tabakhandel* (1912), 166f.
47 In the 1830s, the number of cigar makers in Bremen had increased to such an extent that the senate passed a number of regulations relating to the trade and em-
nate at Mannheim. Before the German Tariff Union was established, these manufacturers claimed that tariffs on the importation of South German tobacco for manufacture in North and West German commercial cities made the trade along the Rhine almost unprofitable.\textsuperscript{48}

The importance that traders and manufacturers placed on tariff and wage differences illustrates that, in the early 19\textsuperscript{th} century, the Rhine provided no transport or transaction cost advantages to tobacco traders and manufacturers that could not be damaged or even undone by regional differences and political borders. The establishment of the Prussian tariff area in 1818 made Palatian tobacco very expensive for manufacturers in the Middle Rhine area.\textsuperscript{49} On the other hand, the 1818 tariff laws caused Dutch entrepreneurs from Amsterdam and Rotterdam to establish tobacco manufacturing businesses in the Lower Rhine area as branches of their own firms.\textsuperscript{50} Starting with a cigar factory in Aachen in 1827, cigar manufacturing spread across the Lower Rhine area, where wages were low.\textsuperscript{51} In contrast, tobacco manufacturers in the Middle Rhine suffered from relatively high wages in comparison to the Lower Rhine and the considerably lower wages in South Germany.\textsuperscript{52} As a result, they chose to concentrate on the less labour-intensive production of snuff, plug, and cut. After Prussia and Hesse agreed on a tariff union in 1828, and with the establishment of the German customs union in 1834, Middle Rhenish tobacco manufacturers finally had to accept that they would not receive better tariff and tax conditions to compensate for the disadvantages they faced from higher labour costs, without which they would have been able to become major players in the rapidly growing cigar business.\textsuperscript{53}

Nevertheless, the manufacture of tobacco products was not per se unprofitable in regions with higher wages, and entrepreneurs found new combinations. In the 1840s, the firm Arnold Boeninger of Duisburg combined the manufacture of snuff with a shipping agency; the firm had several sailing ships built and commissioned in Bremen that were used to bring

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\item n ployment of workers, cf. Staatsarchiv Bremen (StAB), Senatsregistratur, 2-Ss-5-b-T1-b, Tabakfabrikation 1802-1864.
\item Boerner, \textit{Tabakhandel} (1912), 177.
\item Boerner, \textit{Tabakhandel} (1912), 178.
\item Terpoorten, \textit{Entwicklung} (1929), 63; Uhlmann, \textit{Entwicklung} (1934), 29.
\item Uhlmann, \textit{Entwicklung} (1934), 30.
\item Borner, \textit{Tabakhandel} (1912), 183.
\item Uhlmann, \textit{Entwicklung} (1934), 30; Boerner, \textit{Tabakhandel} (1912), 183.
\end{itemize}
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tobacco freight from North America and Asia to Europe. Its US partner company, Brother Boninger, Oelrichs & Lurman, was located in Baltimore, one of the foremost export harbours for tobacco, and was probably well integrated into the tight Hanseatic business network spanning the Atlantic. The example of Boeninger shows that the integration of trade and manufacturing was a viable strategy to compensate for wage disadvantages, and that the location of a merchant house alone did not prevent it from taking part in the globalizing economy of the mid-19th century, provided that it could forge links to the centres of trade.

Bremen had succeeded in attracting the lion’s share of the tobacco trade by the middle of the 19th century using a successful combination with emigrant shipping. This meant that the relative importance of Dutch ports, and thus the Rhine connection, declined. In the 1850s and 1860s, the number of tobacco freights that were shipped up river on the Rhine fell remarkably, partly because trade in that direction was in decline, but also because railway transport proved to be more efficient. Although total tobacco imports increased in the late 1860s and early 1870s, only about 10% were shipped from the Netherlands on the Rhine.

In the last quarter of the 19th century, however, when Dutch merchants began to intensify tobacco cultivation in the Dutch colonies on the islands of Sumatra and Java, the Netherlands again became a major and, in some respects, even the most important, source of foreign tobacco for German cigar manufacturers. In 1869, a Dutch and a German merchant jointly founded the firm Deli Maatschappij in Amsterdam in order to plant tobacco on Sumatra, and this company still was the biggest in the region on the eve of WWI. Indeed, between 1880 and 1900, exports of tobacco leaves from Sumatra more than tripled. These leaves were much sought after as cigar wrappers, while Java leaves were popular as binders and filler. Accordingly, German tobacco imports from the Netherlands and the Dutch colonies increased markedly in the last quarter of the 19th century.

58 Döhle, *Tabakmarkt* (1913), 134f.
60 Cf. table in Döhle, *Tabakmarkt* (1913), 138.
Nevertheless, this could only mean a temporary increase in imports via the Rhine; whereas, around 1880, roughly one fifth of all tobacco imports came from the Netherlands, by 1910 imports from there had virtually vanished, and tobacco from the colonies made up almost half of total German imports.61 The Dutch colonial tobaccos were bought in Amsterdam and Rotterdam. German importers from Bremen tried to acquire a part of this trade in 1888, when they obtained shares in Sumatra plantations, but they failed to break the Dutch monopoly.62 A very low export tariff on raw tobacco also secured the positions of Amsterdam and Rotterdam as the marketplaces for highly valued cigar tobaccos. German traders and manufacturers from Hamburg, Bremen, and South Germany had no choice but to visit the Dutch markets regularly.63

The geographical distribution of the cigar industry depended mainly on wage levels, provided transportation was available. Cigar manufacturers

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61 Source: Statistisches Jahrbuch für das Deutsche Reich vols 2 (1881), 10 (1889), 15 (1894), 35 (1914), 37 (1916).
62 Döhle, Tabakmarkt (1913), 138.
63 Döhle, Tabakmarkt (1913), 145.
from the tobacco growing regions of South Germany, especially the Upper Rhine Valley, combined local and imported raw tobacco for making cigars of all price categories, depending on the amount of better and more expensive overseas tobacco in the finished product. There was indeed a connection between the southern and northern parts of the Rhine region, but this had little to do with the river itself, but related to the fact that the cost of raw materials, including (predominately railway) transport and tariffs, was much lower than the labour costs in the cigar industry. Cigar manufacturing thus migrated to areas with low wages. In Westphalia, cigar manufacturing emerged as early as the 1840s when importers from Bremen and Hamburg had mostly medium and good quality US imported tobaccos made into quality cigars.

Table 1: Origin of tobacco consumed within the German customs union (metric tons)

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic cultivation</th>
<th>% of total</th>
<th>Imports</th>
<th>% of total</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1861-1865</td>
<td>23,319</td>
<td>43.9</td>
<td>29,840</td>
<td>56.1</td>
<td>53,159</td>
</tr>
<tr>
<td>1866-1870</td>
<td>21,250</td>
<td>36.8</td>
<td>36,470</td>
<td>63.2</td>
<td>57,720</td>
</tr>
<tr>
<td>1871-1875</td>
<td>34,431</td>
<td>40.8</td>
<td>49,847</td>
<td>59.2</td>
<td>84,278</td>
</tr>
<tr>
<td>1876-1880</td>
<td>27,530</td>
<td>35.2</td>
<td>50,715</td>
<td>64.8</td>
<td>78,245</td>
</tr>
<tr>
<td>1881-1885</td>
<td>36,008</td>
<td>53.0</td>
<td>31,877</td>
<td>47.0</td>
<td>67,885</td>
</tr>
<tr>
<td>1886-1890</td>
<td>29,951</td>
<td>40.0</td>
<td>44,988</td>
<td>60.0</td>
<td>74,939</td>
</tr>
<tr>
<td>1891-1895</td>
<td>29,451</td>
<td>36.6</td>
<td>50,952</td>
<td>63.4</td>
<td>80,403</td>
</tr>
<tr>
<td>1896-1900</td>
<td>30,245</td>
<td>33.6</td>
<td>59,711</td>
<td>66.4</td>
<td>89,956</td>
</tr>
<tr>
<td>1901-1905</td>
<td>28,234</td>
<td>30.1</td>
<td>65,661</td>
<td>69.9</td>
<td>93,895</td>
</tr>
<tr>
<td>1906</td>
<td>25,660</td>
<td>28.5</td>
<td>64,335</td>
<td>71.5</td>
<td>89,995</td>
</tr>
<tr>
<td>1907</td>
<td>23,071</td>
<td>23.6</td>
<td>74,834</td>
<td>76.4</td>
<td>97,905</td>
</tr>
<tr>
<td>1908</td>
<td>27,527</td>
<td>24.8</td>
<td>83,287</td>
<td>75.2</td>
<td>110,814</td>
</tr>
<tr>
<td>1909</td>
<td>22,542</td>
<td>25.7</td>
<td>65,100</td>
<td>74.3</td>
<td>87,642</td>
</tr>
<tr>
<td>1910</td>
<td>23,083</td>
<td>24.2</td>
<td>72,202</td>
<td>75.8</td>
<td>95,285</td>
</tr>
<tr>
<td>1911</td>
<td>23,344</td>
<td>23.5</td>
<td>75,999</td>
<td>76.5</td>
<td>99,343</td>
</tr>
</tbody>
</table>

Source of data in Table 1: Statistisches Jahrbuch für das Deutsche Reich vol. 1913.

Local tobacco manufacturers, especially those in South Germany, combined domestically grown and imported tobacco to manufacture cigars in the medium price range for mass consumption. Until about 1890, the tobacco regions of South Germany (the Upper Rhine Valley in the state of Baden and western Bavaria), together with the third major cultivation area
in Prussia (Uckermark), grew about one third to one half of the tobacco consumed in Germany. Later, the share of German tobacco declined rapidly, and imported tobaccos were used in even the traditional areas of cultivation.\textsuperscript{64} Cigars made entirely from German tobacco were inexpensive and of an inferior quality. The local crop or a blend of local and American tobacco was used for fillers, and the more expensive and savoury Sumatra leaves were used as wrappers. Around 1850, these cigars were even exported from Baden to the US, but after protectionist measures in the latter in 1862, Baden manufacturers offered their inexpensive cigars on the domestic markets.\textsuperscript{65} The low capital intensity of cigar making, the supply of cheap labour and the high share of locally grown leaves in these regions favoured production in small units and with seasonal labour, and cigar making often had to be reconciled with agricultural rhythms.\textsuperscript{66} Mechanization was limited to machines that facilitated the preparation of the leaves, but rolling cigars remained manual labour well into the 20\textsuperscript{th} century. In order to circumvent tariffs on finished goods, entrepreneurs from the import harbours (especially Bremen and, to a lesser degree, Hamburg) and the Rhenish cities established business operations in South Germany for the production of low and medium-priced cigars, whereas the best and most expensive tobaccos were processed in and around the North German ports.\textsuperscript{67}

In this regional division of labour, the Middle and Lower Rhine lost its former role as mediator between the Dutch ports and their German hinterland. The rise of cigar manufacturing in the cities of the Middle and Lower Rhine partly compensated for this loss, with small and medium-sized businesses emerging in the cities of the Lower Rhine (Duisburg, Emmerich etc.) between 1820 and 1840.\textsuperscript{68} In part, the entrepreneurs were the existing producers of snuff and cut tobacco, who now expanded their ac-

\textsuperscript{64} Cf. Zimmermann, \textit{Tabakindustrie} (1931), S. 23, providing statistics of cultivation areas and tobacco harvests.

\textsuperscript{65} Zimmermann, \textit{Tabakindustrie} (1931), S. 14.

\textsuperscript{66} Cf. Schubnell, \textit{Kinderreichtum} (1941).

\textsuperscript{67} A good example is the firm Leopold Engelhardt & Biermann, which grew from a small merchant house to become one of the major cigar manufacturers after opening its first cigar factory in 1863. In 1907, the firm controlled about 70 factories in Southwest and Central Germany from its headquarters in Bremen, and employed more than 5,000 workers. Cf. Eckstein, \textit{Leopold Engelhardt & Biermann} (1911), 518.

\textsuperscript{68} Terpoorten, \textit{Entwicklung} (1929), 66f.
activities to cigars and mostly conducted the actual cigar making in South Germany. Firms like Arnold Boeninger in Duisburg thus combined their proximity to and knowledge of the Dutch tobacco markets with the exploitation of wage differences. This expansion of firms from the Lower Rhine area was also a result of the fierce competition between entrepreneurs from South Germany and the factories of the former French tobacco monopoly in the German Imperial territory of Alsace-Lorraine in the late 19th century. The emergence of a national market, brought about by a progressive removal of tariff barriers and falling transport costs, forced tobacco manufacturers to look beyond their usual regional sales areas and product preferences.

When cigarette consumption and manufacturing rose after the 1880s, this again led to a change of trade patterns and business strategies. The costly Dutch colonial tobacco was not used for cigarette manufacturing, and the Dutch market dealt almost exclusively in cigar leaves. At first, US, and later almost exclusively Oriental tobaccos from Greece, Bulgaria, and Turkey were rolled into cigarettes, meaning that cigarette enterprises emerged in locations that were favourable for the trade in these goods: again, the Hanseatic ports and especially Dresden in the case of Oriental cigarettes. Dresden's access to Hamburg via the Elbe and good railway connections to the east and the Port of Triest, where the Oriental tobacco freights arrived, were favourable locational factors. In the Middle and Lower Rhine area, cigarette manufacturing did not gain a foothold before WWI.

The Netherlands was thus twice a main source of tobacco for the German markets and also twice lost that position: the first time, around 1840, was due to the shift in the Atlantic trade to Bremen and Hamburg, and the second to the decline in cigar consumption after WWI. The development of the tobacco trade and industry was shaped by three factors: tax and tariff policies that could reinforce or undo the cost advantages the Rhine provided; the specific cost structures and international value chains of different tobacco products; and changes in demand for different products. Location alone provided no safeguard against changes in these three factors.

69 Terpoorten, Entwicklung (1929), 69.
70 Terpoorten, Entwicklung (1929), 74.
71 Döhle, Tabakmarkt (1913), 133.
73 Cf. the table in Bormann, Zigarettenindustrie (1910), 19.
3. Conclusion

At first glance, the Rhine appears to be the natural point of entry for colonial goods into mainland Germany. In the Early Modern period, coffee and tobacco were indeed traded via Amsterdam and Rotterdam and reached Germany in exchange for iron, wood and manufactured goods. Nevertheless, in the course of the 19th century, trade patterns moved away from the river for mainly economic and, to some degree, political reasons. In the case of coffee, changes in the world market meant that the knowledge of entrepreneurs became more important than location, and Rhenish coffee merchants turned into manufacturers. Similarly, the tobacco trade into Germany initially went mainly through the Netherlands, but in the 19th century the transport cost advantages of the Rhine region vanished when overseas trade was handled by the Hanseatic cities, with the exception of German domestic tobacco cultivation. A new regional division of labour emerged that served both the local and national markets. Crucial knowledge of the varieties of tobacco and its preparation that traders and manufacturers had acquired served them well when it came to adapting to changing economic patterns.

The initial importance of the Rhine for the importation of colonial goods fell, and the Hanseatic cities took over the role from the Dutch ports: Hamburg mainly for coffee, and Bremen primarily for tobacco. Rhine-based coffee trading firms became manufacturers in order to compensate for the loss of trade, and did so successfully by concentrating on the high profit margins of the new coffee value chain stage of producing ready-made coffee through roasting, grinding and packaging. Tobacco merchants had combined trading and manufacturing from a very early stage. Since the world market for tobacco and the requirements of tobacco products were more diverse than the coffee market, alternative sources of raw tobacco could be developed in the Dutch colonies. The Netherlands was thus able to secure its role in the European tobacco market again after an initial loss of importance. Rhenish tobacco manufacturers adapted to the growing demand for cigars by expanding their activities to areas with low wages. In both cases, the advantageous geographical location of the Rhine region had initiated the growth of business networks that outlasted the decline of the Rhine’s transport cost advantages. It also enabled actors to change their business strategies to suit an economy that required the exploitation of immaterial assets, namely their knowledge of markets, cus-
customer preferences, trade routes, product properties and labour cost differences.

Accordingly, changing patterns of world trade and consumer demand led to a reorientation of trade and manufacturing activities in the Rhine region. Nonetheless, the Rhine kept some of its importance for supplying both goods, but not because the river provided cost advantages, but because economic actors modified and deepened their value chains. Coffee merchants integrated subsequent stages of production, and tobacco manufacturers brought together domestic and international raw materials to make a range of products tailored to varying demands. Despite the tangible compression of time and space in the first wave of globalization, enterprises and business networks in the Rhine region remained indispensable nodes of information and commodity flows.

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Bonanza and beyond: the Rhenish Lignite Industry within the (Trans-)national Rhine Economy, 1880s to 1930s.

Boris Gehlen (supported by Hendrik Fischer)

Abstract: At first sight, the Rhenish lignite industry seems to be a kind of case sui generis, albeit perhaps a less relevant one from an international perspective, with a negligible link to the Rhine economy. Nevertheless, it can be shown that the region’s development from producing a poor fuel for poor people in the last quarter of the 19th century to becoming the most profitable mining area in Germany can be seen as a textbook example of institutional economics. We argue that the development of the Rhenish mining area is a tale of opportunity costs and systematic investments. Along with favourable geographic conditions, patient capital, a successful business and organizational strategies were the main factors in the realization of economies of scale, scope, density and organization in the long term. Over time, Rhenish lignite thus became a serious competitor in the coal markets and particularly in terms of the supply of electricity. At the end of the 20th century, brown coal had become one of the major resources for electricity production, not only on a Rhenish or German scale, but also a European one. This development would not have happened the way it did without the Rhine economy: in the late 19th century, profits in foreign Rhenish markets were a crucial pre-condition for the successful development of Rhenish lignite.

1. Introduction

The Rhenish lignite (or brown coal) mining industry is part of the Rhine economy, first of all, obviously, for geographical reasons. It is located in the core of the Rhineland – roughly in a triangle between the cities of Aachen (Aix-la-Chapelle), Cologne and Bonn – and to its east it almost directly borders the River Rhine. Yet beyond this mere geographical observation, there is still a research gap in terms of any analysis of the area’s
economic and business history, as well as its transnational scope.¹ As a consequence, this paper first describes (2) and explains (3) the essential developments of mining and the commercial exploitation of (Rhenish) brown coal. Thereafter, it puts the findings in the larger context of a transnational Rhine economy by analyzing whether the river and/or the economy as a market and an institutional framework had an impact on the area’s development and vice versa (4).

2. German and Rhenish lignite: competition of areas and products

The Rhenish mining area was a technological and economic late-comer; until 1877, Rhenish lignite was only used locally, where it was carved out by hand, sun dried and used for heating. Lignite could be characterized as a poor fuel for poor people.² Compared to the Rhenish situation, other brown coal mining areas were ahead in producing on an industrial scale: in 1885, only 3.5% of German lignite deliveries originated from the Rhenish lignite area. At the same time, the East German (or Lusatian) (17%), and especially the Central German mining region (78%) near Halle, Leipzig and Magdeburg, were much larger, while other lignite areas in Germany never had a significant market share.³ Nevertheless, the most important supplier in Germany at that time was the (northern) Bohemian area located on the Saxon-Austrian border (on Austrian territory), which had two main competitive advantages: 1) Bohemian brown coal had a favourable chemical composition that provided a fairly high energy value. Its solid structure, moreover, made it suitable for bulk cargo; 2) the Bo-

1 For an initial overview, see: Gehlen, Silverberg (2007); Feldman, Stinnes (1998); Kleinebeckel, Unternehmen Braunkohle (1986); Buschmann et al., Braunkohlenbergbau (2008); Czempin, Braunkohlenmarkt (1913); Oellerich/Czempin, Braunkohlenbergbau (1927). Boris Gehlen is currently working on a paper that compares the development of the three main German lignite areas up to the 1930s (working title: Inferior Coal, Superior Derivatives? Market Evolution in the German Lignite Industries, 1880s to 1930s.).
3 Own calculations based on Oellerich/Czempin, Braunkohlenbergbau (1927), 23, 66; Adomzent, Konzentration (1933), 11-13, 87; Plönes, Übererzeugung (1935), 12-13.
hemian lignite area bordered the Elbe, which made Central and East Germany the natural hinterland for its coal.⁴

Bohemian lignite mainly competed with Lusatian and Central German brown coal, and in some parts of the market with German and English hard coal, but not with Rhenish lignite.⁵ Nevertheless, Bohemian coal’s advantages implicitly reveal the disadvantages of the other areas, namely transportation costs and, especially, the quality of their lignite. While the fuel value of German hard coal ranged between 5,300 and 7,900 calories, and that of Bohemian raw lignite between 3,000 and 5,900, Central German (2,300-3,000), Lusatian (2,300-3,700) and Rhenish raw brown coal (2,000-2,200) only had poor calorific values that ranged even below those of wood and turf, due to a high proportion of water per unit.⁶ Indeed, as a rule of thumb, hard coal had 4.5-fold higher fuel value than raw lignite.⁷

Facing such preconditions, it is understandable that lignite’s exploitation remained at a low level until the 1880s. In the Rhineland, some energy intensive industrial firms, especially sugar refineries and glass and brick works in the south (‘Südrevier’) near Bonn and Brühl, used brown coal as a cheap energy source,⁸ as did private households in close vicinity to the coal fields. This pattern can also be observed in the other lignite regions, although alternative fuels were much more favoured in the Rhenish area; consumers could easily obtain high quality hard coal from nearby – the Ruhr and Aachen mining regions – which made transportation costs almost negligible. In contrast, the hard coal supply in Central and East Germany was more expensive due to the higher transport costs; for this reason, brown coal, and its derivatives such as ‘Nasspresssteine’ (hot pressed coal) or paraffin, was able to achieve a more significant market share there earlier (since the 1860s) than in the Rhineland.⁹

Correspondingly, technical innovations arose mostly in the Central German area. The most important one, in 1877, was the technique used to briquette brown coal. In a manner of speaking, this innovation had been the

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⁴ Randhahn, Wettbewerb (1908), 82-88.
⁵ Czempin, Der deutsche Braunkohlenmarkt (1913), 37; Fremdling, Britische und deutsche Kohle (1989), 41, 48.
⁶ Schmitz, Bedeutung der Kohlentarife (1927), 15f.; Hotop/Wiesenthal, Deutschlands Braunkohle (1902), 9.
⁷ Storm, Geschichte (1926), 298.
⁸ Fischer, Braunkohlenbergbau (2003), 84-85.
⁹ Hamers, Braunkohlenbergbau (1910), 130; Randhahn, Wettbewerb (1908), 56.
lignite’s steam machine, and was the starting point of its industrialization; before then, only 128,000 tons (1875) were mined in the Rhenish area. The output only increased slowly at first (1885: 332,000 tons), but then ‘exploded’ (1900: 5.1 million tons), with briquettes making lignite competitive overnight. The fuel value more than doubled up to 5,000 calories. Moreover, lignite briquettes burnt more steadily and produced less soot and ash than hard coal, and were therefore particularly suitable as domestic coal.

In the same period, engineers developed mechanical diggers, ropeways and conveyors in order to remove spoil and quarry lignite more cheaply and easily. These innovations set the stage for large-scale, open-cast mining, as long as the geological conditions were suitable. A later innovation stimulated (Rhenish) brown coal production even further: the conversion of lignite into electricity. Specific power plants had been built on the coal fields since the turn of the century, and these soon became the most efficient way to produce electricity in Germany, or even globally, as businessman Paul Silverberg argued in 1920.

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10 Fischer, Statistik (1989), 49.
11 Oellerich, Braunkohlenbrikett (1912), 14, 19; Randhahn, Wettbewerb (1908), 66.
As Figure 1 indicates, the invention of briquettes and power plants did not have an immediate impact on lignite mining, but the output increased substantially from the mid-1890s onwards, when a process of catching up with hard coal began. Lignite production did not, however, grow to the disadvantage of hard coal before WWI; it was only afterwards that the picture changed.

Starting with a coal miners’ strike in the Ruhr area in 1889 and the hard coal delivery problems that ensued, several exogenous effects repeatedly, but unintentionally, reinforced lignite’s sustainable growth. Indeed, the following were all factors in making lignite more important after 1918 – at least in nominal terms: the loss of territory after WWI, including the Silesian hard coal area; reparations, which had to be partly paid in coal; the Ruhr crisis and the occupation of the Rhineland (both in 1923); and the general lack of coal. Taking its lower fuel value into account (Figure 1 only presents unweighted outputs), lignite still had a smaller market share after 1918, but compared to the other lignite mining areas, Rhenish lignite was catching up quickly: the German market share of Rhenish lignite in-

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creased from 5% in the 1890s up to 32% in 1930, with one sharp decline in 1923 because of the occupation of the Rhineland and the great strike that was its consequence.\(^{14}\)

Nevertheless, due to the economies of scale, scope, density and organization explained below, Rhenish firms could, over time, generate enormous cost advantages: in terms of all relevant figures, the Rhenish lignite area performed significantly better than any other coal-mining region in Germany, regardless of whether it involved hard or brown coal. Even in 1913, the weighted output per worker and shift, i.e. factoring in the different calorific values by converting them to hard coal equivalents, was roughly 2.5 times higher than in the Ruhr and Central German areas and twice as high as in East Germany. These productivity advantages even increased after WWI: in 1928, the corresponding values were 4.3, three and (still) two-fold. The unit labour costs amounted to: 1.67 M (1913) and 1.62 RM (1928) in the Rhenish area; 5.94 M (1913) and 7.46 RM (1928) in the Ruhr region; 4.10 M (1913) and 4.37 RM (1928) in Central Germany; and 3.11 M (1913) and 2.84 RM (1928) in Lusatia. This indicates that only the Rhenish and East German areas were able to reduce unit labour costs by way of rationalization in the 1920s, while the other regions had to cope with the effects of shorter working hours and wage rises from 1918 onwards.\(^{15}\) These different cost efficiencies are mirrored in the returns on equity of certain free-standing firms for 1913. These amounted to 14% at the Rheinische Aktiengesellschaft für Braunkohlenbergbau und Brikettfabrikation (in short: RAG), but ranged in Central Germany from roughly 6 to 9% and in East Germany between 8 and 12%, with an exception being that this figure could rise to 17% due to a combination of high briquette sales and a comparatively small equity.\(^{16}\)


\(^{16}\) For the data, see: Spoerer, *Von Scheingewinnen* (1996); Gehlen, *Silverberg* (2007); Schneider, *Finanzierung* (1933).
3. Explaining a bonanza: a tale of opportunity costs?

In general, the Rhenish mining area clearly benefitted disproportionately from the coal market developments after the 1880s. This was for multiple reasons, which in combination turned out to be the eponymous bonanza. Yet beyond that, the performance of the Rhenish lignite area arose from rational business strategies, which enabled the enterprises to constantly achieve high profits.

3.1 Geology and geography

Talking about mining necessarily requires some discussion of its natural environment. Although Rhenish lignite had the highest proportion of water, and thus the poorest fuel quality, of all German hard and brown coal areas, its geological and geographical preconditions were rather favourable. At first, the Rhenish coal fields were coherent and qualitatively consistent, while in the Central German area there were particularly fragmented deposits of varying quality. Secondly, the Rhenish seams ranged between 20 and 100 metres, which made them relatively thick. Thirdly, in some places, the seams even emerged on the surface. Usually, the platform was rarely thicker than 20 metres and consisted mostly of sand and gravel, which is why it could be removed easily.17 Meanwhile, in some parts of Central Germany, the soil was stony and reached up to 50 metres, and even 450 metres in Bohemia.18

Overall, the geological preconditions in the Rhineland were almost ideal for mechanized and large-scale open-cast mining. In addition, with prudent exploitation and business strategies, the competitive disadvantages due to the poor fuel quality could be compensated for in the long run: as shown above, even in 1913, the Rhenish area was the most cost-efficient mining region in Germany.

When the industrialization of lignite started in the 1880s, the Rhineland already had good transport connections in terms of both railways and shipping. All Rhenish brown coal pits had been connected with trans-regional railways since 1897.19 Nevertheless, for a period, these beneficial trans-

port connections instead proved to be a competitive disadvantage, because they enabled hard coal producers to sell their products in even the core area of Rhenish lignite.\(^{20}\)

Even though this argument became much less important after the industrialization of briquette production had created a lignite product that was competitive with hard coal, railway tariffs in particular determined the scope of the coal markets. The unified tariff for raw materials in 1890 was extended to coal in 1897, but was somewhat disadvantageous for lignite. Formally, it treated hard and brown coal as equals, with the effect being that the same amount was charged for one weight unit. Yet taking the poor fuel value into account meant that lignite was de facto discriminated against; to reach the same fuel value of one weight unit of hard coal, 4.5 units of raw brown coal or 1.5 of briquette had to be transported. This obviously made lignite transport relatively more costly. In combination with its scale of distances, the railway tariff scheme made the transport of raw lignite unprofitable at distances over 100 km, and that of briquettes over 300 km, because the higher transport costs then offset the production cost advantages. Correspondingly, hard coal from the Ruhr and Silesian areas was largely transported over 300 km and beyond.\(^{21}\)

Despite some modifications, this tariff scheme was in force over the entire period. Its main effect had been structural: it fragmented the coal market into more or less ‘natural’ distribution areas. In most German regions, the combination of production and transport costs created de facto monopolies for producing areas and/or coal products. Lusatian lignite briquettes, for example, dominated the domestic coal market in Berlin, as did Rhenish Union briquette on the Upper Rhine. Hard and brown coal producing areas only competed in some regions like Schleswig-Holstein, Hesse-Nassau or parts of Bavaria, where two or more coal suppliers charged similar final prices for a fuel unit, i.e. the combination of production and transport costs including a margin. Exceptions from the tariff were, however, made for transport to harbours and abroad, which had an impact on the transnational scope of Rhenish lignite outlined in Part 4.

Despite the discriminatory tariff scheme, Rhenish brown coal benefitted from the dense transportation networks in its region in the long run and, moreover, from the high fuel and power demands in the densely populated

\(^{21}\) Puzicha, *Wettbewerb* (1938), 15.
and heavy industry dominated Rhine-Ruhr agglomeration. Finally, lignite producers realized economies of density, especially compared to the other lignite areas in regions that were less developed economically.\textsuperscript{22}

### 3.2 Property rights and business strategies

Along with economies of density, the Rhenish lignite producers could, in the long run, achieve economies of scale, scope and cooperation, which matches Chandler’s model perfectly.\textsuperscript{23} This did not, however, simply come out of thin air; the most crucial path-shaping factors for the area’s development were probably ‘patient’ property rights combined with the favourable Prussian Mining Act. Unlike those parts of Central Germany where the Saxon Act was in force, in the Prussian Rhineland claims were not bound to land ownership. In Central Germany, both earlier exploitation (on a small capital basis and conducted by small- and medium-sized enterprises) and institutional boundaries led to fragmented property rights with different exploitation interests.\textsuperscript{24} Meanwhile, the often aristocratic Rhenish land owners had secured mining claims for their normally large realities well before the 1880s, but did not activate them until the dawn of lignite’s industrialization. Instead, they used the land for agriculture and forestry until the exploitation of brown coal was proved to be more profitable after the invention of briquettes. Put another way, the land owners then took advantage of favourable opportunity costs. The claim holders did not usually exploit the coal fields themselves, but transferred the corresponding rights to newly founded lignite firms, often (co) run by engineers from the Central German area. As a quid pro quo, the claim holders received a certain amount of company stock. Moreover, they usually supported the management’s long-term strategies by relinquishing dividends in favour of reinvesting profits in the early years. As a main result, these ‘patient’ property rights enabled organized, coherent and large-scale exploitation strategies from the very start. Meanwhile, in the other areas, property rights were embattled, fragmented and, moreover, led to different

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\textsuperscript{23} Chandler, \textit{Scale} (1990).
\textsuperscript{24} Heinz, \textit{Kartellbildungen} (1919), 5-13, 34; Randhahn, \textit{Wettbewerb} (1908), 15-17; Hammerstein, \textit{Entwicklung} (1933), 20-22.
exploitation and refinement strategies, for example the use of lignite as energy for industrial firms vs. briquette production.\textsuperscript{25}

In contrast to those areas, in the Rhineland the dominant lignite cartel (1902: ‘Braunkohlen-Briet-Verkaufsverein’; 1915: ‘Rheinisches Braunkohlen-Brikett-Syndikat’) was driven by only a few players who had the only remarkable influence on the area’s developments. Many other minor producers were subsidiaries of key players of large-scale Rhenish industry, such as Rheinische Stahlwerke, Vereinigte Stahlwerke van der Zypen und Wissener Eisenhütten, Felten & Guilleaume, and Bayer (later I.G. Farben), and were solely energy suppliers for their parent companies.\textsuperscript{26} Above all, they were not competitors, for they only marketed small elements of their outputs. Moreover, they can be ignored, because their minor market activities did not affect the strategies of the pure lignite producers at all. Furthermore, the subsidiaries were integrated in the cartel, and the joint ventures were strategically dominated by the lignite firms: five firms (Roddergrube, Brühl-Godesberger Verein, Fortuna AG, Gruhlwerk and Donatus) shaped Rhenish lignite production from the 1880s/1890s onwards. In 1908, these five free-standing competitors merged into two new companies: Fortuna, Gruhlwerk and Donatus became Rheinische AG für Braunkohlenbergbau und Brikettfabrikation, which dominated the north of the mining area; and Roddergrube and Brühl-Godesberger Verein became Braunkohlen- und Briketwerke Roddergrube AG in the south.\textsuperscript{27} Finally, a rather dramatic hostile takeover shaped a regional monopoly in 1933, when Roddergrube de facto took over RAG.\textsuperscript{28}

These successive mergers became the most visible result of the growth strategies within the lignite area. Both internal and external growth had been forced by a variety of incentives. At first, the producers pursued similar strategies, and the coal quality was more or less interchangeable. Neither factor was probably decisive, but they did not at least obstruct interfirm cooperation and/or mergers. Moreover, open-cast mining was perfectly suited to mechanical diggers and mechanization in general, which led as

\begin{itemize}
\item \textsuperscript{25} Richrath,\textit{ Finanzierung} (1928), 169-171.
\item \textsuperscript{26} For example: Plumpe,\textit{ I.G. Farbenindustrie AG} (1990), 165-168.
\item \textsuperscript{27} Dammers,\textit{ Kartellbildung} (2003), 69-78.
\item \textsuperscript{28} Gehlen,\textit{ Silverberg} (2007), 407-465. Although the head of the RAG, Paul Silverberg, was a native Jew, the 1933 transaction was a market manoeuvre without any political background.
\end{itemize}

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much to a high capital demand as did the building up of power plants at the dawn of the electrification era. Capital intensity again implies strategies in order to realize economies of scale. Moreover, mechanization caused a slight de-qualification of the workforce, because fewer high-skilled miners were needed; instead, semi-skilled workers could be hired, which reduced labour costs, especially compared to those in the lignite and hard coal areas, where only underground mining was possible. In general, this caused 2.5 to 3-fold higher production costs. Furthermore, the syndicate quotas (see below) forced mergers, because companies could thereby increase their shares of the cartel sales, especially the firms that owned large coal fields but had only relatively small cartel quotas.

Besides the economies of scale, the Rhenish lignite producers could also achieve economies of scope to a greater extent than their Central and East German competitors. The vertical integration of electrical power plants was particularly crucial for the relative success of the Rhenish lignite industry. Based on calculations in 1916, the industry was able to achieve at least 60% higher profits from lignite’s conversion into electricity than from briquette sales. At that time, three tons of raw lignite were needed to produce one ton of briquette, which was sold at a profit of 1.40 M. If the same quantity of raw lignite was converted into electricity, the profit was at least 2.20 M.

Producing electricity out of lignite also had production cost benefits compared to electricity production based on hard coal, because of the easier coal exploitation in open-cast mining. As the demand for electricity was high in the Rhine-Ruhr agglomeration in both industry and households, it is not an accident that the large private and semi-public players in German electrification were (and are still) located near the Rhine and Ruhr.

How important the electrification strategies were – compared to the Central German area, for instance – can be seen in the increasing share of lignite use from a long-term perspective: it increased from about 5% in

1915 up to 15% in 1930 and 80% and more in the 1970s.\textsuperscript{33} The conversion into electricity can be seen as the most relevant issue for the market success of Rhenish brown coal, especially when we look at the main competitors in the German lignite markets located in the Central German and Lusatian areas: these mining regions had been superior for a long period because of their knowledge of and focus on briquette production (and some less profitable lignite derivatives). Nevertheless, they locked in capital to serve markets with weak long-term growth. Ultimately, strategies – especially briquette vs. industrial energy sources – competed not only within mining areas, but even within companies. As a result, a smaller degree of concentration can be observed: in 1913, the three biggest Rhenish lignite companies (including joint operating firms) had a combined share of the area’s production of 54% (briquette) and 86% (raw lignite), while the corresponding values in Central Germany were 31% and 24%.\textsuperscript{34} Firms in the Central and East German areas achieved fewer economies of both scale and scope. Many local lignite producers instead became raw material suppliers for public utilities and/or energy intensive industries rather than large-scale producers of either briquettes or electricity. While Rhenish firms optimized their cost-benefit ratio over time, most free-standing brown coal producers in Central and East Germany could only operate with a ‘broken value chain’.

In general, a three-fold ‘second mover advantage’ for the Rhenish lignite industry can be observed:

1) The later development of the area prevented Rhenish firms from investing in brown coal derivatives, which were the cash cows for, especially, the Central German lignite producers in the 1860s and 1870s, but proved to be rather unprofitable in the long run.

2) As hard coal had been a serious, if not superior, competitor on the West German coal markets, even when lignite briquette gained additional market shares, Rhenish lignite firms searched for more attractive opportunities that ultimately occurred in the form of electricity production. Rhenish firms then tried to consolidate their coal market shares by selling briquettes, but did not seek to expand these sales. Instead, they used the additional raw lignite delivery for power plants.

\textsuperscript{33} Kleinebeckel, \textit{Unternehmen Braunkohle} (1986), 279.
\textsuperscript{34} Own calculations based on data from Adomzent, \textit{Konzentration} (1933), 12-15; Oellerich/Czempin, \textit{Braunkohlenbergbau} (1927), 25-26.
3) In Central and East Germany, briquettes could compete with hard coal due to transportation cost advantages, which is why less market pressure existed to invest in alternatives such as electricity. Moreover, insufficient area cohesion led to major cost disadvantages in the long run, at least in Central Germany. Nevertheless, cooperation and cohesion proved to be an additional factor in the Rhenish success story.

3.3 Cooperation and cartelization

In the late 19th century, (brown) coal, and especially briquette production, alternated between cyclical surplus production that put pressure on prices, and (seasonal) excess demand in severe winters, when small-scale producers with bad coal qualities were out to make quick money with which they ultimately discredited briquettes in general. Both processes encouraged the briquette producers to cooperate. However, until 1900, the cooperation only led to some lax and temporary cartels. Nevertheless, thereafter, the firms agreed a close form of cooperation, which was inspired by and aimed at the Ruhr Coal Syndicate (Rheinisch-Westfälisches Kohlen-Syndikat, RWKS).

Notwithstanding the anti-competitive effects of cartels in general, the Rhenish lignite syndicates – Braunkohlenbrikett-Verkaufsverein 1902/04-1915 and Rheinisches Braunkohlensyndikat since 1915 (see Figure 2) – were organizations that were almost perfectly tailored to their members’ interests. The cartel only affected briquettes, but not raw brown coal, although there was a politically enforced raw lignite cartel from 1919 to 1924. The cartel organized every firm in the Rhenish area from 1915 onwards, which, of course, means that neither cartel outsiders nor free-riders existed then or later. In the end, homogenous interests thus resolved the classical problems of collective action.

