

## The Corporate Network in Germany 1896 - 2010

### Abstract

Taking seven sample years from 1896 to 2010, this chapter analyzes three structural network parameters: density, position of banks and intrasectoral interlocks. Network density peaks in 1928 (16.2%) decreasing thereafter to end at 1.2%. Banks were central to the corporate network with each German bank averaging eight seats on the boards of non-financial firms in 1928; 0.5 in 2010. Intrasectoral density can be used to coordinate market behavior of competing firms, which became a substitute for cartels following German Antitrust Laws post-WWII. By 2010, the German corporate network is effectively dismantled, with little discernable difference between Germany and the US.

### 1. The German production regime

The comparative analysis of economic institutions has been a long tradition in the social sciences. Schmoller (1906) compared the market structures in Germany and the United States. He pointed out that the market structure in the US was shaped by an anarchic competition, while the market order in Germany was 'regulated' because of the cartelization of the German industry. Chandler (1990) emphasized the importance of economic institutions for the success of the large corporation. He presents Germany as an example of 'cooperative capitalism,' while the United States is the prototype of 'competitive capitalism.' He also refers to the central role of cartels for the coordination of market transactions in Germany.

In 1897, the German Supreme Court upheld the legality of cartel contracts and sentenced a disloyal member firm to pay the stipulated penalty for breach of contract.<sup>1</sup>

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<sup>1</sup> Cf. Entscheidungen des Reichsgerichts in Zivilsachen, Vol. 38, Leipzig 1897, pp. 155-162. See also Böhm (1948) who criticized the ruling of the Court.

This ruling legalized cartel contracts and provided a stable legal framework for cartel organizations for the next fifty years in Germany (Pohl 1979). The cartels and the dominant position of banks were the central institutions Hilferding (1915) had in mind when he described the German economy as a regime of ‘organized capitalism.’

The German Supreme Court tried to balance two basic rights: Freedom of trade (free competition) on the one hand, the right of the small producers to protect their trade and to secure their subsistence, on the other hand. The Court ruled in favor of the small producer and substantiated its decision on that grounds that Thomson (1971) sets forth in his classic article on the ‘Moral Economy.’<sup>2</sup>

In contrast, the Sherman Act (1890) defined cartels and monopolies as a ‘conspiracy against the public’ and as a criminal act that obstructs commerce. The market model that the American politicians had in mind when they voted for the Sherman Act was as a market order of *negative freedom*; any obstacle that stood in the way of free market exchange and unconstrained competition was to be removed.<sup>3</sup> The state sets the rules for the game, it has to guarantee a level playing field, but it does not interfere with the economy.

In their influential book on the ‘varieties of capitalism’ Hall and Soskice (2001) widened the comparative perspective by including a number of different economic institutions in their analysis, among them trade unions, the educational system, innovation systems and the welfare state. National market orders constitute a system of *functionally interdependent institutions*. These institutions differ systematically between, on the one hand, countries the authors label ‘liberal market economies’ (e.g. the US, or UK) and, on the other hand, countries that belong to the group of ‘coordinated market economies’ (e.g. Germany, or Switzerland).

Abelshauser (2001) provides an historical account of the German ‘production regime.’ He argues that many institutions in the German production regime were already created before the First World War. The German Empire was a ‘hot bed’ of economic institutions that shaped the German production regime for the next hundred years. The restructuring of the German political economy in the late 19<sup>th</sup> century has frequently been misinterpreted as a ‘backwards’ step towards a more traditional economic order. Abelshauser (2001, 509) argues instead that it should be interpreted as an adaptation process of the economy on its way to a new knowledge- and science-based industrial production. Among the central institutions that shaped the German production regime were non-competitive forms of market coordination (cartels, corporate networks), the revival and modernization of the apprenticeship

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<sup>2</sup> Bork (1978, xi) criticizes the idea that a market order should protect the small producer: “... the sole consideration the judge must bear in mind, is the maximization of consumer welfare. The judge must not weigh against consumer welfare any other goal, such as the supposed social benefits of preserving small businesses against superior efficiency.”

<sup>3</sup> The notion of “negative freedom” is defined in Berlin (2002, 169).

system, the legalization of unions, and the implementation of works councils (co-determination).

This article focusses on the analysis of one of these central institutions in Germany during the 20<sup>th</sup> century: *corporate networks*. Networks between large corporations are created when a manager or director sits on the board of directors of *several* firms. These multiple directors offer their services as a 'go-between' to coordinate an exchange between large corporations; they provide information on technical and organizational innovations (Davis 1991). They may also control and discipline executive managers who fail to do their duties as trustees of the shareholders and the employees. Multiple directors have access to confidential information; they influence the selection of top-managers and they vote on many issues of corporate governance. Therefore, corporate networks are more institutionalized than an informal club of alumni or a casual 'old boy's' network; the decisions that multiple directors make as members of the board have legal consequences and may trigger claims for compensation.