35 Schmalenbach et al., Gutachten (1928).
36 Plönes, Übererzeugung (1935), 14-34; Lehmann, Braunkohlensyndikat (1930), 13.
37 Franken, Einwirkung (1926), 5-6; Thelen, Braunkohlenbergbau (1916), 30-31; Dammers, Kartellbildung (2003), 32, 52.
38 Dammers, Kartellbildung (2003), 69-78.
Nonetheless, both syndicates and further common organizations were not restricted to quality or price-rigging, but were instead conceived as a common marketing agency for the Rhenish area. Accordingly, on the one hand, it invented the brand ‘Union briquette’ in 1904, and on the other contracted its members to a fixed sale price regardless of their different production or transportation costs. Briquette freight rates were, by default, charged on the basis of the rail station ‘Liblar’. The different rail distances from the pits to the station were offset against each other internally. As a result, Rhenish briquettes had a level quality and product price which could, however, differ between target areas due to transportation costs. Yet for customers in the same region, price and quality still were the same. As a consequence, the cartel turned Rhenish briquettes into a homogenous product for consumers: they did not purchase briquettes from Roddergrube or RAG, but Rhenish versions instead. At the same time, other lignite areas offered several brands with substantial differences in quality. In the long run, and in combination with cartelization, business strategies and railway tariffs, this rather ‘modern’ branding strategy led at first glance to

a paradox effect: because Rhenish firms restricted themselves to a certain briquette output and used raw lignite in power plants instead, they relinquished a higher share of the briquette markets and kept retail prices at a high level, not least to communicate the better quality of their coal. While the average unit cost fell due to economies of scale, the retail prices still remained higher than those of the Central and East German brands. Besides the obvious effect of the lack of local competition, this can, again, be explained with opportunity costs. Rhenish firms could theoretically have expanded the geographical scope of their briquette markets by using their competitive production cost advantages in a price competition with producers from other areas, but they refused to do so for rational reasons: such a strategy would, on the one hand, necessarily have reduced profits per briquette unit due to a smaller margin, and, on the other, converting lignite into electricity was even more profitable in any event. In brief: an expansion of briquette production would have reduced both profits in terms of briquette sales and electricity production.40

In general, the cartelization had been inspired by the RWKS, but the Rhenish industrialists refused to cooperate with it: they were afraid of being dominated by their Ruhr counterparts. Instead of joining the RWKS, the Rhenish businessmen tried to remedy some of the syndicate’s deficits and shape a more flexible sales organization, using ‘classical’ cartel regulations, as well as ‘modern’ marketing instruments like branding, to do so.

At first, the calculation of the syndicate quotas differed from those of the RWKS. Indeed, the member firms did not have a nominal quota, i.e. a certain amount of tons of briquettes, but a relative one, i.e. a percentage of the cartel’s revenues. As a result, the Rhenish syndicate was able to control both its own sales strategy as well as the capacity policy of its member firms. On the one hand, the syndicate was free to sell briquettes with regard only to the market’s capacity (which stabilized prices as well), but did not guarantee that its members could sell a fixed, nominal amount of briquettes; they ‘only’ got their share of the generated revenues. In 1913, for example, the Roddergrube and related firms had a cartel share of 27% and the RAG-complex of 46% of all syndicate sales. To put it in simple terms, the Rhenish syndicate’s control lever was ‘sales’ in contrast to that of the RWKS, which was orientated by ‘production’. This structure evidently had a major effect on the business strategies of the Rhenish lignite

producers: the firms could not raise their revenues by increasing their capacity, but only by reducing their costs or by increasing their cartel quota, which could only happen by absorbing the quota of another cartel member. As a result, the Rhenish firms had incentives to rationalize and merge, rather than to build up new briquette capacities, which had to be approved by the syndicate anyway. Moreover, the syndicate’s strict control of briquette sales set a strong incentive for the member firms to search for an alternative, non-cartelized, use of raw lignite, i.e. converting it into electricity. In a manner of speaking, the Rhenish briquette cartel organization brought about favourable opportunity costs in order to invest in power plants.41

Secondly, the Rhenish syndicate did not strive to replace regular trading firms, but to activate them for tentative ‘market research’.42 Thirdly, closely related to this, an information centre was created to advise potential (commercial) customers about the technical requirements for lignite heating. Bakeries, for example, had to install new ovens before they could take advantage of brown coal. This customer relationship management soon proved to be successful: the share of industrial usage, which was less dependent on economic trends than use in households, increased from 15 (1904) to 30% (1910), and in the 1920s ranged between 35 and 40% of all briquette sales.43

Fourthly, the syndicate (since 1915 its ‘sister’ organization ‘Vereinigungsgesellschaft rheinischer Braunkohlenwerke GmbH’) acted as a common investor. In particular, it invested in infrastructure, especially in Rhine harbours and storage facilities in Wesseling near Cologne, in Mannheim in 1905, Straßburg in 1909, and Karlsruhe in 1916, in order to foster the use of briquettes in the (southern) Rhine economy.

Overall, the impact of the Rhenish lignite syndicate could be read as a textbook example of cartelization effects: the cooperative structure of the Rhenish lignite industry was extremely favourable for the producers (in the first decade of the 20th century, Rhenish lignite expanded sales by an average of 15% per year),44 but customers paid the price: the nominal

labour productivity rise of about 38% between 1898 and 1908 (in real terms 13%, due to a pay rise awarded to miners of 25%) would have allowed the retail prices of briquettes to fall significantly. However, they instead rose by 64% in the same period. Roughly calculated, cost reductions and retail price increases amounted to an additional margin of 100% in nominal terms. Unsurprisingly, cooperation, collusion and cartelization enabled the Rhenish firms to gain monopoly profits in a constrained view of briquette markets.

The perspective changes to some extent when taking the whole fuel market into account: despite the strategy for monopoly profits, lignite briquettes still had a more favourable retail price than (cartelized) hard coal and could therefore increase their market share. Union briquette, for example, raised its market share of all coal sales in the left bank Rhineland from 5 (1898) to 24% (1910), and in Hesse-Nassau from 0.5 to 6.6%. In the hard coal-dominated Westphalian region, however, this share remained negligible (0.05 to 0.6%). Nevertheless, at least in some regions, cartelization had been one instrument with which to systematically access previously non-competitive coal markets in favour of, or at least not to the disadvantage of, customers.

However, when examining these figures, it is clear that Rhenish lignite was not really taken seriously as a competitor in the Ruhr area until 1913, although it tried to free itself from the dominant Ruhr coal. Nevertheless, after the preconditions had changed quite dramatically after WWI, Rhenish lignite and Ruhr hard coal closed ranks. On the one hand, state regulation forced cartelization and cooperation to a large extent for the Coal Statute (‘Kohlenwirtschaftsgesetz’) in 1919, and left it up to the market actors to either choose a voluntary or a compulsive cartel.

Moreover, cooperation was extended on the company level, again partly due to those regulatory threats. The genuine hard coal-based electricity producer RWE had at first used the Rhenish Roddergrube as a contract supplier for lignite and finally took it over in 1920. On the other hand, the Rhenish RAG gradually became the main shareholder of the Ruhr enterprise Harpener Bergbau AG after 1926. In the electricity markets, cooperation was also institutionalized by an informal and ‘personalized’ cartel.

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45 Own calculations based on Siebert, Lage (1910), 130 (labour productivity); Plönes, Überzeugung (1935), 24, 37 (prices).
46 For details, see: Czempin, Braunkohlenmarkt (1913), 33-35.
47 Adomzent, Konzentration (1933), 27-30.
between RAG (Paul Silverberg) and RWE (Hugo Stinnes) after 1920 and a
demarcation of influence spheres.\textsuperscript{48} This cooperation ended in 1933, when
the RWE-subsidiary Roddergrube took over RAG, and it ended in integra-
tion. Thereafter, the RWE had a regional electricity monopoly along the
(German) Rhine, which was finally codified in the Electricity Law (‘En-
ergiewirtschaftsgesetz’) in 1935.

4. Lignite’s (trans-)nationality and the Rhine

The development of the Rhenish lignite industry at first seems to be a
rather national phenomenon, which is certainly true to some extent. As a
strategic relevant energy and electricity resource, it was not controlled by
legislation by accident, especially under the preconditions of economic na-
tionalism in the 1920s and 1930s. Yet the story would be incomplete if
Rhenish brown coal is reduced to a mere national resource. Moreover, be-
fore its industrialization, cartelization and large-scale use, lignite (bri-
quettes) had a transnational rather than a national scope, as Figure 3 indi-
cates: until 1892, foreign markets along the Rhine, especially the Nether-
lands and Switzerland, were more important distribution areas than Ger-
man domestic markets: in the peak year of 1886, the Netherlands imported
no less than 48\%, Switzerland 20\% and France 8\%. Indeed, only 21\% of
all Rhenish briquette sales were made in Germany.\textsuperscript{49} The reason for this is
quite simple: some regions in the east of the Netherlands were rather cut
off from the coal supply in these areas (as well as in some regions of
Northwest Germany along the Dutch border). Rhenish lignite firms sold
special briquettes for specific Dutch needs – so-called ‘Doofbriketts’ –
which were not affected later by cartel regulation. Established (hard) coal
producers were clearly not interested in such niche markets.\textsuperscript{50}

\textsuperscript{48} Gehlen, Silverberg (2007), 164-165.
\textsuperscript{49} Hamers, Braunkohlenbergbau (1910), 127; Dammers, Kartellbildung (2003), 94;
Plönes, Übererzeugung (1935), 14, 24; numbers: own calculations based on Böker,
Entwicklung (1908), 3-5.
\textsuperscript{50} Nachrodt, Absatzorganisation (1927), 26f., 53; Piatschek, Braunkohle (1937), 15.
In a manner of speaking, the transnational Rhine economy was an enabling factor for the Rhenish lignite industry’s development, as it provided ‘test’ markets abroad when the domestic coal markets did not yet offer profit opportunities. Nevertheless, this structure already influenced the latter markets: Rhenish briquette pioneers, with comparably secure revenues from foreign sales, successfully tried to prevent the market access of potential rivals by using the foreign surplus to sell briquettes at dumping prices in the domestic markets. This kept the number of market players manageable, which was one factor in the Rhenish region’s success.

Again, when opportunity costs were more favourable after the 1890s, the original transnational pattern changed to a more national Rhine economy. Foreign sales, however, remained rather stable in nominal terms; only exports to the Netherlands fell significantly from 1913 to 1925, while

51 Dammers, Kartellbildung (2003), 38.
those to France, as well as ‘exports’ to the Upper Rhine area, increased. In particular, the lignite provision along the Rhine in Germany’s southwest (and Switzerland, as well) became an ‘emerging market’ for the Rhenish mining area.\textsuperscript{52}

Ironically, the Rhine had no long-term impact at all on the German lignite markets, as was the case for waterways in general; the exception was the transport advantages mentioned above that Bohemian brown coal had thanks to the River Elbe.\textsuperscript{53} Why this was the case is unsurprising: German producers’ opportunity costs for using waterways were too high for two reasons: 1) lignite briquettes were unsuitable as bulk cargo, as they had to be piled on pallets and carefully put onto ships, which increased transhipment costs significantly; 2) raw lignite was admittedly a possible bulk cargo, but due to the discriminatory railway tariffs, transport to harbours was expensive and ultimately made shipment via waterways unprofitable.\textsuperscript{54} The invention of special cranes, the specific harbour infrastructure and the reduction of charges for waterways (especially in Baden) at least made the Rhine more important for lignite transportation (see Figure 4).\textsuperscript{55}

\textsuperscript{52} Nachrodt, \textit{Absatzorganisation} (1927), 54-55.
\textsuperscript{53} Randhahn, \textit{Wettbewerb} (1908), 37.
\textsuperscript{54} For example: Heinz, \textit{Kartellbildungen} (1919), 19.
\textsuperscript{55} Nachrodt, \textit{Absatzorganisation} (1927), 50-52.
Sources: own calculations based on ZA Rheinbraun, Braunkohlen-Briket-Verkaufsverein GmbH Köln, 722/710, Geschäftsberichte 1911/12, 1914/15; Nachrodt, Absatzorganisation (1927), 49, 52, 58; Oellerich/Czempin, Braunkohlenbergbau (1927), 38.

Besides some exogenous stimulation of shipments (especially the restraints of railway transportation during the occupation of the Rhineland in 1923), the trend towards a larger but never dominant share of waterway transportation is obvious. Nonetheless, shipments to the mouth of the Rhine did not play any role before 1913, because in times of a national coal surplus special railway tariffs existed to promote transport abroad. Accordingly, in 1913/14, only 6.5% of briquettes with a destination of the Netherlands (and 19.4% with a destination of Switzerland) were shipped, with most of them transported by rail. As a result, before WWI, German railway regulations in particular enabled a transnational scope of Rhenish lignite (and other coal as well), as they artificially fostered market expansion abroad (and stimulated large-scale strategies in Germany). For Rhenish lignite, the natural foreign markets were located along the Rhine, and thus within the Rhine economy: the Netherlands, Luxemburg, Belgium, Switzerland, Alsace-Lorraine and – albeit with a fairly small proportion –
even Austria and Northern Italy in the south as well as Denmark in the north.\textsuperscript{56}

Some patterns changed after WWI due to its political consequences. France became a more relevant market again, as it had been until 1890.\textsuperscript{57} There are two reasons for this: 1) the re-integration of Alsace-Lorraine into France turned Rhenish briquette deliveries into exports; 2) reparations had to be partly paid in coal. What turned out to be an additional charge for Ruhr coal ironically became a free advertisement for Rhenish briquette. The forced deliveries opened up markets in France that were previously unavailable, although their scale remained rather low (see Table 1 below).

As Figure 4 shows, briquette shipments became more relevant after 1918, but this was internal German growth; trans-border shipments of the rather stable briquette exports to Switzerland shrank from 19.4\% to 2.7\%. Indeed, only shipments to the Netherlands could be increased to 72.2\% of the nearly halved exports in 1924/25, due to the abolition of the special railway tariffs. In times of a general lack of coal, as in the early 1920s, artificial export promotions were not only superfluous, but also harmful in national terms. Moreover, in the meantime, critical Dutch customers had accepted the non-piled delivery of briquettes, meaning that Rhenish lignite after WWI could take advantage of both the Rhine River and Dutch canals as a favourable transport system. Nevertheless, briquettes increasingly competed with English and German hard coal on the Dutch markets, which is why lignite provision to the Netherlands fell nominally after 1918.

Instead, the Upper Rhine area became the most relevant trans-regional market for Rhenish briquettes, not least with respect to the Rhenish investments in infrastructure, especially harbours, coal storage facilities and transhipment stations. The latter already indicate a typical pattern in the opening up of Upper Rhine markets and the change in transportation modes to Switzerland. Due to a complicated interaction of (nationwide) railway and (state-wide) waterway tariffs, the most favourable transportation scheme turned out to be to use the railway from the briquette factory to Wesseling Harbour, then to transship the briquettes on vessels and back to railways at the Upper Rhine harbours (Mannheim, Karlsruhe), from

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\textsuperscript{56} For this and the following, cf. Nachrodt, \textit{Absatzorganisation} (1927), 53-65.
\textsuperscript{57} Böker, \textit{Entwicklung} (1908), 3-5.
where the goods were transported via rail to their final destinations in Germany and Switzerland. One consequence of this was that 92% of all lignite shipments were upstream shipments in 1924/25. The effects of these structural changes, and especially the development from a more transnational to a more national (briquette) Rhine economy, are presented in Table 1.

Table 1: Share of briquette sales in select regional markets, 1913/14 and 1924/25

<table>
<thead>
<tr>
<th>Market</th>
<th>1913/14</th>
<th>1924/25</th>
</tr>
</thead>
<tbody>
<tr>
<td>German Upper Rhine</td>
<td>14.06 %</td>
<td>17.58 %</td>
</tr>
<tr>
<td>Netherlands</td>
<td>5.01 %</td>
<td>1.77 %</td>
</tr>
<tr>
<td>Switzerland</td>
<td>3.92 %</td>
<td>2.74 %</td>
</tr>
<tr>
<td>Belgium</td>
<td>1.83 %</td>
<td>1.09 %</td>
</tr>
<tr>
<td>France (including Alsace-Lorraine)</td>
<td>5.03 %</td>
<td>5.17 %</td>
</tr>
<tr>
<td>Luxemburg</td>
<td>1.10 %</td>
<td>0.85 %</td>
</tr>
</tbody>
</table>

Source: Nachrodt, Absatzorganisation (1927), 53-54.

5. Conclusion

By the end of the 1920s, the Rhenish lignite area had – after a long, steady and well-planned development process – become the most profitable mining area in Germany, and even weathered the Great Depression without facing the major problems other regions were dealing with. As demonstrated, this was the effect of several factors: favourable geographic conditions, patient capital, and successful business and organizational strategies, which in combination led to a bonanza, with many boom years for the firms involved. Indeed, always when opportunity costs suggested an alternative strategy, Rhenish firms were able to react properly to these market (and regulatory) incentives. In the long run, they realized economies of scale, scope, density and organization. Over time, Rhenish lignite thus became a serious competitor to the coal markets – especially for domestic coal – and particularly in terms of the supply of electricity. In fact, brown coal-based power plants gradually became the most relevant electric energy source in the (German) Rhineland and – besides hard coal and, temporarily, nuclear power – the main resource for electricity production in Germany overall until the most recent past. It thus not only symbolizes the
transition from the coal to the electricity-based Rhine economy throughout the 20th century, but essentially influenced its development by providing comparably cheap energy.

Although this was mainly a national (German) process, it had – beyond that – an impact on the Rhine economy as a whole via the energy supply, which is nevertheless quite hard to quantify. Moreover, its development cannot be explained without considering the trans-national scope in the late 19th century: without the foreign Rhenish markets at the early stages of the area’s industrialization, the development path of Rhenish lignite would probably have been different.

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https://doi.org/10.5771/9783845284736
Generiert durch IP '54.70.40.11', am 11.10.2020, 16:05:29.
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The Rhenish Lignite Industry within the (Trans-)national Rhine Economy

- Historisches Archiv der Stadt Köln
- Konrad Adenauer papers, 902/227/1, 43-49: Silverberg to Adenauer, January 2nd 1920
5. Infrastructures
Connecting to Global Oil. The Construction of Oil Pipelines in the Rhine Basin, 1955-1960.¹

Marten Boon

Abstract: The transition from coal to oil after WWII reshaped the Rhine region’s energy supply infrastructure, as its industries replaced domestic coal with foreign oil. Pipelines were constructed to connect the growing refineries in the Rhine region to ports where imported crude oil landed. In theory, a trans-European pipeline system extending from the French port of Marseille could meet the entire crude oil requirements of the inland refineries in France, West Germany and Switzerland, as well as the seaboard refineries in the North Sea ports. Multinational oil companies proposed such a transnational pipeline system as a rational and efficient solution. Nevertheless, the fragmented political landscape of pre-integration Europe created uncertainty about the feasibility of the pipeline. Moreover, within multinational oil companies, the interests of the head offices and the national subsidiaries diverged to the extent that regional pipelines involving less uncertainty were given preference over the potentially more efficient transnational system. As a result, the crude oil pipeline system that was actually constructed consisted of a number of regional pipelines divided in a northern section extending from the North Sea ports and a southern section originating in Marseille. The two sections were not integrated and divided the Rhine region in two: Rotterdam and Wilhelmshaven supplied the Rhine-Ruhr and Rhine-Main areas; and Marseille supplied the Upper Rhine area up to Karlsruhe. The division between the two pipeline systems was further amplified by the rapidly growing size of crude oil tankers after the 1956 Suez Crisis, with the result being that long sea routes became cheaper relative to long overland pipeline routes. This division has persisted to the present day.

¹ This chapter is based on my dissertation: Boon, Oil Pipelines (2014), passim.


1. Introduction

The transition from coal to oil after WWII radically changed the economy of the Rhine region, reshaping the area’s energy supply infrastructure as the Rhine industries replaced domestic coal with foreign oil. The Western European energy balance had been dominated by coal before the war. Nevertheless, by 1972, on the eve of the first oil crisis, the share of coal had declined from 80 to 24%, while that of oil had risen from 15% in 1952 to 55% in 1972. After the energy crises of the late 1940s due to hampered coal production in post-war Europe, Middle Eastern oil increasingly flowed to Western European markets. Until the first oil crisis of the 1970s, Middle Eastern crude oil was pivotal for Western Europe’s energy balance. To save on foreign currency, countries expanded their refinery capacity with a view to replacing oil product imports with crude oil imports. Under the auspices of the Marshall Plan and the Organization of European Economic Cooperation, a large number of small refineries were constructed, with each designed to supply the domestic market. Yet this patchwork of refineries was inefficient. The growing disparity between coal and oil prices further fuelled the demand for oil in Western Europe from the mid-1950s onwards, bringing about a rapid expansion in the scale of oil refining, transportation and infrastructure.

The Rhine region, with its many industrial and urban agglomerations, had traditionally relied heavily on coal, mainly from the Ruhr. Having successfully navigated the transition from coal to oil, the major chemical

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2 Odell, *Oil and World Power* (1986), 120-121. Unless otherwise stated, Western Europe comprises West Germany, the Netherlands, the United Kingdom, France, Italy, Belgium and Luxemburg.
3 Odell, *Oil and World Power* (1986), 120-121.
complexes along the Rhine became pull locations for the growth of West Germany’s largest clusters of the oil and petrochemical industry between the 1950s and 1970s, attracting billions of dollars of foreign direct investments (FDIs) in the oil industry. The oil supply chain experienced a massive increase in scale in order to supply these clusters. Increasingly larger tankers required deeper ports, while hinterland transportation needed the construction of pipelines. As only some ports benefitted from the geographical conditions required to adapt to ever larger tankers, oil flows to Europe became concentrated, giving rise to strong competition between European ports. Pipelines only increased the concentration of flows, as their profitable operation depended on large and constant volumes of throughput. The arrival of super tankers and pipelines elicited a fundamental transformation of existing transport relations and infrastructure in the Rhine region, as Western European energy markets came to depend on massive imports of oil.

By the early 1970s, when the first oil crisis of 1973-74 ended the period of unprecedented economic growth in Western Europe, the oil supply chain consisted of a small number of large oil ports that were connected by pipelines to the main oil refinery clusters of the European continent. Most of the largest crude oil pipelines ran into West Germany. The oil pipeline system was divided into two sections: a northern section serving the Lower Rhine area up to Frankfurt am Main, and a southern section serving the Upper Rhine area up to Karlsruhe, Mannheim and Bavaria, with each section comprising several pipelines (Figure 1).

Figure 1: Crude oil pipelines to West Germany, c. 1970

Source: Molle/Wever, Oil refineries (1984), 53, 164-168. The system has remained unchanged to the present day.

Source: Molle/Wever, *Oil refineries* (1984), 53, 164-168. The system has remained unchanged to the present day.
In the case of West Germany, its major crude oil landing ports were Rotterdam and Wilhelmshaven on the North Sea and Marseille, Genoa and Trieste in the Mediterranean. This system crystallized in the 1960s and has remained stable ever since. This stability over the past five decades, however, obscures the turbulent history of how the present pipeline system came about. This chapter explains this system by examining its origins in the years 1955-1960. The system was the result of two different perspectives on the planning and construction of Western Europe’s major crude oil pipelines. On the one hand, pipeline projects were seen by national governments as a way to develop domestic seaports and enhance the security of the national supply. On the other, multinational oil companies viewed the planning of pipelines as a transnational issue that should be dealt with at a European level. Nevertheless, the absence of a supranational organization coordinating and harmonizing laws and regulations frustrated the transnational effort. Moreover, the involvement of domestic oil companies, particularly in France and West Germany, and national subsidiaries of multinational oil companies with a considerable degree of autonomy further weakened the case for a single integrated trans-European pipeline system. These complications were compounded by the rapidly growing size of crude oil tankers, which changed the economics of pipeline planning in Western Europe in the late 1950s and early 1960s.

This chapter starts with a brief discussion of the economics of oil pipelines, while the second section examines the various pipeline plans that emerged between 1955 and 1960 to supply the burgeoning refinery clusters in the Rhine basin. Finally, the third section discusses the pipeline system that emerged from the various plans and considers the long-term effects of its implementation.

2. ** Pipelines and tankers **

Up to the mid-1950s, barges and rail tank cars transported all of the crude oil destined for refineries in the Rhine-Ruhr region. Barge transportation was dominant for the transport of products and crude oil in the Rhine basin. The Rhine region largely depended on oil imports via the Port of Rotterdam, which had established itself as a major oil port by the end of the 19th century. Important transhipment points along the Rhine, in partic-
ular Mannheim, complemented Rotterdam’s position. However, with the construction of new and the expansion of existing inland refineries from the mid-1950s onwards, these transportation modes came under pressure; those already in existence could only deliver crude in batches, although it was much more economic for refinery operations to have a continuous supply.

Pipelines are by far the cheapest overland mode of transport if there are concentrated flows of oil; only transportation by maritime oil tankers can be cheaper. As a result, the structure of the supply chain of Middle Eastern crude oil to the Rhine region depended in part on the relative costs per ton-kilometre of pipelines and tankers. As long as tankers remained small in size, pipelines presented the largest relative transport cost reductions in the supply chain. Short sea routes between the Middle East and Western Europe, and long pipelines across the European continent, were favoured. When tankers became cheaper, however, long sea routes no longer mattered and could even become an advantage in combination with short pipelines. This trade-off between the relative advantages of pipelines and tankers was a decisive factor in reshaping the oil transport infrastructure in the Rhine region.

Pipeline economics differ considerably from other modes of transportation, because the transported goods move and the means of transport remains immobile. This means that pipelines can be highly efficient, but they are also very inflexible. The decision where to construct a pipeline involves a careful process of planning, in which several issues are at stake. In general, the capital costs and amortization make up 65% of the total operating costs of a pipeline. The longer the pipe, the higher the capital outlay for its construction. As a result of the high share of fixed costs in a pipeline’s cost structure, ton-kilometre costs do not reduce with distance, unlike with most other transport modalities. The capacity of a pipeline is the only variable that can lower its ton-kilometre cost substantially. Rising capital costs derived from distance can be offset by increasing the diameter of a pipe, because capacity increases exponentially, but capital costs do

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10 Manners, Pipeline Revolution (1962), 157-159.
11 Manners, Pipeline Revolution (1962), 158.
12 Manners, Pipeline Revolution (1962), 157-159.
so linearly, causing the ton-kilometre expense to fall as capacity rises.\textsuperscript{13} However, because fixed costs are relatively high, pipelines require a stable and continuous payload to be competitive and efficient. A key factor is whether there is sufficient demand to warrant a continuous payload on or near the full capacity of a pipeline over the long term.\textsuperscript{14}

As capacity and payload are the largest determinants of the ton-kilometre costs, it is generally more efficient to serve a region or market with one large-diameter pipeline than with several with a smaller capacity.\textsuperscript{15} In theory, the capacity of a pipeline is unlimited as long as pumps can be added to increase the speed of the flow through the pipe. Yet adding pumps adds to operating costs, and at some point these rise faster than the amount of oil pumped through a pipe, causing ton-kilometre costs to rise again.\textsuperscript{16} The effect of adding horsepower to the pumping capacity is greater in larger diameter pipelines than in smaller ones. The main economic problem with pipeline planning is to identify the optimal configuration of diameter and pumping power at the expected throughput to ensure the lowest possible ton-kilometre cost.\textsuperscript{17} An additional problem is the need to plan for adequate spare capacity in the pipeline to allow for future growth while maintaining sufficiently low ton-kilometre costs in the first few years of the pipeline’s operations. This means that if a pipeline from, for instance, Marseille could operate with a sufficiently higher capacity to the Rhine-Ruhr area than Rotterdam, it could, in theory, be cheaper to supply crude oil from Marseille, even though the distance from Marseille to Cologne is four times longer than that from Rotterdam to Cologne.

Pure pipeline economics are not the only determining factor in pipeline planning, because institutional issues are just as important when it comes to understanding how and why this planning evolved historically.\textsuperscript{18} Pipelines have a high degree of asset specificity, meaning that they are geographically fixed and dedicated to serving a limited number of users in a limited space; beyond transporting oil from A to B, they are useless. As the capital invested in pipelines is sunk, the routing, operation and trans-

\textsuperscript{14} Manners, \textit{Pipeline Revolution} (1962), 159.
\textsuperscript{15} Makholm, \textit{Political Economy} (2012), 29.
\textsuperscript{16} Meyer et al., \textit{The economics of competition} (1976), 130-131.
\textsuperscript{17} Meyer et al., \textit{The economics of competition} (1976), 126.
\textsuperscript{18} Makholm, \textit{Political Economy} (2012), 30.
port tariffs need to be concluded and fixed before it is actually built, especially when private capital is involved. Privately funded pipelines therefore tend to be part of vertically integrated oil companies in order to deal with the potentially high transaction, coordination and contracting costs. Another source of uncertainty is government legislation and regulation. Jeffrey Makholm’s recent study of the history of the political economy of pipelines shows that although oil and gas pipelines are technically similar the world over, their operations, governance and regulation differ from country to country. In contrast to the US, where pipeline legislation and regulation was already in place – an inheritance from the Standard Oil Trust era – no such legislation existed in Western Europe in the 1950s, let alone legislation for cross-border pipelines. The oil companies considering pipelines in Western Europe in the 1950s were therefore planning in a regulatory void. Although European economic integration had been launched in 1957, the harmonization of laws and regulations and coordination between member states was yet to come about.

3. National versus transnational pipelines

Around the mid-1950s, it had become apparent to oil companies that the demand for oil was rapidly exceeding the refinery capacity then in place, and oil companies in various countries established inland refineries close to their final markets. Pipelines were required to feed these refineries with crude oil. Between 1955 and 1965, both multinational and domestic oil companies in West Germany, France, Switzerland and Italy engaged in a number of consortia studying a variety of pipeline trajectories to all the major inland refinery clusters in Western Europe. The planning perspective on pipeline development of these consortia differed considerably, because pipeline economics and the fragmented institutional framework in Western Europe were at odds. On the one hand, economies of scale in pipeline transportation would be optimal if a limited number of long distance large diameter pipelines serving several countries were constructed. This would suggest a transnational perspective on pipeline planning. On the other hand, the absence of a supranational platform to coordinate such

a transnational project politically caused governments to take a strong interest in the national development of pipelines. This problem had also presented itself in the post-war refinery expansion programmes in Western Europe, which were specifically designed to expand refinery capacity to the level of domestic demand, irrespective of economies of scale in refining. This was reflected in the very different aims of the consortia studying the construction of crude oil pipelines in Western Europe between 1955 and 1960.\footnote{This chapter focuses on the consortia dealing with pipelines in the Rhine region. Other consortia included Italian-led initiatives to build crude oil pipelines into Bavaria in the early 1960s. These are discussed in Bader-Gassner, \textit{Pipelineboom} (2014), passim.}

3.1 \textit{The German pipeline consortium: a national perspective}

In 1955, a consortium of German oil companies and German subsidiaries of multinational oil firms led by Esso AG, the German subsidiary of Standard Oil of New Jersey, planned the first of the Rhine region’s major crude oil pipelines.\footnote{The consortium consisted of three German subsidiaries of multinational oil companies (Esso, Deutsche BP and Deutsche Shell), representing the majority of the pipeline’s projected capacity, of which Deutsche Shell and Deutsche BP participated in conjunction with the German-owned Scholven and Union Kraftstoff. Three other German-owned companies complemented the consortium: the former hydrogenation plant Gelsenberg Benzin, the much smaller Ruhrchemie (owned by coal and steel companies in the Ruhr area) and Ruhröl (part of the Stinnes group). Source: ‘Pipeline nach Wilhelmshaven oder Rotterdam’ (1955).} With Esso AG in the lead, the consortium was considering Wilhelmshaven and Rotterdam as potential starting points for the pipe. The pipeline was projected to have an initial throughput capacity of 8 million tons per year, serving the new Rhine-Ruhr refineries of Esso AG, Deutsche Shell and Deutsche BP, as well as a number of smaller German-owned refineries. Esso AG planned to have its new refinery near Cologne operational by early 1959, and this required a pipeline and a feeding terminal in a suitably adapted port. The consortium deemed Rotterdam to be attractive for fiscal reasons, but thought that the nautical situation of the port was lacking compared to Wilhelmshaven.\footnote{Bundesarchiv Koblenz (BAK), Bundesministerium für den Marshallplan/Bundesministerium für wirtschaftliche Zusammenarbeit (bis 1957), Kabinett und Parlamentsangelegenheiten, Ölumschlaganlage in Wilhelmshaven sowie Pipeline Ver-}
Wilhelmshaven to be better positioned to successfully adapt its port to meet its requirements in time. In response, the Rotterdam Municipal Port Authority developed a number of plans to adapt its port to the wishes of the consortium.\(^\text{24}\) The development of these plans, however, was not moving fast enough to accommodate the immediate requirements of the consortium, and these delays reduced Rotterdam’s chances of winning the pipeline bid.\(^\text{25}\) Nonetheless, Esso AG used the frantic efforts of the Rotterdam Port Authority to increase pressure on the German federal government, where the plan quickly gained political interest on local, regional and federal levels.

Esso AG fostered political interest from the bottom up, providing Wilhelmshaven City Council with a detailed calculation of the pipeline and its economic benefits.\(^\text{26}\) This information was used by Wilhelmshaven and the state government of Lower Saxony to lobby the federal government for financial support to secure the pipeline.\(^\text{27}\) The message was that if the federal government hesitated to pledge support, the project would surely be lost to Rotterdam.\(^\text{28}\) The pipeline plan was one of the few potential growth opportunities for the economically depressed city of Wilhelmshaven, with its high unemployment rate and limited opportunities for development. Provided the federal government invested in it, Wilhelmshaven could even become ‘the best deep water port in Europe’.\(^\text{29}\) Moreover, it was not in Germany’s interests to have the largest part of its oil supply flowing through a foreign pipeline.\(^\text{30}\) The federal ministries in-

\(^\text{24}\) Goey, Ruimte voor industrie (1990), 81-82.
\(^\text{26}\) BAK B146/1697, Letter Esso AG to Arthur Grunewald, alderman of Wilhelmshaven, 14 March 1956.
\(^\text{27}\) BAK B146/1697, Memo from Grunewald (Wilhelmshaven) to BMWi, 17 March 1956.
\(^\text{28}\) BAK B146/1697, Memo from Grunewald (Wilhelmshaven) to BMWi, 17 March 1956.
volved were susceptible to these arguments and were in principle prepared to support Wilhelmshaven financially.\textsuperscript{31} Reaching a consensus on how to share the dredging costs, however, took several months. Although it was quite clear to the participants in the consortium that the decision had been made to support Wilhelmshaven, the oil companies postponed making their final choice until the German federal government committed to paying to adapt the Port of Wilhelmshaven.\textsuperscript{32} By mid-June 1956, federal funding for the Wilhelmshaven project had been secured, despite continuous discussions between the Ministry of Finance and Economic Affairs on the one hand and the Federal Ministry of Transport on the other over the competition that oil pipelines posed to the traditional transport modalities of barge and rail.\textsuperscript{33}

Tensions were, however, rising within the consortium. Royal Dutch Shell was still a firm supporter of Rotterdam and did not want to give up its preference, which was a position that was vigorously defended by Deutsche Shell in the German consortium.\textsuperscript{34} Moreover, Royal Dutch deemed the Wilhelmshaven pipeline to be economically suboptimal and was studying alternatives jointly with British Petroleum (BP). In a concerted effort, BP and Royal Dutch attempted to destabilize the German


\textsuperscript{32} BAK B146/1697, Letter from Esso AG to BMF, BMW, BMV, BMZ, BMVert, LSMF, LSMW and the NRWMW regarding the meeting of the pipeline consortium on 19 April 1956, ‘Betr.: Rohöl-pipeline Projekt Nordsee-Rhein-Ruhr’, 30 April 1956.


consortium. An additional study on the Wilhelmshaven plan jointly ordered by Royal Dutch, BP and Jersey Standard found that Rotterdam presented a cheaper alternative after all, which delayed the consortium’s decision-making.\textsuperscript{35} Esso AG, nonetheless, maintained its preference for Wilhelmshaven.\textsuperscript{36} When it became clear that Esso AG would not budge, Deutsche Shell withdrew from the consortium.\textsuperscript{37} Although BP had harboured serious doubts about the economic benefits of the Wilhelmshaven pipeline from the start, it recognized

‘that the obvious appeal [of] an all German line to nationalistic ambitions is making it increasingly difficult to achieve any dispassionate all-party examination of relative merits. It is, therefore, necessary to make a decision between the material advantages of building a line from Rotterdam and the less tangible but equally important consequences of proceeding in the face of German opinion’.\textsuperscript{38}

After several months, the consortium, with BP, finally agreed to choose Wilhelmshaven and incorporated the Nord-West Oelleitung GmbH on 15 November 1956.\textsuperscript{39}

3.2 The trans-European pipeline: a transnational perspective

Royal Dutch’s exasperation with the German consortium resonated with BP. In March 1956, BP, Royal Dutch Shell and Jersey Standard initiated a joint effort to coordinate European crude oil pipeline development. BP’s concern was to slow down the German consortium in order to consider alternatives.\textsuperscript{40} The principal alternative to the German pipeline was Royal Dutch Shell’s plan for a trans-European pipeline system from Marseille to


\textsuperscript{38} British Petroleum Archive (BPA), Ruhr Pipeline Scheme (and Refinery) / Drake, A. E. C., 97335, Internal BP memo, ‘Ruhr pipeline, the comparative merits of the Rotterdam and Wilhelmshaven routes’, 29 June 1956, 3.

\textsuperscript{39} Förster, Geschichte der Deutschen BP (1979), 274.

\textsuperscript{40} BPA 97335, Letter from BP planning group to A.E.C. Drake (director of supply), ‘Proposed pipeline to the Ruhr’, 15 March 1956.
Rotterdam via Strasbourg and the Rhine-Ruhr area. It aimed to set up a group of oil companies to study the possibilities of such a plan. According to Royal Dutch Shell, ‘[…] it was essential to take these pipeline questions out of the hands of local companies and have them dealt with on a Head Office basis […]’, although the company acknowledged that this might present ‘[…] difficulties […] to Esso with their highly de-centralized organization’.

The idea for a single pipeline system serving several countries from one entry point made economic sense, as long as the high capital costs of a single long-distance pipeline could be offset by its capacity. Bundling supplies to several locations warranted sufficient demand for such a pipeline. Royal Dutch’s trans-European pipeline plan proposed to do just that: connect the Mediterranean Port of Marseille with refineries in Northeast France, along the Rhine in Germany, Rotterdam, Antwerp and even Hamburg. The plan expanded on that of an existing French consortium, SOPIMER, which studied a pipeline from Marseille to the Strasbourg area. Royal Dutch’s initial examination of the idea attracted attention from other major oil companies, and by late July 1956, BP, Jersey Standard, Caltex and Socony joined Shell in the Company for the Study and Planning of Pipeline Projects in Western Europe NV (SAPPEUR).

Notwithstanding the potential advantages of a trans-European pipeline, the project was politically sensitive. Royal Dutch anticipated that ‘both before and after completion such a pipeline would be subject to protracted negotiations at Governmental level’. In particular, Royal Dutch feared that the French state would interfere with private pipeline plans. BP’s observation that the Wilhelmshaven pipeline was the result of economics subordinated to national sentiment underlined Royal Dutch’s impression of the political landscape in Western Europe. Notwithstanding the problems that

the European institutional framework would cause, the trans-European pipeline plan seemed to be feasible economically.\textsuperscript{47}

Bechtel, the engineering company that calculated the economic and technical feasibility of the plan, pointed out that the economics hinged on the development of the size of crude oil tankers. Bechtel’s estimate of the capital costs of the supply chain of crude oil from Middle Eastern points of export to inland refineries in Western Europe (consisting of the cost of tankers and pipelines) showed that a trans-European pipeline required less capital, less steel, less power (for pumping) and less manpower than separate national pipelines.\textsuperscript{48} However, the estimate also showed that larger tankers would reduce the capital costs of national pipelines considerably, because this required the deployment of fewer tankers. Moreover, larger tankers would reduce the ton-kilometre costs, and it would therefore make it less expensive to cover long distances by sea, allowing ports like Rotterdam and Wilhelmshaven to compete with Marseille over supplies to the Rhine-Ruhr area.\textsuperscript{49} Long distance transport by pipeline would then become less advantageous up to a point where the total capital outlay for a single long distance pipeline would be greater than for a set of national pipelines extending from several ports along the Mediterranean and the North Sea. Maritime crude oil tankers grew in size rapidly from the mid-1950s onwards.\textsuperscript{50}

The success of the trans-European pipeline plan largely depended on the speed of the consortium’s decision-making. With larger tankers, the potential savings derived from transporting crude oil to the Rhine-Ruhr area from Marseille fell relative to the advantages of North Sea ports. As the Rhine-Ruhr area was the first major inland cluster of refineries to become operational (in 1959), the realization of the trans-European pipeline hinged on whether it could be constructed before 1959. Due to its length, the pipeline needed a large diameter, which in turn required enough de-

\textsuperscript{47} BPA, Sappeur NV minutes of meetings, 43379, ‘SAPPEUR NV. Aide memoire to a meeting held on Thursday, 20th September 1956 at the Hotel Wittebrug in The Hague’, 28 September 1956, 2.