The national corporate network is an important *economic institution* that provides an opportunity structure for the regulation of competition and the coordination of market exchange (cooperative capitalism). The network provides an institutional structure that may enable managers to follow long-term strategies and to choose cooperation instead of defection.

The structure of corporate networks, i.e. their density, centralization and the position of banks in the network, varies between countries. We have collected a sample of the 250-350 largest firms for several years during the 20<sup>th</sup> century. This sample design provides empirical evidence to answer a number of questions, for example: Are there significant differences in the structure of corporate networks between Germany and the United States? How does the structure of the networks evolve over time? What role do banks play in the corporate network (centrality)?

## **2. Explanations**

Institutional differences between nation states have been discussed in the scholarly literature for many years. At least three explanations have been offered for the varieties of institutions: (a) functional interdependence, (b) cultural inheritance, and (c) economic development (modernization). A brief account of each will be presented in this section.

(a) Institutions evolve over time and become functionally interdependent in many ways. Hall and Soskice (2001, 17) emphasize the idea of institutional complementarities: "... two institutions can be said to be complementary if the presence (or efficiency) of one increases the returns from (or efficiency of) the other." Functional

complementarities may solidify a process of path dependency. Economic actors cannot change a single institution without producing negative consequences for other institutions and because actors cannot change everything at once, institutional structures become self-reinforcing. Institutional differences between countries persist over a long period; path dependency and institutional hysteresis<sup>4</sup> may even widen these differences over time. The central position of bankers in the corporate network and the importance of bank loans for industrial investments provide an example of functional complementarities in Germany. Banks granted long-term loans to large corporations (patient capital) and in exchange, bankers were offered a seat on the supervisory board of the debtor company.

In many cases, the network had a protective function. It sheltered producers against cut-throat competition (cartels), provided a control device for banks to monitor their debtors (bank loans) and protected the apprenticeship system and joint research and development ventures against free-riders (Thelen 2004). During the 1990s, the dense network between German banks and industrial firms protected the latter from hostile takeovers.

(b) Cultural patterns play an important role in the structural analysis of corporate networks in Asian countries. Business groups in Korea (chaebol), Japan (keiretsu), and China (qiyejituan) are examples of corporate networks of particularly high density and centralization.<sup>5</sup> Member firms coordinate their behavior, exchange employees, provide loans for industrial investments, and form joint ventures for research and development.

Nakane (1970) argues that group cohesion is a cultural pattern that is reproduced in different subsystems of the Japanese society and is an important feature in understanding how economic and political institutions in Japan function. A similar argument is put forward by Biggart and Hamilton (1997): "Asian economies espouse different institutional logics from those of Western economies, logics rooted in connectedness and relationships." (ibid: 37) In a comparative study on the 'origins of nonliberal capitalism' Streeck (2001) argues that the strength of Rhineland capitalism is rooted in its "capacity to mobilize noneconomic social ties, noncompetitive cooperation, collective obligations, and moral commitments in support of economic efficiency." (ibid: 2)

Explanations based on differences in cultural patterns underline the importance of social cohesion for economic performance. Dense social networks have the advantage of supporting deferred reciprocity in economic exchange; a service may be delivered today in the expectation that it will be reciprocated sometime in the future. Dense networks erect barriers against defection and 'free-riding' as network

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<sup>4</sup> Cf. Bourdieu (1979, 158, 361).

<sup>5</sup> For Japan cf. Gerlach (1992); chaebol: Chang (2003); China: Redding (1996).

members have the capability for monitoring and sanctioning their members. The empirical evidence presented in section 4 shows that the German corporate network had a particularly high density in the interwar period, when the country was hit by a series of political and economic crises.

(c) Two countries that have attained different levels of modernization and economic development have different systems of economic institutions. Institutions which are efficient for a backward nation trying to catch up may not be efficient for a mature economy that produces at the forefront of technology (Abramovitz 1986). For example, in relatively 'backward' nations the allocation of financial resources are not channeled through financial markets, but are frequently distributed by a cartel of banks or the state (Gerschenkron 1962).

Katz (1998) argues that the dense corporate networks between Japanese firms (keiretsu) were efficient during the stage of economic development and the process of catching up. Once Japan had reached the stage of a mature economy, these networks have become inefficient; an obstacle in the way of Japanese corporations adapting to a global economy. A similar argument has been made for the business groups in Korea (chaebols) and for the corporate networks in Germany ('Germany Inc.')

The explanations for the varieties of institutions across different countries briefly outlined above are not mutually exclusive. Culturally specific institutions that provided a competitive advantage during the stage of economic development may become inefficient when a country has reached the stage of economic maturity. Path dependency and institutional hysteresis may prevent actors from adapting institutions to a changing environment. An alternative view claims, however, that there is not *one* but *several* ways to organize an efficient economy. Corporate networks that regulate competition and enable firms to benefit from a *cooperation rent* may be as efficient as a highly competitive market that produces high transactions costs (e.g., opportunism, financial crises).

### 3. Micro-macro perspective

Corporations are free to create their own *ego-network* and to get connected to other corporations of their choice. The structure of ego-networks might be explained by organizational strategies; firms try to get connected to other firms to reduce their resource dependency (e.g., an interlock between an aluminium company and a power station). Many industrial firms co-opt bank directors to get access to financial resources (Mizruchi 1996). Figure 1 provides an example of the ego-network of the *Deutsche Bank* in 1914. Each dot represents a German corporation to which *Deutsche Bank*

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<sup>6</sup> Cf. Chang (2003); Adams (1994).

was connected. A director of *Deutsche Bank* had a seat on the supervisory board of, for instance, *Mannesmann*, *Siemens*, *Allianz*, *Accumulatoren Fabrik*, and eight large coal mining corporations.<sup>7</sup>

Figure 1: Ego-network of Deutsche Bank (1914)<sup>8</sup>

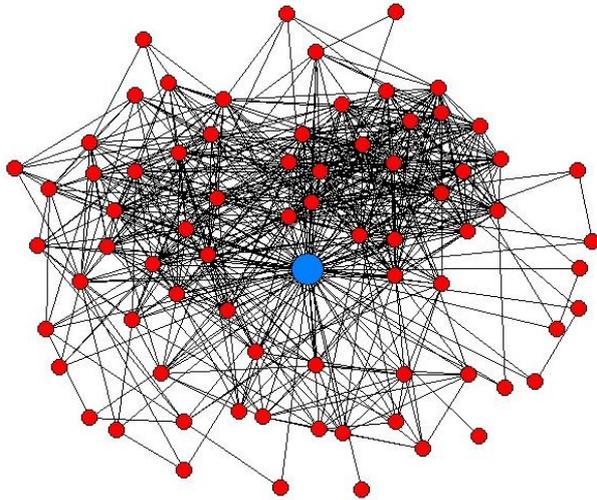
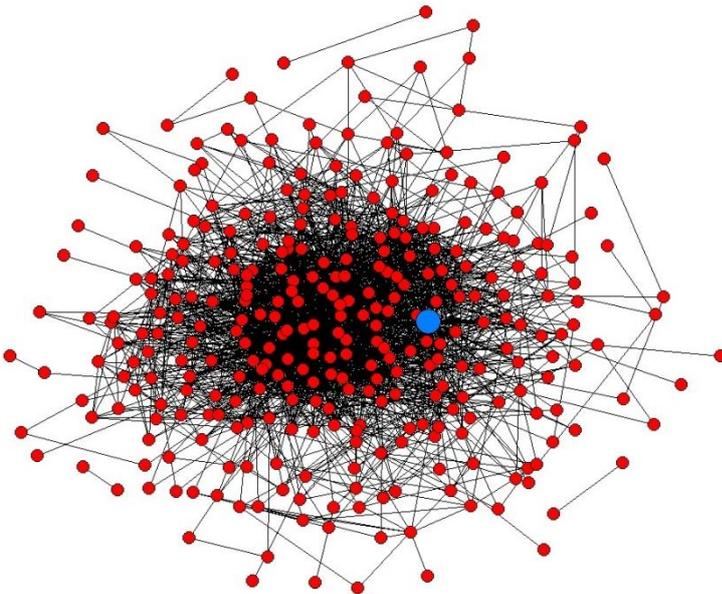


Figure 2: Total corporate network – Germany 1914<sup>9</sup>



The structure of an ego-network is determined by the decisions of individual firms. The structure of the *entire* network, however, cannot be controlled by any individual

<sup>7</sup> The history of the *Accumulatoren Fabrik* is analyzed in Chandler (1990, 402-408). The long-term relationship between Deutsche Bank and Mannesmann is reported in Strandmann (1978). Cf. Ziegler (1998) for an analysis of the supervisory boards of large German corporations during the 1920s.

<sup>8</sup> Degree: 68; 992 ties; density: 21.8%.