\textsuperscript{50} Brennecke, \textit{Tanker} (1975), 317 (table 24).
mand for it to operate efficiently. By 1957, however, it was clear that the Wilhelmshaven pipeline would be a separate, German venture. This would reduce the flow rate of the trans-European pipeline considerably, because it meant that the pipe would not carry crude oil to Hamburg. It would also mean losing part of the Rhine-Ruhr demand to the Wilhelmshaven pipeline.\textsuperscript{51} Bechtel therefore proposed a slimmed down version of the pipeline that still comprised the Rhine-Ruhr area and Rotterdam.\textsuperscript{52} As Royal Dutch Shell had withdrawn from the Wilhelmshaven pipeline project, it still needed a pipe to feed its own refinery near Cologne by 1960. The decision-making in the consortium, however, was slow and Royal Dutch decided in 1957 to construct its own pipeline between Rotterdam and Cologne.\textsuperscript{53} Royal Dutch proposed integrating the Rotterdam-Rhine pipeline in the trans-European pipeline once it was operational. Nevertheless, once constructed, the Rotterdam-Rhine pipeline could be expected to start competing with the Marseille pipeline rather than complementing it, effectively leaving no additional demand for the Marseille pipeline in the short term.\textsuperscript{54} As the Marseille pipeline needed Rhine-Ruhr area demand to guarantee a sufficient payload to allow for its high capital outlay, competition from the Wilhelmshaven and Rotterdam pipelines would destroy its business case.

With the Rotterdam-Rhine pipeline, the consortium faced a choice of either constructing the trans-European pipeline as the integrated system originally proposed by SAPPEUR or deferring the venture to 1968, when additional Rhine-Ruhr demand would warrant the feasibility of a major southern pipeline from Marseille to the Rhine-Ruhr area.\textsuperscript{55} Jersey Standard concluded that, with the Rotterdam-Rhine pipeline in place, ‘con-
struction of the Trans-European pipeline system from the Mediterranean to the Köln-Ruhr [sic] area [was] premature and unneeded for several years’. 56

Even though the companies involved believed that the trans-European pipeline would be realized at a later stage, the construction of the Wilhelmshaven and Rotterdam pipes led to the abandonment of the plan. The reasons for its failure were twofold: slow decision-making in the short term and larger tankers in the long term. The former was caused by the uncertain context in which the consortium operated, in particular with regard to the institutional framework in which the pipeline would be operating. At the time, no pipeline legislation existed in the countries concerned. Moreover, the absence of any international coordination or regulation of cross-border pipeline transportation in Western Europe presented uncertainty as to whether transit countries would interfere in the pipeline’s operations. As a result, the consortium put considerable effort into studying the legal aspects of cross-border pipeline operations. The goal was to arrive at a legal status for the pipeline company ‘which can ensure the permanent stability not only of the legal but also of the economic and fiscal conditions regulating the pipeline’s activities in the various territories concerned’. 57 These concerns were not unrealistic. With the appearance of pipeline plans on the European transport markets, governments began contemplating whether and how pipelines should be integrated in existing legislation and regulations for traditional modes of transport. Three main concerns dominated the discussion: competition with other modes of transportation, tariff discrimination and taxation. 58 The positions on these issues differed considerably among the principal countries affected by the trans-European pipeline plan, i.e. the Netherlands, France and West Germany. As pipelines have a high degree of asset specificity and require large initial capital outlays, the companies involved needed guarantees that their investments were safe and that they enjoyed optimal freedom to operate, including with regard to the setting of tariffs, so as to ensure a sat-

57 BPA 43379, ‘SAPPEUR NV. Aide memoire to a board meeting held on Thursday, 14th March 1957 at the company’s office, The Hague’, 22nd March 1957, Attached ‘Note on some legal aspects of the proposed Trans-European Pipeline’, 1.
isfactory return on their investment. The legal issues delayed the decision-making of the consortium and enhanced the perception of the risks involved among the participants, much to the dismay of the consortium’s board, which recognized that delay would ultimately lead to the failure of the pipeline plan. By late 1957, the consortium had fallen into disarray and the French oil companies CFP and Pechelbronn decided to pursue their own pipeline from Marseille to Strasbourg, the Southern European pipeline, which later came to include a branch to Karlsruhe.

In the long term, the size of tankers sealed the fate of the trans-European pipeline. In the course of the 1960s, crude oil pipelines to South Germany were constructed from the ports of Marseille, Genoa and Trieste, but none of these extended past Karlsruhe (Figure 1). The crude oil pipelines into West Germany therefore consisted of a northern and a southern system. Analogous to the term watershed in hydrology, the divide between the northern and southern pipeline systems has been called the oil-shed. There were several factors to explain why an integration of these systems never came about, but the most important was the rapid growth of crude oil tankers after the 1956 Suez Crisis, which caused tanker freights to drop relative to pipeline freights.

When Royal Dutch Shell started studying the trans-European crude oil pipeline, it was potentially the cheapest way to transport crude oil from the Mediterranean to the Rhine-Ruhr area rather than by ship via Rotterdam. Nevertheless, by the time the Southern European pipeline was actually being constructed, larger tankers had pushed down the cost of maritime shipping to the extent that the Rotterdam-Rhine pipeline would remain in operation to supply crude oil to the Rhine-Ruhr area. In fact, tanker freights were brought down so much that Rotterdam’s pipeline connection to the hinterland was even extended as far as Frankfurt am Main. If tankers did not expand beyond 100,000 tons, Frankfurt could be supplied cheaper from Marseille than from Rotterdam. However, using tankers of 100,000 tons or more meant that Frankfurt could be supplied cheaper via Rotter-

59 Makholm, Political Economy (2012), 4-6.
60 BPA 43379, ‘Report to the Board’, 7 June 1957, 4-5.
62 Molle/Wever, Oil Refineries (1984), 49.
With the first 100,000 ton tankers rolling off the blocks in 1959, the possibility of connecting the Marseille pipeline to the Rotterdam-Rhine pipe and turning the pumps to bring crude oil to the Rotterdam refineries via Marseille and the Ruhr faded quickly.

As the minutes of SAPPEUR reveal, the decision to not pursue an integrated pipeline system was not taken because tankers became cheaper relative to pipelines; the cost differences only became clear some years after the abandonment of the trans-European pipeline plan. The legal and institutional questions delayed quick decision-making during 1957, which proved fatal for the venture. When the timing for the different parts of the pipeline started to diverge, with some requiring a pipe within two years and others not needing one until the mid-1960s, constructing the system became unfeasible. As a consequence, the trans-European pipeline continued in a slimmed down version as the Southern European pipeline, with the primary aim being to serve the Upper Rhine area. The capacity of this pipeline was therefore, in the longer term, too small and the tariffs too high to compete with the Northern European pipelines for the supply of the Middle and Lower Rhine areas.

4. Conclusion

The introduction of crude oil pipelines on the European continent was an interesting experiment into large-scale, cross-border infrastructural investment in a period when European integration had still to materialize. Why the crude oil pipeline system in Western Europe consisted of two separate parts depended on the diverging forces of economic and political rationales. On the one hand, the economic rationale suggested a single trans-European pipeline that connected the major refinery clusters in France, West Germany, Switzerland and the Netherlands. On the other hand, the lack of international coordination and cooperation on issues of transportation in Western Europe provided uncertainty for private investments in cross-border infrastructure. Furthermore, the experience of the post-war national refinery expansion programmes had testified to the primacy of national politics over questions of energy, and it is unsurprising that na-

64 Hubbard, *The Economics of Transporting Oil* (1967), 29.
65 Brennecke, *Tanker* (1975), 144.
tional governments took an equal interest in the question of pipeline planning. National governments saw pipelines as a way to enhance the security of the supply and to foster the development of domestic ports. For domestic oil companies such as the German partners in the Wilhelmshaven consortium and the French initiators of the SOPIMER plan, a national perspective made perfect sense. This also applied to some extent to national subsidiaries of multinational oil companies, in particular Esso AG, which operated with considerable autonomy from its parent company, Standard Oil of New Jersey. Exacerbated by the fact that most refinery expansions at inland locations were aimed at serving local demand, the initiatives for pipeline consortia resulted from the need to serve a specific cluster of refineries in a limited geographical area. This created something of a dilemma for multinational oil companies with refineries in several countries. On the one hand, they had the oversight, capacities and resources to commit to a project as ambitious as the trans-European pipeline and to bring it to fruition. On the other, their national subsidiaries did the actual refining and marketing and ultimately their profitability was at stake. This dual position is clear in the manner in which both BP and Royal Dutch Shell operated. They were both unhappy with the national perspective of the German consortium, but eventually both chose a pipeline solution that they thought was suboptimal compared to a trans-European pipeline; supply security was ultimately more important than economic potential.

Although the economic potential of the trans-European pipeline was dependent on the size of crude oil tankers, this was not the main cause of the failure of the plan in the short term. The SAPPEUR project faltered because it proved too difficult to simultaneously consider and synchronize the production planning of individual companies, study the complexities of the regulatory framework, and predict the speed and direction of economic growth and oil demand in Western Europe. In particular, the study of the legal and institutional aspects of the trans-European pipeline delayed decision-making up to a point where its construction would simply come too late to serve the demand in the Rhine-Ruhr region, which was one of the core areas in the original plan. As the Wilhelmshaven and Rotterdam pipelines were constructed, the business case for the trans-European pipeline crumbled and it was left to the French participants in the consortium to take the lead in the southern pipeline section. The legal and regulatory problems that SAPPEUR anticipated turned out to be of minor importance, as the Rotterdam-Rhine pipeline and the Southern European pipeline operated across borders without problems, largely because the
two countries and the EEC refrained from implementing pipeline legislation other than technical and safety regulations. Moreover, the economic foundations of the trans-European pipeline disappeared with larger tankers rolling off the blocks each year, which brought down the cost of transporting crude oil relative to pipeline transportation. As a result, the crude oil pipeline system in the Rhine region consisted of two separate sections. While Rotterdam had been the principal port for Rhine region oil imports since the 1890s, due to its superior Rhine infrastructure, the pipeline planning process of the late 1950s resulted in the Rhine region connected to global oil by two major ports: Marseille and Rotterdam.

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From Rhine to Transnational Finance: Regionalism and Reputation in International Banking, 1950-1980.

Christopher Kobrak

Abstract: That finance and many other business sectors are global in structure is a truism of popular and even academic literature. The role played by regional clusters, however, is often missing in discussions of how and why business has come to be conducted with ever fewer national restrictions on corporate strategy. This paper is designed to suggest how some long-standing and recent strengths of the Rhine banking community contributed to our current transnational financial architecture. It takes as its starting point the view that international finance today is: 1) dominated by megabanks and insurance companies built on an old model (with somewhat new twists), as well as newer financial organizations like pension and hedge funds; 2) played out on a shadowy plain (platform) designed to free transactions from national frictions. I will briefly describe this configuration, explain why the existence of Euromarkets (offshore markets) are so important to it, and then highlight the role played by banks based in the Rhine Valley in the creation of the Euromarket from 1950-1980.

Only by chance do factors of natural resources and the geographic distribution of industries coincide with national, ethnic or even geographical boundaries. Europe is, in other words, an effective base for the control of the major industries, where Germany, England, France and other politically water-tight compartments are not. Many of the major industries require coordination and integration on an even larger scale.
‘…[I]n a world where the problems of science, technology, commerce and finance are fundamentally international in scope, the national state operates almost entirely by the way of lag, leak and friction. It is a historical anachronism which stands in the way of [the] realization of the economies of mass production, geographic specialization, and comprehensive local, regional, continental and world planning.’

US economist, *R. A. Brady*, in The Rationalization Movement in German Industry, 1933

1. Introduction

The study of networks and clusters in creating economic advantages has a rich interdisciplinary history. The idea of clusters of business expertise has not only played an important role in management science, but also in historical discussions about the competitive advantages of business. In the last two decades, several economists, political scientists and sociologists studied closed networks¹ and argued that strong, often informal, contacts led to quick and reliable communication, which fosters reliance on reputation. The threat of a lost reputation for inappropriate behaviour builds trust. Networks also enhance shared goals and methods, which reduce transaction costs and reputational advantages.² Although some studies look at the formation and decay of networks, most concern what historians would view as relatively short time-frames and very few deal with banking. One excellent recent study does examine banking, but only in terms of networks and reputations inside a few organizations in the same city.³

Criticized by some for an absence of rigour (a lack of statistically dis-confirmable hypotheses), Michael Porter popularized the concept of clusters in the management literature. He argued that successful companies – and the nations in which they are based – are embedded in groups of firms with the appropriate demand, parallel and complementary skills and resources, and shared cultural attributes. Although Porter wrote a little about international alliances as a means of growing firms beyond their national (and national regional) base, his unit of analysis was the nation state. He

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emphasized national diamonds (clusters of mutually reinforcing, value enhancing attributes) and the government’s role in cultivating them, arguing that even the most international companies have strong national roots from which they derive much of their competitive advantage. Porter acknowledges that a firm’s proximate environment is crucial, but it is not necessarily national (p. 29). Chance and history play a big part in the configuration of diamonds. Nevertheless, the idea of cross-border regions plays virtually no role in Porter’s thinking, and he does not consider at all the cross-border coordination of financial services.⁴

The importance of clusters, centres and networks to finance is well known, at least in the financial history literature. Most recently, Susie Pak investigated how the personal New York network of J. P. Morgan shaped American politics and finance.⁵ Much of Youssef Cassis’s research, for example, highlights how and why financial centres function. In several authored and edited works, he describes how informal networks, trade relationships and ancillary services promoted finance. His unit of analysis has been the city, country or ethnic group.⁶ Yet the idea that certain regions of Europe had commercial and cultural networks, sometimes but not always centred around cities or geographic entities such as rivers, is a central theme in some economic and general histories. These regional networks often predated and even transcended the nation state, hanging together as economic entities and useful units of analysis as borders shifted.⁷

Yet the literature on both regionalism and banking has had little to say about the importance of cross-border interactions between organizations lying in relatively small geographic entities as a means of creating the appropriate degree of trust for unbounded transactions. Most of the work on regionalism in the international business literature ignores finance. Alan Rugman, for example, has argued that modern business is more regional than global, but financial services are completely left out of his commentary.⁸ His most recent edited volume on international business has virtual-

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ly nothing to say on financial services. While some management literature has highlighted financial relationships, these tend to be more personal and less geographically influenced. Some scholars have looked at the importance of trust for the financial transactions for which contracts are hard to draw. Trust is generally most important where discretion is required and uncertainty is high, and is easier to create where actors share some history together.

Talking about regional finance today may seem paradoxical. If anything seems to define our 21st century financial architecture, it is how finance seems to flow over the largest national or even regional containers. Even state-owned banks, once focused on local projects, seem overwhelmed by poor judgements about far off mortgage-backed securities or the sovereign debt of foreign countries. Financial intermediaries that were virtually unheard of 60 years ago, such as pension, sovereign wealth, and hedge funds, move money with few restrictions from one national jurisdiction to another. Many traditional arbitrators of risk have transformed themselves into risk consultants. The world of international investment banking is dominated by 10 to 20 megabanks, whose assets are equal to or greater than the GDPs of many of the countries in which they are incorporated. They have internalized financial transactions in huge multinational trading platforms, which at once reduce economic frictions and regulatory oversight. These platforms allow them to create, market and trade new and highly complex financial instruments, whose notional values dwarf the size of traditional equity and debt markets.

Nevertheless, from foreign exchange trading to venture capital, centres still count. Despite the growth of emerging markets and tax havens, most of the people and organizations conducting finance have large portions of their activity in London and New York. Even those who move out of these money centres tend to cluster in places like Charlottesville, Frankfurt or Singapore. Emerging markets have also clustered around cities, for example Mumbai and Shanghai. It is not by accident, moreover, that the largest

11 There is a growing body of literature on family businesses that emphasizes these advantages, especially the importance of reputation. See, recently, Fernández Pérez/Colli (Eds.), *The Endurance* (2013) and Olegario/McKenna (Eds.), *Corporate Reputation* (2013).
12 Kobrak, *From Multinational to Transnational Banking* (2016).
and most active venture capital firms are located close to the companies and entrepreneurs they fund, many of which find themselves in regions like Silicon Valley.

In this chapter, I propose looking at the Rhine regions’ banking relations in their historical context, with a special emphasis on how these relationships contributed to the formation of offshore banking in the second half of the 20th century. This is part of a larger study on the interaction of formal and informal financial regulation and cross-border influences on financial governance. It will rely on secondary sources in the field and anecdotal rather than statistical arguments. The main part of the chapter is divided into three sections: the period before 1950, immediate post-war rebuilding, and the birth of Eurocurrency centres on the continent. In addition to tracing the development of Rhine banking during the period, I will also suggest some broader points about the importance of reputation and regional networks to our financial architecture, even though there will be none of the quantitative mapping used by social science on networking and clusters.

2. Rhine finance in history before 1950

In some accounts, Rhine finance does not play a huge role in the history of banking, or at least nothing like that of regions or organizations such as Italy, the Templars or London. Even North Germany, with Hamburg and Berlin, gets more coverage in some accounts, especially those examining the second half of the 19th century, as does Central Europe, excluding the Rhine area, in the first half of the 20th century. Clearly, during the late Middle Ages and Renaissance periods, the Rhine region was tied into the banking empires of the Italians and Fuggers based in Augsburg, both of whom had agents for clearing trade facilities and loans in the region. Like many of the early banking houses, the Fuggers’ business emanated from trade. Yet their fortunes rose and fell with the unity of the huge political entity created by the Hapsburgs, which, for approximately 100 years, in-

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13 Kindleberger, *A Financial History* (1993). In his section on banking, for example, there are entire chapters devoted to the United Kingdom, Scotland, Germany, Spain and Italy, but nothing to the Low Countries. Nothing within these chapters is treated as an economic unit. Switzerland gets a few paragraphs, along with other neighbouring countries in the German section.
cluded virtually all of Europe and even the Americas. This was a fragile bond in which the Rhine region served as an important, albeit what proved to be a weak, link. With offices throughout much of the Hapsburg Empire and beyond, the Fuggers helped to connect Southern and Northern Europe. Although they were brought down relatively rapidly by the defaults of their patrons, who were one of the first financial victims of the religious and other divisions of the 16th and 17th centuries, the Fuggers helped to establish a system of financial intermediation in Central Europe.\textsuperscript{14} Italian banks also settled their countrymen in offices in many places in and adjacent to the Rhine region – Bruges, Champagne, Besancon, Antwerp and Amsterdam – to provide a variety of banking services, with many directly connected to trade.\textsuperscript{15}

In Ghent, Lille, Liege, Maastricht and Cologne, textile manufacturing and trade were particularly important.\textsuperscript{16} It was in the Flemish cities that the medieval European international trade in wool was established and with it came a great stimulus to banking services. Flanders became linked to Italy as early as the 11th century, bringing Flemish cloth to the Byzantine Empire and the Islamic region. Trade fairs developed, but without financial innovation they would have been almost impossible. The risk of transporting bullion was too great, but double-entry bookkeeping and commercial credits made long-distance transfers and clearing possible.\textsuperscript{17}

The Early Modern period established a pattern in the economic and political prospects of the Rhine region. At the heart of Europe, the value of the Rhine was not just as a major economic centre and conduit of goods and services, but also, sadly, as a battlefield. Although the frequent wars of the Early Modern period were a boom to some kinds of banking, they disrupted trade-related finance and were often fought over around and through the Rhine region. The areas around the outlet of the Rhine were at war for much of the 16th and 17th centuries, which was a state of affairs that both stimulated and threatened finance by simultaneously increasing demand and risk, which generally brought forth innovation and intermediation in the context of strong social bonds. Nevertheless, the region was even then financially tied to the rest of world by banks and political connections, some of which originated outside the area itself. By the early

\begin{thebibliography}{9}
\bibitem{14} Kindleberger, \textit{A Financial History} (1993), 47.
\bibitem{15} Kindleberger, \textit{A Financial History} (1993), 45.
\bibitem{16} Baskin/Miranti, Jr., \textit{Corporate Finance} (1997), 37.
\bibitem{17} Hughes/MacDonald, \textit{International Banking} (2002), 13.
\end{thebibliography}
16th century, Antwerp’s central position for trade had made it, for example, the financial hub of Europe, with both the Fuggers and Welsers conducting extensive business there.18

With turmoil as a backdrop, the Netherlands had a moment in the financial-history sun with the prominence of its capital markets and banking during much of the 17th century. Although some of the instruments used extensively in the region at that time were born in Italy, the Low Countries contributed some fundamental innovations in public financial exchanges and corporate forms.19 The United Provinces was also one of the leaders in banking, which, along with corporate finance innovations, influenced other parts of Europe. During the first half of the 17th century, the new Dutch Republic could boast of several banks engaging in trade finance and clearing. Nevertheless, according to Charles Kindleberger, these banks focused on British, Baltic and Bay of Biscay trade, not Rhine business. By the end of the century, several of the banks failed during wars with France and Britain.20 Yet much of this activity moved to England and Switzerland as the military fortunes of the Netherlands shifted.

The earliest Swiss banks had their origins and orientation in France, but by the end of the 19th century several had been formed in Basel and Zurich and looked north for business. According to some sources, the textile centre of Mulhouse owed its existence to Swiss banking. Some banks were active as far as Karlsruhe and Stuttgart on the German side of the Rhine, and Strasbourg, Besancon and Nancy on the French side. Much of the capital for the Swiss banks came from Germany. Early on, many of the assets of the larger discount banks, too, were in foreign bills.21

Many private banks were founded and active in the region, but many of them moved their centre of gravity quite quickly east and west in the 19th century, and shifted much of their activity into joint-stock universal banks that they helped to found.22 Some of the most important private German banks had their roots in the Rhine region, with three examples being Speyer, Oppenheim and Bethmann, which built their initial fortunes with trade and finance in the region. Oppenheim, for instance, chose Rhine-related

19 Baskin/Miranti, Jr., *Corporate Finance* (1997), 89.
transportation and insurance as major fields of investment, and serves as an excellent example of how banks were tied to a region. When the bank was founded, Cologne, like many other Rhine cities, was actually part of France. Marriage bonds brought the family into Parisian banking. Then, by 1836, two of the Oppenheim brothers opened a bank in Amsterdam, while Sal Oppenheim was one of the founders of Crédit Mobilier in Paris in 1852.

Nevertheless, as Dieter Ziegler has pointed out, during the early 19th century, ‘the role and function of private banking houses depended on the peculiarities of the place where they operated.’ The geographical position of the Hamburg banks, located in the major North Sea port, gave them a leg up in terms of financing overseas trade. The political fragmentation of the region gave Rhine-based German banks, especially those in Frankfurt, a special mission in dealing with foreign exchange issues, which were a serious impediment to trade in the Rhine region during the first half of the 19th century.

The most famous private bank of all, the House of Rothschild, started this way and earned its first capital in the heart of the Rhine region, but its real claim to fame came as four of the sons, especially Nathan and James, established and grew the family’s business activities in London and Paris. The relative influence of the Rothschild and other family banks waned in the late 19th century, as a great deal of financial clout shifted to joint-stock, often universal, banks located in money centres with influential central banks and capital market exchanges, which were not particularly characteristic of the Rhine region. When trade barriers were removed and foreign exchange rates stabilized, there was less need for customized attention. Insurance, clearance and trade financing could be conducted through branches of large banks and insurance companies spread over larger areas than just the Rhine region and cleared in financial centres like Berlin, Paris and, most importantly, London.

The Rhine region did, however, play a crucial role in the so-called ‘Revolution in Banking’. Although private banks were still crucial well into the 20th century for some activities, especially international investment

23 Teichmann, Private Banks (2009), 207.
24 Email, G. Teichmann, Head of the Oppenheim Archive, to C. Kobrak, November 22, 2011.
25 Ziegler, German Private Banks (2009), 159.
26 Ziegler, German Private Banks (2009), 160.
banking, the Rhine region led the way in the creation of just the sort of powerful new organizations that enlarged the scale and scope of finance in the modern era, ultimately freeing financial activity from local and regional confines. The Rhine region was home to the first movers in universal banking. With other financial centres adopting or tending towards different models well into the 20th century, its banks were among the leading universal banking institutions in the world. The inspiration for the universal banking model came from a French economist and philosopher, Saint-Simon, who could, at a bit of a stretch, be regarded as a son of the Rhine region. Although the major German banks tended to be based in Berlin, many of the smaller firms that founded them and served as their principal shareholders and monitors came from the Rhine region. Belgian banks like Société Générale and Banque de Belgique were early mixed banks and heavily involved in both industrial development and international investment. While Belgium’s banks might have served as better examples than German ones for Gerschenkron’s views about the role of banks in industrialization, he has little to say about them, and even less about Dutch and Swiss banks, in terms of the mobilization of capital to speed up industrialization.27 Although connections with German and French banks could be strained during periods of conflict, Dutch and Swiss banks enjoyed good working relations with a network of French and private German and public banks with whom they cooperated on projects.28

The importance of Brussels as an international financial centre shifted somewhat with the Franco-Prussian war. Belgian neutrality enhanced its safe haven status for foreign capital and led to the creation of new banks, including the Banque de Bruxelles in 1871, at the initiative of the Oppenheims and their friends in Germany, who had long been active there. With the cooperation of Belgian institutions, the new organization built on a 20-year long network of cooperation. Some German banks even moved representative offices from Paris to Brussels.29 In 1909, Deutsche Bank’s managers decided to set up a branch in Brussels, as they had been attracted to the efficiency of Belgian banking for many years. Indeed, even in 1874, Deutsche Bank had participated with several Belgian and German banks in a joint venture in Latin America. Although that enterprise had to be closed down in the 1880s, Deutsche Bank’s wholly owned Belgian opera-

tions opened other offices, began doing business with Belgian colonies, and employed 207 workers by the time WWI broke out.\textsuperscript{30} In 1913, Brussels was probably the fourth most important financial centre in Europe, after London, Berlin and Paris. Its largest bank, Société Générale de Belgique, was the tenth largest ranked by assets in Europe, just ahead of Barclays and Disconto-Gesellschaft, and was far larger than its Swiss and Dutch rivals. Ideally placed in Brussels, its aggressive international strategy led to ownership interests in and international investment projects with many foreign banks.\textsuperscript{31} In short: as French or German influence waned in Belgian banking, that of other nations increased.

WWI shattered the pre-1914 balance among banks and many normal banking activities, leaving a system that was much more focused on internal matters during the interwar period.\textsuperscript{32} During the 19\textsuperscript{th} century, with its relative stability and security, there was little need for special relationships; the region’s financial network did not disappear, but it was not decisive in explaining commercial and institutional developments. This changed radically with WWI.

In periods of crisis, almost by definition, confidence and routine wane, which can strain or, alternatively, enhance networks. Starting in the summer of 1914, banks and their clients could no longer be confident that their transactions would be processed and cleared, and at what foreign exchange rate, which was a concern they had not had for decades. Suddenly, for whose account a transaction was being made \textit{made} a difference. In these circumstances, individuals and organizations turned to trusted friends close at hand. Within a few weeks of the outbreak of hostilities, German banks were conducting their business through special accounts with Swiss banks, even with neutral countries like the United States. German employees were sent to Switzerland to monitor correspondence, the purpose of which had to be confidential in all three countries.\textsuperscript{33} Within a few years, Dutch banking addresses were being used for routine matters. Much of the financing that came into Germany after WWI was arranged by bankers from the Rhine region outside Germany. When German companies chose to cloak the true ownership of foreign subsidiaries between

\textsuperscript{30} N.N, \textit{Vor hundert Jahren} (2010).
\textsuperscript{31} Cassis, \textit{Capitals of Capital} (2006), 125.
\textsuperscript{32} Kurgan-van Hentenryk, \textit{Finance and financiers} (1992), 322-323.
\textsuperscript{33} Kobrak, \textit{Banking on Global Markets} (2008), 169-182.
the wars, they chose banks from contiguous nations to the west and south, primarily the Netherlands and Switzerland.34

By WWI, Swiss banks had established several important international universal banks, but some of the economic and political turmoil that preceded and followed WWII stimulated their businesses. The growth of bank assets exceeded that of national income for most of the years between 1924 and 1973. Even WWII itself, which undermined business in general, gave rise to some profitable businesses, such as gold trading and money laundering, mostly with neighbouring states.35 With rising political tensions, banks used their network to stay active in European markets outside their home countries. Indeed, Deutsche Bank, even though it had its own Dutch subsidiary, tried to disguise it and work through Dutch nationals in the mid-1930s.36

Despite these reciprocal relationships, even banking studies of the interwar period tend to focus on individual countries in the region rather than on how bankers and systems from different countries interacted with one another. At the very least, bankers were beset by common problems and opportunities. Before WWI, as one scholar wrote, ‘It is mainly for reasons of geographic proximity that the bank systems of Belgium and the Netherlands can be studied under one and the same heading.’37 Yet while the systems of the two countries began with different configurations, a common set of complex problems during the interwar period reduced some of these disparities and probably necessitated closer working relationships. In both countries, banking became more concentrated, states more involved and banks had to take a more active role in helping clients, which was a tradition that was already strong in Belgium.38 As the currency turmoil heightened and availability lessened, even normal trade over relatively close distances became more complicated. Politics also played a greater role in different ways.

While the German, Dutch and Swiss relationships were strengthened during the interwar period, the German and Belgian ones deteriorated. Although Deutsche Bank’s Belgian branch continued to function and even plan an expansion during WWI, the bitterness of German occupation led

35 Cassis et al., *Switzerland* (1992), 296-302.
to its closing. Deutsche Bank had no branch in Belgium for the next
decade, until its merger with Disconto-Gesellschaft.39

During this period, foreign capital strengthened both Dutch and Swiss
banking in the region. Their neutrality during WWI helped them to main-
tain relationships with all parties and keep their currencies stable. Their
links to German bankers served the Dutch well in particular. In the 1920s,
a Dutch internship was considered to be an important part of the training
of future German banking leaders, and the major German banks set up op-
erations in the Netherlands right after WWI. Even industrialists founded
banks there to tap into Dutch funds and protect their assets from the rav-
ages of inflation. The amount of German drafts on the Amsterdam market
grew quickly: between 1924 and 1929, German companies and govern-
ments acquired nearly 1 billion dollars in financing on Dutch capital mar-
kets. In terms of German foreign issues and discounting, the Netherlands
played a leadership role, even outside the country, rivalling British banks
and clearly outdoing Swedish and Swiss ones.40 As one of Germany’s
leading banking journals pointed out, it was no coincidence that German
business flocked to Amsterdam; indeed, the conjunction of capital avail-
ability and longstanding relationships made the city the newest centre for
German trade and other financing.41 In 1930, the Netherlands and Switzer-
land together accounted for a third of Germany’s credits, which was more
than the vastly larger and richer United States.42

3. First steps after WWII

The events of the first half of the 20th century understandably had a huge
impact on finance in the Rhine region in the second half of the century. All
European banks were confronted, to varying degrees, with several interre-
lated strategic dilemmas: finding reserves for financing trade and invest-
ment; gaining access to dollars for currency convertibility and clearing
transactions; rebuilding other clearing mechanisms; and re-establishing
overseas connections. US finance and banks were both a help and a hin-

39 N.N, Vor hundert Jahren (2010).
41 Thannhäuser, “Amsterdam als Finanzplatz des deutschen Außenhandels,” Bankwissenschaft, 2, 681-693.
drance in developing solutions to these problems. German banks were probably the hardest hit, making them even more dependent on Rhine solutions than before the war. In the immediate aftermath of the war, in addition to the destruction it caused and anti-German stigma, the Germans lost control of their own currency and banking system. Banks were broken up and shifted westwards. The big three German banks moved the, at least de facto, centre of their activities from Berlin to Frankfurt, as did numerous other German financial institutions, including the eventual Central Bank and organizational vehicle of the Marshall Plan (Kreditanstalt für Wiederaufbau). Frankfurt, which had lost much of its status as one of Europe’s most important financial centres when it was annexed by Prussia in 1866, was well on the way to becoming the continent’s principal financial hub a hundred years later. Frankfurt’s position as a financial centre continued to grow, suffering little even from German reunification.43 Whereas financial and commercial companies could look for opportunities in the East and West before WWII, during the decades that followed the war, the latter was now practically the only serious ‘game in town.’

Although much of the lending of the Marshall Plan was designed to encourage purchases of US goods and was co-ordinated by the Kreditanstalt, in Germany and other countries it was often channelled through local banks and tied to creating closer European commercial ties. This was a project to which the Rhine region was central, although Europeans were often less enthusiastic than their US financiers.44 For Americans and many Europeans, one of the primary purposes of the aid was to breakdown continental barriers to trade using temporary supranational organizations staffed largely by the private sector. This financial approach was designed to help Central Europe to form an effective counterweight to the United States and United Kingdom and then fade away. It was intended to be an aid to private enterprise, dispensed as much as possible through private institutions, which would lead to both stabilization and integration.45 While some powers, particularly France, resisted Germany’s immediate economic reintegration into Europe, the Benelux countries, in forming their 1948 trade agreement, counted on increasing commerce with Germany. Much of the debate about the allocation of Marshall Plan funds revolved

43 Ramm, German Banks (2002), 177-178.
around whether French modernization would suffer from increased loans to Germany. The Dutch and Belgians in particular wanted the money used to stimulate bilateral trade with Germany, which was a source of exports that promised to have more immediate returns than the other possible options.\footnote{Hogan, \textit{The Marshall Plan} (1987), 63-64.}

4. \textit{Strategic alliances and the birth of continental offshore and European banking}

Although the rise of offshore financing is most associated with Britain’s need for funding to kick start its shattered financial sector and the flight from US regulation and political risk, the Rhine region became one of the centres for Eurofinancing. While not completely new, the post-war scope of this innovation – not to be confused with the new European currency of more recent vintage – transformed international finance. Most interestingly for this chapter, the banks and countries acted in concert, sometimes forming joint ventures.

The reasons for the creation and impact of a Eurocurrency market are largely beyond the scope of this paper. Suffice to say, there was a boom in financial innovation and cross-border transactions due to: the demand for dollar deposits outside the United States; the need of European banks for greater sources of loanable funds; and the willingness of Central Banks to leave deposits and investments in a currency other than that of the country in which they were located largely unregulated. The story of the Eurocurrency market’s creation is a complex mix of regulation, deregulation, political risk and a growing sense of international interdependencies.\footnote{Schenk, \textit{International Financial Centres} (2002).} Eurocurrency deposits grew from 20 to 480 billion dollars from 1964 to 1975, while annual Eurobond issuances (bonds sold through the Eurocurrency market) grew from 0.7 to 7.3 billion dollars. Eurocredit syndicate loans and foreign bonds, which also grew out of this change in the structure of banking, enjoyed similar growth.\footnote{Battilossi, \textit{Introduction} (2002), 14-15.} The Eurobanks were the chief agents of recycling OPEC revenues after 1974. By the early 1980s, most capital controls had been removed – in part because the Euromarket’s ascent had made them largely unenforceable – and the need to invest OPEC

\footnotetext[46]{Hogan, \textit{The Marshall Plan} (1987), 63-64.}
\footnotetext[47]{Schenk, \textit{International Financial Centres} (2002).}
\footnotetext[48]{Battilossi, \textit{Introduction} (2002), 14-15.}
funds had subsided. Nevertheless, the Euromarkets (currency, bonds and loans) had survived and thrived, even after their immediate causes had declined. Indeed, they had attained a competitive advantage, especially for offshore customers, which allowed them to dominate and shape international finance. Their growth removed many of the frictions relating to global portfolio investment.\textsuperscript{49} It is hard to quantify their full impact. Yet, as one former investment banker put it: ‘Those firms that ignored the Eurobond markets in 1982 to 1986 began to disappear from even the domestic rankings of market-share leaders.’\textsuperscript{50}

Working in Europe, and to some extent following their US clients, American bankers led the way. The so-called American banking ‘invasion’ – which Richard Sylla quite rightly dubs an escape from US regulation rather than an invasion – helped transform European banking between 1950 and 1970.\textsuperscript{51} In the last full decade of Bretton Woods, US bank branches in continental Europe increased over ten-fold.\textsuperscript{52} Not only did this serve as a complement or catalyst to Eurocurrency banking, but US banks also tended to be among the first to operate a large European-wide network of banks. They, along with US commercial companies, tended to push European banks towards more harmonized banking systems, including encouraging changes to banking regulations that reduced restrictions on the ability of European banks to compete against this new US challenge.\textsuperscript{53} Certainly, London was the preferred point of entry for US banks, but operations in West Germany, the Low Countries and Switzerland soon followed. Indeed, from 1950 to 1970, the future Citibank alone grew its European branches ten-fold from three to 32, which was more than three times its pre-war peak.\textsuperscript{54}

Although Paris and London in 1980 were still top of the list of European capitals containing offices of foreign banks, Frankfurt, Brussels, Amsterdam and Zürich had closed the gap. As early as 1970, foreign bank assets accounted for nearly 10% of Swiss assets. Also by 1970, the assets of foreign banks were a small but quickly growing segment of Luxembourg

\textsuperscript{49} Heffernan, \textit{Modern Banking} (1996), 80.
\textsuperscript{50} Smith, \textit{The Global Bankers} (1990), 181.
\textsuperscript{52} Wilkins, \textit{The Maturing} (1975), 394.
In 1980, two-thirds of all Belgian banks were foreign subsidiaries or branches. Some US banks created joint ventures with Belgian banks. While London was the clear leader in the field, it had competition. Indeed, one of the advantages of Eurodeposits was that they could go anywhere, and did. In the early 1960s, the Bank of International Settlements held Euromarket deposits in Switzerland and Belgium, as well as in other European and non-European centres. By 1965, the DM, Swiss franc and Dutch guilder were popular currency options for Eurobonds.

Government regulators had many concerns. Eurodeposits threatened their ability to control their domestic economies. Even then, the existence of ‘hot money’ posed a threat to stability because it could be easily withdrawn. In the mid-1960s, Swiss banking authorities discouraged their banks from accepting short-term foreign deposits. During the same period, France and Germany prohibited the payment of interest to foreigners. Some Central Banks advised their bankers to stop dealing in Euro accounts. Yet the efforts of regulators could not stop the flow; they just redirected the tide. Bankers developed new products, such as the Eurobond, which was an issue marketed mainly in countries other than the one in which the currency was denominated. Eurobond issuance was a response to increased European and US domestic and international bond issuing costs and government and private borrowing needs, and was also a means to soak up the increasing amount of savings held in the form of Eurodeposits. As financial instability increased, the amount of innovation in the Euromarkets and the concerns of regulators mounted. By the end of the 1960s, several banks were offering Euro CDs, which were traded on a secondary market to avoid local deposit controls.