<sup>9</sup> Large dot: Deutsche Bank embedded in the total corporate network; N=250 companies; ties: 4572; density: 7.34%.

or company. In 1914, the corporate network created among 250 German companies comprised a total of 4572 relationships (Figure 2). The *structure* of these relationships – meaning, the density, the level of centralization, and the redundancy of the network (percentage of multiple ties) – lay beyond the control of any one person or organization. The structure was influenced by the legal framework (e.g., cartel laws), by traditions and cultural patterns (e.g., degree of social cohesion), by the development of the national economy (e.g., relative backwardness) and the geographical and sectorial distribution of large corporations (e.g., location of headquarters of many large corporations in New York or Berlin).

The difference between ego-networks – the micro-perspective – and the structure of the total national network – the macro-perspective – has important implications for the analysis and type of explanations one can offer. In the first case, we argue in terms of strategies and interests of individual actors, the actors being organizations or managers (Koenig et al. 1979). In the second case, we look at the structure of the total network in which the individual company is embedded.

The structure of the national network is an example of what Durkheim (1950, 7) has called a ‘social fact.’ He points out that social facts “acquire a body, a tangible form, and constitute a reality in their own right, quite distinct from the individual facts which produce it.” Figure 2 provides an example; ego-networks are created by individual actors but are embedded in a large encompassing structure that is out of the control of individual actors.

The following analysis does not examine the micro-perspective of individual actors or companies. It focusses on parameters that characterize the structure of the total network. In section 4, the density of the network over the period 1896-2010 is analysed. In section 5, we look at the particular position German banks had in the network. In section, 6 *intrasectoral* ties are analysed which complemented the cartel organization before 1938, and replaced it after the (World War II).

#### **4. Density of the corporate network**

Figure 3 presents the network density for Germany and the United States for the 20<sup>th</sup> century. Data are available for the following sample years: 1896, 1914, 1928, 1934, 1938, 1976, 1992, and 2010.<sup>10</sup> In Germany, network density was particularly high during the period 1914 – 1938, after the Second World War it is in permanent decline until, at the beginning of the 21<sup>st</sup> century, the German corporate network has disintegrated almost completely.

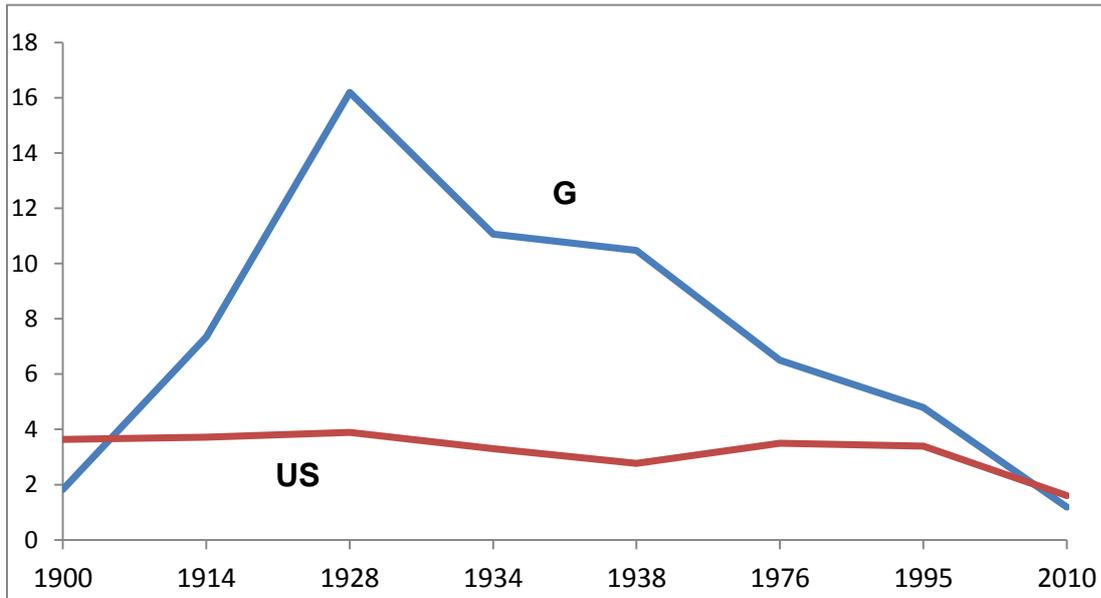
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<sup>10</sup> 1896 is the first sample year for Germany; 1900 is the first sample year for the US. Data for 1934 are available for Germany only. Data source for 1976: Stokman and Wasseur (1985, 31); cf. Ziegler (1984). Data source for the US for 2010: Schifeling and Mizruchi (2013, Table 1).

### The corporate network up to the Second World War

At the turn of the 19<sup>th</sup>/20<sup>th</sup> century, the density of the German network was still lower than that of the US-network; by 1914 the density was significantly higher in Germany, reaching its highest level in 1928 (16.2%). The period before 1914 was a period of take-off and consolidation. Many firms became public corporations listed on the stock exchange. They were connected to each other by directors with many board positions.<sup>11</sup>

Figure 3: Network density: Germany (G) and United States (US) 1896-2010



Why was the network density so high in Germany in 1928? It never again reached this high level later in the century, and neither France nor the US had a corporate network of such high density in any year during the 20<sup>th</sup> century. There are two possible explanations.

During the 1920s the network became *concentrated* upon a small group of German managers who were repeatedly nominated to sit on the supervisory boards of large German firms.<sup>12</sup> In 1896, the top-15 German big linkers had on average 5.7 positions in the network; in 1928, they had on average 23.8 positions. The larger the number of positions held by the big linkers, the higher the density of the network.<sup>13</sup> If we

<sup>11</sup> Carl Klönne (Deutsche Bank) was sitting on 20 supervisory boards; Walther Rathenau (AEG) had 19 board positions; Carl Fürstenberg (Berliner Handelsgesellschaft) had 18 board positions.

<sup>12</sup> Here is a list of the five top-linkers (number of positions in parentheses): J. Goldschmidt (47, banker), O. Schlitter (33, banker), L. Hagen (29, banker), P. Silverberg (25, only supervisory board), A. Vögler (25, steel). In 1923, Louis Hagen was the chairman of a group of German bankers who tried to negotiate an agreement with the French occupation army (Jeannesson 1996, 66).

<sup>13</sup> Oskar Schlitter had 33 positions in 1928. This banker created  $(33 \cdot 32) / 2 = 528$  ties in the network. If he had accepted one additional position, the number of ties would have been:  $(34 \cdot 33) / 2 = 562$ ;  $562 - 528 = 33$  additional ties.

eliminate the 15-top big linkers from the German network in 1928, the number of ties in the national network would be reduced by 37%.<sup>14</sup> In the US, the top-15 big linkers had on average 8.3 positions in 1900 und 8.6 positions in 1928. This small difference corresponds to the small difference in density in Figure 3. So, while there was a sharp increase in network density *and* in the average number of positions of the big linkers in Germany, there was hardly any change in the US.<sup>15</sup>

A second explanation for the high density in 1928 refers to specific historical circumstances in Germany. After the First World War, German corporations lost all subsidiaries they owned in the countries of their former enemies; the German economy went through a hyper-inflation (1923) that destroyed the wealth of the middle class and depreciated the equity capital of banks. The French army occupied the industrial centre of Germany (Ruhrgebiet) in 1923 and as a result, many large corporations were forced to move their headquarters out of the *Ruhrgebiet* to the Northern/Southern parts of Germany (Jeannesson 1996). The high density of the corporate network at the end of the 1920s may be interpreted as a *protective* device against an external enemy (the French army) and an internal one (the communist party).

Between 1928 and 1934, the network density declined from 16.2 % to 11.1%. Two explanations may be offered for this decline. First, in reaction to the banking crisis of 1930/31, the German government passed a law that limited the number of supervisory board positions.<sup>16</sup> This made it illegal for any person to hold more than *twenty* supervisory board positions. It was shown that network density strongly increases with the increasing number of positions a big linker is able to accumulate. Accordingly, the density is reduced when directors are forced to reduce the number of positions. The average number of positions the top-15 big linkers held in large German corporations declined from 23.8 (1928) to 18.3 (1934).

Secondly, before 1914 up to the late 1920s, many German big linkers were of Jewish origin, among them Jacob Goldschmidt (47 positions), Paul Silverberg (25 positions), and Georg Solmssen (21 positions). After the Nazi regime came to power in 1933, Jewish directors were ousted from their management and supervisory board positions, with many of them emigrating to the United States or Switzerland. The liquidation of the German Jewish economic elite in 1933/34 also reduced the network density (Windolf 2011).

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<sup>14</sup> The computation refers to the total sample size of 366 firms (isolated firms excluded). Matrix: symmetrized, not dichotomized.

<sup>15</sup> Barnes and Ritter (2001, 206) have published a study on the corporate network in the US for the period 1962-95. They show that during this period 25% of all ties were created by directors holding *two* positions; however, 75% of ties were created by directors holding *three or more* positions. This confirms the argument that density increases with an increasing number of top-big linkers holding many positions.

<sup>16</sup> Cf. Die aktienrechtlichen Vorschriften der Verordnung des Reichspräsidenten über Aktienrecht, Bankenaufsicht und über eine Steueramnestie. 19 Sept. 1931, RGBl I, S. 493.