The existence of the Euromarket not only led to regulatory problems, but also some policy solutions for national economic issues. On the continent, Germany, with its persistent trade surpluses, used Eurocurrency investments to siphon off flows that would enter Germany and contribute to inflationary pressures. German financial authorities understandably feared their general loss of control, but France used the offshore market as a way

56 Hentenyk, Commercial Banks (1995), 52.
of enhancing Paris as a capital market without changing the rules on the use of franc deposits.\footnote{Schenk, \textit{International Financial Centres} (2002), 97.} This helped to restore continental Europe’s financial eminence. Indeed, from 1955 through to 1962, Zurich, Brussels, Amsterdam and Frankfurt together conducted 60\% more international issues than London and 40\% the number carried out in New York.\footnote{Cassis, \textit{Capitals of Capital} (2006), 207.} Luxembourg was one of the main countries to profit from the Eurobond market; it was just behind London for loan initiations and the secondary market. Attracted by Luxembourg’s favourable transaction costs, taxes and corporate laws, many German banks, and later Swiss ones, set up there to avoid home-country reserve requirements. The abundance of foreign banks and the vibrant Euromarket attracted even more investment, which is a great example of path dependencies.\footnote{Cassis, \textit{Capitals of Capital} (2006), 228.}

Euromarkets are often connected with offshore financial centres for many reasons. Indeed, with the introduction of the currency the Euro, offshore is sometimes used to describe all the places, organizations and institutions where finance is carried out largely unregulated by OECD governments. Strictly speaking, offshore banking is the practice of offering financial services in places with light controls but a good legal system and many tax advantages, especially for non-resident actors. Although banks are not completely independent of host- and home-country regulation, this tends to enhance their capacity to attract clients and perform many transactions that require discretion, varying from grey areas of the law to outright illegal activity, at least as seen by the jurisdictions that clients wish to escape. The legal services include managing funds, brokering, insuring and registering companies, and tend to be provided by large banks capable of providing services locally and moving money around globally, often internally in megabanks, and obviously with few legal constraints to offering a broad range of services worldwide. While modern technology allows them to be placed virtually anywhere, like on small islands with few natural resources, they tend, for example, to be associated with and cluster around large financial centres like New York (Bermuda, Aruba and Panama), London (Channel Islands) and Frankfurt. Two of the largest are Luxembourg and Switzerland. Although Switzerland has begun to lose some of its competitive advantage by instituting limits on secret banking, it has been a huge magnet for foreign investment looking for a safe haven since

\begin{thebibliography}{99}
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\bibitem{Schenk}
\bibitem{Cassis1}
\bibitem{Cassis2}
\end{thebibliography}
the turmoil of the interwar period. Luxembourg is a relative newcomer; the number of banks there tripled from 1970 to 1980 and banking accounted for 9% of employment and 17% of GDP by the 1990s. Many investment funds, holding companies, insurance and reinsurance, as well as other financial intermediaries, have chosen to domicile themselves there. Although membership of the EU has limited some of its competitive advantages, with its secrecy and holding company laws, Luxembourg became a trusted regional magnet for many who wanted to avoid the heavy tax burdens of neighbouring countries.\textsuperscript{64} Moreover, because of their tax and regulatory advantages, Switzerland and Luxembourg were among the first countries in which Belgian banks established foreign European entities.\textsuperscript{65}

Rhine banks were key supports for the Eurobond and offshore markets. Deutsche Bank, Banque de Bruxelles and Rotterdamsche Bank (later merged with Amsterdamsche Bank to form AMRO) were among the pioneers.\textsuperscript{66} These banks, with a long tradition of universalism, also had a long history of international activity. Yet they were still regulated by their home countries and reluctant to pursue foreign direct investment alternatives, leaving cooperative ventures as the preferred strategy.\textsuperscript{67}

To overcome their own resource, expertise and service limitations in the face of the US banking challenge, many European banks began to band together in the 1960s. These alliances took two principal forms, banking clubs and consortia. Clubs were broadly focused coalitions of large commercial banks designed to extend the services of member banks across borders. There were at least four major banking clubs by 1974, all involving major banks from the Rhine region. Although they covered broad areas of Europe, including in some cases Italy and Spain, the Rhine region was often a core part of their activities. Consortia were the more common of the two, in which banks came together and established separate joint ventures owned by two or more banks, usually from different nations, often to pursue international activities together. In 1971, 35 of the top 50 banks in the world belonged to consortia. Although London was the most important headquarters for consortia, many European banks established their consortia centres in Brussels, Luxembourg, Zurich and Paris. Most of the consortia were focused on providing medium- and long-term funding.

\textsuperscript{64} Hughes/MacDonald, \textit{International Banking} (2002), 183-191.
\textsuperscript{65} Hentenryk, \textit{Commercial Banks} (1995), 52.
\textsuperscript{67} Hughes/MacDonald, \textit{International Banking} (2002), 46-47.
for specific regions of the world. Euromarket flotations served as their chief area of expertise. Six of the 28 clearing bank investments of consortia banks were located in the Rhine region, even though the geographic spread of their activities stretched from the Far East to North America. Many of these clubs and consortia failed, though, sometimes being victims of their own success.68

Deutsche Bank’s experiences with alliances and the region were indicative. Much of its initial international expansion after the war followed its prewar experiences. The bank followed customers. This involved many regions, including Latin America, but the Rhine region played an important part. Deutsche Bank turned to banks with which it had traditional contacts. Hermann Josef Abs, Deutsche Bank’s first managing director after the bank was reunited, preferred to work through a network of reliable partnerships rather than to establish a supra-national bank to restore Deutsche Bank’s international business and alleviate capital shortages. The first discussions about a stronger organization for international co-operative development were held in 1958 with Amsterdamsche Bank and Banque de la Société Générale de Belgique. This club became the nucleus of the European Banks’ International Company (EBIC, founded in 1970), which later added banks from outside the region, but whose headquarters was in Brussels.69 Among other objectives, the alliance was designed to create a European banking solution to help its members prepare for greater European financial integration. The group created a European Advisory Council to exchange experiences and deal with issues of mutual interest. They wanted to cooperate on some kinds of business, especially large-scale financing and new services. Their conversations were replete with faith in the larger, political European project, and even included discussions of an eventual merger that would create a truly European bank. The alliance established many separate organizations for cooperation in servicing companies from member countries in the region and other parts of the world, such as the United States, with long-term financing and leasing being an example. Most of these new organizations had a core Rhine-area membership.70

Their original purposes reflected their original weaknesses. The individual banks needed to reduce the costs and risks of international ven-

68 Ross, _Clubs and Consortia_ (2002), passim.
As member banks became stronger, they also became less dependent on the alliances and more willing to go it alone, pursuing many forms of direct investment. Nevertheless, while they opened their own branches and subsidiaries and bought other financial institutions, they continued to rely on their Rhine networks for many services. As members of the alliances broke away, the Rhine region became one of the first in which they operated independently, although they were still tied to the area by strong bonds. As late as 1989, six of Deutsche Bank’s ten foreign share listings were in the Rhine region. It used Luxembourg for its more sophisticated launches of its own debt instruments. One of the first places where most large German banks established foreign subsidiaries after the war was Luxembourg. These subsidiaries put pressure on the margins of domestic lenders by adding Eurofinance as a competitive factor. After the success of its two principal German competitors in Luxembourg, Deutsche Bank saw the need for its own separate bank there, Compagnie Financière de la Deutsche Bank AG (CFDB). Deutsche Bank was the 36th foreign bank to create a base in Luxembourg. In the early 1970s, the new Deutsche Bank subsidiary was remarkably successful, with its total assets tripling in three years. In 1974, Deutsche Bank consolidated its Luxembourg operations in Deutsche Bank AG Luxembourg (DBAL). This move, while a one-country reorganization, signalled a changed orientation from being a national to becoming an international bank.

5. Conclusion

The account in this chapter is admittedly sketchy and speculative. The topic cries out for a more detailed examination of bank and other archives to unearth more detail about how and why banks in the Rhine region worked together. There is comparatively little written about the Rhine area as a regional centre of finance. Historical research still tends to be nationally oriented, and financial research more narrowly focused on centres like London, New York and Zurich. There are several rich, and as yet relatively untapped archival sources, that could shed a great deal of light on the re-

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No doubt there are also other published bank histories to which I did not have access, and which could add to this story. Considering the importance of the region to Europe and its financial history, this lacuna in the literature, the near total absence of studies focused on the Rhine as a regional financial network, is odd.

What is clear, however, is that the interaction between regional competencies and global reach is a complex, changing story. This short study makes several points. The first is that the degree and type of cross-border dependency have been greatly influenced by politics. The effects of political conflicts have at times drawn economic actors together or torn them apart. Financial actors have used their regional networks to overcome and even profit from political tensions and military catastrophes. Many of the first international forays of both large joint-stock regional banks and private ones like Oppenheim after WWII were into adjacent countries, a development that can only partially be explained by logistics. Although outside the scope of this paper, I suspect, paradoxically, that European and global liberalization of financial transactions, coupled with technological developments, has loosened the grip of some specific networks on financial activity. While increasing their number and the breadth of their activity, regulatory and technological changes have not diminished the importance of centres of excellence and competence in general. Even though banks have internalized more activities, they concentrate many important services in several places. Since the 1980s, greater European-wide financial regulatory authority and the introduction of the Euro, for example, have pushed European and non-European bank strategies away from alliances and correspondent networks and more towards more foreign direct investment, reducing the need for external networks and cross-border transaction costs. A number of international regulatory accords have helped all banks to pursue more global investment strategies, but London, New York, the Rhine Valley, and now Singapore, Hong Kong and Shanghai, are still places where sophisticated banking personnel and services are clustered.

74 The Belgian state archives, for example, are holding around 1000 files from Deutsche Bank’s Brussels operations, which have just recently been catalogued. Conversation with Martin L. Müller, Head of Deutsche Bank’s Archive, November 1, 2011.

75 Teichmann to Kobrak.
The second point I wish to make is that much of the economic research dealing with globalization focuses on a macroeconomic plain, leaving the microeconomic and organizational development to archivists and some business historians. Oddly, it may be in the field of organizational development where the Rhine region is having its greatest financial impact today. Increasingly, international investment banking is dominated by megabanks, whose conceptual model resembles universal banks, which not only derived their competitive advantage from delivering a wide range of financial services, but also by internalizing many functions performed elsewhere by public markets or networks. Although the literature on universal banks focuses on the big German banks, the model began in France, moved early into Belgium and was largely adopted by Swiss and Dutch banks long before their US counterparts, even when they initially expanded outside the United States. Perhaps the greatest issue facing financial policy-makers today is how to deal with the internalization and combination of these functions (retail deposits, commercial banking, M&A, other investment banking services, insurance and trading, especially complex derivatives) on a now global scale and across borders by a wide array of banks from many different countries. Many regulators would like to go back to the old US approach embodied in Glass Steagall, and for a time also more prevalent in some parts of Europe, namely separating banking functions. Few discussions, however, deal with the transformation of the Rhine model into a global approach to finance and how that older model fits, or does not, into a world in which personal networks and reputation have lost much of their force as social control mechanisms.

Although Ronald Coase is one of the most cited economists in the economic literature, his discussions about internalization versus market functions, as well as his notion of social costs, rarely find their way into arguments about financial regulatory change. Perhaps a broader study of Rhine finance will shed light on the pros and cons of this form of banking and why in some periods it produces economic value or, at the very least, seems to function without posing a considerable system risk.

76 Kobrak, From Multinational to Transnational Banking (2016).
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The Transport Function versus Post-industrial Identities. To What Extent does Urban Restructuring Threaten the River Transport Capacities of the Rhine Ports?

Antoine Beyer

Abstract: In the past two decades, most of the German ports on the Rhine, as well as Strasbourg in France and Basel in Switzerland, have put in place impressive urban waterfront development projects. In most cases, these have followed models adopted by a large number of sea ports from the 1970s onwards. The urban authorities thus consider their port areas to be underused and sometimes merely as wasteland. Their aim to urbanize river banks is part of a development strategy that came about because the metropolitan regions along the Rhine have to compensate for the decline of the manufacturing industry and create an urban image that fits in with the service economy so that there are urban amenities to attract highly skilled workers. The new urban settlements along the Rhine display great architectural ambition in the framework of globalized city marketing (e.g. Duisburg, Düsseldorf or Cologne). On the other hand, the global economy requires unprecedented transport capacities on the river as a result of increasing sea trade. The continuous transfer of container traffic to the hinterland is forecast to increase barge traffic by about 70% between 2010 and 2030 (BMVI, 2014). Yet this expanding demand could be left unsatisfied because of the increasing scarcity of land for port installations. The Rhine ports appear to be at the heart of two major and contradictory economic changes that are affecting developed countries, due to changes in the global economy. This trend brings immaterial, mostly knowledge-based, activities, into conflict with the material flows generated by production and consumption. The classical conflict between white- and blue-collar workers finds a new expression based on urban land property management in central port areas. In this debate, which is covered by an extensive scientific literature, the first objective of this paper is to present a survey of land consumption for port use or urbanization and the specific forms that this takes in the Rhine Valley. The objective is to see the extent to which Rhenish port areas have really shrunk (in absolute and relative terms) in the past 15 years. The second objective is to devise a typology
with a general model and its different variations that presents the different development paths followed by the Rhine cities. The research will focus on the detailed analysis of several variables that could explain local differences.

1. River front urbanization as a post-industrial policy.

The trend towards urban redevelopment in port areas is known as waterfront regeneration, and the first successes in North America (the Inner Harbour in Boston and Baltimore, Battery Park in New York, Downtown Vancouver etc.)\(^1\) have influenced European projects. Among the most significant architectural achievements are the London Docklands, the Albert Dock in Liverpool, the Art District that houses the Guggenheim Museum in Bilbao, the Kop van Zuid in Rotterdam, the international events in Barcelona, Genoa and Lisbon, and, lastly, the Hafenstadt project in Hamburg. The reshaping of new city centres in declining industrial port cities imposed a model that was copied all over the world.\(^2\) Regular academic exchanges and meetings between urban planners on the theme flourished, and quickly gave birth to an international association (AIVP)\(^3\) that acts as a global observatory and brings together the most varied achievements. The urban process and its socio-economic dynamics are well documented in countless scientific publications.\(^4\) The process has raised a great deal of interest, not only because the port regeneration projects have been an overwhelming commercial success, but also because they have served as a catalyst for creating new identities for cities. What also drew particular attention for research in the social sciences was the new way of perceiving urban life. In addition, the large dimensions and integrated nature of the projects attracted particular attention to the way planning was jointly conducted and financed by public authorities and the private market. The second point was the impression, to a great extent justified, that the new urban districts, with their high number of flats, marinas, office buildings and recreational areas, were created for the wealthiest members of society. The

\(^3\) AIVP stands for Association Internationale Villes-Ports/Worldwide Network of Port Cities.
working classes faced a gentrification process that threatened both their job and housing opportunities. In this respect, Montreal, with its social housing in the restructured port, is an exception. Port regeneration was also seen as a visible sign of a shift from a production to a services economy. More generally, the developments were seen as the most visible artifact of the neo-liberal ethic that was gathering momentum in social and economic life at the same time. The continuous lowering of customs duties was an incentive to delocalize manufacturing activities to low-wage countries. The process of de-industrialization in ports has also been accelerated by the containerization of the goods transported by ships, whose increased capacity required new specialist, land-consuming, terminals outside the existing port infrastructures, leaving behind an industrial wasteland.\(^5\) Port regeneration thus appears as an urban icon of the contemporary world, highlighting increasing social inequality and growing economic profits based on the control of accelerating material and financial flows, higher transport volumes in container terminals and instantaneous stock exchange listings in financial centres. Indeed, it is not a coincidence that the dock activities of the past were replaced by finance and banking in New York and London.

Most of our research cases involve sea ports, although a few can also be regarded as river ports (Rotterdam, London and Montreal). Little attention has been paid to the restructuring of river ports as such, which are considered to be late-comers to the restructuring process and characterized by smaller projects.\(^6\) It is, however, true that the urban governments in river ports, especially in the Netherlands, have been directly influenced by what has happened in sea ports.

The population has also shown an increasing interest in ‘living and working near water’,\(^7\) as the slogan to promote port revitalization in Germany puts it. This shift provided an opportunity for architects and town planners, who were commissioned to restructure river ports by applying their experience of restructuring sea ports. Nevertheless, the model must be applied cautiously, as the size of the projects and their relationship to a particular port are quite different. In most cases, a river port is nearer to a city, both in a geographical and political sense, as port management generally remains in the hands of the municipalities. Unlike sea ports, which

\(^7\) “Wohnen und arbeiten am Wasser”.

https://doi.org/10.5771/9783845284736

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simply withdrew from obsolete installations and built new terminals further away on unused land partly reclaimed from the sea, river ports do not have the same opportunities for expansion and have much more of a struggle to avoid losing land. The idea of an imbalance between urban and productive activities, and the place of nature and sustainability, are also more important in the second case, partly due to the fact that sustainable development dominates contemporary discourse and concerns. Nevertheless, it can be accepted that the model is, in many respects, transferable to river cities. On the Rhine, the trend towards port regeneration is characterized by its rapidity and scale. Almost every large and medium-sized city has a regeneration programme that is hastening a continuous functional disconnection between the city and its port activities, which is shared by river and sea ports alike (Bird 1971 and Hoyle 1989).

Like the sea ports, the economic basis of the river city has changed rapidly in recent decades, leading to the relocation of commercial activities. What is perhaps new in this context is the development of metropolitan thinking, where the city has to reorganize its role as a symbolic and effective centre within a wider regional space. It is also a clear signal from certain larger municipalities of a desire to slow down, or even reverse, urban sprawl by means of a new district that has an image of architectural quality and a natural environment because of the surrounding water. Proximity to higher urban services is guaranteed by the proximity of the city centre and direct public transport connections to it. According to Uwe Stöckner, 60% of port revitalization on the banks of the Rhine is planned to reinforce the city’s status as a centre, 30% to rehabilitate the public space on the river banks and only 14% to strengthen port activity by consolidating traffic. Port restructuring can be seen as a way of reconnecting the city to the river space, where access to water is considered to be a central part of the urbanization process, intimately linked with positive values such as leisure and proximity to nature. The waterscape appears to be extremely valuable, as it offers the last open view in a dense urban environment. Urban amenities are accessible by walkways and cycling paths along a pleasant riverside. Cultural institutions are well represented through museums (the chocolate museum in Cologne, the city’s history museum in Duisburg) or other cultural activities afforded by proximity to a city centre with its dense cultural life. The port area also has a unique

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8 Stöckner, Strategien (2005).
atmosphere, which is central to its distinctive nature and contributes directly to the quality of the location. This atmosphere is provided by former docks, which have usually been turned into marinas for private yachts, and some of the most interesting, remaining industrial buildings. The architectural character gives an aesthetic and historic touch that offers unconventional spaces for lofts and office buildings. Consequently, the architectural heritage of a port also increases its attractiveness.

The nature of the port area has been completely changed. The urban river space was imbued with a system of values that ignored the traditional uses of the river bank, namely as: an uncared for no man’s land (as it was only a short time ago); and a space for industrial work (as it was previously). The dominant concept was now that of reinforcing the idea of renewal through imagination and urban quality with a programme based on architectural creation and place management. The port area functions as a stage for architectural projects that contribute to urban marketing. New buildings, designed by famous architects to add to their fame, are built as landmarks. Port renewal, especially on the Rhine, calls on stararchitecture (a system where postmodern architects have been transformed into the stars of the architectural world). Jencks argued for ‘double coding’, so that postmodernism could be understood and enjoyed by the general public and yet still command ‘critical approval’.\(^9\) Examples are the emblematic building by Franck Gehry in the Medienhafen in Düsseldorf, the Hitachi Power office by Sir Nicholas Grimshaw, the Museum of Fine Art by Herzog, de Meuron and Norman Foster in the Innenhafen in Duisburg, the 2009 MIPIM award-winning Kranhäuser by Alfons Linster, and Teherani in Cologne. The new office and residential buildings are a symbol of modernity, but also refer to the crane of the medieval period when the city was a flourishing commercial centre. Today, these buildings are associated with the cathedral, with which they share a pre-eminent place on the Rhine waterfront (Ill. 1). Yet the most impressive achievement is probably the concentration of the world’s most famous architects in Basel at the former Sankt Johann Port, which presents itself as a unique open air museum of contemporary architecture.\(^10\) Basel and Duisburg have positioned their ur-

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10 Diener + Diener, Marco Serra, Adolf Krischanitz, José Rafael Moneo Vallés, Frank O. Gehry, Tadao Ando, Fumihiko Maki, David Chipperfield, Yoshio Taniguchi, Eduardo Souto de Moura, Álvaro Siza, Jacques Herzog & Pierre de Meuron, Rem Koolhaas.
ban restructuring programmes, the so-called IBA (International Architecture Exhibition), within the broader German cultural scene. This is, in a sense, the Guggenheim effect applied to the Rhine. Fierce competition is certainly taking place, encouraging new and more ambitious projects.

**Figure 1. Die Kranhäuser (‘the cranes’ in Cologne)**

Source: NPI (2016)

With their world renowned architect names and iconic buildings, the architectural programmes referred to simultaneously built a new futuristic cityscape and forged a new urban identity, especially in the former port areas. These ambitious projects set out to attract corporate head offices and research centres by offering outstanding central locations and real estate clusters for the media in Düsseldorf and Cologne, for finance in Frankfurt and for biotechnologies in Basel. Job creation is an important factor, and is set to reach 8,400 in the *Medienhafen* in Düsseldorf, 2,100 in the *Rheinhauhafen* in Cologne and 5,000 in the Innenhafen in Duisbourg.\(^\text{11}\) In Basel, the new Drei-Länder District is due to increase the city’s population by 20,000, as is the ‘Projet des Deux Rives’ in Strasbourg.

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<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Gernsheim</td>
<td>n.a.</td>
<td>n.a.</td>
<td>15.3</td>
<td>no</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Karlsruhe</td>
<td>5,791 (7,312)</td>
<td>23 (68)</td>
<td>229</td>
<td>no</td>
<td>-</td>
<td>-</td>
<td>185</td>
</tr>
<tr>
<td>Kehl</td>
<td>5,517 (6651)</td>
<td>32 (100)</td>
<td>264</td>
<td>no</td>
<td>-</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Koblenz</td>
<td>722 (777)</td>
<td>71 (135)</td>
<td>30</td>
<td>no</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Köln</td>
<td>22,413 (24,497)</td>
<td>200 (439)</td>
<td>218.5</td>
<td>Rheinauhafen</td>
<td>1998</td>
<td>15.5</td>
<td>15</td>
</tr>
<tr>
<td>Krefeld</td>
<td>3891 (4,962)</td>
<td>57 (537)</td>
<td>500</td>
<td>no</td>
<td>-</td>
<td>-</td>
<td>29.5</td>
</tr>
<tr>
<td>Lahnstein</td>
<td>n.a.</td>
<td>n.a.</td>
<td>12.8</td>
<td>no</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Strasbourg-Lauterbourg</td>
<td>n.a.</td>
<td>n.a.</td>
<td>86</td>
<td>no</td>
<td>-</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>Ludwigshafen</td>
<td>8,327 (9054)</td>
<td>83* (260)</td>
<td>127</td>
<td>Rheinufer Süd</td>
<td>1996</td>
<td>30 (15)</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 1: The public ports in the Rhine area and their urban projects (author’s own amalgamation of several sources. Traffic data from Planco 2013)
The counter-arguments raised by port authorities

Supporters of port activities and their representatives, the local Chambers of Commerce and in Germany the BÖB (the German Organization of Public River Ports), are paying close attention to these new urban developments. The topic is not a recent one, and several reports, position papers and public meetings have raised public awareness of the risk of shrinking port areas. Their position is rather alarmist, as they present the loss of land as an irreversible process that cannot easily be compensated for by new installations. The opportunities for expansion onto the water are very

limited and subject to strict environmental controls, requiring long and expensive procedures (Planfeststellungsverfahren) that generally raise fierce opposition within neighbouring communities. Port expansion in Godorf, south of Cologne, illustrates a complex situation of this type. The new site, at some distance from the core conurbation, should make future land port development possible by providing space to compensate for the urbanization of the central 15 hectares of the Rheinauhafen. The project has been delayed for many years now, and may have finally been halted as a result of legal action by environmental groups that want the zone to be classified as a nature reserve, even though it is completely surrounded by a huge Shell oil refinery. Transferring existing productive activities from former port areas is not straightforward either, as these activities have long leases (20 to 30 years) and their maturity dates do not coincide. This means that some of the land leases have to be renegotiated, possibly at a high price. The industrial installations and investments also usually have a high value. The removal of existing terminals likewise represents an economic loss, as these generally have freight-handling equipment. On the other hand, building new infrastructure is very expensive, and also requires rail and road connections. Furthermore, existing port facilities not only play a major role in river transport, but also provide urban access to rail services. Through their rail subsidiaries, the port authorities are usually in charge of the maintenance of the local rail infrastructure and often provide rail services. Indeed, some river and rail services could disappear if existing port installations are reduced.

The reduction in the size of a port area not only limits activities there; more indirect consequences also have to be considered in terms of spatial redistribution. The proximity of port and urban activities and, in some cases, the mixing of functions may lead to more acute cohabitation conflicts. Handling and production in ports usually generate several types of unwelcome impact (noise, odours, gas emissions and road traffic, for example) that can reduce or interfere with the port activities that remain, which are seen as being incompatible with an area’s new urban character. Safety rules impose certain minimum distances and may require some new construction (protection walls, covered areas to reduce noise etc.). This requires the creation of buffer zones for lighter economic activities that consume land that cannot be set aside for other transport or industrial purpos-

es. In urban sites, even a slight reduction in land occupancy rates may radically limit the possible use of the port and trigger a gradual process of abandonment. The possibility that a site may be claimed for urban purposes, or the mere proximity of inhabited zones, creates uncertainty for industrial or transport investors. The perceived lack of security for long-term returns on investment or the fear of additional costs may hamper the modernization process. This situation is a kind of self-fulfilling prophecy; in other words, the possible threat makes port decline happen merely by predicting it. A recurring demand on the part of port supporters is that port perimeters should be secured once and for all to prevent any possible kind of domino effect.

If the new urban districts within a former port area provide considerable job opportunities, the BÖB among others argues that ports also create significant numbers of jobs and that their position near residential areas may be regarded as an important factor in the reduction of commuting and urban sprawl, especially for less skilled workers. In Germany, the 109 public ports are thought to provide 235,000 direct and a further 400,000 indirect jobs.\[14\] Another estimate states that every 1,000 tons of freight handled create between 1 and 1.5 jobs and produce €80,000 to €100,000 of added value before tax.\[15\] The argument here is that: port-related activities employ workers of all types, particularly those with fewer qualifications, and have the advantage of being less liable to delocalization. On the contrary, they play a decisive leverage role from the economic perspective, sustaining local industries of every type. Historically, river ports have depended a great deal on municipal decisions that often underestimated the real overall economic benefits that a port offers, not only as a cash and job provider, but also as a provider of public services, which is vital for a larger region and is not given enough importance or is even ignored.

On the other hand, the firms that operate in ports stress the need for sustainable mass transport such as that provided by waterways. The position of port supporters is therefore not only defensive, as the intensification of hinterland traffic has opened up new opportunities for inland waterways. After several years of steadily falling tonnages, the sector is now experiencing rising demand. Unlike the other modes, which are already suffering from a shortage of infrastructure, the river and canal systems offer a high

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capacity reserve that can be mobilized without important costs and with a limited environmental impact. Other positive factors are the sector’s low transport costs and smaller carbon footprint. The German government has already recognized the importance of mass waterborne transport as a means of providing better access to seaports, as set out in strategic policy programmes (*Hafenkonzepte*). Their greater interest in freight traffic makes regional (Länder) and national (Bund) administrations better promoters of port activities than municipalities. Yet the fact that the federal administration is exclusively responsible for the maintenance and development of waterway infrastructures means that it is not the best institution for promoting the positions of a port’s installations. By turning on its head the traditional argument that commonly opposes cities and ports, the BÖB suggests that urban ports, as an integral part of a city, should be eligible for federal subsidies (*Städtebauförderung*) in order to redevelop their own activities.16 The increase in the amount of land available for a particular port should be accompanied by stricter land management in general and be reserved for players in the inland waterways sector, or at least firms that commit to using barges for a significant part of their transport needs. The current financial penalties do not seem to be dissuasive enough; either the amount required is too low or a site’s proximity to a city centre is attractive and maintains the *status quo*. In most cases, leases that were drawn up in a less rigorous period will continue to influence land distribution in the coming decades.

The pressure exerted by sea port terminals on inland terminals will increase considerably for container traffic in the coming years. At the present time, the capacity for bulk transport seems to be sufficient, and the volume of bulk products is rising less than that of container traffic. The only way to handle higher volumes while avoiding congestion is to modify the modal split in favour of the alternative to transport by road. This trend also interests port authorities, which have developed proactive measures to promote the use of such modalities. The Port of Rotterdam aims to carry 47% of container traffic by alternative transport modes by 2035 compared to 35% today. The operators of the Maasvlakte II terminal must meet a quantitative target for a modal split. The Port of Antwerp is less prescriptive, but is still planning infrastructure investment that should lower the modal share of roads from its current level of 57% to 44% in 2030.

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This expected rise in the transport demand will put increased pressure on rail (+36%) and the waterways (+27%). As a direct consequence, until 2025, the average rate of growth should be 6.3% a year. This means that the ports along the Rhine will have to play a multimodal role and perform more logistics activities.

Table 2: Sea ports: forecasts for container traffic in 2025

<table>
<thead>
<tr>
<th>Growth in TEU (2010-2025)</th>
<th>Rail</th>
<th>Barge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antwerp</td>
<td>+40,000</td>
<td>+430,000</td>
</tr>
<tr>
<td>Rotterdam</td>
<td>+70,000</td>
<td>+340,000</td>
</tr>
<tr>
<td>Total</td>
<td>+110,000</td>
<td>+770,000</td>
</tr>
</tbody>
</table>

Source: Planco, 2013, 74.

To be able to respond to the new demand, the river ports must have enough available land to be able to handle container flows and take advantage of this opportunity to create services and added value in warehousing and logistics activities. One of the key factors is the availability of land for new high capacity terminals and logistics activities, as well as sites that have good connections to high capacity continental freight corridors.

2.1. NRW report (2008)

In its report Hafen-Konzept, the region (Länder) of North Rhine-Westphalia (NRW) forecast a doubling of container flows by 2015 and a tripling by 2025. It also proposed preserving and, if possible, extending the land set aside for port activities. This regional policy programme soon became a model. The success story of LogPort in Duisburg was also an example of what could be achieved and how new logistical capacities could be provided. It shows that it is essential to be able to offer a very large area of land with direct access to the port infrastructure and good connections to the rail and road networks. This was achieved by reclaim-
ing the huge Rheinhausen industrial plant from Krupp industries and transforming it into one of the continent’s largest logistical hubs (265 hectares) with the financial help of the Länder and European subsidies.

Planco estimates that each EVP handled requires 0.6m$^2$ of space, which is slightly more than the value generally used for sea port terminals. The NRW experts applied a lower reference figure, arguing that economies of scale could permit the more intensive use of existing infrastructure and additional land gained by a change of use.\(^{21}\) Consequently, the actual need for new port land has been set at around 325 hectares in 2025 for the North Rhine-Westphalia region, much of which could be taken from existing reserves of land (220 hectares). The presence of several possible brown-field sites and the extension of the Deltaport (Emmelsum, Rhein-Lippe-Hafen Wesel and Stadthafen Wesel) close to the Dutch border should be enough to meet these needs. Yet in some of the largest ports, for example Neuss, Düsseldorf, Cologne and even Duisburg, there is no free land for new uses.

2.2 The second Planco report for the Ministry of Transportation (2013)

The strategic analysis conducted by the North Rhenania-Westphalia region impressed the federal government, which launched a study to determine what measures would be required to pave the way for future inland port development. This study is also a logical continuation of previous work that stressed the need to improve rail accessibility to the German sea ports and reorganize federal IWW investments by imposing a strict hierarchy on the German river system dominated by the Rhine and its primary tributaries.\(^{22}\) Two striking factors emerge from this report. First, most of the major investment will be in the sea port gateways, and second, investment decisions exhibit a clear hierarchy. Both ideas were applied to the container terminal, following a proposal that already had the support of the sea port operators, in particular the Port Authority of Rotterdam, to alleviate congestion in the Rotterdam port by sorting the containers in an inland hub. This proposal also fit in with the rapid process of consolidation that has taken place among the barge operators on the Rhine, notably to the ad-


\(^{22}\) Beyer, Logistical issues (2012).
vant of the largest, Rhenus.\textsuperscript{23} Economies of scale are playing the same reorganization role as they did before for sea port and seaside operations, but this time in a continental setting. In this concentration process, only a few sites are able to provide the required quality of service.

The Planco study took account of several variables. Our prime interest is, of course, land availability. We have defined three categories of port with a respective land development potential of at least 15 (A), 10 (B) and 5 hectares (C) for additional industrial settlement. Lack of land is one of the major handicaps facing many inland ports such as Berlin, Frankfurt, Gelsenkirchen, Hamm, Heilbronn, Kehl, Koblenz, Regensburg and Saarlouis. The three types of port are:

\begin{itemize}
\item \textbf{Class A:} a main continental hub with a collecting and distributing capacity; a major centre for logistics activities; and able to act as a substitute for sea ports.
\item \textbf{Class B:} a major hub with supra-regional collection and distribution functions in the sea port hinterland.
\item \textbf{Class C:} a hub with limited expansion capacity and therefore limited commercial potential.
\end{itemize}

One of the recommendations is that the regional governments should undertake research to identify land resources for port extensions where needed and also introduce regional planning legislation (\textit{Landesplanung}) to secure them. This proposal is a direct and unprecedented call for the Länder to intervene in port issues.

Two more arguments for preserving port capacities have not been explicitly mentioned in official German documents and only rarely in other reports. The first of these is urban logistics, which is a topic that has assumed much more importance, for example in the promotion of the French river ports in inner cities. The second is the possibility of reindustrialization on sites that are located directly on the IWW, especially with regard to the issue of energy transition in urban areas.

\section{3. Different shades of grey}

After our examination of general considerations in the first two sections of the paper, we will now consider the different types of situation and conflict in detail. First, it should be remembered that municipalities are not fundamentally opposed to port activity in their urban areas. Indeed, it is rare for the situation to be black or white, i.e. one where port activity will

\begin{itemize}
\item \textsuperscript{23} Beyer, \textit{Innovations techniques} (2013).
\end{itemize}
either disappear or stay as it is, meaning that grey areas dominate. Some municipalities support the modernization of existing sites. This is, for instance, the case for the municipality of Neuss, which rejected a profitable project based on office buildings to rent the site to a logistics provider. In this case, the port as a logistics location is an integral part of the city’s urban identity and economic orientation. In contrast, the city of Düsseldorf, which faces Neuss on the opposite bank of the Rhine, continues to gradually replace its traditional port activities with high level services. The remarkable success of the Medienhafen conversion project encourages continuation of the urbanization process that is under way, with a real and positive spillover effect.

Elsewhere, falling traffic in a technically obsolescent environment leads to a non-conflictual transition. Port traffic in Münster on the Dortmund-Ems canal was falling so much that it made no sense to maintain a port there. The entire area will therefore be gradually converted to urban use. The first stage of redevelopment has already been completed with the “Kreativ Kai” urban project that combines housing and leisure (especially gastronomic) in the former port area. By this time, the nucleus of the Port of Duisburg, the so-called Innenhafen, had lost almost all commercial significance. The body of water around which redevelopment has taken place is a few kilometres away from the Rhine and can only be reached by way of a narrow outdated lock. Its area of 50 hectares represents only a small fraction of the total area of the port (3.5% of the 1,350 hectare port extension). A number of buildings dating from the early 20th century have been recognized as historical monuments and must therefore not undergo any structural change. Faced by a severe loss of population, the core of the industrial Ruhr needed this redevelopment project to restore its urban image and enable it to continue to perform the role of a port management centre, in particular by providing a location for the headquarters of the transport and logistics services firms attracted to other parts of the port by the large amount of available land.

In the case of many port docks, further attempts at modernization are not justified in view of their inappropriate location and the high costs involved. The cost of replacing obsolete equipment and the design of the port itself would be too high to be justified economically. The parcels of

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land and the lengths of the quays were designed in the past to handle ships that stayed in the port for longer than is the case now. Moreover, there is almost no use today for old warehouses with several floors. Furthermore, the amount of land that is available is not, in most cases, sufficient for space consuming modern activities, and major investment would be required to provide the necessary direct access to motorways. Uwe Stöckner has estimated that in 60% of cases, urbanization processes are prompted by the cessation of port activity and are mostly undertaken by the port authorities themselves.\textsuperscript{26} The ports that were transformed into new urban areas on the Rhine and Neckar lost any significant transport role and 50% of them handled no further traffic once the decision had been made.\textsuperscript{27}

Urbanization is not the only way to revitalize unused or underused port areas. Other river-connected functions may be encouraged that are more directly linked to the existing infrastructure, with one example being tourism terminals, which can take advantage of the proximity of a city centre. In Cologne-Deutz, the alternative proposal to the conventional plan for a marina would be to safeguard the maintenance and repair centre that could also provide an emergency repair service for river cruise boats, as the majority of them call at Cologne. Such a solution would have additional benefits as well: it might permit the reintroduction of a certain amount of goods traffic, and the project would be compatible with urban logistics and the creation of jobs that are directly connected to the river. In addition, not all the port areas are suitable for urban development due to a flood risk. Ute Stöckner takes an optimistic standpoint, estimating that 95% of port areas could be declared suitable for building if adequate measures are taken, such as, for example, strengthening dikes, using the ground floor exclusively as garage space or keeping it completely free.\textsuperscript{28}

Urban land use does not have to involve construction, and many cities set aside the areas immediately adjacent to the river banks for leisure, and may, for example, build paths for walking or cycling in large open green spaces or parks (see the Blau Mannheim project).

Another option is to bring together port handling activities at specific sites and modernizing a few installations to improve their efficiency. Traf-

\textsuperscript{27} Stöckner, \textit{Strategien} (2005), 112.
\textsuperscript{28} Stöckner, \textit{Strategien} (2005), 48.
fic intensity in relation to quay length varies from one to seven,\textsuperscript{29} which suggests that major productivity gains are possible in many cases. As a result, higher intensity and more compact organization could produce quite interesting results locally. This was the solution chosen in Frankfurt am Main, for example, where the \textit{West Hafen} was completely closed down and local economic actors were willing to be relocated to other port sites (\textit{Ost-Hafen} or the nearer \textit{Gutleuten Hafen}). Meanwhile, the power plant that could not be removed without great economic loss has been integrated within a completely new urban environment. The same process took place in Basel for the historic St Johann port, whose poor rail and road access meant it generated through traffic in residential areas.

Leasing out former port land can also be seen as a financial opportunity for the port administrators. First, this may make it possible to create a more efficient spatial distribution, as it is followed by investment in modernization elsewhere. The transfer of property may generate profits that can be reinvested in port infrastructures. Reinvestment does not have to be focused on the riverside, but may also be used to improve land transport links (i.e. the electrification of the rail track within the port area to speed up combined transport and thereby make the whole site more competitive). Some port administrations prefer not to sell land directly to promoters and instead try to make greater profits by taking shares in a jointly-owned company that is responsible for real estate operations, as was the case in Cologne with the port management firm HGK for the \textit{Rheinauhafen} project. Similarly, in Strasbourg, the port administration (\textit{Port Autonome de Strasbourg}) decided to lease the land to urban promoters to maintain their ownership interest and benefit from regular income generated by future operations. At the same time, as a shareholder or even a land owner, the port can more easily prevent any developments that could interfere with remaining port activities. In this case, too, ownership is used to ensure the desired balance is maintained.

The most risky development procedure is mixed use, where a buffer zone has to be created with certain new protections (noise reduction barriers, vegetation barriers, etc.). In Neuss, a new covered area has been constructed to lower noise and dust emissions from a steel plant. The question to be answered is: to what extent is mixed use possible without generating conflict? This requires the creation of transitional spaces and a strict hier-

\textsuperscript{29} Stöckner, \textit{Strategien} (2005), 97.
archy of possible activities. Port or local urban activities may dominate, depending on local circumstances. The Tolbiac port project in Paris is an acknowledged reference for the mixed use of quays: during the week, access is reserved for raw building materials; in the evenings and weekends, it provides space along the River Seine for pedestrian use, while special lighting effects at night turn the port installation into a local landmark. At the other end of the scale, urban newcomers have to accept the pre-existing activity without any improvement on the grounds that it was present before they arrived (acquired rights). In some cases, however, conflict may be unavoidable, and the following list is a comprehensive overview of possible conflicts:
A. Conflict about direct land use:
   with land availability (for port activities – for alternative use)
   without land availability
B. Neighbourhood disputes (indirect conflict):
   housing
   industry
   leisure

Comprehensive objective evaluation results in three main possible organization scenarios:
   port activities exclusively
   mixed use
   alternative use

When the potential for expansion is limited, other possibilities should be considered. The first of these is to take over industrial land or re-use brown-field sites. These may be directly accessible from the water, and can be provided with new terminals, as is the case in LogPort 1 & 2 in Duisburg or the Trilogiport in Liège. Alternatively, for activities further from the riverside, a connection to port facilities can be provided. In 2010, Duisport signed an agreement with Rütgers Germany to develop a joint venture to encourage the setting up of logistics services for chemicals and energy products in the industrial estate at Castrop-Rauxel, which has 15 hectares of land along the Rhein-Herne canal and lacks direct access by


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water. The Port of Frankfurt, which is constrained by its limited expansion potential, tried to either achieve institutional cooperation or gain full or partial ownership of river terminals within a radius of 35 kilometres, with the Rhine Port of Gustavsburg used to provide additional capacity. The large number of public ports along the Rhine (on average, one every 20 kilometres between Basel and Emmerich) encourages closer cooperation. The consolidation that has been observed among the economic players has been pursued to varying degrees by almost all ports. One of the areas under discussion is the pooling of land management resources and the joint use of terminals to optimize existing capacities, for example the merger of Neuss and Düsseldorf (a grouping that also controls 45% in the Port of Krefeld), and later with HGK (Cologne). In some cases, the way in which the ports complement each other is obvious, for example the major ports have the financial and technical capacity to develop logistics services and the secondary ports own the land. The ports are developing gradually, partly because of the shortage of land, into regional networked systems that are interconnected not only by water, but also by rail and road. This change helps to minimize sterile competition between neighbouring ports, as the existing terminals specialize and so increase their efficiency. It is clear that the implementation of metropolitan thinking has saved about half a dozen major hubs that had been identified by the recent Planco report.