### *The corporate network after the Second World War*

In February 1947, the British and US occupation powers issued laws on the decartelization and deconcentration of German industry. “By the end of 1948 over 1,100 cartel agreements were formally terminated” (Wells 2002, 154). However, it took almost ten years before the West German Parliament passed an antitrust law.<sup>17</sup> The antitrust law was one of the most controversial economic regulations in West-Germany in the 1950s. Many German managers and entrepreneurs vehemently opposed the antitrust law accusing antitrust of being a violation of the freedom of contract.<sup>18</sup>

Figure 3 shows that the density of the corporate network declined substantially after the Second World War. The first year for which data are available is 1976. Network density was about 6.5% and, by 1992, it had declined further to 4.8%, less than half of what it had been in 1938. It was still, however, significantly higher than in the United States (3.4%). The decline of network density after Second World War was a spill-over effect of the antitrust legislation and of the deconcentration process of the 1950s in Germany.

Finally, by 2010 network density has declined even further to 1.1% making the density of the German corporate network lower than the density of the US-network (1.6%) in 2010. The density of the German network is also lower than in the late 19<sup>th</sup> century. The globalization of the economy and a change in corporate governance rules are important factors in the explanation of this decline.

During the 20<sup>th</sup> century the corporate network was a *national* network. It was a coordination instrument and a protective device for the large indigenous corporations producing in Germany. Globalization has changed this stable environment; in many large German corporations, more than 50% of the workforce is employed outside of Germany (e.g., Siemens, Deutsche Bank). A *national* network is no longer useful for the coordination of market exchange.

The globalization of financial markets has also changed the ownership structure of public corporations in Germany. In many large corporations, institutional owners (investment-, pension-, and hedge-funds) hold the majority of shares. They exercise a strong influence on the corporate governance of the firm. Section 5.4.5 of the *German Corporate Governance Code* stipulates that members of the management board should not take on more than *three* positions on the supervisory board of other corporations.<sup>19</sup> The regulatory approach of the Code is similar to that in the United States; managers are required to ‘comply or explain.’ Managers who hold more than

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<sup>17</sup> Gesetz gegen Wettbewerbsbeschränkungen; the law came into force in January 1958.

<sup>18</sup> Cf. Nörr (1994, 200). Böhm (1956) discusses the question of whether the antitrust law violated the (West) German Constitution.

<sup>19</sup> The revised version (2012) is available at: [http://www.corporate-governance-code.de/ger/download/kodex\\_2012/D\\_CorGov\\_Kodex\\_Entwurf\\_de.pdf](http://www.corporate-governance-code.de/ger/download/kodex_2012/D_CorGov_Kodex_Entwurf_de.pdf) [10 Jan. 2013]

three positions on the supervisory board of other corporations have to 'explain' why they are represented on so many boards. In our data set for 2010, none of the German managers hold more than four board positions, thus complying with the corporate governance code.<sup>20</sup> It has been shown that in 1928 the top big linkers created almost 40% of all interlocks in the network. By 2010, however, big linkers have completely disappeared from the supervisory boards of large German corporations.

## 5. Banks in the corporate network

The position of bankers in the network and the influence they are able to exercise on non-financial firms have always been a central issue in debates over the power of banks. Even before the First World War, Hilferding (1955, 445) maintained that the spheres of industrial, commercial, and financial capital, which had once been distinctly separate from one another, were already under the joint command of high finance. This was an early statement of the *bank hegemony hypothesis* which was reformulated by Kotz (1978) in an influential book. Mintz/Schwartz (1985) argued that banks undeniably occupy a central position in the corporate network, but that this is not necessarily evidence of dominance or hegemony that banks supposedly exercise over industrial firms.

In this section, the position of banks in the corporate network is analyzed for Germany and the United States. The analysis is limited to the network of *directed* interlocks<sup>21</sup>; i.e., the network of executive managers. If the *executive* directors of a bank sit on the board of non-financial firms, these interlocks are called the outdegree of the bank. If the *executive* managers of non-financial firms sit on the board of a bank, these interlocks are called the indegree of the bank. In 1928, each German bank had on average 8.3 directed ties to non-financial firms (outdegree). In the same year, each German bank had 2.1 industrial managers sitting on their supervisory board (indegree; cf. Table 1).

The *outdegree* of a bank is a proxy for the influence the bank is able to exercise over non-financial firms. Bank directors who sit on the boards of many industrial firms have a chance to influence their strategies and to monitor the level of risk-taking of

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<sup>20</sup> They hold one executive position and three non-executive positions on different supervisory boards or they hold four non-executive positions on supervisory boards (professional supervisory board members).

<sup>21</sup> If the executive manager of company A has a seat on the supervisory board of company B (external director), this manager creates a *directed* (primary) tie between companies A and B. If the same manager holds a third position as external director on the supervisory board of company C, a directed interlock is created between companies A and C. At the same time, an *undirected* (secondary) tie is created between companies B and C. The more positions a manager holds in a corporate network, the more *undirected* ties are created. In a corporate network, there are usually many more undirected (secondary) ties. For instance, in the German network (1914) there are 3,219 *undirected* interlocks and 543 *directed* interlocks.

these firms. However, this argument also applies to the bank itself; the indegree of a bank is a proxy for the influence non-financial firms are able to exercise over the bank.<sup>22</sup> Industrial managers who sit on the board of a bank have the opportunity to get loans with favorable conditions. In 1928, each US-bank had on average 3.1 industrial managers sitting on their boards (cf. Table 1).

*Table 1: Interlocks between banks and non-financial firms*

<b>Germany</b>	<b>1900</b>	<b>1914</b>	<b>1928</b>	<b>1938</b>	<b>1992</b>	<b>2010</b>
Outdegree: Banks → non-financials	2.5	5.7	8.3	6.2	6.8	0.5
Indegree: Non-financials → banks	0.4	0.8	2.1	1.9	2.1	0.3
Ratio: Outdegree/indegree	6.3	7.1	3.9	3.3	3.3	1.6
<b>United States</b>						
Outdegree: Banks → non-financials	3.4	3.7	5.2	4.5	1.3	*
Indegree: Non-financials → banks	1.3	1.6	3.1	2.0	2.0	*
Ratio: outdegree/indegree	2.7	2.3	1.7	2.3	0.6	*

Note: \*: Data not available. Figures are calculated from the matrix of directed (primary) interlocks.

Tarr (1966) examined several banks in Chicago that declared bankruptcy between 1893 and 1905. He discovered that local entrepreneurs sitting on the board of banks (*indegree*) actually ‘plundered’ the banks: “In 1893, the Chemical National Bank failed and subsequent examination revealed that most of its funds had been loaned to its directors and stockholders, often on poor security or signature alone.”... [In December 1905] “the Chicago National, the Home Savings, and the Equitable Trust Company had failed.” Cause for the bankruptcy was “...Walsh’s grossly excessive loans to his own enterprises and those of his banks’ directors” (Tarr 1966: 451). Walsh was the CEO of these three banks.

We have calculated the ratio of outdegree/indegree (Table 1). In 1914, the average outdegree of German banks was 5.7; their average indegree was 0.8; the ratio of these two figures is 7.1. This figure means that for every industrial manager sitting on the supervisory board of a German bank, there were 7.1 bank managers sitting on the supervisory board of an industrial firm. German banks sent many more executive directors to the supervisory boards of non-financial firms than they received industrial managers to sit on their own supervisory boards. In the United

<sup>22</sup> A detailed analysis of the composition of the supervisory boards of German banks is given in Krenn (2012, 227-239).

States, the ratio outdegree/indegree is lower for all sample years. In 1992, the US-banks had an average outdegree of 1.3 and an indegree of 2.0. This means, that there were more industrial managers on bank boards than bankers on the board of non-financial firms (ratio: 0.6).

In Germany, non-financial firms were meeting places for bank directors (high outdegree). In the United States, banks were meeting places for managers from industrial firms as the banks coopted many managers from non-financial firms to sit on their boards (high indegree).

How can the differences in the network structure between banks and industry in the two countries be explained? There are institutional differences between Germany and the United States that influence the relationship between the financial sector and industrial firms, among them the structure of the national banking system (universal banks), the different types of financing (debt versus equity), and the distribution of risk among different market actors.

(a) In the United States, the *concentration* of the industrial sector was much higher than that of the financial sector. The trusts controlled large parts of the American industry, while the financial sector was *fragmented* and the activities of financial institutions were confined to the state level. For example, in 1914 the largest steel company in Germany was the *Friedrich Krupp AG* and in the United States it was the *U.S. Steel Corporation*. The largest bank in Germany was the *Deutsche Bank*; its counterpart in the United States was the *National City Bank of New York*. The equity capital of the *Deutsche Bank* was approximately equal to that of *Krupp AG* (250:215 Mio RM), while the equity capital of the *U.S. Steel Corporation* was nearly thirty-five times higher than that of *National City Bank*. The largest American bank in New York had equity capital totaling no more than \$25 million.<sup>23</sup>

American investment banks were financial intermediaries that sold securities (stock and bonds) for large corporations on the financial markets. The banks themselves would not have been able to cover the capital needs of big American corporations from their own resources. State regulation prevented the US-banks from growing into large universal banks.<sup>24</sup> In contrast, in Germany the universal banks controlled relatively large financial funds which enabled them to provide long-term loans to industrial firms for investment purposes.