4. Current legal procedures and increasing the ability of the Länder to play a key role in arbitration and mediation for inland port issues.

The municipalities along the Rhine have a strong, direct influence on river port development, not only as landowners, but also as shareholders and, above all, policy-makers with regard to local land use. In a way, they can be regarded as both judge and defendant. Nevertheless, the management and assignment of land use in river ports is bound by rules that are laid down at the national or regional level, but rarely introduce impartiality. It is important to also bear in mind that each German region (Länder) has its own policy and priorities for regional planning. While the general predominance of municipalities is well established, especially in the leading ports, their autonomy in terms of self-government may be greater in Baden-Württemberg than in the neighbouring Hessen. What is taking place is an increase in the amount of influence that public stakeholders from the re-
gional and federal levels exert in waterway ports. This gradually changing framework could affect the order of priorities and current issues.

More than half of the Rhine and Neckar ports, both public or private, depend on local authorities.\textsuperscript{31} The largest ports are under municipal administration, but are mainly operated privately.

\begin{table}[h]
\centering
\caption{The governance of German Rhine ports}
\begin{tabular}{|l|c|c|c|}
\hline
Municipal influence in port governance & Administration & Ownership & Operation \\
\hline
Municipality & 38.5 & 34.6 & 17.3 \\
Länder & 7.7 & 13.5 & 3.8 \\
Bund & 0 & 3.8 & 0 \\
Private & 34.6 & 32.7 & 50 \\
Other & 19.2 & 15.4 & 28.8 \\
\hline
Total (in \%) & 100 & 100 & 100 \\
\hline
\end{tabular}
\end{table}

Source: after Stöckner 2005

In response to the NRW Länder’s request for more protection and a possible expansion of the port, it has been established that no specific law can be applied.\textsuperscript{32} Land use is regulated by the municipalities, which are sovereign with regard to planning within their boundaries. In contrast, the waterside and the river itself are subject to federal legislation (\textit{Wasser- et Wasserstrassenrecht}), which is more important when extending an existing port or creating a new one. The federal government can therefore not intervene in a matter that is deemed to be under local jurisdiction. Of course, urban development has to respect the general federal town-planning and safety rules, especially those concerning the emission of pollutants locally. Non-compliance can be invoked as a ground for refusing urbanization, as was the case in, for example, the Port of Düsseldorf in relation to the new city extension in the port area.

Public authorities other than the municipal government may intervene if a project conflicts with Länder legislation, as long as the port has been mentioned specifically as an objective in regional planning documents (\textit{Ziel der Raumordnung im Landesentwicklungsplan oder Regionalplan}). As regional legislation prevails over municipal legislation, the municipality must adhere to the required policy. Until recently, regional planning

\textsuperscript{31} 52\% according to Stöckner, \textit{Strategien} (2005).
documents paid little attention to the port issue, but this will change as new documents are drafted. One of the recommendations made by North Rhine Westphalia to protect port potential from urban development is to strengthen the measures in the future regional development plan (*Landesentwicklungsplan* 2025). This will put the regional administration in a stronger position to set land aside for port expansion (*Hafenvorranggebiet*), and will ensure that it has a real capacity to influence policy when it initiates dialogue with the municipalities on a new basis. The Länder may also grant financial incentives in support of a desirable development path. Regional governments are becoming more aware of their role as mediator and may re-establish equilibrium between ports and municipalities.

The most active in this respect, the Länder of NRW, has another important possible tool; in its 1978 regional development plan, it set aside 13 sites with a large amount of land. The smallest (200 hectare) site was originally earmarked as a possible location for the construction of huge industrial plants, but was never needed. In the meantime, the surface area has been reduced to 80 hectares, which could provide possible sites for logistics and industrial activities that are directly linked to water transport. A further recommendation made by NRW was that the urban development plan (*Stadtentwicklungsplan*) must be compatible with the long-term master plan for the port (*Langfristige Hafenentwicklungsplanung*)\(^{33}\). This would provide an incentive for a negotiated, integrated solution (*integrierte Planung*), which is too rarely the case today. In a manner of speaking, the compatibility of the two documents would be a way of ensuring official recognition of the port as a priority and integral part of the urban project. Another proposed way of setting aside land for use for port-related activities would be to make it necessary to justify urban extension in a port area by proving that no other sites are available. In addition, once it has been decided that expansion can go ahead, the municipality would automatically be compelled to provide other land that is suitable for port expansion to make up for the loss.

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5. Developing a typology of the changing Rhine ports in an urban perspective

This last section relates to the construction of a morphological and dynamic typology of the Rhine ports based on the port/city relationship. The sample of ports consisted of the major public ports along the Rhine. These were used to develop a general, graphic model (Any port, Fig. 5). The presence of the river means the urban zones develop asymmetrically, from the historic core (A) to the suburbs (B) and the outer conurbation (C). The river generally divides its functional area into two administrative zones that may also coincide with regional boundaries in the Middle Rhine and international borders in the Upper Rhine region. In some cases, these borders become less significant when one moves downstream, as the Rhine, which initially marks national boundaries, later separates regions (Bundesländer) and then municipalities, some of which have even been abolished when mergers have taken place (e.g. Cologne). This may occur through incorporation into another municipality (e.g. Cologne Deutz) within metropolitan areas (Rhein-Neckar) or, more recently, through cross-border cooperation (e.g. the Eurodistrict in Strasbourg or Basel). The second theme is the position and expansion of port sites within urban zones. Their locations are determined by: historical and technological developments from the creation of ports to that of commercial hubs near city centres (1) (*Stadthafen*); further developments by the turn of the 20th century; and the subsequent modernization of ports that transformed them into production sites (2) (*Industriehafen*). Initially located on the outskirts of cities, they have been progressively integrated into the built environment. Finally come the more recent port creations, which take the form of specialist terminals on the outskirts (3).

The overall position of each port can be briefly characterized as resulting from the combination of pressure from two sides: urban demand and the dynamism of logistics. Our models show a variety of trajectories ranging from a reduction in the size of port areas in the core urban sites (suppression/amputation or concentration) to relocation in the metropolitan...
margins (relocation/expansion in older industrial areas in a brown-field or, more rarely, a green-field site).

Figure 2: The Rhine port: a spatial model

Another possible way of increasing traffic in order to optimize limited port capacities is port cooperation. Higher handling densities in specialist terminals may offer a better yield without the need for spatial expansion. The attempt to achieve economies of scale is also a major trend that fosters closer links between neighbouring ports, and helps barge operators to provide integrated services. In some cases, new collaborations are set up, replacing existing attitudes of urban competition (e.g. Düsseldorf and Cologne) that even go beyond national borders (Upper Rhine). Spatial proximity provides a good opportunity to pool resources and develop a new, more efficient productive system. The space lost on the right bank in the Düsseldorf Medienhafen and its future development is less alarming given the fact that it may be interpreted as a transfer to Neuss on the facing Rhine bank, where the port capacities are under less real estate devel-
opment pressure. The term ‘alliance’, as used here, covers a wide range of more or less formalized agreements and close ties between port authorities. In order to impose some order on the wide range of terms that are used, we propose an interpretative grid that covers various situations ranging from a merger (Rhein-Cargo) to the loose cooperation agreements between the Upper Rhine ports (Fig. 6).

**Figure 3: Emerging port alliances**

![Image of Emerging port alliances]

Source: own conception.

### 6. Conclusion

The dynamic that has been observed in the case of sea ports during the last 30 years is now also apparent in river ports. The container system has had a profound impact on traffic and the location of facilities. The new terminals that sprang up some distance from the inland basins provided town planners with large amounts of derelict land upon which they could create successful urban waterfronts. On the river, freight handling densities are higher, boats are smaller and less land is available than in the case of the
sea. The desire to create a new urban relationship with the riverside seems to be in conflict with the port’s desire to protect its industries and further increase its handling and logistics capacities. The many new and attractive projects stretching from Cologne to Basel show the widely held view that the development of urban port areas is central to urban redevelopment and the expansion of a city’s core functions. In most cases, prestigious buildings are the ultimate showcase of a new way of life, promoting contemporary urbanity and bringing global talent to the Rhenish ports. The actual pressure that is applied as a result of the ports’ real need for land for port activities may temper the excessively alarmist position of the river port lobbies. Port revitalization is not to be systematically condemned. On the contrary, it may help to modernize port infrastructure by concentrating traffic and adapting it to the new technical environment. The urban sites that have been transformed were mainly on the edge of the port area and suffered from poor technical characteristics. On the other hand, they represent a unique financial opportunity for supporting the process of port reorganization. The real bottlenecks are, above all, in some major hubs in the Lower Rhine like Cologne and Düsseldorf, although alternatives could be found (respectively at Godorf and Reisholz). Demands for land must be interpreted from a two-fold perspective: countering a constant withdrawal of land, which discourages long-term investors; and attracting the attention of the public authorities to the need to assist with port redeploymet. The region of North Rhine–Westphalia has shown the right direction by reviewing legal procedures in an attempt to guarantee the existence of port areas. New legal measures could create a new balance of power in favour of the ports, but they do not as yet really exist. This is regarded with increasing interest, especially in NRW, which is the region that has the greatest awareness of the value of inland ports for the harmonious development of transport. It is also the region that handles half of Germany’s river tonnage and will be the most affected by capacity shortages in the coming years, as it sees itself as the natural continental gateway for sea port operators. Such restrictive legislation is less likely to be applied elsewhere. It is also important to underscore the leading role of NRW as a possible stakeholder in the regional coordination and integration of river ports and waterway policies, for which previously only the municipality and the federal government were responsible. This is a change that has been welcomed at the federal level. In fact, Berlin supports NRW’s intervention as a clear sign that priority is being given to a river port system with a hierar-
chy and public investment. NRW’s position therefore has much in common with that of the European Commission.

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6. Transport
The Post-war Economic Recovery of the German Rhine Economy, 1918-1929.¹

Jeroen Euwe

Abstract: Using an analysis of transport flows, this essay argues that a German Rhine economy existed on the eve of WWI. Furthermore, the volume of traffic and the cohesiveness of the Rhine area’s ties to the Netherlands, Belgium, Luxembourg and Switzerland – and after the war, the Alsace and Lorraine in France – suggest that the region was part of a transnational Rhine economy. Following an examination of the structure of the transport flows within the Rhine region, the effects of the war on the cohesion of the Rhine economy and the post-war recovery of transport within this area are examined. Given that these transport flows are the result of economic activity, it is assumed that – even though the volume of transport does not reflect the value of the goods transported – the economic developments in the Rhine economy are, to a significant degree, mirrored in the (changes in) the volume and direction of these flows.

1. Introduction

Writing in 1828 to his friend, the poet Johann Peter Eckermann, Goethe stated: 'Mir ist nicht bange, dass Deutschland nicht eins werde; unsere guten Chausseen und künftigen Eisenbahnen werden schon das Ihrige tun...!'.² Some four decades later Germany was politically integrated. However, as historian Nikolaus Wolf argues, the country remained socially and economically poorly integrated, and was divided – partially because of natural geography – into roughly an eastern and a western part.³ Indeed, it was only by the end of the Weimar Republic that Germany had become an economically well-integrated country, according to Wolf’s aptly named

¹ The author wishes to thank the German Historical Institute in Washington D.C., whose long-term fellowship in economic history enabled him to work on this paper.
² Cited in: Brinkmann, Der Rhein als Verkehrsader (1925), 340.
study 'Was Germany ever united?' Yet within Germany, again in part because of natural geography, there was at least one region that had for some time already been integrated to a very high degree: the region formed by the German Rhine riparian Bezirke (districts) and the districts that were connected to it through the tributaries of the Rhine. In the mid-1920s, the French economic geographer Jacques Levainville referred to the region formed by the German and other riparian states as the 'economic zone of the Rhine'. These days, it is often referred to as the 'transnational Rhine economy'.

In this chapter, an analysis of transport flows is used to argue that: 1) a German Rhine economy existed; and 2) the volume of traffic and the cohesiveness of its ties to the Netherlands, Belgium, Luxembourg and Switzerland – and after the war, the Alsace and Lorraine in France – suggest that the same can be said of the transnational Rhine economy. Following an examination of the structure of the transport flows within the region, the effects of the war on the cohesion of the Rhine economy and the recovery of transport are discussed. Given that these transport flows are the result of economic activity, it is assumed that the economic developments in the Rhine economy are, to a significant degree, mirrored in the volume and direction of these flows. It should be noted, however, that the volume of transport does not reflect the value of the goods transported. As a result, while these figures are useful for examining the post-war recovery of transport and the internal bonds of the Rhine economy, they do not directly reflect the share of each district with respect to German GDP.

2. Data and methodology

Ideally, a gravity model should be used to examine the issues described above. Such an approach would allow for a more precise study of not just the level, but also the nature, of the economic integration of the Rhine economy. By including different factors that are related to trade costs (geographic distance as well as political, technical and other barriers), it is then also possible to include a plausible benchmark against which to mea-
sure economic integration (cohesiveness).\footnote{For a more in-depth discussion of the issue, see: Wolf, \textit{Was Germany ever united?} (2009), 849. Wolf refers to Deirdre N. McCloskey's \textit{The Rhetoric of Economics} (Madison 1998) for a discussion on the need for plausible benchmarks if measures of economic integration are to be meaningful.} A proper implementation would entail the breakdown of the total flow of goods into a number of main categories, such as fuels, ores, chemicals, cereals and perishable foodstuffs (like vegetables and fruit). Consequently, the use of a database limited to total transport between districts – which is what has been used here – has some obvious limitations in terms of both explanatory power and advisable statistical techniques. Given the results obtained with the currently available database, the strength of the economic ties that these findings reveal, and the fact that this essay is not concerned with the nature of these ties, a deliberate choice was made to ensure that the calculations were kept at an intuitively relatable level.

The required information on transport within and between districts, as well as the traffic of these districts with other countries, is readily available in the publications of the German \textit{Statistisches Reichsamt} (before 1919, the \textit{Kaiserliches Statistisches Amt}) on inland shipping and railroad freight. These documents provide information on the tonnage of over 80 classes of goods transported between the 37 districts that make up Germany.\footnote{Kaiserliches Statistisches Amt (after 1918: Statistisches Reichsamt), \textit{Statistik der Güterbewegung [1913-1923]} (1914-1925); Statistisches Reichsamt, \textit{Die Güterbewegung [1924-1929]} (1926-1930); Kaiserliches Statistisches Amt, \textit{Verkehr und Wasserstände} (1916); Statistisches Reichsamt, \textit{Verkehr [1919-1926]} (1922-1928); Statistisches Reichsamt, \textit{Die Binnenschifffahrt [1927-1929]} (1929-1930).} The traffic is reported as being from its point of origin to its point of destination, which would seem to make producing a precise overview of German transport flows a simple task: the level of integration can be expressed as the percentage share of traffic with the Rhine economy in the total traffic for each district. Similarly, integration for the German Rhine economy as a whole would be the share of the sum in internal traffic of the total traffic with Germany of all these districts. At the recorded point of destination, however, goods may have been transhipped onto barges or other forms of transport such as carts and lorries, possibly headed for a destination outside a particular district. During the period under review, these latter two modes of transport were used almost exclusively for local transportation and are therefore of no consequence. Indeed, it was only by the end of the 1920s that the share of lorries in terms of longer-range transport...
transport started to grow, although the share with respect to volume remained small.\textsuperscript{7} Inland shipping, on the other hand, was second only to railroad freight as a form of transportation, and of the almost 340 million tons of goods that were transported through the districts of the German Rhine economy, over 32 million were at some point transhipped to or from railway transport. Given that either the actual destination or the origin of these goods is unknown, the effects of transshipment need to be taken into account. The method of calculation mentioned above is therefore only usable as an upper limit of integration.

Data for transhipment was published in the documents dealing with inland shipping, and was provided per port and for each class of goods. In order to keep the requisite database at a manageable level, only the total transshipments for all the ports in a district were used. The volumes of transshipments are published as being either from ship to train, or from train to ship. It is, therefore, not necessary to subtract the entire transshipment volumes from the total volume of traffic. Instead, the much lower volumes of transshipments in each direction of travel and for each mode of transportation are subtracted from the applicable subtotal. So, for instance, the outgoing traffic via inland shipping to other districts in the Rhine economy minus the volume of goods transshipped from rail to barges yields the minimum share of the Rhine economy in terms of outgoing traffic via inland shipping. Since the volume of transshipped goods sent outside the Rhine economy can never exceed the total volume of goods sent outside the region, any surplus in transshipped goods was internal traffic, further limiting its impact on calculations. Once the same procedure is applied to incoming and outgoing traffic for both modes of transport, the minimum share of traffic to the Rhine economy of the total traffic for each district – and therefore the entire German Rhine economy – is known. In this way, the margin between upper and lower limits has been reduced to a few percent for the entire German Rhine economy. More importantly, for the Ruhr ports (those near Duisburg, which was the largest inland port in Europe), the margin in 1913 between the upper and lower limits could be reduced from over 68\% (yielding unusable data) to a mere 1.1\%. This reduction proves that instead of being a transhipment port to Germany as a whole, 97 to 98\% of domestic traffic in these ports was generated in, and geared towards, the Rhine economy.

\begin{figure}
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\caption{The Rhine}
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\textsuperscript{7} Euwe, \textit{The Rhine} (2012), 227-228.
3. The German Rhine economy prior to WWI

In the second half of the 19th century, as the coal-based industrialization of the Rhenish-Westphalian region of West Germany accelerated, much of the new industry was concentrated near the Ruhr (a tributary of the Rhine) and along the Rhine. Large coal deposits in the vicinity – high quality coal suitable for coking in the Ruhr, lignite (brown coal) near Cologne and Bonn – provided fuel for industry in general and raw materials for parts of the chemical industry. Some 85% of the coal produced was used locally. Nevertheless, many of the new industries relied on a supply of raw materials from districts elsewhere along or near the Rhine, or from abroad. In 1913, the Ruhr metallurgical industry, for instance, received 84% of its ore by train. Just over 40% came from Lorraine, while the remainder consisted of imported ores transhipped from Rhine barges at the Ruhr ports in Duisburg. These barges, in turn, came mostly from Rotterdam, and their return freight was mainly coal.

Initially, for traffic to and from districts situated along the Rhine and its tributaries, the use of inland shipping was an obvious choice, as the railways were not in direct competition with inland shipping during the first half of the 19th century. Until the 1860s, railways in the region were constructed at right angles to the Rhine, effectively enlarging its hinterland. This mutually advantageous relationship did not last long, as tracks were laid along the Rhine in this decade. By the end of the 1860s, rail freight had surpassed inland shipping in the Rhine basin, and a bitter rivalry ensued. The navigability of the Rhine was being improved by canalization, which was a process that would take until the early 1890s. This resulted not just in increased safety and faster shipping times for Rhine shipping, but also allowed for the use of larger barges. In 1882, of all 228 unpow-pered Rhine barges (the dominant type of transport ship), only two had a

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8 Levainville, *The Economic Function* (1924), 244-245; author’s own calculations.
9 Kaiserliches Statistisches Amt, Statistik der Güterbewegung [1913] (1914); Kaiserliches Statistisches Amt, *Verkehr und Wasserstände* (1916); own calculations. Since domestic ores contained less iron than imported ores, the importance of imports to the total production of iron was far greater than its share would suggest. See, for instance: Levainville, *The Economic Function* (1924), 244.
13 Lülsdorfs, *Die Bedeutung Rotterdams* (1940), 38.
capacity between 1,000 and 1,200 tons, which was the largest available at that time. By the turn of the century, this fleet had increased to 1,289 barges, over 40% of which had a capacity of 1,000 tons or more. Moreover, over the course of two decades, the size of Rhine barges had increased as well, as the largest were now able to carry over 2,500 tons.\footnote{14} The ships that tugged these barges in trains of up to four ships increased in size in terms of their power and fuel efficiency.\footnote{15} Transport costs for both modes of transport fell greatly between 1860 and 1913: German rail tariffs by 55%, Rhine shipping by 82%.\footnote{16} The combination of improved navigability, higher volumes and lower costs caused Rhine traffic to increase by 112% during the 1890s onwards, and by a further 97% between the turn of the century and 1913.\footnote{17} While Rhine shipping remained a relatively minor mode of transport in terms of inland traffic (12% in 1913), its role in foreign trade increased. Indeed, by 1913, both modes of transportation had an equal share of the international transport of the German Rhine economy.

As part of the same transport revolution that led to lower costs for rail and inland waterway transportation, the costs of transcontinental shipping also fell dramatically.\footnote{18} In the 1870s, the influx of cheap grain from North America forced a reaction from the grain and other cereal-growing regions in Western Europe. In the West Netherlands, the focus shifted to labour- and knowledge-intensive horticulture. This led to the widespread use of fertilizers, which were mostly imported from Germany, with the Rhine region exporting potassium salts and the chemical industry producing substantial amounts of artificial fertilizer. The perishability of horticultural products necessitated a market nearby, and as Dutch production of these items far outstripped national demand, this market was largely to be found in the Ruhr industrial region and other German districts of the Rhine economy. The increasing outputs of industry in these German areas were not the only factor responsible for the greater dependence on foreign trade. As employment in industry grew, the population increased, causing a growing need for additional food supplies. According to a German dissertation from the turn of the century, the main hinterland for Dutch exports to Germany, which – apart from horticultural products – consisted mostly of

\footnote{14} Kaiserliches Statistisches Amt, Bestand (1914) 17, author’s own calculations.  
\footnote{15} Klemann/Schenk, Competition in the Rhine Delta (2013), 837.  
\footnote{16} Klemann/Schenk, Competition in the Rhine Delta (2013), 838.  
\footnote{17} Klemann/Schenk, Competition in the Rhine Delta (2013), 837.  
\footnote{18} Klemann/Schenk, Competition in the Rhine Delta (2013), 838.
goods produced by the food industry, was West Germany, in particular the Prussian Rhine province and Westphalia.\textsuperscript{19} The materialization of the international Rhine economy was thus a delicate interplay between the location of raw materials, the emergence of high-volume cheap transport (which forced changes in the agricultural economy), and the needs of a growing population due to the expansion of industry.

The peculiarities of Germany’s trade policy also played their part in creating an economic interdependence between what had, by then, become the constituent parts of an international Rhine economy. German steel was exported at a price that was not only lower than the German market price, but was actually offered below cost. This was an impetus to the Dutch (river) shipbuilding industry, which encompassed 423 wharfs that employed some 18,000 workers just prior to WWI. In contrast, the German Rhine region had only 118 wharfs with just over 1,300 employees. As over 70\% of the barges in the German Rhine fleet were built in the Netherlands, German protectionist policies had actually encouraged further economic interdependence.\textsuperscript{20}

The drop in the cost of ocean-going shipping not only caused Dutch agriculture to change, and so become more dependent on the Rhine economy as the population there expanded, it also provided the industry of the German Rhine economy with a larger market. As foreign trade expanded, the importance of sea ports increased. In order to divert traffic from the Rhine economy to the German North Sea ports at Hamburg, Bremen and Emden, the Prussian \textit{Staatsbahn} introduced the \textit{Staffeltarife} (reducing costs as the transportation distance increased) for rail freight. As the \textit{Staffeltarife} could have reduced the volume of transhipments between inland shipping and the railways, a special \textit{Wasserumschlagstarif} was also put in place. As the lower rates were used for just a few seemingly arbitrary commodities, they did not have a great impact at the time.\textsuperscript{21} Even though the volume of traffic in Hamburg (the largest of the German North Sea ports) was greater than that in Antwerp, its importance to the Rhine econo-

\textsuperscript{19} Stubmann, \textit{Holland und sein deutsches Hinterland} (1901).
\textsuperscript{20} Metz, \textit{Der Rheinschiffbau} (1912).
\textsuperscript{21} Napp-Zinn, \textit{Binnenschifffahrt und Eisenbahn} (1928), 25, 110-111; Walter, \textit{Enige economische beschouwingen} (1951), 104.
my was far less, as its main hinterland was East Germany.\textsuperscript{22} In order of importance, the most crucial ports for the Rhine economy’s traffic by 1913 were Rotterdam, followed at some distance by Antwerp, Hamburg, Bremen and Emden.\textsuperscript{23}

In this and a variety of other ways, Dutch foreign trade and port activities became very dependent on Germany, while Germany in turn increasingly relied on trade with the Dutch and access to the world market through the Port of Rotterdam. Comparable mechanisms caused similar – though seemingly less strong – economic ties for Belgium, Luxembourg and Switzerland to the German Rhine economy. This effectively created a transnational Rhine economy, as is evident from transport statistics for the period. Indeed, by 1913, 83\% of exports and imports routed via the German Rhine region were traffic with the transnational Rhine economy: the Netherlands, Belgium, Luxembourg and Switzerland. At least 90\% of this traffic was actually generated within the German Rhine economy itself.\textsuperscript{24}

\textit{Table 1: The share of the Rhine economy in terms of the total trade of the international Rhine economy with Germany, 1913-1929 (in percentages)}

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Sources: See Table 2; own calculations.

\textsuperscript{22} NL-HaNa, KvK Rotterdam/Secretariaat, 3.17.17.04, inv. nr.1617, Memorandum concerning the interests of the Port of Rotterdam regarding the annexation of German territory; Kaiserliches Statistisches Amt, \textit{Verkehr und Wasserstände} (1916); Kaiserliches Statistisches Reichsamt, Statistik der Güterbewegung [1913] (1914); own calculations.

\textsuperscript{23} Kaiserliches Statistisches Amt, \textit{Verkehr und Wasserstände} (1916); Kaiserliches Statistisches Reichsamt, Statistik der Güterbewegung [1913] (1914); own calculations.

\textsuperscript{24} Kaiserliches Statistisches Amt, \textit{Verkehr und Wasserstände} (1916); Kaiserliches Statistisches Reichsamt, Statistik der Güterbewegung [1913] (1914); own calculations.
The reciprocal ties of the Rhine region’s international partners to the German Rhine economy were even stronger: 90% of Swiss and 96% of Luxembourg transport with Germany was destined for (or came from) the Rhine economy, while for Dutch and Belgian traffic this figure was 98% (Table 1). At this point in time, it was in domestic traffic that the German part of the Rhine economy showed its greatest cohesion: between 88 and 89% of all domestic transport in its district was both generated within and between parts of the region (Table 2).

**Table 2: The cohesion of the German Rhine economy in terms of internal transport and transport with the international Rhine economy, 1913-1929 (in percentage terms)**

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<td>99.4</td>
<td>90.5</td>
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<td>98.1</td>
<td></td>
<td>92.8</td>
<td>95.6</td>
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</tr>
</tbody>
</table>
4. The importance of the Rhine economy to Germany prior to the war

The German Rhine economy was not only strongly integrated, but was also of great importance to the German national economy. Of the 37 districts that constituted Germany, the 11 that made up this region accounted for 49% of all of the country’s domestic traffic. This was mostly due to the volume of transport via train, which was over nine times as high as that of inland shipping.\textsuperscript{25} Contrary to the assumption promoted by its moniker, the German Rhine economy was thus mostly dependent on the railways.

This volume of inland transport was not, however, evenly distributed among its component districts. Starting from the German-Dutch border, the Rhine province (consisting of districts 25 (which encompassed district 28: the ports at Duisburg), 26, and 23 (the Ruhr in the Rhine province) accounted for almost 40% of the region’s traffic. The province of Hessen-Nassau (district 21), situated on the right bank\textsuperscript{26} opposite district 26, accounted for almost 7% of traffic. The next two districts along the river were the Bavarian Pfälz (district 31) on the left bank and Hessen (district 32) on the right bank. Together, they accounted for 5% of the traffic. They

\begin{itemize}
\item \textsuperscript{25} Kaiserliches Statistisches Amt, \textit{Verkehr und Wasserstände} (1916); Kaiserliches Statistisches Reichsamt, Statistik der Güterbewegung [1913] (1914); own calculations.
\item \textsuperscript{26} The left and right banks are relative to an observer looking downstream.
\end{itemize}
did, however, share part of the ports at Mannheim (which functioned as a hub for these regions) and Baden (district 33). These ports (Ludwigshafen in the Bavarian Pfalz, and Mannheim and Rheinau on the right bank of the Rhine in Baden) handled 3% of all domestic traffic. The last two districts along the river before the border with Switzerland, the Alsace (district 30) and Baden (district 33), claimed 6% of the goods transported. The districts in the German Rhine economy that had no direct access to the Rhine (Lorraine, the Saar area and Westphalia, including part of the Ruhr region, respectively districts 29, 27, 24 and 22) each accounted for between 5.4 and 6.2% of transported goods, with the exception being the Westphalian part of the Ruhr (23%). Unfortunately, these districts do not allow for the traditional division into the Lower, Middle and Upper Rhine areas. Nevertheless, the point at which the Pfalz and Hessen meet the more northern districts of Hessen Nassau and the Rhine Province is positioned roughly halfway along the German part of the Rhine and is an acceptable alternative. The northern part of the German Rhine economy can thus be said to have consisted of the Rhine province and Hessen Nassau along the Rhine, with Westphalia (containing part of the Ruhr) located more inland. Together, these northern districts accounted for 75% of all traffic in the German Rhine economy, while by themselves the Ruhr districts accounted for nearly 36%.

Two clusters of ports within the region functioned as a hub for their respective hinterlands: those at and near Duisburg (Duisburg – since 1905, including Ruhrort, Rheinhausen, Homberg, Walsum, Alsum and Schwellgern, with all but the first two dedicated to specific industrial concerns); and the ports at Mannheim (Mannheim, Rheinau and Ludwigshafen). The larger ports at Duisburg-Ruhrort were located on the right bank of the Rhine and functioned primarily as a gateway for the needs of Ruhr industry (and its workers), which was its immediate hinterland. Indeed, over 80% of all incoming traffic came by train from there. Duisburg's outgoing traffic was distributed more evenly, with 39% destined for the Ruhr region, 10% for the Rhine province and Hessen-Nassau, 11% for the Bayerische Pfalz and Hessen, 20% for the ports at Mannheim, and 10% for the Alsace and Baden. As between 97 and 98% of its domestic traffic was with other parts (and generated within the districts) of the Rhine economy, the ports at Duisburg were thus dedicated to this economy (Table 1). In

contrast to the ports at Duisburg, those at Mannheim handled more outside traffic, as is evident from the fact that between 79 and 83% of its traffic was with the rest of the Rhine economy and was generated there as well (Table 1). Most (57%) of all the domestic traffic handled here was received via shipping from the northern districts of the German Rhine economy and sent on as rail freight to the southern districts (31-33, 42%) and outside the Rhine economy to Württemberg (district 35, 17%). The ports at Mannheim therefore functioned as a hub connecting the northern districts of the Rhine economy (especially the Ruhr by way of the ports at Duisburg) to its southern districts and – to a lesser degree – the southeast of Germany.

Important though its share of German domestic traffic may have been, it was in foreign trade that the region's significance to the German economy expressed itself most. On the eve of WWI, 68% of German exports (in weight, not value) were sent through its districts, and at least 93% of these actually originated there. In terms of imports, this share was 66%, with at least 81% of these destined for the German Rhine economy. Of its four international partners, the Netherlands was by far the most important gateway to the rest of the world for the German Rhine economy, with 46% of all traffic. Belgium was a distant second, with almost 21% of traffic, followed by Luxembourg (10%) and Switzerland (6%). The reason for the dominant position of the Netherlands was partly due to the fact that the Port of Rotterdam was 100 kilometres closer to the Ruhr (the economic heart of the Rhine economy) and had direct access to the Rhine, while barges from the Belgian port of Antwerp had to take a tortuous route through a series of canals and locks before reaching a tributary of the Rhine near Dordrecht. More difficult to explain is the fact that, even though the Belgian rail network was far more extensive than that of the Dutch and its connections to the German hinterland were better, Dutch and Belgian rail freight with respect to the German Rhine economy was similar in terms of volume.

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The Post-war Economic Recovery of the German Rhine Economy, 1918-1929.

Table 3: Share of the international Rhine economy in terms of total foreign trade of the German Rhine economy, 1913-1929 (in percentages)

<table>
<thead>
<tr>
<th></th>
<th>1913</th>
<th>1920</th>
<th>1925</th>
<th>1927</th>
<th>1929</th>
</tr>
</thead>
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<td>Saargebiet</td>
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<td>75.8</td>
<td>88.7</td>
<td>92.5</td>
<td>92.2</td>
</tr>
</tbody>
</table>

Sources: See Table 1; own calculations.

5. The post-war recovery of the German Rhine economy

The first post-war years in Germany were characterized by political instability, social troubles, problems with reparation payments and continued high inflation. The Versailles settlement had not only burdened the country with the need to pay reparations, but had also cost it its colonies and about 10% of its population, as well as around 15% of its arable land, some 75% of its iron ore deposits, and significant parts of its other raw materials. This not only affected German production, but also made the country's dependence on the importation of raw materials and foodstuffs much greater. The German Rhine economy changed as well, as the Alsace and Lorraine were returned to France, the towns of Eupen and Malmedy and surrounding areas were turned over to Belgium, and the Saargebiet became a League of Nations mandate to France from 1920 onwards.

29 Statistisches Reichsamt, Statistik des Deutschen Reichs Band 310, 1., 2 (1924); Braun, The German Economy (1990), 33.
Table 4: The post-war recovery of German transport. Indexed, 1913=100.

<table>
<thead>
<tr>
<th>Year</th>
<th>Rail freight</th>
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<th>Rail freight</th>
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Sources: See Table 2; own calculations.

* Corrected for the post-war borders of Germany, per the estimates of the German Statistisches Reichsamt (see text).

** According to the Statistisches Reichsamt, the data for 1922 and 1923 are not entirely reliable, with that for 1923 being especially problematic.

Table 5: The post-war recovery of German transport. Indexed, 1919=100

<table>
<thead>
<tr>
<th>Year</th>
<th>Rhine economy</th>
<th>Rest of Germany</th>
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<th>Rest of Germany</th>
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<td></td>
<td>Rail freight</td>
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<td>100</td>
<td>100</td>
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<td>143</td>
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296
As the losses of territory cut across existing districts in the eastern and northern parts of the country, the pre- and post-war volume of transport cannot be directly compared. The German *Statistisches Reichsamt* did, however, provide an estimate for the total volume of transport in 1913 in Germany via inland shipping and rail freight (including imports, exports and transit traffic) in 1913 for Germany with its post-war borders. Nevertheless, this only allows for a comparison of the effects of the war and the subsequent recovery of all domestic and international inland shipping and rail freight of the German Rhine economy with that of Germany as a whole (Table 4). Other direct comparisons with pre-war Germany are impossible. A close estimate of the pre-war level of transport within the Rhine economy’s post-war boundaries is, however, achievable by deducting the traffic in the Alsace and Lorraine (under the assumption that the traffic in the small area around Eupen and Malmedy was negligible). The *Saargebiet* was a mandate of the League of Nations that applied from 1920 onwards. This was administered by the French, and therefore also needs to be compensated for in subsequent comparisons with the pre-war situation. Accordingly, when post-war losses are taken into account, inland shipping in the German Rhine economy in 1919 had been reduced to 67% and rail freight to 63% of their former levels (Table 4). Despite the more severe effects on post-war rail freight, it made up 90% of transport in the region by the end of the decade, which was the same share it had in 1913.

Using the situation in 1919 as a baseline, the recovery of traffic can be compared to that of the rest of Germany (Table 5). Initially, traffic in the German Rhine economy showed a stronger resurgence than in the rest of the country, but this would soon level off. The amount of traffic outside the Rhine region increased twice as fast from 1921 onwards until the recovery in Germany overall was cut short in January 1923 by the occupation of the Ruhr by French and Belgian forces in response to Germany defaulting on its reparation payments. Production in the Ruhr (and in the in-

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30 *Statistischen Reichsamt, Verkehr* (1926), VIII.
dustries elsewhere that depended on raw or semi-finished materials from the Ruhr industry) came to an almost complete halt due to the ensuing strike. Indeed, compared to the previous year, traffic in the Rhine economy plummeted by 61%, but transport in the rest of Germany suffered much less, with a reduction of only 16%. Inflation, which had been steadily increasing since the war, turned into hyperinflation, further damaging the economy until it was brought under control in November 1923. As the strikes had stopped a few months earlier, the economy started to grow again: while traffic in the rest of Germany remained stable, that in the Rhine economy increased by 55% during 1924. In August of that year, the Dawes Plan, which addressed the problems Germany had in paying reparations, was adopted. This led to the international community regaining faith in Germany’s financial stability, which meant that German companies were now able to acquire both long and short-term loans on the international financial markets to finance expansion or the acquisition of raw materials. In 1925, when the occupation of the Ruhr came to an end, the growth of traffic in the Rhine economy would accelerate even further. Domestic transport in both the Rhine economy and the whole of Germany reached its post-war zenith by 1927, but then declined somewhat (Table 5). Transport in the Rhine region accounted for 45% of all German inland transport by 1929. In 1913, this had been 49%. A direct comparison to the pre-war situation is impossible, however, because although the losses of the German Rhine economy can be compensated for, this is not the case for the rest of Germany’s losses in the north and east.

6. Changes in the structure of the German Rhine economy

Despite the German Rhine economy’s faster recovery, its cohesion had declined substantially by 1920. While 88-89% of its transport had been between (and generated in) the region’s districts before the war, this figure was 82-85% by 1920. Five years later, it had recovered to 84-87%, only to decline again to 83-85% in 1929 (Table 2). An examination of the individual districts reveals that the decline was mostly due to a loosening of the bonds with the Ruhr region in Westphalia, the province of Hessen-Nassau, and the ports at Mannheim (districts 22, 21 and 34). These districts, together with the rest of Westphalia, had been the least integrated in the rest of the region prior to the war.
In 1913, the northern districts had accounted for 87% of all domestic traffic (when corrected for territorial losses, originally 75%). In 1919, their share had diminished to 84%, indicating that domestic transport had shifted somewhat to the south of the region. However, already by 1922 the pre-war level was reached. After a decrease due to the occupation of the Ruhr, by 1927 the share of the northern districts was again 87%, at which level it remained for the remainder of the decade. In spite of the decrease in integration, domestic transport in the Rhine region thus showed remarkable continuity as the economy recovered.

Just why the internal bonds had become less strong is difficult to explain on the basis of the existing data. It may have been that the level in 1913 had been unusually high. Given that there was no significant shift between modes of transport, the only plausible explanation seems to be that the lower level in 1920 was the result of the reduced transport flow, which would have caused a change in the pattern of goods towards the bare necessities for the sustenance of both the population and local industry. The obvious explanation for the lack of recovery of the cohesion of the Rhine economy by 1925 and thereafter would be Germany’s trade policy. Germany was free to formulate its own trade policy from January 1925 onwards, which was previously impossible under the provisions of the Versailles Treaty, and it used its newfound freedom to immediately revise its approach to trade towards a more protectionist outlook. The country’s trade policy became increasingly protectionist from 1927 onwards, because of the crisis in agriculture. Nevertheless, this explanation seems to be contradicted by developments within the international Rhine economy.

7. The international Rhine economy

In 1919, foreign trade routed through the German Rhine economy was at 18% (21% when corrected for the loss of the Alsace and Lorraine) of its level in 1913.

By the summer of that year, following the Treaty of Versailles, the Allied economic blockade of Germany had been lifted and foreign trade had started to recover. The following year, foreign trade showed a strong recovery to 47% of the (corrected) pre-war level. Nevertheless, compared to domestic transport – which was at 72% of the (corrected) pre-war level by then – the recovery of foreign trade lagged considerably behind. The events of 1923 caused foreign trade with the Ruhr to decline to some 5%
of its pre-war level, and there was a fall to 20% for the Rhine economy as a whole. Thereafter, the recovery was fast, and far exceeded the resurgence of domestic transport. The volume of international transport by 1926 was 26% higher than it had been in 1913, and it would reach its post-war nadir in 1929 at a volume that was 31% higher. Even though the volume of both exports and imports increased greatly, this was mostly due to the growth of the latter.

Compared to the rest of Germany, the initial recovery of the region in terms of international transport had been slower. Nevertheless, from 1925 onwards, the rate of recovery of foreign trade through the German Rhine economy would surpass that of the rest of the country. This is also reflected in the increased importance of the region to German foreign trade. In 1913, 67% of all foreign trade had been with – or transhipped in – the German Rhine economy. This share had increased to 77% in 1929 from a low point of 64% in 1920. A notable feature of this increased share in German foreign trade was the growing importance of inland shipping. In 1913, rail freight and inland shipping each transported half of the exports and imports that were routed through the region. The share of inland shipping had increased to 67% by 1929. This increased share in German foreign trade was not, however, accompanied by a full recovery of the cohesion of the German component of the international Rhine economy. In 1920, the minimum share of the German Rhine economy in terms of the imports and exports that were routed through it was 80%. This had increased to 88% by 1929. Compared to the pre-war situation, when this figure had been 90%, the German Rhine economy was somewhat less cohesive, and a slightly larger part of its imports and exports actually originated in (or were destined for) other parts of Germany.

On the other hand, the cohesion of the international Rhine economy seemed to continue to grow. In 1913, of the foreign trade conducted through the German Rhine region, the combined share of Switzerland, Luxembourg, Belgium and the Netherlands was 83%. After a fall to 76% in 1920, this increased to 89% by 1925, and was 92% by 1929 (Table 3). Upon closer examination, however, one sees that this obscures an important shift in the structure of the international Rhine economy: the ‘restoration’ of the pre-war international cohesion was primarily due to the traffic with the Alsace and Lorraine, which had been part of the German empire until 1919, and after 1920 with the Saargebiet. Of the other parts of the international Rhine economy, only traffic with the Netherlands would fully recover and actually surpass the pre-war level (Table 3). In fact, the share
of traffic within the German Rhine economy of the foreign traffic with Germany as a whole fell for all countries in the international Rhine economy (Table 1). This fall was minimal, however, for the Netherlands and Belgium. When considering the actual volume of transport between these countries and the German component of the Rhine economy, only transport with the Netherlands actually increased past its pre-war level. In fact, the increase of transport with the Netherlands was such that it more than offset the fall in traffic with other parts of the Rhine economy.

The stronger ties with the Netherlands were not just limited to the increasingly important Dutch role as a gateway to the rest of the world; the fact was that post-war Germany was a different country from 1913, as it not only had different borders, but also different needs in terms of its foreign trade. In 1913, 28% of German imports had been foodstuffs; this was 42% by 1925, which is where it would remain for the rest of the 1920s. In terms of exports, the share of finished goods increased from 63% to 74% in 1929, mostly at the expense of foodstuffs (which were now needed domestically). Dutch exports to Germany, some 75% of which consisted of foodstuffs, increased and the Netherlands was Germany's third most important supplier by 1929 (it had been in ninth position in 1913). Throughout the 1920s, the Netherlands alternated between first and second position with Great Britain as Germany's premier export market.31

The importance of trade with Germany and of Germany as a hinterland to the Dutch ports (primarily Rotterdam) made a German economic recovery crucial to the Dutch economy. It is in part because of this that the Dutch government granted a substantial and partially revolving line of credit to Germany in 1920 for the purchase of foodstuffs and raw materials.32 Ultimately of more importance was the role of Amsterdam's financial centre. Prior to the war, much of Germany's trade had been financed through the financial centre in London, where many German banks were active. As Germany’s banks were no longer able to operate in the UK post-WWI, they turned to Amsterdam, where they founded daughter companies.33 In combination with Dutch financial institutions, these banks financed a substantial part of Germany's foreign trade. As the German Con-

31 See: Euwe, It is therefore (2012), 164-165. For a complete overview of Germany's changing needs in international trade and its links with the Netherlands, which are both, by necessity, highly condensed here, see Chapter 4.
32 See: Euwe, It is therefore (2012), 102-106, 172-175 for an overview of this credit.
33 Euwe, It is therefore (2012), 90-95.
sul General in Amsterdam informed his superiors in Berlin in a secret report, the guilder in 1920 was 'Germany's gold-backed currency, and after all we are basically returning to the world market under a Dutch flag.' His successor filed a confidential report by February 1924 in which he stated that 'today [it is] the most important foreign base of the German banking world' and a 'centre for the financing of raw materials for the German industry'. When an inventory of the German short-term debt was made at the time of the Stillhalte in 1931, it emerged that Dutch banks and companies were by far the most important financiers of German trade and industry, followed at some distance by the Swiss and British.

In inland shipping, which had become much more important in terms of post-war German exports, the role of the Dutch also became progressively more crucial, as the share of the Rhine shipping of ships under German colours showed a structural decline throughout the 1920s. In 1919, the share of German ships on every stretch of the Rhine had been between 75 and 85%. By 1929, the share on the Upper and Middle Rhine had fallen to 51 and 55%, and to 39% on the Lower Rhine. The German share was almost entirely taken over by ships under Dutch colours. However, far from illustrating a shift from the Dutch to the German Rhine fleet, this was actually the result of an interweaving of both Rhine fleets. This process had already started before the war, when a number of German shipping companies such as Thyssen placed their fleets either in part or in their entirety under the Dutch flag. After the war, the threat of possible confiscation moved some German companies – with the approval of the German government – to place their entire fleet under Dutch colours. Nevertheless, both before and after the war, the main motives were the favourable tax laws, the lower wages and the lower employer contributions in the

35 BArch R 3101/20210 fol. 196-200 Confidential report on the Amsterdam financial market by Prinz Hatzfeldt, Deutsches Generalkonsulat, Amsterdam, to the Auswärtige Amt, Berlin. 27 February 1924.
36 Euwe, Financing Germany (2010); Euwe, It is therefore (2012), 125.
37 Zentral-Kommission für die Rheinschifffahrt, Jahres-Bericht (1920-1934); Statistisches Reichsamt, Statistik des Deutschen Reichs, Verkehr der deutschen Binnenwasserstraßen 1919-1933 (1920-1934); own calculations.
38 Jolmes, Geschichte der Unternehmungen (1960), 63, 84.
39 Most, Seehafenausnahmetarife, Devisenwirtschaft und Rheinschifffahrt (1937), 35.
According to a 1930 report by the *Rheinkommission*, at least 39% of Dutch Rhine barges could be seen as predominantly German-owned.\(^{40}\) The capacity of the Rhine fleet would increase by almost 40% between 1925 and 1931, which was almost entirely due to the expanding Dutch fleet.\(^{41}\) The reason for this expansion was that the Germans had had to cede part of their Rhine fleet to the French and Belgians by way of reparations. These now had to be replaced. The new barges were usually built in the Netherlands and financed by specialist Dutch banks, thus further deepening the already strong Dutch-German economic bonds. Nonetheless, there had been signs of overcapacity even before the war, but this problem now made itself even more felt.\(^{42}\) In contrast to the prices of rail freight, freight prices in Rhine shipping, which was where (apart from large company fleets) a great number of smaller shipping companies were active, were very elastic. The predominance of Rhine shipping in German international transport can therefore, at least in part, be explained by lower prices.

The interweaving of the German and Dutch Rhine fleets, the building in the Netherlands of ships for German companies cloaked as Dutch companies and financed by Dutch banks, and the German direct investment in banking, port installations, and many other parts of Dutch industry caused the emergence of what might best be described as an integrated Dutch-German Rhine transport system.\(^{43}\) While this does not quite explain the diminished cohesion of Switzerland and Luxembourg with the rest of the Rhine economy, it does help to clarify the rapid emergence of the Dutch predominance in the international transport of the region.

In its international traffic, the German Rhine economy initially showed a strong shift towards the southern districts. Whereas in 1913, the northern districts had accounted for 87% of international traffic (when corrected for territorial losses, 72% originally), by 1919 this had fallen to 57%. As the economy recovered, the northern districts would reassert themselves. Throughout the second half of the 1920s, their share was at the pre-war level or even slightly higher. Throughout the second half of the 1920s, be-

\(^{40}\) Lülsdorfs, *Die Bedeutung Rotterdams* (1940), 65.
\(^{41}\) Harms et al., *Die deutsche Rheinschifffahrt* (1930), 196-197.
\(^{42}\) Walter, *Enige economische beschouwingen* (1951), 83.
\(^{43}\) Jolmes, *Geschichte der Unternehmungen* (1960), 82.
\(^{44}\) For a more complete overview of this process, see: Euwe, *It is therefore* (2012), 206-252; Euwe, *The Rhine* (2012).
between 51 and 56% (with a temporary spike in 1926 to 62%) of international transport in the Rhine economy was either destined for, or had its origins in, the greater Ruhr area (districts 22, 23 and 28). In 1919, this had been 27%. Along the northern stretch of the Rhine, the Rhine province accounted for between 27 and 30% throughout the 1920s. For the southern part of the Rhine economy (the Bayerische Pfalz, Hessen, Baden and the ports at Mannheim), the trouble in the first few years had translated into a temporary higher share of international traffic, which grew from 23% in 1920 to 24% in 1923, followed by a decline thereafter. By the end of the decade, it had a 13% share, which was about the same as it had been in 1913 (if one takes into account the loss of the Alsace and Lorraine). Much like they did for inland traffic, the cluster of ports in Mannheim functioned to a significant degree as a gateway between the Rhine economy and its hinterland in Southeast Germany. In relative terms their role therefore decreased as the Rhine economy recovered.

Table 6: The distribution of traffic from Switzerland, Luxembourg, Belgium and the Netherlands in the German Rhine economy in 1913, 1925 and 1929 (in percentage terms)

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<tr>
<td>Saargebiet</td>
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<tr>
<td>Elsass-Lothringen</td>
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<td>67</td>
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<td>Schweiz</td>
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<td>Luxembourg</td>
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<td>Belgien</td>
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<td>Niederlande</td>
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Sources: See Table 2; own calculations.

8. Conclusion

This chapter has examined the structure of transport in the Rhine region, and has argued that a German Rhine economy existed before WWI and
during the interwar period. This consisted of the Rhine riparian districts and the districts that connected to it through tributaries. This is not to say that Rhine shipping was the major factor linking the districts in the region; quite the opposite in fact. In terms of domestic transport, the Rhine economy was mostly dependent on the railways, which had over nine times the volume of shipping. The high degree of the economic integration of the region is illustrated by the fact that in 1913, 88 to 89% of the transport volume (not value) in the region was generated there and occurred between its different parts.

The region was not only highly integrated, but also more important to the German economy than its size would indicate. In 1913, its 11 districts (of 37 in Germany) were responsible for 49% of all domestic transport. Three quarters of this transport was accounted for by the northern half of the region, where the Ruhr industrial area alone was responsible for at least 36% of all the transport within the region.

Once the initial post-war troubles had been overcome, the recovery of domestic transport was rapid and, by 1925, surpassed that of the rest of Germany. Nevertheless, because transport had decreased more than it had in the rest of the country, by the end of the decade – and just prior to a new economic crisis – it would only be at roughly the same volume as in 1913 (once corrected for the loss of the Saargebiet and the Alsace and Lorraine). At that point in time, the districts of the Rhine region were responsible for 45% of all German domestic transport, which suggests that domestic traffic in the rest of Germany had recovered more fully.

Even though, initially, the level of integration of the region seemed to recover, a decline set in by the second half of the 1920s. Indeed, by 1929, the overall level of economic integration had dropped to 83-85% from 88-89% in 1913. Just about every district of the Rhine economy had become somewhat less integrated, but especially the Ruhr area in Westphalia, the province of Hessen-Nassau and the ports at Mannheim had seen their share of traffic outside the Rhine economy grow. In spite of this decrease in integration, once the economy recovered, the basic structure of the German Rhine economy showed remarkable continuity.

It was in Germany's foreign trade that the Rhine economy's importance manifested itself the strongest. In 1913, 67% of this trade was conducted via the Rhine economy, and at least 90% of this trade actually originated within, or was destined for, the German Rhine economy. By the end of the 1920s, the share of the German Rhine economy in Germany's foreign trade had increased by 10%. Its importance to Germany had, however,
grown even more than these figures indicate, as the growth had been pre-
dominantly in exports. By 1929, 85% of all exports were sent through the
Rhine economy, whereas in 1913 this had been 68% (in both cases with at
least 90% originating there).

In contrast to the situation in domestic traffic, where it seems that the
German districts of the Rhine economy were slightly better integrated into
the greater German economy at the cost of losing internal cohesion, the
solidity of the international Rhine economy seemed to continue to in-
crease. In 1913, 83% of the foreign trade conducted through the German
Rhine economy had been with other countries in the transnational Rhine
economy, from where a significant part was then sent on to the rest of the
world. Despite German efforts to direct more traffic to their own North
Sea ports, the Dutch and Belgian ports were the Rhine economy's gateway
to the rest of the world. In spite of renewed efforts after the war to redirect
this traffic to German ports, over 92% of foreign trade was now with the
rest of the transnational Rhine economy by 1929. Nevertheless, it should
be noted that this apparent increase in integration masks the fact that this
was largely because the Saargebiet and the Alsace and Lorraine were now
either under the League of Nations (i.e., French) control or part of France.
In fact, the share of Switzerland, Luxembourg and Belgium in terms of
traffic with the German districts of the Rhine economy fell significantly;
only the Dutch share increased from 46% in 1913 to over 56% of all inter-
national traffic through the German Rhine economy by the end of the
1920s. Nevertheless, these links remained strong and they were mirrored
in the importance of the region in terms of the traffic of these four coun-
tries with Germany. The German Rhine economy's share of these coun-
tries' traffic with Germany, which had been 90% for Switzerland and
significantly higher for the other three countries before the war, also fell,
although this was limited in the case of the Netherlands and Belgium. The
overall picture that in some aspects showed greater cohesion, while also
showing signs of a decrease in this respect. This process was accompanied
by an increased interweaving of the Dutch and German economies.

The bonds between the partners in the Rhine economy were therefore
strong before the war and remained so thereafter, both in domestic and in-
ternational traffic. They also show a number of interesting shifts that were
the result of territorial changes and the financial-economic consequences
of the war. Nevertheless, the approach used here is too limited for any fur-
ther research; a more detailed database is required – incorporating the
most important commodities and their variations – so that the nature of
these bonds can be assessed. This would also provide more insight into the effects of the increasingly protectionist German trade policy. Furthermore, such a detailed database would enable a gravity model to be used, which would in turn allow for an interesting examination of border effects. This approach would not only provide a much-needed benchmark for economic integration, but would also greatly increase our understanding of the structure of the economic bonds in the transnational Rhine economy. As this exploratory essay shows, the results would be both very interesting and integral to a proper understanding of Germany's post-war economic recovery.

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Maritime Gateways and Barge Connectivity: Container Barge Transport on the Rhine

Theo Notteboom

Abstract: The Rhine, with its tributary rivers, is by far the most important inland waterway system in Europe. This chapter deals with the historical and current relationships between the Rhine and the gateway ports in the Rhine-Scheldt delta. The focus is on the inland waterway transport of containerized cargo. After a conceptual discussion on port systems and barge networks, a detailed historical analysis of barge connectivity between the sea port system and the Rhine basin is provided. The recent stagnation in barge volume growth on the Rhine has shifted the focus of market players to the improvement of the logistics quality of barge connectivity. The chapter concludes with a plea for the development of a transnational logistics strategy for the Rhine basin in which barge transport has a key role to play.

1. Introduction: profile of the Rhine basin and the Rhine-Scheldt delta

The Rhine basin is the most important inland waterway system in Europe. The Rhine economy and the ports of the Rhine-Scheldt delta at the mouth of the Rhine River share a long history of mutual dependence and reinforcement. The regions of the Rhine basin are among the most important economic centres in Europe, and North Rhine Westphalia is one of the continent’s strongest industrial regions. Once the centre of Germany’s heavy industry, the state has successfully undergone a structural transformation into an innovative business location.¹ The region now houses leading companies in growth sectors such as logistics, nanotechnology, environmental economics and energy. While the direct influence of the Rhine only covers 5.3% of the land area of the EU28, the region houses nearly

¹ See, for example: Jochimsen, The regionalisation (1992).
15% of the total population of the EU28 and generates an elevated 18.6% of its GDP (based on Eurostat statistics).

The main ports in the Rhine-Scheldt delta, i.e. Rotterdam in the Netherlands and Antwerp in Belgium, are the two most important sea ports in Europe in terms of total cargo throughput, handling respectively 466 million tons and 208 million tons of cargo in 2015. Rotterdam, Antwerp and Zeebrugge are also major container ports (respectively number one, two and 15 in Europe in 2015), while the other ports in the delta, Ostend, Ghent, Zeeland Seaports and Amsterdam, all play a modest role in containerized transport. With a total maritime container throughput of about 23.5 million TEU in 2015, the delta is among the busiest container regions in the world and is the most important multi-port gateway area in Europe.\(^2\)

One of every 25 maritime containers handled worldwide is being managed in the ports of the Rhine-Scheldt delta. Indeed, about a quarter of all the containers handled in Europe’s ports pass through one of the delta ports.

Rotterdam is often denoted as a port for Germany, in particular servicing the German Rhine states. The Port of Antwerp has always had a strong connection with hinterland regions along the middle and upper sections of the Rhine in France, Germany and Switzerland. Inland barge transport constitutes a key component when it comes to understanding the history and current position of the Rhine states and the large sea ports in the Rhine-Scheldt delta region (see Figure 1).

\(^2\) For a more detailed analysis, also see: Notteboom, *Concentration and the formation* (2010).
Figure 1: Map of the gateway ports in the Rhine-Scheldt delta and the main inland nodes in the Rhine basin

By guaranteeing large-scale and cost-efficient access between the inland centres and gateway ports, inland waterway transport has greatly facilitat-
ed the Rhine economy in terms of strengthening its key position in Europe and the rest of the world. Ever since the start of the containerization process, barge transport has contributed to shaping efficient logistics and supply chain practices in the Rhine economy through a specific geographical and organizational logistics system of gateways, corridors and inland nodes.

This chapter deals with the historical and present relationships between the Rhine economy regions and the gateway ports in the Rhine-Scheldt delta. The focus is on the inland waterway transport of containerized cargo. The first section presents a conceptual discussion of port systems and barge networks. Next, the history of barge connectivity between the main ports of the Rhine-Scheldt delta and the Rhine basin is analyzed in detail. This section is followed by an analysis of the logistics quality of barge connectivity against the backdrop of the recent stagnation in barge volume growth on the Rhine. The conclusions provide a link between inland waterway transport on the Rhine and the need for a transnational logistics strategy for the Rhine basin.

2. Conceptual notes on barge networks and gateway ports

The competitive position of a gateway port largely depends on the inland network that connects it to the economic centres in its immediate and more distant hinterland. A gateway port is a node where intercontinental transport flows are transhipped onto continental areas and vice versa.\(^3\) Often, there is more than one gateway providing access to a specific region. A multi-port gateway region is defined as a port system with an obvious gateway function.\(^4\)

The potential role and spatial configuration of a container barge network is strongly entwined with the availability and navigability of the inland waterways and canals, the cargo dispersion patterns along the waterway system and the distances between the gateway ports and the economic centres in the hinterland. Notteboom (2001), Notteboom and Konings (2004) and Frémont et al. (2009) have presented theoretical models on the

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spatial and functional development of barge networks in relation to sea port systems. Notteboom (2001) distinguishes four phases in the spatial development of an inland network, with his model describing how freight corridors allow larger ports to penetrate the hinterland. Smaller ports tend to channel some of their container traffic to the larger ports in order to benefit from their extensive hinterland network, leading to a hub-feeder hierarchy. The model also discusses the formation of inland hubs in more distant hinterlands. Notteboom and Konings (2004) describe a spatial model of the evolution of a hypothetical container barge network. The model distinguishes four separate phases, each with specific spatial features in terms of growth, concentration and the dispersion of inland container terminals in the network in connection to the development of a port system. Frémont et al. (2009) extend this model further by integrating the interdependence between the setting up of combined waterway-road services, and the competition between ports and between shipping lines.

The development of bargeing networks out of gateway ports is subject to market-related and operational considerations. Inland barge networks have to meet the growing demand in global supply chains in terms of frequency, direct accessibility and transit times. The demand side thus exerts strong pressure on the service schedules. Barge operators, however, have to design services and networks that allow them to optimize the use of equipment and benefit most from scale economies in vessel sizes. Figure 2 provides a schematic overview of the typical evolution of a barge network based on the total barge volumes in the river basin and the average frequencies (per week) of the barge services connecting the gateway ports with the inland centres. The presented generic phases take into account the ideas captured in the spatial models discussed above and the results of a number of empirical studies on barge network development in Northern Europe.

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8 Frémont et al., *Inland barge services* (2009).
The development pattern of a barging network is strongly entwined with the development of the associated sea port system. A certain level of traffic concentration in a limited number of sea ports is beneficial to a cycle of modal shifts from road haulage to high-volume transport modes such as barge transport. Figure 3 links concentration levels in gateway port systems to the level of cargo dispersion in the hinterland. River systems typically have a tree-like structure with limited or no lateral connections between the different branches. Moreover, the vessel capacity that can be deployed (and consequently the service network that can be used) is restricted and not homogeneous due to varying draft limitations and other physical conditions in various parts of the river system. These elements favour the use of line-bundling services, with each rotation connecting a gateway port or an inland hub to a number of inland terminals per navigation area (respectively, cases D and C in Figure 3). A network design based on the hub-and-spoke concept, and centred around an inland hub close to a sea port(s), provides a solution in cases of high cargo concentration in a few inland centres combined with a high level of traffic dispersion in the multi-port gateway region (case A). Frequent end-to-end barge services are preferred in cases of elevated cargo concentration levels in the port system and the hinterland (case B). A sea port with a strong local cargo base will, sooner or later, be tempted to increase the inland penetration of its intermodal hinterland network by expanding its capture area towards tributary
rivers and other navigation areas outside the main artery or core network (see also phase 5 in Figure 2).

The next section provides a historical overview of container barge transport in the Rhine basin. The observations will be linked to the conceptual ideas presented in figures 2 and 3.

**Figure 3: A typology of possible barge network configurations**

Source: Own compilation.
The history of barge connectivity between the Rhine-Scheldt delta and the Rhine basin

3.1 The pioneering years: container barge transport as an oddity

The launch of the first container ship, the Ideal X by US-based Malcolm McLean in 1956, can be regarded as the start of the container era. The first transatlantic container service between the US East coast and Northern Europe in 1966 marked the start of long distance containerized trade. The first specialist cellular container ships were delivered in 1968, and the containerization process soon expanded over maritime and inland freight transport systems. Container shipping developed rapidly due to: the adoption of standard container sizes in the mid 1960s, the awareness of industry players of the advantages and cost savings resulting from faster vessel turnaround times in ports, and the integration with inland transport modes such as trucks, barges and trains.

The ports of Antwerp and Rotterdam were among the first European ports to engage in large-scale containerization. In 1966, the year when the first container ship called at the Port of Rotterdam, the port handled about 60,000 TEU. The Port of Antwerp, meanwhile, recorded a total throughput of 43,820 TEU in the same year. Containerization in Rotterdam increased to about one million TEU in 1971, with Antwerp achieving one million units seven years later. The first containers in Rotterdam were handled by the company Quick Dispatch. The founding of Europe Combined Terminals (ECT) in 1966 proved to be crucial for the development of a specialist container stevedoring business in Rotterdam. In 1967, ECT opened the first full container terminal in the Eemhaven port area. Three years later, a dedicated terminal for Sea-Land was inaugurated in the Prins Willem Alexander Port area (Rotterdam Port Authority, 1996 and Van Driel, 1990).

In the late 1960s, the stevedoring company ‘Gylsen, Hessenatie, Noord Natie, Müller-Thomson Antwerp and Antwerps Havenbedrijf Pays’ developed container operations in the Port of Antwerp along the Leopold and Churchill docks (built in the framework of a 10 year expansion pro-

10 Rodrigue and Notteboom, 2009a; Rodrigue and Notteboom, 2009b; Levinson, The box (2006).
11 Rotterdam Port Authority, Container yearbook (1996); Van Driel, Samenwerking (1990).
gramme, 1956-1967). At the end of 1967, Hessenatie-Neptunus was the first operator to start container operations at the new Churchill dock. Some argued that the container capacity created at the end of the 1960s was far too large (Coppieters, 1968), but history proved that demand would soon outgrow the capacity of the Churchill dock.

Inland waterway transport played a very modest role in the initial stages of containerization. In 1968, only a few years after the introduction of the container to Europe, a first barge terminal for handling them was set up in Mannheim (Lower Rhine). This was followed shortly afterwards by specialist terminals in Strasbourg and Basel (Upper Rhine). These infancy years did not, however, bring scheduled dedicated barge container services to the Rhine. Pioneers in barge container transport such as Koeningsfeld and NRM (Nieuwe Rijnvaart Maatschappij) carried small containerized volumes at irregular intervals on conventional barges to conventional transhipment points on the Upper (Basel and Strasbourg) and Middle Rhine (Mannheim and Karlsruhe). This phase corresponds to the first phase in Figure 2. The services primarily grouped empty containers in the immediate vicinity of the users. Barge operators only offered a ‘sea port to inland port’ service, excluding pre- and end-hauling by truck. The lack of door-to-door services and the irregularity of the sailings made barge transport unattractive to deep sea carriers and shippers. As a result, total barge volumes on the Rhine remained small at 1,525 TEU in 1970 and 10,700 TEU in 1975. The joint maritime container throughput handled in the three container ports of the Rhine-Scheldt delta (Rotterdam, Antwerp and Zeebrugge) evolved from 645,510 to 1.52 million TEU in the same period.

3.2 The first expansion wave: focus on the Middle and Upper Rhine

Containerization in Northwest Europe grew rapidly at the end of the 1970s. In 1980, container throughput in Rotterdam approached two million TEU, which was a traffic level that Antwerp would only achieve in 1993. The sustained growth of container throughput in Rotterdam soon led to the idea of constructing massive container facilities on the Maasvlakte, which was an area reclaimed from the sea. The construction of the

12 Coppieters, Konventionelle Schiffslegeplätze (1968).
Maasvlakte extended the total area of the Port of Rotterdam by 3,000 hectares to 10,000 hectares. The first container terminal on the Maasvlakte, which is now the Delta Multi-User terminal (DMU), welcomed a first container vessel in September 1984. The Maasvlakte terminals handled 0.6 million TEU in 1988, which amounted to approximately 18% of the total container throughput in Rotterdam.

The completion of the Delwaide dock in 1982 gave a real impetus to strong growth in the Antwerp container business. Terminal depths along the dock reached 600 metres compared to just 300 metres for the older facilities. Mergers and acquisitions characterized the Antwerp stevedoring business at the end of the 1980s. The most important transaction was the take-over of Hessenatie by Compagnie Maritime Belge (CMB) in 1988 and the integration of the stevedoring company Gylsen in Hessenatie.

Barge services started to play a more prominent role in the late 1970s. Annual transport volumes on the Rhine expanded from 10,700 TEU in 1975 to 311,146 TEU in 1986. Rotterdam’s container throughput reached 2.87 million TEU in 1986, of which 397,000 TEU was already being transported by barge. The Port of Antwerp recorded a maritime container volume of 1.31 million TEU in the same year and a barge volume of 157,300 TEU. Inter-port container exchanges by barge between Antwerp and Rotterdam amounted to 120,000 TEU in 1986.

Rotterdam is blessed with a central location at the mouth of the River Rhine. The Port of Antwerp realized an excellent direct connection to the Rhine through the completion of the Scheldt Rhine Canal in 1976 after nine years of construction (see indication on Figure 1). The 32 kilometre high-capacity barge connection (including sets of locks) meant that Antwerp and Rotterdam were now almost equidistant from the Rhine.

The introduction of scheduled liner services by barge proved to be instrumental in the success of inland waterway transport. Barge operators started to divide the Rhine into three navigation stretches, namely the Lower Rhine (as far as Cologne/Bonn – only a limited number of services at that time), the Middle Rhine (from Bonn up to Karlsruhe) and the Upper Rhine (from Karlsruhe up to Basel in Switzerland). Fixed departure schedules ensured regular container services between Antwerp and Rotterdam and a limited set of ports of call in each of the navigation areas. The configuration of the barge services thus followed case D in Figure 3. Once punctuality could be guaranteed, with exceptions only occurring where there were problems with water levels, barge transport quickly gained in competitiveness. CCS (48% of the barge container market in 1985),
Rhinecontainer (31%) and Frankenbach (12%) dominated the market. The observed strong growth in inland waterway transport coincided with major investments in container terminals along the Rhine. Indeed, about 20 dedicated barge terminals were opened along the Rhine in the period 1980-1987,\textsuperscript{14} with most terminal initiatives developed along the Upper and Middle Rhine.

3.3 \textit{The second expansion wave: strong downstream development and organizational dynamics}

In the period between the late 1980s and the end of the 1990s, barge terminal initiatives further expanded downstream towards the lower section of the Rhine, as barge operators succeeded in making the inland waterway option competitive with road transport over distances of less than 500 kilometres. At the same time, terminal operators started to look for interconnections with rail transport and terminals gradually began to develop in other navigation areas and Rhine tributaries. Operators expanded and optimized their liner service networks on the Rhine by means of operational agreements and the further development of line bundling services to each of the threenavigation areas on the Rhine, complemented by a limited number of direct end-to-end shuttles. Existing barge carriers started to operate joint liner services on the Lower Rhine, Upper Rhine and Danube rivers in order to raise the level of service and prevent destructive competition. The operational agreements were characterized by a limited degree of central planning and the commitment of barge units, with each of the participating parties maintaining its own commercial identity and freedom. Examples are the ‘Fahrgemeinschaft Oberrhein’ (Upper Rhine transport collective) and the ‘Fahrgemeinschaft Niederrhein’ (Lower Rhine transport collective). CCS, Rhinecontainer, Haniel and Haeger & Schmidt set up ‘Fahrgemeinschaft Niederrhein’ (Lower Rhine transport collective) at the start of 1992 to tackle the problem of low load factors and heavy losses in the industry. By setting up collaborations in capacity, the load factor was soon above 60% and the carriers were back in the black (Van Driel, 1993, Konings, 1999 and Boer, 1999).\textsuperscript{15} This was not achieved at the cost

\textsuperscript{14} Notteboom/Konings, \textit{Network dynamics} (2004).
\textsuperscript{15} Van Driel, \textit{Kooperation} (1993); Konings, \textit{Container-Binnenschiffahrt} (1999); Boer, \textit{Binnenhavens} (1999).
of quality, as the partners streamlined their sailing schedules in order to offer a high frequency of departures from the sea ports to the Lower Rhine.

The volumes carried on the Rhine increased from 311,146 TEU in 1986 to 1.084 million TEU in 1999. In Antwerp, containerized barge traffic evolved from 128,700 TEU in 1985 to 1.3 million TEU in 1999, and in Rotterdam from 225,000 TEU to 1.5 million TEU. Inter-port barge traffic between Rotterdam and Antwerp reached 647,000 TEU in 1999. In the same period, the gateway ports of Rotterdam and Antwerp recorded ever larger maritime flows of containerized cargo: respectively, 6.34 million and 3.61 million TEU in 1999. A fully automated and dedicated Delta Sea-Land terminal (DSL), later renamed DDN (Delta Dedicated North), opened its doors in Rotterdam in 1993. The Maasvlakte terminals handled 3.5 million TEU in 1999 or approximately 55% of Rotterdam’s container throughput. In Antwerp, the decision was made to start constructing container capacity along the River Scheldt in front of the sea locks, allowing considerable savings in the port turnaround time of container vessels. The first Scheldt terminal, the Europe Terminal, started operations in 1990, with the second terminal, the North Sea Terminal, welcoming the first vessel in 1997.

3.4 The new millennium: Is the Rhine basin reaching a maturity phase?

The new millennium brought strong growth in maritime container volumes, partly as a result of the ‘China effect’ in the world economy. Total container traffic in the main ports of the Rhine-Scheldt delta doubled in the period 1999-2008 from 10.8 million to about 22.2 million TEU. The start of the economic crisis resulted in a sharp fall of container throughput to 19.7 million TEU in 2009, but volumes were back at pre-crisis levels by 2013. The Port of Antwerp opened a new tidal container dock on the left bank of the River Scheldt in late 2005. The new dock has a capacity of approximately nine million TEU alongside five kilometres of quay wall and an area of some 230 hectares. The Port of Rotterdam welcomed the opening of the Euromax terminal in 2008, with an initial capacity of 2.4 million TEU that was expandable to over five million. The port also developed ambitious infrastructure plans to enable further container growth, i.e. a second Maasvlakte, a part of which is to be dedicated to the container business. The construction works on the breakwaters started in late 2008 and the first two container terminals opened in late 2015. The invest-
ment needs associated with the major expansion plans led to an influx of global terminal operators. This process started in the late 1990s and resulted in the presence of the Singapore-based PSA in Antwerp and Zeebrugge, the Hong Kong-based Hutchison Port Holding in Rotterdam, Danish APM Terminals in Rotterdam and Zeebrugge, and the Dubai-based DP World in Antwerp and Rotterdam (Notteboom, 2009b).16

The volume surge also led to a wave of investments in inland container terminals. New terminals are, however, now mainly constructed in Northern France, the Netherlands and Belgium, while the Rhine basin relies primarily on the extension of existing terminals. The Benelux countries and Northern France now have over 40 container barge terminals (excluding those in sea port areas). In 1991, there was still no terminal network on the north-south axis (only two terminals), while the Rhine basin already had 25 container terminals. A noteworthy feature of this development is that some of the new terminals are located a short distance from the sea ports (even less than 50 kilometres). The growth of the terminal network has been partly initiated by financial incentives given by local, regional or national authorities, with government subsidies sometimes encouraging the emergence of less viable terminal initiatives. Konings (2004) discusses the technical and logistics innovations that provide interesting opportunities for the development of container barge transport on small waterways.

The number of terminals in the Rhine basin is still increasing, albeit at a much slower rate than in the 1980s and 1990s. Many new terminals have appeared along the Rhine tributaries, and German inland terminals in particular are emphasizing the trimodal nature of the facilities on offer by seeking connections to the Kombinierten Ladungsverkehr (KLV) network operated by Deutsche Bahn. Emmerich, Neuss, Mainz, Mannheim, Cologne, Duisburg and Dortmund are among the inland ports trying to combine their leading role in barge transport with a hub function in international intermodal rail networks. In most of them, however, there is still no combined barge/rail transport to speak of: the transit volumes between barge and rail on most of the Rhine terminals are still very low.

After a period of decentralization in the Rhine basin, the large container carriers followed a strategy aimed at concentrating river freight volumes in a limited number of freight terminals. The resulting rationalization in the number of Rhine terminals (in particular on the Lower and Middle

16 Notteboom, Complementarity (2009b).
Rhine opened up the possibility of larger barges being introduced, such as the sister ships Jowi and Amistade, which are motorized barges with a slot capacity of 398 TEU. The available volumes allow high frequencies in the line-bundling services out of Antwerp and Rotterdam using motorized barges, tandem barges and pushing convoys with capacities ranging between 100 and 600 TEU. Outside the Rhine basin and the Antwerp-Rotterdam link, much smaller barges are used, not only because of the limited width of many waterways (e.g. the Lys River and Upper Scheldt), but also because of the need for greater flexibility and shorter port turnaround times. These last two elements are crucial to the success of barge container transport over short distances.

Table 1: Container traffic of a selection of Rhine ports (barge only) – in TEU

<table>
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<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Düsseldorf</td>
<td>63,923</td>
<td>96,990</td>
<td>226,000</td>
<td>362,000</td>
<td>369,000</td>
<td>348,000</td>
<td>152</td>
<td>1,096</td>
<td>-6%</td>
<td>-1%</td>
<td>-1%</td>
<td>-1%</td>
</tr>
<tr>
<td>Emscher</td>
<td>12,256</td>
<td>35,143</td>
<td>58,000</td>
<td>68,000</td>
<td>75,573</td>
<td>68,610</td>
<td>10%</td>
<td>14%</td>
<td>26%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neckar</td>
<td>27,045</td>
<td>89,192</td>
<td>193,473</td>
<td>127,000</td>
<td>107,391</td>
<td>76,207</td>
<td>28%</td>
<td>-44%</td>
<td>-34%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aachen</td>
<td>137,133</td>
<td>5,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0%</td>
<td>-30%</td>
<td>-27%</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Frankfurt</td>
<td>40,000</td>
<td>29,240</td>
<td>37,652</td>
<td>27,585</td>
<td>24,258</td>
<td>-18%</td>
<td>36%</td>
<td>27%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gesves</td>
<td>25,035</td>
<td>50,075</td>
<td>43,500</td>
<td>42,600</td>
<td>65,000</td>
<td>65%</td>
<td>16%</td>
<td>12%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Koblenc</td>
<td>36,056</td>
<td>46,015</td>
<td>42,040</td>
<td>54,140</td>
<td>52%</td>
<td>17%</td>
<td>9%</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Ludwigshafen</td>
<td>45,000</td>
<td>52,401</td>
<td>63,621</td>
<td>58,757</td>
<td>52%</td>
<td>20%</td>
<td>17%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mannheim</td>
<td>44,233</td>
<td>67,900</td>
<td>87,212</td>
<td>133,598</td>
<td>125,600</td>
<td>95,516</td>
<td>10%</td>
<td>26%</td>
<td>7%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stuttgart</td>
<td>22,000</td>
<td>23,310</td>
<td>29,533</td>
<td>33,568</td>
<td>25,607</td>
<td>11%</td>
<td>13%</td>
<td>54%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Würzburg</td>
<td>65,000</td>
<td>112,140</td>
<td>112,767</td>
<td>154,239</td>
<td>150,000</td>
<td>50%</td>
<td>17%</td>
<td>14%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bonn</td>
<td>34,148</td>
<td>64,027</td>
<td>71,360</td>
<td>83,934</td>
<td>82,464</td>
<td>78,788</td>
<td>6%</td>
<td>2%</td>
<td>9%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kiel</td>
<td>600</td>
<td>9,100</td>
<td>8,729</td>
<td>9,582</td>
<td>14,959</td>
<td>65%</td>
<td>72%</td>
<td>10%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Westfalen</td>
<td>19,093</td>
<td>26,463</td>
<td>18,954</td>
<td>16,011</td>
<td>14%</td>
<td>-10%</td>
<td>-7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offenbach</td>
<td>12,000</td>
<td>35,768</td>
<td>53,295</td>
<td>84,810</td>
<td>52,881</td>
<td>43%</td>
<td>-12%</td>
<td>-25%</td>
<td>-30%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strasbourg</td>
<td>10,240</td>
<td>34,435</td>
<td>66,468</td>
<td>76,906</td>
<td>74,845</td>
<td>84,000</td>
<td>26%</td>
<td>17%</td>
<td>6%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>548,103</td>
<td>1,419,427</td>
<td>1,385,291</td>
<td>1,239,143</td>
<td>32%</td>
<td>-17%</td>
<td>-8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Own compilation based on data concerning individual terminals and various issues of Schiffahrt, Hafen, Bahn und Technik.

The Rhine remains by far the most important corridor, notwithstanding rising volumes in the other navigation areas and on the Antwerp-Rotterdam link. The barge volumes on the Rhine increased from 1.084 million TEU in 1999 to about two million in 2013. The Middle Rhine accounts for nearly half of the total container volumes on the Rhine. Rotterdam has a strong position in relation to barge traffic from/to the Lower Rhine and Middle Rhine, whereas Antwerp and Rotterdam are equally strong on the Upper Rhine. Up to the year 2005, the Rhine volumes showed a growth trend that is similar to the total growth in barge traffic in the ports of Antwerp and Rotterdam. Since 2005, Rhine traffic has remained at the same level, while the two load centres recorded further growth in inland
waterway volumes, confirming the rise of barge transportation outside the Rhine basin to inland terminals in the Benelux countries and Northern France. Table 1 confirms that, for a sample of inland ports, barge volumes on the Rhine are indeed showing signs of stagnation: average growth between 2000 and 2009 reached a modest 30%, while most terminals recorded a negative growth figure between 2005 and 2008/2009. The shipment of containerized goods on the Rhine is reaching a maturity phase where improvements in the system are of a more qualitative nature than in volume terms (see also, phase 6 in Figure 2).

Rotterdam and Antwerp together accounted for around 92% of barge container transport to and from the European port system in 2013, compared to 96.2% in 2003. The modal split data for 2008 show a market share of barges in relation to land container transport of 32.4% for Antwerp and 30.2% for Rotterdam (Figure 4). Antwerp and Rotterdam achieved promising modal shifts in the 1990s and early 2000s. The last couple of years, however, have brought no further market share increases for inland waterway transport. Table 2 demonstrates that the share of inland waterway transport in the modal split of the two main ports with respect to some Rhine regions reaches more than 50% in many cases.

Barge container transport as yet plays a modest but growing role in other load centres around Europe. Le Havre handled 145,000 TEU of barge traffic in 2008 in relation to the Paris region. In 2013, the barge volume of Le Havre reached 183,000 TEU. Hamburg, meanwhile, is slowly developing barge services on the Elbe, with 119,000 TEU in 2008 and 108,000 in 2013 compared to only 10,000 in 2000. The Marseilles-Lyon route (Rhône-Saône) in Southern France for its part accounted for about 85,000 TEU in 2008 and 78,500 TEU in 2013 compared to only 2,800 in 1999 (Figure 6). Frémont et al. (2009) discuss the development of barge transport in the French ports of Le Havre and Marseille. They argue that observed growth is explained by the growth in maritime traffic, the deficiencies of rail in France, the emergence of combined transport operators, the direct involvement of a few shipping lines (e.g. CMA CGM) and the strong incentives given by public authorities.
The modal split for inland container transport in Rotterdam (left) and Antwerp (right)

Figure 4: The modal split for inland container transport in Rotterdam (left) and Antwerp (right)

Source: Based on the statistics of the Antwerp Port Authority and the Rotterdam Port Authority.

Table 2: Modal split in relation to some economic regions under the influence of the Rhine economy – figures for 2001 (based on container volumes in TEU)

<table>
<thead>
<tr>
<th>Economic Region</th>
<th>Port of Antwerp</th>
<th>Port of Rotterdam</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Road</td>
<td>Rail</td>
</tr>
<tr>
<td>Belgium</td>
<td>82%</td>
<td>14%</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>28%</td>
<td>12%</td>
</tr>
<tr>
<td>Germany - Baden-Württemberg</td>
<td>13%</td>
<td>0%</td>
</tr>
<tr>
<td>Germany - Rheinland-Pfalz</td>
<td>43%</td>
<td>0%</td>
</tr>
<tr>
<td>Germany - Nordrhein-Westfalen</td>
<td>51%</td>
<td>3%</td>
</tr>
<tr>
<td>Germany - Hessen</td>
<td>19%</td>
<td>0%</td>
</tr>
<tr>
<td>France - North East</td>
<td>82%</td>
<td>8%</td>
</tr>
</tbody>
</table>


4. Improved logistics quality in barge connectivity

The previous section revealed that total barge volumes on the Rhine are slowly reaching a maturity phase. This observation might point to a transition from a period characterized by strong growth and terminal network expansion (phases 4 and 5 in Figure 2) to one of a more qualitative improvement in the barging system (phase 6 in Figure 2). This section discusses the organizational and logistical transformations that are taking place in barge connectivity between the Rhine-Scheldt delta and the Rhine economy.
4.1 Improved synchronization in the logistics system

Gateway ports and inland waterway transportation have been affected by the need for zero-error systems of transfer that are imposed by the rise of lean manufacturing techniques and just-in-time stock policies (JIT). The pressure to minimize delays and improve synchronization called for increased cooperation and coordination among players active in supply chains.

The intense pressure on the reliability of the sailing schedules of Rhine operators is an example of the need for coordination. At the core of the problem lies the lack of transparency on barge flows in sea port areas. As a result, relevant parties in both Rotterdam and Antwerp are brought together by the port authorities to enable them to obtain a better insight into the barge-related flows moving in the respective ports. The ultimate aims are to: 1) give advice to barge operators through existing barge traffic systems on the optimal terminal loading sequence, and 2) create a good market environment for the bundling of small batches of containers, so that the average call size of barges increases. In some cases, barge or inland terminal operators have taken matters into their own hands.

4.2 Market consolidation and vertical integration

The call for cooperation and coordination is materializing against the backdrop of large-scale consolidation and vertical integration in the logistics industry. Through a vertical and horizontal integration of their activities, market players such as shipping lines, forwarders, transport operators and logistics groups seek to reduce costs, improve efficiency, generate revenue and deliver value and a ‘one-stop shop’ service to the customer (see, for example, Robinson, 2002, and Notteboom and Winkelmans, 2001).17

The new millennium brought rising pressure to bear on the existing cooperation agreements on the Rhine, as more and more operators were eager to start services independently from their partners. CCS, for instance, withdrew from the Fahrgemeinschaft Niederrhein collective on 1 January 2000. In 2006, the Fahrgemeinschaft Oberrhein (OFG) nearly ceased to exist when Rhine Container and Haeger & Schmidt decided to step out of

17 See, for example: Robinson, Ports as elements (2002), and Notteboom/Winkelmans, Structural changes (2001).
the OFG partnership and start up the Upper Rhine Container Alliance (URCA). A major restructuring of barge services within the OFG took place once Interfeeder was taken over by Contargo in October 2006. Joint ventures, mergers and takeovers are a relatively new aspect in the barging industry, and are aimed at increasing the geographical scope of the services offered and developing the operators’ own barge transport networks.

Leading barge container carriers are increasingly trying to achieve a functional vertical integration of the container transport chain by extending the logistical services package to include complete door-to-door logistical solutions. CCS was the first Rhine carrier to begin operating on this principle as early as 1976 (Denis, 1999). Rhine Container, too, was able to offer a wider logistical service to customers soon after it was set up in 1978, thanks to the logistics know-how of its co-founder Kühne & Nagel. Barge operators now often form part of larger logistics conglomerates that offer integrated logistics solutions for manufacturing supply chains. In the 1990s, three logistics holdings took a strong grip of the barging market: 1) Wincanton, the mother company of Rhenania with the subsidiary Rhine Container, 2) Rhenus Logistics, the mother company of Contargo (including SRN Alpina and CCS), and 3) the Imperial Logistics Group, which is the mother company of Alcotrans. The integration of leading barge operating companies in the structures of highly-diversified logistics groups further strengthens the functional integration in the logistics chain. On top of barge operations via Rhine Container, the Wincanton group has set up its own railway company, Rail Container, which uses main hubs in Neuss and Mannheim and cooperates with ERS, IFB, MSC and others. Rhenus Logistics, meanwhile, offers similar services through the RheinRail Service of CCS.

A final and fairly new aspect of the vertical integration strategy followed by barge operators is the desire to fully exploit the complementarity with rail transport by forging closer links with existing rail companies, or, if required, even acting as a rail operator themselves. The present market consolidation in European rail transport leaves a limited scope for barge operators to position themselves as rail shuttle operators, allowing them to overcome the restricted geographical coverage of the European inland waterway network.

4.3 An increased focus on the logistics function of inland terminals

Inland terminals are increasingly key to the functional development of port systems (Notteboom and Rodrigue, 2005). Independent barge operators and market players have developed a keen interest in the exploitation of inland terminals. About two thirds of all terminals in the Rhine basin are operated by inland barge operators or the logistics mother company of a barge operator. The remaining terminals are operated/owned by sea port stevedoring companies, inland port authorities (e.g. Port Autonome de Strasbourg) or logistics service providers.

The deep sea terminal operator ECT in Rotterdam has followed an active strategy of acquiring key inland terminals that act as ‘extended gateways’ to its deep sea terminals, for example the DeCeTe terminal in Duisburg (Germany) and TCT Belgium in Willebroek, Belgium (Rodrigue and Notteboom, 2009b). DP World is following a similar strategy via the concept of terminal operator haulage.

Other inland terminal operators include: 1) rail operators (which wish to exploit the complementarities of rail and barge transport by setting up tri-modal hubs); 2) independent logistics service providers (who set up terminal activities to guarantee their own supply of freight); 3) inland port authorities (such as the Port Autonome de Strasbourg, which sees a barge terminal and the associated logistics activities as a means of regional development and a way of increasing regional competitiveness); 4) and holding companies (which acquire stakes in inland terminals in order to diversify their portfolio or package of activities).

The development of inland barge terminals is increasingly linked with cluster formations of logistical activities, leading to a process of logistics polarization and the creation of logistics zones. With the increasing role of inland terminals in supply chains, a process of terminalization is unfolding, where the function of warehousing, in its entirety or in part, is shifted to the terminal (Rodrigue and Notteboom, 2009b). Quite a few logistics zones are competing with sea ports for the location of distribution facilities and value-added logistics. The availability of fast, efficient and reliable intermodal connections, where possible also by barge, is one of the

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most important prerequisites for the further logistical development of inland terminals.

Inland barge terminals are also increasingly positioned to relieve pressure on sea port terminals. Rotterdam, for example, is planning to develop a series of so-called container transferia in the vicinity of the port near the main transport corridors to the hinterland service areas. Trucks are loaded and discharged at a container transferium and inland barge shuttles secures a frequent and reliable connection between the transferium and the large container terminals in the port. The operational and planned Gateway Access Points (GAPS) in Belgium serve a similar purpose. These inland terminals have an important satellite function with respect to sea ports, as they help to relieve the sea port areas of potential congestion.

5. Concluding remarks: towards a transnational logistics strategy

The European container barge network has up to now always been primarily focused on the Rhine. The network has its origins in transport between Antwerp, Rotterdam and the Rhine basin, and in the last decade it has also developed enormously along the north-south axis between the Benelux countries and Northern France. It has been demonstrated that inland waterway transport accommodates a third of all the containers moving between the two main ports and their hinterland. For the Rhine states, the market share of the barge option in the modal split typically ranges between 50% and 85%. Barge transportation has proven to be an indispensable stepping stone in the logistical and economic development of the Rhine economy and the multi-port gateway region of the Rhine-Scheldt delta. The huge scale of barge operations in Rotterdam and Antwerp generates advantages not found in smaller container ports. The organizational advantages are apparent in the clustering of barge operators and related companies.

Nevertheless, our analysis has shown that Rhine volumes have been stagnating in the last few years, and that most of the growth in inland waterway transport is now coming from navigation areas either downstream of or peripheral to the core network of the Rhine. Other container ports are seeking to give inland barging a more prominent place in their inland distribution patterns of maritime containers, but the existing dominance of the port pair Antwerp-Rotterdam and the Rhine corridor in barging is unlikely to be challenged. The Rhine barging industry has entered a phase of consolidation and vertical integration. Market players are seeking in-
creased synchronization and coordination with a view to further optimiz-
ing the role of inland waterway transport in supply chains. This develop-
ment coincides with the increased terminalization in supply chains.

Individual regions and states have developed strategies to strengthen
their position in global supply chains and global production networks. The
intermodal connectivity of inland logistics zones (also via barges) plays an
important role in attracting logistics service providers and European distri-
bution centres. The region of Flanders in Belgium, for example, developed
the Extended Gateway project via the Flemish Institute for Logistics (VIL)
(Van Breedam and Vannieuwenhuyse, 2007). While each of these strate-
gies has its merits in terms of anticipated regional, economic and logistics
development, there is a major weakness in the artificial restriction of their
scope to predominantly just one region, without recognizing the transna-
tional nature of logistics development in the Rhine economy. As a result,
many of the logistics zones and inland terminals in one region of the
Rhine basin have strong cargo and logistics links with gateways and logis-
tics zones in other regions. Confining a logistics strategy within the territ-
orial borders of countries or regions creates blind spots and ignores the
logistics dynamics in the wider transnational Rhine economy. This weak-
ness calls for coordination among regions to establish a more comprehen-
sive transnational logistics strategy for the Rhine economy. Container
barge transportation should be given a key position in such coordination
initiatives, as this chapter has demonstrated that this transport mode has
always been instrumental in enhancing closer transnational integration and
connectivity among the logistics zones in different regions along the
Rhine axis.

This chapter does not claim to have provided answers to all the ques-
tions that might arise in relation to barge connectivity between the Rhine
economy and the Rhine-Scheldt delta port system. Further research is
needed to quantify the contribution of barge transport and the gateway
ports in the Rhine-Scheldt delta to the competitiveness of Rhine states in
the world economy. Moreover, the relative competitive position of the
Benelux ports vis-à-vis other multi-port gateway systems that (can) give
access to the Rhine states deserves further academic study. The increasing
competition between barge and rail shuttles from the Rhine-Scheldt delta
ports and rail products emanating from the North German sea port system

is also an interesting field for further research, particularly when considering traffic flows in relation to German inland destinations along the Rhine (i.e. the tension between a transnational connectivity solution via the delta versus a national solution via German ports).

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Maritime Gateways and Barge Connectivity: Container Barge Transport on the Rhine


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Theo Notteboom

7. Environment
Abstract: River histories have blossomed in the last couple of years, and the approach of the Transnational Rhine Economy Network has brought innovative watershed perspectives to economic history. Yet from an ecological perspective, there is a certain irony in framing the transnational dimension of the Rhine economy as a river’s history, because in order for the Rhine to become the great European highway connecting agricultural, industrial and urban areas, it had to cease being a natural river. The size of the floodplain has been sharply reduced and biodiversity extremely diminished, while pollution has increased significantly. This chapter adds some environmental spice to the Rhine economy by focusing on: the transformation of the river into a mere canal, the perennial problem of flooding, early attempts to conserve and protect Rhenish landscapes, and more recent initiatives to restore at least parts of the river to a more or less natural state.

1. River histories

In its series of conferences and publications, the Transnational Rhine Economy Network has made it perfectly clear how and why the Rhine region has become the unrivalled economic backbone of Western Europe and, in the words of Hein Klemann and Ben Wubs, ‘the foremost inland waterway in the world, with the tonnage moved on its surface greater than on any other river’.¹ From the perspective of an environmental historian, one of the specific strengths of this research network is that it takes the river seriously: the Rhine is not just looked at as a more or less neutral and passive route of transportation like streets or railroad lines. Indeed, at the core of this research network is the conviction that the river plays an im-

¹ Klemann/Wubs, River Dependence’ (2014), 1; see, also: Euwe, The Rhine (2012).
important part in the production of space itself. The Rhine connects inland and port cities with vast hinterlands by providing the riverine societies along its banks with ‘ecosystem services’. While the river has historically been claimed by nation states – most importantly Germany and France – it is also a producer of a genuine transnational space.\(^2\) Moreover, by its interfaces and links with other infrastructures such as pipelines, railroads, highways and communication facilities, the Rhine region is connected to areas beyond the boundaries of the watershed. As a consequence, the river lies at the heart of this peculiar space; it is a ‘structuring force of the transnational region’.\(^3\) National perspectives can capture only small parts of the dynamics of river systems like those of the Danube, the Elbe, or, for that matter, the Rhine. Fluvial analyses, meanwhile, transcend the national-state perspective on both a subnational and transnational level.

The approach of the Transnational Rhine Economy Network dovetails with the steady growth in river histories over the last couple of years, especially in the field of environmental history.\(^4\) Rivers are no longer mere supporting actors in master narratives like modernization discourses or nationalist myths. Instead, they take centre stage. The geography and hydrology of the watershed open up trade routes, enable inter-regional cultural contacts and also pave the way for military conquests. The seasonality of rivers has historically created unique challenges and opportunities for many cities, for instance when a river freezes over or when spring floods or prolonged droughts during the summer months have to be anticipated and dealt with.\(^5\) Rivers are also instruments by which power can be exerted. Metropolises like London, Paris or Vienna have made use of ‘their’ rivers to control the hinterland (for instance, safeguarding their provision with wood), while others, like Los Angeles or Las Vegas, have tapped watersheds hundreds of kilometres away to allow for steady growth in a semi-arid environment and in doing so have limited the opportunities available in the regions from where the water was taken.\(^6\) Rivers are also an integral part of the urban metabolism; they provide drinking water and a

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\(^4\) Castonguay/Evenden (Eds.), *Urban Rivers* (2012); Mauch/Zeller (Eds.), *Rivers in History* (2008); Knoll et al. (Eds.), *Rivers Lost, Rivers Regained* (2017).


sewer for city dwellers, as well as an ‘ultimate sink’ for industrial waste. Major rivers, their tributaries, canals and portages created a vast network of inland commercial relationships long before the railroad, the automobile and the airplane produced their own unique geographies. According to Donald J. Pisani, at the start of the 19th century, for example, it made ‘more sense to think of the United States […] as a series of rivers separated by land, than as a huge land mass punctuated by rivers’.

Many Western rivers share similar ‘eco-biographies’ in the sense that they have been heavily modified for industrial and commercial purposes, and have even been sacrificed and only recently rediscovered. They are ‘socio-natural sites’ where societies (both human and non-human) intersect with the natural world and produce legacies and path dependencies, for example in the form of the location of new settlements or flood control works. Furthermore, rivers represent a space of opportunity and hazard, and have thus produced what might be described as ‘risk societies’ along their banks. Finally, they are sites of memory. The Elbe is not just a river, but also a symbol of the division of Europe during the Cold War, while the Ohio River – often referred to by African Americans as ‘River Jordan’ – still signifies the thin line between freedom and slavery in US history. Rivers are thus far more than just canals for the shipment of goods and people. The aim of this article is therefore to give the Transnational Rhine Economy Network some environmental undercurrents.

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11 The term has, of course, been popularized by Ulrich Beck and his 1986 book of the same name (*Risikogesellschaft*). Natural hazards and disasters hardly played a role in this seminal work. The ‘new risks’ that Beck referred to were invisible and ‘democratic’ threats such as nuclear fallout and chemical pollution. However, in his more recent conceptualization of the ‘World Risk Society’ (*Weltrisikogesellschaft*, 2007), natural catastrophes play a much more prominent role.
13 This endeavour has to be selective, though, given the spatial limitations of a chapter in a book. For comprehensive environmental histories of the Rhine, see Mark Cioc’s highly praised ‘eco-biography’ of the river and Christoph Bernhardt’s (2016) massive study of the rectification works on the Upper Rhine.
2. *Transformations of the Rhine hydrology*

While the economic importance of the Rhine is difficult to overestimate, there is also a certain irony in framing this success story as a river’s history, because for the Rhine to become the great highway connecting agricultural, industrial and urban areas, thereby creating its own economy – the Rhine economy – it had to cease being a natural river.

Today, it is difficult to imagine that this river once meandered freely through a floodplain several kilometres wide rather than through a stabilized channel of just a few hundred metres.\(^{14}\) It is equally difficult to conceive of a river landscape with thousands of islands, oxbow lakes, a braided bed, constantly eroding banks, newly formed land, and a highly diverse fauna.\(^{15}\) This is, however, what the river looked like, especially in its ‘wildest’ part, the Upper Rhine. According to Horst Johannes Tümmers, early 19\(^{th}\) century maps show the presence of more than 1,600 islands on the 110 kilometre stretch from Strasbourg to Karlsruhe alone.\(^{16}\)

This environment was not, however, as romantic as it looks on paintings such as Peter Birmann’s famous ‘View from the Isteiner Klotz’\(^{17}\). The enormous floodplains, especially along the Upper Rhine, created ideal conditions for water-borne diseases such as malaria or dysentery. Moreover, settlements along the banks of the river were at constant risk of being flooded, destroyed and washed away.\(^{18}\) There were thus good reasons, or so it seemed, to ‘ameliorate’ not just the river, but also the entire landscape.

Modern engineers, though, were not the first to tinker with the hydrological regime of the Rhine. The Romans had already built flood control works and small canals, but this infrastructure decayed once the Roman Empire lost its grip on the region. Water management and river engineering was resumed in the early medieval era, but only really took off in the 18\(^{th}\) century as a result of various factors, including the increasing territorial consolidation in Germany, mercantilistic economic policies, and technological innovations and scientific improvements, especially in the field

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\(^{16}\) Tümmers, *Der Rhein* (1999), 139.

\(^{17}\) On the painting, see: Tümmers, *Der Rhein* (1999), 137-138.

of hydrology.\textsuperscript{19} In Prussia in the 18\textsuperscript{th} century, hydrologists and engineers had successfully ‘tamed’ the Oderbruch (the Oder Marshes) and rivers such as the Warthe or Ruhr.\textsuperscript{20} Accordingly, as David Blackbourn has pointed out, when Johann Gottfried Tulla set out to transform the Upper Rhine into a more reliable and much less volatile river, it ‘was their scale, not this or that specific innovation, which made [his] proposals distinctive, [and] even startling’.\textsuperscript{21}

At the start of the 19\textsuperscript{th} century, social and commercial pressure on the river grew noticeably stronger. Commerce increased after the end of the Napoleonic Wars and especially after the Congress of Vienna had established the Rhine Commission in 1815, which greatly facilitated interstate travel on the river. The arrival of steamboats on the Rhine in 1816 significantly reduced transportation costs, while population growth in Baden and other German states in the southwest heightened the incentives to gain land from the river by ‘rectification’.\textsuperscript{22}

The plans by the Baden engineer Johann Gottfried Tulla to ‘rectify’ the Upper Rhine provided the blueprint for nearly six decades of infrastructural work that fundamentally changed the character of the river. The river channel was ‘straitjacketed’ into a narrow bed between 200 and 250 metres wide between 1817 and 1876. As a result of Tulla’s cuts and other straightening measures, the Rhine was shortened by 81 kilometres and lost approximately 10,000 hectares of its former floodplain.\textsuperscript{23} The flood hazard was not eliminated entirely along the Upper Rhine by Tulla’s rectification project, but was certainly substantially reduced. In addition, the waterborne diseases that had plagued the region for centuries disappeared almost completely in the following decades.\textsuperscript{24}

\textsuperscript{19} CHR/KHR, \textit{Der Rhein} (1993), 37.
\textsuperscript{21} Blackbourn, \textit{The Conquest of Nature} (2006), 91. Flood protection on the Alpine Rhine by small dams made of stone or wood has its origins in the 11th century; see Tümmers, \textit{Der Rhein} (1999), 58. See, also: Speich, \textit{Helvetische Meliorationen} (2004); Pinter et al., \textit{Flood magnification} (2006), 149.
\textsuperscript{22} See: Cioc, \textit{The Rhine} (2002), 16, 36-37, 42.
\textsuperscript{23} Tümmers, \textit{Der Rhein} (1999), 145; Bernhardt, \textit{Zeitgenössische Kontroversen} (1998), 293.
\textsuperscript{24} Cioc, \textit{The Rhine} (2002), 50-52.
The Rhine gained velocity by being channelled into a narrow bed, compared to its pre-rectification status. This in turn led to increased erosion of the river bed, which was lowered by as much as seven metres, and a drop in the water table in the adjacent area. This was deliberately planned, and not an unintended effect of the rectification works. The Rhine now flowed in a more stable bed, and the low lying areas adjoining its banks were efficiently drained, ‘turning “swamp” and “bog” into arable land.’

Amelioration of the Rhine was not uncontested, though. Inhabitants of affected villages resisted the measures, sometimes with violence, because they feared economic disadvantages due to the loss of land and, more importantly, were in some places afraid that their villages would be located closer to the river and so be even more flood-prone than before. In 1817, a planned cut in Knielingen, today a neighbourhood of Karlsruhe, could only be realized after the city was occupied by troops from Baden and Bavaria. It was only after the devastating 1824 Rhine flood had spared precisely the six villages that had been affected by Tulla’s rectification works that resistance to cuts and the channellization of the river fell away substantially.

As important as Tulla’s work was for the social, economic and environmental history of the Rhine, it only marked the start of almost two centuries of massive hydrological interventions. In Austria and Switzerland, constant sedimentation from the Alps had heightened the riverbed and the natural levees so much that the water level of the river at the flood stage was as high as the roofs of the houses behind the dams in some places. Large-scale correction works began here in the 1830s and 1850s, respectively. Further down the river, on the Middle and Lower Rhine, Tulla’s work was continued during the second half of the 19th century.

Yet another influential and ecologically devastating infrastructural project on the Rhine was the construction of the Grand Canal d’Alsace/Rheinseitenkanal – a lateral channel parallel to the Upper Rhine that was built between 1925 and 1951. The Grand Canal siphoned more than

29 Pinter et al., Flood magnification (2006), 149.
1,400 cbm/s off the main channel – now appropriately called the ‘Re-
strhein’ (the ‘remaining Rhine’) with merely 20 to 30 cbm/s on average –
to maintain a shipping route between Strasbourg and Basel and to provide
eight power plants with sufficient water. As a result of this diversion, the
water level in the region along the old riverbed, which had already been
lowered substantially by Tulla’s work, dropped even further.31

3. The return of the suppressed: flooding

Another environmental problem was created by the very success of Tulla’s
rectification project. While flooding on the Upper Rhine was indeed sub-
stantially diminished, it seemed to become worse further downstream. The
Prussian government had been concerned right from the start about the
possible consequences of Tulla’s work in its own territory. Indeed, as early
as 1819, the Ministry of the Interior warned about possible negative ef-
facts on the Middle and Lower Rhine. This uneasiness was the result, as
Christoph Bernhardt argues, of negative experiences the Prussians had en-
countered when ‘correcting’ the Oder marshes in the 18th century.32 One
argument against the rectification work on the Upper Rhine was the con-
cern that the increased velocity of the river and the ensuing riverbed ero-
sion would lead to more sedimentation downstream and so to a greater
risk of flooding. One contemporary witness, Fritz André, acknowledged
the positive effects for the inhabitants of the Upper Rhine, but predicted
that the consequences for those living further downstream would be catas-
trophic.33

A second argument made by Prussian experts held that the flood peaks
of Rhine River floods would reach the lower parts of the river faster, and
would coincide with a greater likelihood of flood peaks in its tributaries,
most notably the Neckar, Moselle and Main rivers, also raising the spectre
of devastating floods.34 What is evident from these discussions, and from
the legal and political battles that they triggered in the course of the 19th

31 Geiler/Lange, Von der Furkationsaue (2006), 45-47; Bernhardt, Zeitgenössische
32 Bernhardt, Zeitgenössische Kontroversen (1998), 299-300; see, also: Blackbourn,
33 André, Bemerkung (1828), 1-2.
century, is that each state tried to minimize the danger of flooding in its own territory, if need be to the cost of its neighbours up or downstream, thereby pursuing an environmental ‘beggar-thy-neighbour’ policy.35

The growing importance of the flood problem on the Middle Rhine in the second half of the 19th century was not, however, just the result of upstream river correction works; changing patterns of land-use in the floodplains played an equally important role. The middle and lower parts of the Rhine Valley had been subject to rapid industrialization and urbanization. As a result, the patterns of vulnerability had changed, too. While, for example, agricultural damage still played a large role during the devastating flood of 1784, damage to industrial and infrastructural facilities was much more prominent in the ‘flood of the century’ in 1882-83.36 A 1904 Prussian bill dealing with the obstruction of the water flow in river floodplains also emphasized the anthropogenic component of flood catastrophes. The origins of such disastrous events were characterized as ‘unnatural’, due to the steady increase in the size of the population as a result of industrial growth, especially in proximity to flowing bodies of water, and to the desire to utilize every location in the floodplain.37

36 For a comparison of these two floods, see: Weichselgartner, *Hochwasser* (2000), 123.
37 See: Hermes (Preuß. Ministerium für Landwirtschaft, Domänen und Forsten) and Schulz (Preuß. Ministerium für öffentliche Arbeiten) to the Präsident der Abgeordnetenkammer, April 9, 1904, Bundesarchiv Berlin, R43/1995, 9-10.
The flood of 1876, which was worsened by a severe storm, highlighted these new vulnerabilities. In March of that year, the Rhine reached a flood stage unseen since the 1840s. The main street in St. Goar was five feet under water, in Zell and Moselle the water stood eight feet high above the lowest part of the town, and two thirds of the city were flooded in Neuwied. In Koblenz, at the confluence of the Rhine and Moselle, the water remained in large parts of the city for weeks, especially in the poorer areas of the town, highlighting the close connection between marginalized populations and marginal environmental spaces. 38 Twelve years later, during the Rhine flood of 1882-83, about 10,000 people were affected in Duisburg alone, where the water stood eight feet deep in certain parts of the city. Some buildings in those neighbourhoods were rendered complete-

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ly uninhabitable, but with more and more people affected by floods, public relief to help the flood victims was often insufficient.

Animals also became more vulnerable to flooding with the transformation of the river landscape, and especially the floodplains, into sites for urban, industrial, commercial and infrastructural facilities. The most striking example of this vulnerability is the zoo. The city of Cologne was especially hard hit during the flood of 1882-83. Indeed, within three hours, the low-lying area between the Nippes and Niehl neighbourhoods was submerged beneath ten feet of water. Unfortunately, the Cologne Zoo had been built precisely within this basin. The property was protected by a surrounding wall, but the flood was too strong and tore down parts of it. The animals, many of them trapped in their cages, were terrified as the waters rose in the parts of the zoo that were closest to the river. Several ‘valuable’ species drowned, and the cost of the damage sustained by the zoo's owners, a joint-stock company, amounted to 50,000 marks. To some species, however, the flood meant not a life-threatening danger, but an excellent opportunity to escape. Large numbers of waterfowl, for example, managed to flee the zoo through the breach in the wall. Flooding was, thus, one price that people along the Rhine paid for the transformation of the river into an efficient waterway.

4. Nature consumption – nature protection

Over the course of the 19th and 20th centuries, the tremendous growth of the Rhine economy ran in parallel with environmental deterioration. Pollution by residential and industrial sewage was so bad that some rivers were literally sacrificed, while epidemic diseases like cholera were a constant threat. The Rhine, for instance, was so polluted that it was referred to as the ‘dead river’.

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39 Lehr to Königlicher Regierungs-Präsident von Hagemeister in Düsseldorf, November 30, 1882, Abschrift, GSTA PK, I. HA, Rep. 77, Tit. 52, Nr. 53, vol. I.
40 In Wassernoth,’ Mühlheimer Zeitung, December 2, 1882.
41 Oberpräsident der Rheinprovinz von Bardeleben to Puttkamer, Koblenz, December 13, 1882, vol. 1, Nr. 53, Tit. 52, Rep. 77, I. HA, Geheimes Staatsarchiv Preußischer Kulturbesitz, Berlin. See also, Denkschrift über die Rheinüberschwemmungen im Bezirke der Bürgermeisterei Longerich in den Monaten November und Dezember 1882 sowie Januar 1883‘ (Cologne, 1884), ibid., vol. 3; and Die Rhein-Ueberschwemmungen (1883); Masius, Risiko und Chance (2013), 54-55.
threat to many cities.42 ‘Naturally’, biodiversity took a strong hit, too. Until 1975, 90% of the Rhine River’s former floodplain had been converted into agricultural land or was utilized for infrastructural, industrial, residential and recreational purposes.43 ‘Thus, when the Rhine lost most of its floodplain it also lost most of the living space upon which its biodiversity depended,’ as Mark Cioc pointed out in his eco-biography of the Rhine.44

Nevertheless, with the increasing commercialization, urbanization and industrialization of the Rhine Valley, the voices calling for the conservation of the region’s natural beauty grew louder, too. In Germany, the Rhineland played a major role in the formation of a lobby group for nature protection, and tourism, as it turned out, paved part of the way for this movement.

Rhine tourism has its origins in the 18th century, when British travellers made increasing use of the Rhine corridor as part of the Grand Tour to Italy. What they found, especially on the Middle Rhine, was an ‘imaginary landscape’ that raised expectations and upon which many different hopes could be projected, as Thomas Etzemüller has pointed out.45 Rhine tourists appreciated and consumed the seemingly medieval landscape with its castles, ruins, dramatic vistas, gothic churches and dreadful myths. ‘Rhine romanticism’ was thus an ideal setting to satisfy sentimental longings.46

Tourism on the Rhine benefitted greatly from innovations in the field of transportation and communication. Steam-powered vessels started plowing the river on a regular basis in 1824”; from 1856 onwards, they transported more than one million passengers each year. Railroad construction on both banks of the Rhine began in 1844, and by 1926, the entire river could be travelled by train.47 Of equal importance was the information revolution, i.e. the tremendous growth of lithograph series, literary des-

47 Etzemüller, Romantischer Rhein — Eiserner Rhein (2012), 405; Bock, Baedeker & Cook (2010), 217-244.
criptions of the scenery and travel guides. The most well-known and influential example of the latter is certainly the Baedeker, which according to Rudy Koshar was the ‘first great Bible of the modern tourist experience’. As Tom Lekan notes: ‘Just as the steamship transformed a once arduous, months-long journey reserved for elites into a pleasant, one-day outing for the middle classes, so too did the Baedeker answer the needs of the middle ranks who desired reliable information about train schedules and exchange rates, practical advice about hotels and inns, and economical itineraries that allowed them to cover a great deal of ground on a limited budget.’

Yet this kind of elite and later middle class educational travel was increasingly complemented by and replaced with what Lekan has called ‘mass nature tourism’, i.e. the transformation of ‘nature from a site of bourgeois privilege into a terrain of mass recreation’. With the general increase in leisure time, affordable and quick transportation to many touristic sites and easily available information, from train schedules to literary descriptions, more and more people were able to enjoy nature beyond the city limits. This new supply of recreational opportunities was met by a growing demand – especially from those working in factories – for outdoor activities to emotionally and physically balance the enduring tasks of industrial life. Furthermore, the landscape was made much more accessible for tourism by local tourist groups such as the Beautification Society for the Siebengebirge, which created and maintained walking paths and hiking trails, benches, observation towers, etc.

Arguably, no other site along the Rhine better represents the effects of the ‘tourist gaze’ and the complex relationship between the economic exploitation of the river landscape on the one hand, and attempts to protect its beauty on the other, than the Drachenfels. The Drachenfels Mountain, with its famous medieval ruin near the top, rises ca. 240 metres above the Rhine (321 metres above sea level) as one of the seven mountains of the

49 Koshar, German Travel Cultures (2000), ix.
50 Lekan, A “Noble Prospect” (2009), 835.
51 Lekan, A “Noble Prospect” (2009), 830; See also, Bock, Baedeker & Cook (2010), 70.
52 Lekan, A “Noble Prospect” (2009), 830, 836.
Siebengebirge range. When plans were made to use the Drachenfels as a quarry for the construction works to finish Cologne Cathedral, the Prussian government put the mountain under legal protection and into the public domain in 1836. By that time, the Drachenfels ‘ensemble’ of mountain, ruin and river was already an integral part of ‘Rhine Romanticism.’ So, in addition to nationalist sentiments aroused by the planned destruction of such a symbolic space – the Drachenfels was equipped with a memorial to the Napoleonic Wars since 1914 – tourism played an important role in saving the Drachenfels environment (which is often cited as Germany’s first nature protection area, although it was only officially designated as such in 1922).

Figure 2: Blick auf die Insel Nonnenworth mit Rolandsbogen und Drachenfels am Rhein, oil on canvas, Eduard Hein der Jüngere, 1918

Source: Public domain (Wikimedia Commons).

54 Etzemüller, Romantischer Rhein — Eiserner Rhein (2012), 397; Bock, Baedeker & Cook (2010), 81.
Yet the site also suffered a great deal due to tourism. In the late 19th century, several thousand tourists from Germany, England, the United States and the Netherlands visited the Drachenfels each day. Indeed, it became ‘the most visited mountain in Europe.’ When a funicular railway up the mountain opened in 1883, it transported over 10,000 visitors in the first two weeks. So, while nature protection in the Middle Rhine Valley – like in many other places – has benefitted from the tourist gaze, tourism itself has increasingly become a burden for the landscape it wants to consume. Today, the ‘Vorburg’ on top of the Drachenfels is, appropriately, home to a museum, an archive and a forum for the history of nature protection in Germany.

5. More room for the river

In the last couple of decades, the environmental conditions of the Rhine have improved substantially. The reasons for this development are both intentional and unintentional. One factor was simply the desolate ecological state of the river, as Mark Cioc has pointed out: ‘By the 1970s the liquid flowing in the riverbed was nothing more than a toxic soup of chemicals and raw sewage.’ In other words, the river was biologically dead in many stretches and could not get any worse. Moreover, the rapidly declining significance of coal in the postwar decades almost automatically improved the water’s quality. Furthermore, many politicians acknowledged that there were limits to the compatibility of polluting a river and relying on it for the provision of drinking water. Finally, the nascent environmental movement and a general emphasis on post-material values since the 1960s have spurred a genuine interest in the river landscape and its flora and fauna. As a result of these developments, pollution has been curbed by several transnational, legal initiatives. Salmon populations have been partly returned to the river after each country along its course – from the Netherlands to Switzerland – initiated successful salmon-restoration

55 Lekan, A “Noble Prospect” (2009), 832.
56 Lekan, A “Noble Prospect” (2009), 837.
57 Etzemüller, Romantischer Rhein — Eiserner Rhein (2012), 397-398.
60 See: Nil Disco’s contribution to this volume.
projects in the 1990s. Furthermore, even the centuries-long process of channelization and floodplain loss is now being scrutinized in order to give the river more space to spread for both ecological and flood control purposes.

In the Netherlands, the planned relocation of Dutch citizens out of hazardous areas is being discussed as a tool of disaster risk reduction, albeit on a (still) very small scale. The huge Rhine River floods of 1993 and 1995, in conjunction with the threat of climate change-induced sea level rises, have led to the Dutch government changing its flood control policy and transforming some polders (large basins that have been cut off from the North Sea by dams, drained, and then settled) back into retention basins. As part of the new Room for the River programme of the Dutch government, farmers can continue using their land, but will either have to move to newly created ‘terps’ along the dikes or be bought out and move away.

One of the most ambitious projects in this regard is the attempt to restore parts of the floodplain of the Upper Rhine. In 1988, the state government of Baden-Württemberg initiated the Comprehensive Rhine Programme (Integriertes Rheinprogramm, IRP), with the aim being to undo at least some of the river channelling that began with Tulla’s rectification works. On the stretch between Weil and Breisach, construction has recently begun to lower parts of the former floodplain in order to recreate the vegetation that used to be typical in this region and to provide retention areas for Rhine River floods. If everything goes according to plan, the partially restored floodplains of the Upper Rhine could become a keystone for a possible transnational Rhine ecology.

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Nil Disco

Abstract: Postwar industrialization and urbanization had so polluted the Rhine that its biological death seemed imminent by the early 1970s. The International Commission for the Protection of the Rhine against Pollution (ICPR), supported by a series of Rhine Minister Conferences, began a well-publicized international offensive to clean up the river by fighting pollution at its source. This offensive was intensified in the wake of the deadly Sandoz chemical spill in 1986 and assumed the form of the so-called Rhine Action Plan (RAP). This was a voluntary agreement by riparian nations to reduce levels of specific pollutants by 50% by the year 2000. These aims were actually achieved in record time, and the plan was hailed by officials and analysts alike as a definitive breakthrough in terms of river pollution management. Its format was widely copied in other international river basins. Nevertheless, data on Rhine pollution levels show that enormous improvements in water quality in fact predated the RAP by at least a decade. This points to a level of national, regional and local anti-pollution efforts that were perhaps mirrored in, and even inspired by, what was happening internationally, although this can by no means be seen as a direct result of international regulation. This paper investigates some of these dynamics, focusing in particular on the efforts of the chemical giant BASF-Ludwigshafen to clean up its act by reconstructing its wastewater system and purifying its effluents prior to discharge into the Rhine. In view of the enormous costs involved, questions are raised concerning BASF's motives and the possible role of German state and federal water laws.

1. Introduction

A by-product, or ‘negative externality’, of the post-WW2 economic recovery in Europe was an alarming increase in the pollution of surface waters. As ever, the Rhine River was in the vanguard of this development. While
‘old-fashioned’ organic and salt pollution proceeded apace, new forms of inorganic pollution (especially heavy metals, phosphates and nitrates) were now also a concern. By the early 1970s, oxygen levels had plummeted to less than five milligrams per litre and the river had become a biological graveyard.\(^1\) Although agricultural fertilizers and pesticides and rapidly growing cities contributed significantly to this dismal outcome, the stellar development of the chemical industry during the period of the \textit{Wirtschaftswunder} was no less responsible. This was especially pertinent to the pollution of the Rhine. By 1970, something like 20\% of the world's chemical manufacturing capacity stretched along the banks of the river from Basel to Rotterdam. This increasingly forced actors who were critically dependent on clean Rhine water, especially downstream waterworks but also some of the perpetrators themselves (chemical plants and farmers), to take additional purification measures. Yet the usual methods of purification were increasingly unable to cope with the higher concentrations of pollutants and especially with the new exotic substances dissolved or suspended in the water. Treatment at the point of consumption was becoming increasingly costly, while also becoming less effective. As a consequence, the pressure was on to combat pollution at the source, fortified by the adage ‘the polluter pays,’ which was a principle that became current in the mid-1970s.\(^2\)

This strategy has produced results all over the world, but nowhere as spectacularly as on the Rhine. While the river could still be justifiably called the ‘sewer of Europe’, it is now among the continent’s cleanest large rivers and once again supports a thriving ecosystem. Actors at many levels – from firms and municipalities to the European Community – contributed to this success over the years.

\section{2. The Rhine Action Plan}

The Rhine Action Plan (RAP) of 1987 is usually touted as the definitive breakthrough for a healthy Rhine. The plan was a vigorous international response to the 1986 Sandoz warehouse fire near Basel, in which tons of

\begin{itemize}
  \item \textit{Nil Disco}
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\footnote{\textit{Nil Disco}.}

\footnote{1 Healthy river water holds around 10 mg/litre of oxygen. For accounts of the Rhine's chemical and ecological collapse, see: Cioc, \textit{The Rhine} (2002); Tümmers, \textit{Der Rhein} (1999).

highly toxic chemicals were flushed into the Rhine carried along by the water used to extinguish the fire, killing fish and forcing the closure of water extraction facilities all the way down the river. The RAP is universally described as being a major success; "Measures have been taken all along the river to prevent pollution, and in 1994 the International Commission for the Protection of the Rhine against Pollution (ICPR) could report that most of the reduction goals had been achieved. Indeed, in the field of industrial sources, the 50% target had been almost completely met".3

More to the point, the RAP is regarded as the first international success story in terms of cleaning up the Rhine (and restoring some of its blighted ecology). This was a strategy to liberate the ICPR from interminable deliberations about tolerable levels of specific pollutants with which it was charged under the 1976 Rhine Chemicals Convention. Thanks to the RAP, the ICPR was able to extract itself from endless nitpicking conflicts of national interest and take up a role as an international coordinator of a vigorous effort to restore the river as a source of clean water and as a flourishing ecosystem.

Although the RAP was certainly an effective programme, there are reasons to treat its almost mythical status with some suspicion. A balanced view is all the more important because the RAP's basic approach of setting goals, but not specifying how they should be achieved (which still informs the work of the ICPR), is frequently viewed as a panacea and role-model for international river restoration. As a former executive secretary of the ICPR recently put it:

‘But others, too, learnt from the ICPR! It’s incredible, but the success story of the Rhine is known everywhere in the world. Be it Africa, Asia or South America, the ICPR’s work is known and has often served as an example for the constitution of commissions along many other rivers like the Danube, Elbe or Odra and even the Mekong, Sambesi and Rio de la Plata.’4

Insofar as the RAP is – rightly – seen as the model for the present era in European river-basin management under the terms of the Water Framework Directive of 2000, there is reason to suspect that its mythical status is a form of Whig history, in which a heterogeneous past is simplified and

3 Bozkir et al., Impacts (2010), 132.
4 Koos Wieriks, cited in ICPR, Living Rhine (2010).
glorified as the royal road to the present. Indeed, the RAP did not signal a break with existing trends in pollution reduction, nor did it represent a new internationalist impulse. Its apparent practical effectiveness in fact appears to be due to less, rather than more, transnational regulation.

_Figure 1:_ Tons per year of five heavy metals transported on the Rhine; five year intervals between 1970 and 1995

Figure 1 reveals two things: 1) by the time the RAP became effective, the heavy metal load had already been reduced by more than 50% since 1970 (the decline after 1975 is especially strong). Clearly, someone, somewhere, was taking action, even if it was not the ICPR; 2) the greatest reduction by far is in _industrial_ effluents, both prior to and under the regime of the RAP. Indeed, between 1985 and 1995, there was only a minor reduction in heavy metal effluents from diffuse and communal sources. Figures 2 and 3 corroborate the pre-RAP pollution decline for organic pollutants, and for lead and ammonium nitrate.
Figure 2: Oxygen content in mg/l and invertebrate biodiversity; Rhine 1900-2006

Source: European Environmental Agency.
Figure 3: Concentration of lead and ammonium in Rhine water, 1971-2000. Station Weil: white; Station Koblenz: grey; Station Bimmen/Lobith: dark grey.


Particularly confusing is the evidence that during the almost 15 years that the ICPR and Rhine ministers were trying to get their international act together in the wake of the Endosulfan incident of 1969 (see below), impressive improvements in the degree of Rhine pollution were being achieved. Who was responsible and why? And, more to the point, why were these actors apparently able to take measures at a national and subnational level while they were stymied in coordinating the enactment of similar measures internationally?
As a matter of fact, both industries and national and municipal governments found it expedient – especially after the mid-1960s – to pursue their own programmes to reduce the pollution of surface waters and, by implication, the Rhine. What were their motivations and how were these national and subnational environmentalist practices related to the emerging international regime embodied in the ICPR?

3. The Dutch, salt and the ICPR

In fairness, it should be emphasized that international efforts to clean up the Rhine considerably predated any independent efforts by national governments or private firms. This was primarily because the Dutch had an abiding interest in seeing to it that their upstream neighbours stopped dumping waste, and especially salt, into the Rhine. The biggest single source of salt in the Rhine was the Mines Domaniales de Potasse in Alsace, and excessive salt levels made it extremely expensive for the downstream Dutch to extract drinking water from their Rhine branches and also threatened the profitability of Dutch greenhouse agriculture, which could not cope with saline irrigation water. Matters came to a head in the 1930s around plans (primarily by Amsterdam) to use the newly created Lake IJssel, which was fed by the Rhine, for potable water extraction.

With failed diplomatic efforts in the 1930s still within recent memory, the Dutch delegation took advantage of one of the first post-WW2 meetings of the Central Commission for the Navigation of the Rhine (CCNR) to draw attention to the question of Rhine pollution. One thing led to another, and by 1950 the Rhine riparian governments had established the ICPR thanks to the active support of the Swiss, who were struggling with pollution in their own lakes and who perhaps felt least threatened by the Dutch protests. The new commission had a feeble lease on life, being grounded only in an exchange of diplomatic notes orchestrated by the Swiss government. Yet despite the lack of powers and a clear mandate, it nonetheless provided a platform for diplomats and experts from different Rhine countries to meet and begin to create joint instruments to establish a consensus about the state of the Rhine's water. During the 1950s, an impressive series of annual reports bore witness to the vitality of this consensus, as a transnational "epistemic community" emerged that was dedicated to mapping the nature and extent of Rhine pollution in great detail. By all accounts, this early phase of the ICPR's activities was extremely important...
in nurturing trust and mutual understanding, at least among the experts and civil servants who actually carried out the new Commission's programme.

How was the ICPR organized? It was entirely a creature of the national governments that brought it into being. It originally had no secretariat and no discretionary powers of its own. Decisions at the annual plenary meetings (and in the expert committees) had to be unanimous, meaning that the most conservative country on any issue tended to set the tone. The two-man national delegations were composed of high-ranking civil servants in relevant government ministries. Often, there was competition among ministries and subnational governments for a position in the national delegation. At the plenary meetings that set the agenda for the ICPR’s work programme, there was considerable mutual distrust and a tense atmosphere, because each delegation was bound by strict instructions to protect the national interest and had no leeway for independent manoeuvre.

By 1963, the Rhine riparian governments had become so alarmed about the ever-deteriorating quality of Rhine water, and had developed enough confidence in the ICPR as a useful forum, that they were prepared to accede to a Dutch initiative to underpin the ICPR's status with a multilateral treaty. According to this ‘Bern Convention’, the ICPR – in addition to its basic role as an analyst of Rhine pollution – now also had the power to ‘make recommendations’ to Rhine governments and could be called upon to act on other issues of common concern in addition to pollution.

In practice, the Bern Convention had little immediate effect. Indeed, in the ensuing years, and under the watchful ICPR eyes of the signatories to the treaty, the quality of the Rhine's waters continued to decline (from bad to far worse) – a victim of the new European prosperity expressed in terms like the *Trente Glorieuses* and the *Wirtschaftswunder*. One wonders: what kept the ICPR from speaking out? A retrospective assessment by two ICPR figureheads cites two major factors: 1) the time needed for the riparian nations to establish their positions, develop mutual understandings, and come up with mutually accommodating solutions; 2) the overall indifference to environmental problems before 1970, which meant that ‘stringent measures to reduce effluents could not be enacted.’

However, as Bob Dylan sang in 1964, the ‘times they are a-changin’, and the publication of books like Rachel Carson’s *Silent Spring* in 1962

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and an increasing number of wake-up ‘normal accidents’ like the grounding of the tanker Torrey Canyon in 1967 began to focus attention on what post-war welfare was doing to the natural environment.\textsuperscript{6} The Rhine experienced its own pollution epiphany in June 1969 when Hoechst Chemicals near Bingen accidentally released several tons of the insecticide Endosulfan into the river. The massive starvation of fish and the forced closures of water intakes that ensued received a lot of publicity. Indeed, soon, electorates up and down the river were beginning to call on their politicians to do something about the sorry state of this ignominious ‘sewer of Europe’.

The Endosulfan incident, in combination with a festering impasse over the Rhine’s salt burden, forced the Rhine governments – at the behest of the Netherlands – to hold a first Rhine Ministers Conference in The Hague in October 1972. As Mark Cioc wryly observed: ‘It was not until the river was on the brink of death – and therefore unable to fulfil its duties to humans – that a new attitude about the river began to emerge.’\textsuperscript{7} Now, for the first time, the condition of the Rhine’s waters and possible solutions were being discussed at the highest political level. Where delegates to the ICPR, however exalted their rank, had always been hampered by a lack of discretionary powers, the ministers and their retinues could improvise and make deals on the spot. The upshot of the 1972 conference was a mandate for the ICPR to negotiate terms for three new multilateral conventions: one on chemicals, one on chlorides (salt) and a third on thermal pollution (in view of imminent plans to build nuclear power plants along the river). By 1976, the ICPR committees had worked out texts for the chemicals and salt conventions, and these were signed that same year. It must be noted at this point that France (with a modest chemical industry but a major source of salt) was an early supporter of the chemicals convention, while Germany (with a big chemical industry and diffuse salt sources) was a champion of the salt treaty. The Dutch, of course, were in favour of both treaties, as were, oddly enough, the upstream Swiss. As the history of the various treaties is extremely complex, I will focus here only on the chemicals convention.

The chemicals convention had been hobbled by German fears concerning the competitive position of their many chemical firms on the Rhine if these alone were to be targeted with costly measures to reduce toxic efflu-

\textsuperscript{7} Cioc, \textit{The Rhine} (2002), 199.
ents. The Germans were therefore only willing to sign the treaty if the same effluent constraints were imposed on the entire European chemical industry. To this end, the European Commission had promulgated its own binding chemicals directive, with the ICPR's version being virtually identical. Both treaties specified two lists of chemicals: 1) a ‘black’ list that targeted zero effluents; and 2) a ‘grey’ list composed of chemicals that would gradually have to be eliminated from the effluent mix. The idea was that subsequent negotiations in Brussels (for the EEC countries) and at the ICPR (for the Rhine riparians countries) would establish tolerable effluent levels and a time-path for each chemical on the list. The results would then have to be transposed into national law and subsequently put into practice by the various national governments.

The European influence on Rhine pollution was also augmented by the legally confusing expedient of giving the European Community (EC) a seat in the ICPR. This was in part to represent the position of the EC with respect to Switzerland, which then, as now, was not a member. In the event, the piecemeal dirigiste approach and the tedious detour through Europe made a farce of the chemicals convention; ten years after it was signed, protocols for only three heavy metals had been worked out, even though the ‘black’ list included more than 30 chemicals. The chloride convention fared little better. After commissioning lengthy studies, the French government opted to pump excess salt deep into the Alsatian subsoil. This ran afoul of a parliamentary majority mobilized by local protest groups and the government was forced to shelve the plans. Incensed by this shilly-shallying after the interminable delays, the Dutch government recalled its ambassador from Paris ‘for consultation’, thus initiating the first actual diplomatic row over Rhine pollution.

4. Meanwhile ... back at the ranch

While progress on the international stage seemed to be grinding to a definitive halt, the waters of the Rhine were actually still getting cleaner (though no less salty), as indeed they had been since 1970 (see figures 1, 2 and 3 above). Clearly, at least some important polluters were hard at work cleaning up their act, albeit seemingly beyond the official purview of the ICPR.

There were essentially two background dynamics at work: 1) resistance by Rhine water users who were economically victimized by pollution; and
2) an emerging environmentalist movement, whose roots went back to the 19th century, but which burst into full bloom in the 1970s. The non-governmental and corporate bodies involved not only pressured national governments to take action against environmental degradation – and in particular water pollution – but also organized themselves as collective forces for water quality improvement and in some cases even took their own measures against pollution.

The point is that these actors influenced water quality policies not only at a transnational level, i.e. within the ICPR or EC, but also nationally and even at a local level. Indeed, during the 1960s and 1970s, the struggle against Rhine pollution (and water pollution in general) was being carried on at many policy levels along a broad front. Certainly, for the moment, the national and subnational levels seemed much more effective than the international one, although it would be a mistake to assume that international cooperation – however symbolic – was irrelevant. The transnational level, embodied in the ICPR, was essential to the vigour of the national levels insofar as the former was both a forum for establishing an international consensus about the degree and nature of Rhine pollution, as well as a stage on which national and corporate efforts to combat pollution were made visible internationally. This was effective, because no nation wanted to look like an incorrigible environmental ‘bad guy’ in the context of the emerging Europe of the 1960s.

In the 1960s and early 1970s, all the Rhine riparian countries passed legislation that in one way or another sought to regulate the pollution of surface waters within their sovereign territories. Again, this was in response to palpably increasing levels of pollution, the agitation of environmentalist groups, and chilling messages like Rachel Carson's *Silent Spring*, which painted grim pictures of an approaching environmental apocalypse. Up to the end of the 1960s, environmentalism was not yet an electorally relevant ideology, but local concerns about water and air pollution had begun to find their way into the parliaments and ministries of Rhine riparian countries with increasing frequency, inevitably resulting in more or less effective legislation.

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8 One important example is the Rhine waterworks, which organized themselves into associations, first nationally and later internationally, to pressure governments into pursuing policies that would make Rhine water suitable for the preparation of drinking water at a reasonable cost. See Disco, *Accepting Father Rhine?* (2007).
4.1 Switzerland

Switzerland’s vigorous post-war battle against surface water pollution – with the biologist Otto Jaag and Swiss waterworks at its epicentre – cut its teeth in the fight against the trans-border eutrophication of Lake Constance in the 1950s. The first Swiss national law on surface water protection was passed in 1957. A revised law in 1971 markedly accelerated the construction of sewage treatment plants. Although some 30% of the Swiss population already had their sewage treated by as early as 1970, this figure reached a remarkable 90% by 1990.⁹

4.2 France

The French Assemblée Nationale passed a progressive water law in 1964 based on a division of the country into six major river basins, each with its own river basin authority and powers of taxation based on the ‘polluter pays’ principle. Though deeply rooted in French political tradition, this law is often touted as a precursor to the European Water Framework Directive, with its emphasis on river basin management and the involvement of local communities. Major tasks for the French basin authorities were to assess the quality of surface waters, levy financial burdens on polluters and oversee measures to combat pollution where necessary. Responsibility for sewage treatment was borne by the municipalities. In 1992, a new much more ‘environmentalist’ water law was passed that again considerably accelerated the lagging construction of wastewater treatment plants. Indeed, by 1995, 70% of the French population was connected to such a plant.

4.3 Germany

Germany, with by far the largest Rhine frontage and a huge preponderance of population and industry on the river, was the key player in terms of both the pollution and cleanup of its waters. Again, this considerably pre-dated the RAP (and even the Chemicals Convention of 1976), and in-

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volved various levels of government as well as private industry. As in France, water policies and water management in the Bundesrepublik were and are quite decentralized, although unlike France they were not initially delegated to dedicated river basin authorities, but to the various federal states: the Bundesländer.

This created problems. For one thing, surface water respected internal German boundaries as little as it did international boundaries, and so the same kinds of trans-border water management problems cropped up among the German Länder as existed among European nation states. Furthermore, it was no easy matter to decide who was to represent the German Federal Republic in international water negotiations at the European level or within the ICPR – especially in view of the fact that the latter organization only recognized two delegates per country and was blind to sub-state politics.

Domestic equity no less than international coordination therefore compelled the German federal government to formulate a water policy at a national level. In 1957, the first version of a National Water Act (Wasserhaushaltgesetz) was signed into law, becoming effective in 1960. This was a framework law in the sense that it set guidelines for the water policies of the Länder. An important revision in 1975 compelled the Länder to levy pollution taxes, which was a significant incentive in the fight for cleaner (Rhine) water.

As noted, the need to organize a national delegation to the ICPR also represented a new challenge to the federative water structure. On the occasion of the ICPR's 'legalization' under the terms of the Bern Convention of 1963, the six Rhine basin Bundesländer joined forces in a so-called Working Community of the Federal States for the Purification of the Rhine (ARGE Rhein). At the same time, a federal German Committee for the Purification of the Rhine (DK Rhein) was instituted to coordinate water policy between the federal government and the Bundesländer. One of the DK's major tasks was to coordinate German representation on the ICPR, which was clearly not an easy matter. In any case, it should be noted here that participation in transnational forums compelled major realignments in domestic water policy, not only in Germany, but also ultimately in all EU countries. Under the terms of the current Water Framework Directive, for example, it is incumbent on each nation to organize their water policies by way of river basins, which is a restriction that has compelled the Germans to once again realign responsibilities in terms of domestic water management.
5. Rheinland-Pfalz and BASF

It can hardly be an accident that legislation targeting the effluents of the chemical giant BASF in Ludwigshafen came only a year after the ratification of the Bern Convention in 1963. The German federal states, in this instance Rheinland-Pfalz (whose Rhine frontage comprised nearly a third of that of the entire BRD), clearly felt that the pressure was on and seized the opportunity to put their houses in order insofar as circumstances allowed. The BASF edict, which was dated 25th September, 1964 and was legally anchored in responsibilities imposed on Rheinland-Pfalz by the Federal Water Law of 1960 and its derivative State Water Law of the same year, prohibited or limited the discharge of specific chemical toxins, salts and suspended particles. It also set an upper boundary to the temperature, and limits to the Ph value, of BASF’s discharge water. In addition, the firm had to monitor its effluents on a continual basis and submit chemical analyses at weekly intervals. It might seem surprising that a federal state would issue a directive aimed only at a single firm, but when one considers the incredible and ever-increasing scale of production at the Ludwigshafen plant and the impact BASF effluents had on the condition of the Rhine, even well downstream, it begins to make sense. Indeed, just as an indication, in 1960 BASF extracted nearly 800 million cubic metres of water from the Rhine (compared to only 240 million cubic metres just a decade earlier). Although about 75% of this was only used for cooling purposes in 1965, and was returned to the Rhine warmer, although otherwise unchanged, the remaining ‘process water’ was discharged into the river bearing a new and ever more exotic mix of low and high-tech chemicals.


It is hard to say how tough the Pfalz regulations were thought to be, but they clearly represented a new level of state interference into the detail of industrial production and were at first sight an assault on the corporate
balance sheet. It would probably be a mistake, however, to assume that this was simply a matter of state coercion and that BASF was an unwilling victim of rabid environmentalists. There are good reasons to assume that BASF, too, was interested in a cleaner Rhine – an aim it could hardly realize without doing its own, not inconsiderable, bit.

The crux of the matter was that the water that BASF extracted from the Rhine was already polluted by upstream users and had to be purified on-site at the plant before it could be utilized. The required degree of purification depended on what the water was to be used for. Several stages of filtration generally sufficed for cooling water. The most exacting demands were for ‘boiler water’, which had to be microscopically filtered and thoroughly desalinated, and especially for ‘process water’ which, in addition, had to be chemically pure to varying degrees. So, rather than seeing BASF as simply a polluter of otherwise clean water, it must also be seen as a victim of water polluted by others.
Processing river water to make it suitable for boiler feed water was a complex and costly process involving many steps, as this flow chart makes clear.

Source: Gessner, Wasserversorgung und Umweltschutz (1973), 41.

Some figures may make this clearer. The biological oxygen demand (BOD) is a figure that indicates the degree of organic pollution. A unit of measure based on this parameter is the BOD inhabitant equivalent, which corresponds to the oxygen demand associated with the annual organic ef-
fluent waste produced by an average person. In 1965, 5,970,000 inhabitants upstream of Mannheim-Ludwigshafen (including the Neckar) burdened the Rhine with untreated effluent. The municipalities of Mannheim and Ludwigshafen together contributed an additional 1,141,000, while BASF alone discharged 1,800,000 inhabitant equivalents into the river. Altogether, industries\textsuperscript{12} and municipalities in the Rhine-Neckar region increased the Rhine's BOD level by 68%, with BASF accounting for 30% of this.

Although BASF clearly and materially increased the burden on downstream water users, it was in turn victimized by those further upstream, which included German as well as French and Swiss municipalities and industries. Organic pollutants clogged its filters, while dissolved salts corroded its heat exchangers.

‘Due to organic pollution... problems occur not only in the waterworks, but also in the production facilities, which are dependent on the use of flow-through coolers. So, in the course of time, because of the biological growth processes, condensers can become totally clogged and lose their functionality. The necessary work of cleaning them requires what is, from an economic standpoint, a time-consuming and costly interruption in production.’\textsuperscript{13}

BASF accordingly spent millions of marks per year in treating Rhine water for use in its Ludwigshafen facilities. Boiler feed water, which accounted for only 1.5% of all BASF’s water use in 1968, cost at least 7.5 million DM to treat. Moreover, matters were going from bad to worse on the Rhine, which is reflected in the 175% internal price increase for processed Rhine water at BASF between 1948 and 1968.\textsuperscript{14}

\textsuperscript{12} Gessner, *Wasserversorgung und Umweltschutz* (1973), Table 50, 77.
\textsuperscript{13} Gessner, *Wasserversorgung und Umweltschutz* (1973), Table 50, 77.
\textsuperscript{14} Gessner, *Wasserversorgung und Umweltschutz* (1973), Table 50, 77.
Against this background, it may be less surprising that the Pfalz govern-
ment encountered a cooperative ally, rather than a recalcitrant industrial
giant, in its striving to contribute to a cleaner Rhine. In the late 1960s,
based on new insights into chemical and biochemical processes, BASF be-
gan designing a huge sewage treatment plant specifically aimed at reduc-
ing its outflow of organic pollutants. It took Ludwigshafen and several
other contiguous municipalities on board. The plant itself cost ‘only’ 35
million DM, but the cost of splitting the works' sewer and drainage system
to separate process effluents from untainted cooling water came to 74 mil-
lion DM, with another 46 million DM needed for the municipal connec-
tions and new discharge channels. The plant came online in 1975 and its
effect was immediately measurable as far downstream as Lobith on the
German-Dutch border. Fully oxygenated water holds about 10 mg of oxy-
gen per litre. Thanks to the BASF plant, the oxygen level at Lobith
jumped by nearly 2 mg/litre, which was the largest single improvement ever.15

BASF's not inconsiderable investment in wastewater treatment could only be justified in a climate where this would count as good publicity and as an investment that, by throwing down a challenge to other Rhine polluters, could ultimately result in a cleaner Rhine and lower costs for water purification. In addition, BASF's head start in the esoteric field of chemical-industrial water purification, which was based on its experience with its wastewater treatment plant, gave it a new product to bring to market. Indeed, BASF currently profiles itself as an expert in the ‘greening of industry’ and makes good money selling its purification expertise to other firms and public organizations.

6. Sandoz and thereafter: The power of positive thinking

The story of the Sandoz warehouse fire during the night of November 1, 1986, and its aftermath in the form of the RAP, has been told many times. The basic lineaments are: intense press coverage of the toxic discharges and subsequent biocide along the entire river (1.5 million fish killed); widespread popular disgust (about the river's condition, but also the failure to address that condition adequately); politically astute tactics on the part of the Dutch; a conference of Rhine ministers only 12 days after the accident; and, ultimately, an agreement among the Rhine riparian states to reduce levels of key pollutants to 50% of current values by the year 2000. The RAP had some novel features that go some way to explaining its success. First, although it specified common goals, it was indifferent to how they should be achieved; this was left to national governments, industries and environmental groups. Second, the RAP incorporated an ecosystem approach, such that water quality became an aspect of the ecological state of the river – as expressed by its motto ‘Salmon 2000.’ This imaginative and politically transparent goal required not only further progress in water quality improvement, but also entailed restoration of some of the historic riverscapes that had made it possible for salmon to navigate upriver and spawn. This hydrological and geomorphological element was further

15 Thanks go to Pieter Huisman, Executive Secretary of the ICPR 1976-1980, for pointing this out. Interview, Oct. 20, 2011.
strengthened when the Action Plan on Floods was added to the RAP agenda in 1998.

As is well known, the RAP easily met most of its targets in the course of the 1990s. A few heavy metals, salt, and especially nitrates and phosphates were, and have remained, a cause for concern. This success has been framed as a great victory for international cooperation and the ICPR in particular. In 2000, the plan was extended under the title of Salmon 2020, with the aim being further improvements in water and ecosystem quality, as well as greater floodwater resilience. Furthermore, it has also been widely adopted as a model for tackling pollution and flood risks on other rivers.

The question, though, is whether the RAP really does provide a universal model for the ecological restoration of rivers, or whether its success is attributable to contextual factors that are operative only in the case of the Rhine at a particular moment in history. This is not an easy question to answer.

First of all, it is clear from the data that the RAP did not produce a dramatic change in the rate of reduction of pollution levels. Clearly, by 1987, and especially with respect to organic pollutants, the Rhine was already in a far better state than it had been in 1970. The most we can say on this point is that the RAP captured the existing dynamic – due almost entirely to national and local initiatives (though doubtless conscious of the ICPR as an international watchdog) – and funnelled it into a next phase. Yet the RAP seems to have worked precisely because – unlike the technocratic and utterly paralyzed chloride and chemical conventions of 1976 – it represented less rather than more international cooperation and regulation, and because it actively encouraged national governments, industries and local groups to contribute to the cleanup and restoration of their river and to the return of their salmon.

Although it was not obligatory and was utterly lacking in sanctions, the RAP was able to work because, by 1987, trust had begun to replace mutual suspicion among the Rhine riparian states. Indeed, there was a growing consensus that free-riding could finally become a thing of the past. Free-riding was the cancer of voluntary arrangements, because it not only neutralized part of the progress made by those dedicated to the common goal, but also because it reduced costs to the free-rider and so improved its competitive position. In this case, the political consequences of the public outrage over the Sandoz fire, plus the experience of cooperation over many years in the ICPR and the EC, had created new reservoirs of trust. Even
the lengthy and sometimes acerbic negotiations on the chemicals convention within the ICPR ultimately improved mutual understandings (and provided a wealth of technical knowledge on how to mitigate specific pollutants).\footnote{16 Interview with Pieter Huisman, Oct. 20, 2011.} International relations and diplomacy, like society in general, can be viewed from both ‘realist’ and ‘nominalist’ perspectives. Realism asserts that the international level (or society) has its own emergent properties and exerts its own constraints on the behaviour of the constituent elements, in this case nation states. Nominalism sees the international order (or society) as a kind of fiction, which is merely the result of the actions of the constituent ‘real’ actors, i.e. nation states (or individual humans). My argument about the RAP might sound like a nominalist interpretation, assigning real existence only to national governments and firms and seeing the international level only as a projection by means of which these actors regulate their interactions. This is not, however, my intention. Progress with respect to Rhine water quality, ecological restoration and flood control would by no means have been possible without the existence of the emerging, ontologically independent, international level embodied in the ICPR. As an international forum, the ICPR provided the Rhine riparian nations with a mirror and a visible international stage that demanded accounts of what they were doing. The moral force of what the ICPR thus represented turned out in the end to be stronger than its administrative (or legislative) force. So, although the Rhine was ultimately cleaned up by dint of national and subnational legislation and the agency of private firms, this would doubtless have taken much longer had it not been for the incessant interweaving of national and international dynamics that was also the key feature of the RAP. Accordingly, while adopting a programme like the RAP might seem like a good idea for any river at any time, there is no guarantee – in the absence of the specific history of international conflict and cooperation that took place on the Rhine and created a provisory basis for trust – that it will also be a success.

7. Conclusion

The ‘restoration’ of the Rhine is, of course, a relative concept. As long as it remains the premier navigational channel in Northwest Europe, nothing
will ever bring back the pristine Rhine of meanders, islands, salmon fisheries, shallows, rapids and chronic flooding. Nonetheless, since the 1950s, the industrial assault on the quality of the Rhine's water has been halted and turned around to the point where the river once again functions as an unproblematic source of irrigation and drinking water, and increasingly also as a major recreational resource for riparian populations.

In this paper, I have argued that this clean-up project, while having a highly visible, well-advertised and well-institutionalized international dimension, was in fact first conceived and implemented at national and sub-national levels. By the time the international level was gaining serious momentum, a big part of the clean-up had already taken place. Moreover, it was not only carried out by beleaguered governments responding to electoral pressures, but also by polluting industries ironically looking out for their own interests as users of river water.

Additional in-depth research into BASF's venture into wastewater treatment will be necessary in order to establish precisely what the company's motives were and what role the Rheinland-Pfalz government played. Nevertheless, from the evidence presented here, it seems likely that the company was in fact seeking a long-term solution in order to combat the rising costs of purifying the massive quantities of process and boiler water that it was compelled to extract from the Rhine. The only conceivable solution was to keep upstream polluters (Strasbourg, Karlsruhe, Switzerland) from dumping their untreated waste into the river. Nonetheless, given BASF's own irresponsible effluent practices, any attempt to convince upstream polluters to reduce their pollutant loads by modifying practices or implementing purification facilities could be summarily dismissed as nothing more than the pot calling the kettle black. BASF's only option was therefore put its money where its mouth was and spend a small fortune setting an example for others to follow. Ironically, it then reaped the profits from the proprietary knowledge of industrial wastewater treatment that it had acquired. At the time, the Dutch, for one, had yet to learn that they could only influence upstream polluters after first abandoning their own polluting ways and becoming a shining example of environmentalist virtue.

17 Suter, *Umweltschutz mit Augenmaß* (2008) provides some insights into BASF's turn to effluent purification, but the account lacks a sufficiently critical bite.
Nevertheless, I reiterate the claim made above that, without the international stage provided by the ICPR and later the Rhine Ministers' Conventions, these national and industrial dynamics would have been far less powerful. The sheer visibility provided by the international stage, both of the state of Rhine pollution and of efforts to combat it, acted as a goad to polluters and their governments to bring their practices into line with the new environmentalist morality that was most forcefully and visibly espoused at international levels – and increasingly in edicts promulgated by the EC itself.

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List of Authors

Ralf Banken
Ralf Banken is a Professor in the History, Economic and Social History Department of Goethe University Frankfurt am Main, Germany. He recently published: ‘Building on air: the international industrial gases industry, 1886-2006’ (with Ray Stokes), Cambridge University Press 2016; and ‘MAN. The History of a German Industrial Enterprise.’ Munich 2009 (with Johannes Bähr and Thomas Flemming). His main research fields are: European industrialization; European business history in the 18th-20th centuries; German economic history in the same period; and the history of the Rhine economy, 1700-2000.

Antoine Beyer
Antoine Beyer, a geographer, was born in 1968 in Colmar (Alsace). He has studied in Freiburg, Breisgau and Paris. He has specialized in economic geography and transport studies, and defended his PhD (1999) and wrote his habilitation (2014) on transport systems in the European integration process. He joined the IFSTTAR (French Institute of Science and Technology for Transport Networks and Development) at Marne-la-Vallée and has been teaching transport geography at the Paris-Sorbonne University (2005-2016). He’s now Professor for Transport Geography at the Cergy-Pontoise University.

Marten Boon
Marten Boon is a postdoctoral researcher in the Department of History at the Norwegian University of Science and Technology. He obtained his PhD in economic and business history from Erasmus University Rotterdam in 2014 with his thesis ‘Oil Pipelines, Politics and International Business. The Rotterdam Oil Port, Royal Dutch Shell and the German Hinterland, 1945-1975’. He is currently working on a project entitled ‘Merchants, Majors and Bankers: Unveiling the History of Oil Trading Companies, 1960s-2015’. His interests include business history, transnational history, the history of the oil industry and the history of commodity trading.
Nil Disco

Nil (Cornelis) Disco was a senior researcher in the Department of Science and Technology Policy Studies at the University of Twente in Enschede, the Netherlands. He has been trained as a sociologist at Yale and the University of Amsterdam. He was co-editor (with Eda Kanakis) of ‘Cosmopolitan Commons. Sharing Risks and Resources across Borders’, MIT Press, 2013. He has published in the broad field of science and technology studies on topics as diverse as particle physics and urban engineering. His most recent work is on Dutch and international water management and the theory of transnational commons.

Jeroen Euwe

Jeroen Euwe is a lecturer economic and business history at Erasmus University Rotterdam. He was research fellow at the German Historical Institute, Washington DC, United States. His main research fields are the history of the Rhine economy, 1870-1940 (focusing on finance, trade, transport, international relations and business history), and the Western art market, 1870-1950, focusing in particular on how political and economic crises affect the trade in art, its production and acceptance.

Hendrik Fischer

Hendrik Fischer studied economics, political science, medieval and modern history, and journalism in Cologne. He worked in the Department of Economic and Social History at the University of Cologne, first as a research assistant and – after he took his PhD in 2009 – as an Assistant Professor. He also taught microeconomics, macroeconomics and economic policy at the European University of Applied Sciences in Brühl. Since 2010, he works for the German Space Agency (Deutsches Zentrum für Luft- und Raumfahrt, DLR), currently as Deputy Head of Space Strategy and Programmes.

Boris Gehlen

Boris Gehlen is an Associate Professor (Privatdozent) of Economic and Social History at the Historical Institute at the Department for Constitutional, Social and Economic History, University of Bonn. Recent publications include: ‘Germany Incorporated. Reflections about West Germany's Capitalism’ (editor, with Ralf Ahrens and Alfred Reckendrees), Essen 2013; forthcoming: ‘The Association of German Chambers of Commerce
and Economic Regulation, 1861-1914’, Tübingen 2017; and ‘100 years Association of German Public Banks’ (with Patrick Bormann, Dirk Schiereck and Joachim Scholtysiek), Stuttgart 2016. His main fields of research are: social, economic, business and financial history in the 19th and 20th centuries.

Mark Jakob

Mark Jakob currently is working as a co-ordinator for the Priority Programme “Experience and Expectation. Historical Foundations of Economic Behaviour” at Humboldt University, Berlin. Before, he was an assistant professor at the universities of Göttingen and Marburg. His research interests are the history of family and youth policies and business history, in particular the history of tobacco trade and manufacturing. He studied History and English at Johann Wolfgang Goethe-University in Frankfurt a. M. and took his Dr. phil. there in 2009.

Hein Klemann

Hein A.M. Klemann is a full Professor in Economic History at Erasmus University Rotterdam. He studied history at the Free University Amsterdam and economics at the Free University and the University of Amsterdam. He also obtained his PhD in economic history at the Free University. He has published on: Dutch international economic relations in the 1930s, Dutch economic relations with Germany, the political consequences of close economic ties with a much larger country, small open economies, and the Dutch economy during the German occupation. In 2012, with Dr. Sergei Kudryashov, he published a book on the economy of occupied Europe. Recently, he has been conducting research on German-Dutch economic relations and their political consequences in the 19th and 20th centuries. He has worked at the Free University Amsterdam and Utrecht University, and was a research fellow of the Institut der Niederlande of the Westfälische Wilhelms-Universität Münster and a senior research fellow at the Netherlands Institute of War Documentation in Amsterdam.

Christopher Kobrak

The late Christopher Kobrak was the Wilson/Currie Chair of Canadian Business and Financial History, and Professor Emeritus of Finance at ESCP Europe, Paris. He held a MBA in finance and accounting as well as a PhD in business history, both from Columbia University in New York.
an International Fellow at the Centre for Corporate Reputation, Oxford University, he served on the editorial boards of several business history journals. His publications include: ‘Banking on Global Markets: Deutsche Bank and the United States, 1870 to the Present’; ‘European Business, Dictatorship and Political Risk, 1920-1945’ (edited with Per Hansen); and journal articles on a wide range of business and financial topics.

Uwe Lübken

Uwe Lübken teaches North American and transnational environmental history at Ludwig-Maximilians University in Munich. He received his PhD from the University of Cologne in 2002, where his dissertation on the US perception of the National Socialist threat to Latin America (Steiner Verlag 2004) was awarded the Erhardt Imelmann prize. From 2004 to 2008, he worked as a research fellow at the German Historical Institute in Washington, DC. In 2009, he joined the Rachel Carson Center for Environment and Society, and from 2010 to 2014 served as director of the project ‘Disaster Migration in a Historical Perspective’. His habilitation thesis on the flooding of the Ohio River was published in 2014 by Vandenhoeck and Ruprecht. Dr. Lübken has taught American history at the universities of Cologne, Münster and Munich, and postwar German and European history at the Cologne School of Journalism.

Theo Notteboom

Dr. Theo Notteboom holds a position as Research Professor at Shanghai Maritime University in China. He also is part-time professor at University of Antwerp, Ghent University and the Antwerp Maritime Academy in Belgium. He is immediate past President and Council Member of International Association of Maritime Economists (IAME). Theo Notteboom published widely on port and maritime economics and management. He is co-director of www.porteconomics.eu, a knowledge dissemination platform on port studies.

Laura Rischbieter

Laura Rischbieter is Junior Professor of Economic History at the University of Konstanz. She teaches and writes about modern economic history in a global context. Taking the example of coffee, her PhD thesis addressed the questions of how globalization processes work and how individuals can influence global economic processes. She is currently writing a
pre-1945 history of sovereign debt in theory and practice, using the examples of international finance organizations.

Eva-Maria Roelevink
Dr. Eva-Maria Roelevink is lecturer in economic and business history at the Ruhr University, Bochum. Her thesis dealt with: the Rhenish-Westphalian Coal Syndicate, which was the most important German cartel until 1945; and its internal organization after the outbreak of WWI. Her research interests are cartelization, economic order, mining history and regional industrialization.

Ben Wubs
Ben Wubs is an Associate Professor International Business History at the Erasmus University in Rotterdam and an appointed Project Professor at the Graduate School of Economics, Kyoto University. He is engaged in various research projects related to multinationals, business systems, transnational economic regions, Dutch-German economic relations and the transnational fashion industry. In 2008, he published ‘International Business and National War Interests. Unilever between Reich and Empire’ (Routledge). He has co-supervised an NWO-funded project on ‘Rotterdam and its German hinterland: Outport and Hinterland, 1870-2010’, the synthesis of which will be published by Routledge in 2017. He was also a principal investigator for a European consortium (HERA II), which conducted research into the transnational connections of the European fashion industry since 1945.

Dieter Ziegler