If the manager of a debtor company sits on the supervisory board of the creditor bank, this relationship is prone to opportunism on the part of the debtor. German

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<sup>23</sup> Sources: Handbuch der deutschen Aktiengesellschaften (Hoppenstedt), Vol. 18 (1914); Poor's Manual of Industrials. New York: Poor's Railroad Manual Co., Vol. 1914/15. Rand McNally Bankers Directory (Bankers Blue Book). New York: Rand McNally Co., Vol. 1914/15.

<sup>24</sup> The McFadden Act (1927) prohibited interstate branching; the Glass-Steagall Act (1933) enforced the separation of investment and commercial banking (Roe 1994).

banks had mixed feelings about co-opting managers of debtor companies to sit on their supervisory boards. The debtors were good customers of the bank, but the bank was also aware of the vicious incentives inherent in such interlocks.<sup>25</sup>

(b) The distribution of entrepreneurial risk differed between the two countries. German banks which granted long-term loans to industrial firms, took over part of the entrepreneurial risk (patient capital). They tried to get a seat on the supervisory board of the debtor company in order to monitor its management. US-banks sold securities to the public. The investors who bought these securities were the ultimate risk bearers. The bank was not liable when the corporation went bankrupt whose securities it had floated. The bank could only lose its reputation.

In the United States, the middle class was able<sup>26</sup> and willing to take over part of the entrepreneurial risk of the second industrialization. The culture of puritanism and the tradition of an immigrant population have shaped the attitude toward risk in the US. In Germany, the bourgeoisie was not willing to invest in risky industrial securities. The bourgeoisie preferred to buy government bonds which were erroneously perceived as being risk free assets.

A final remark refers to the sample year 2010. Table 1 shows that the average outdegree of *German Banks* had dropped from 6.8 in 1992 to 0.5 in 2010. In 1992 *Deutsche Bank* had an outdegree of 47, i.e., the executive directors of *Deutsche Bank* held positions on the supervisory board of 47 non-financial firms.<sup>27</sup> In 2010, the outdegree of *Deutsche Bank* was five. These figures provide further evidence for the hypothesis that the disappearance of big linkers is an important cause for the reduced network density in 2010 (cf. Figure 3).

In the United States, the influence and network centrality of banks had already declined by the early 1990s (Davis and Mizruchi 1999). In 1992, the average US-bank had an outdegree of only 1.3 and an indegree of 2.0. In other words, there were more industrial managers sitting on the board of banks than bankers holding seats on the boards of non-financial firms.

## 6. Intra- and intersectoral interlocks

Interlocking directorates at the intrasectoral level serve to regulate competition among potential competitors. In the United States, this type of interlocking was legally prohibited by the Clayton Act (1914). In Germany, cartels were legalized by the

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<sup>25</sup> The bankruptcy of the German firm *Nordwolle* in 1931 provides an example for this opportunism: C. Lahusen was CEO of *Nordwolle* and member of the supervisory board of *Darmstädter und Nationalbank*. This bank had granted a large loan to *Nordwolle*. However, Lahusen had falsified the balance sheet to get the loan from the *Darmstädter and Nationalbank* (Born 1967, 75-76).

<sup>26</sup> GDP per capita in 1913 (in 1980 international \$): Germany: 1907 \$; US: 3771 \$. The average income of a middle class household in the US was considerably higher than in Germany. Source: Maddison (1989, 113, 128), own computation.

<sup>27</sup> In 1992, Dr. Ulrich Weiß and Hilmar Kopper were members of the management board and "ambassadors" of *Deutsche Bank*. Each of them held positions on the supervisory board of seven other firms.

Supreme Court and, therefore, intrasectoral interlocks could develop to complement cartels.

For both Germany and the United States we have computed matrices that give the densities of the intrasectoral network for each economic sector in the diagonal (interlocks between firms in the same industry) and the densities of the intersectoral network off-diagonal (interlocks between firms in different industries). Then, we have computed a block-model analysis to identify the group of sectors with the highest density. Table 2 shows a selection of industries, that is, the cells of the matrix with the highest densities for 1928 for Germany and the United States. In Germany, both the intrasectoral and the intersectoral densities are relatively high. *Intrasectoral* ties may be used as a coordination device to support the cartel organization in each industry. The *intersectoral* ties are often strategic alliances between companies that are functionally interdependent (vertical integration).

Table 2: Intra- and intersectoral density: Germany-United States 1928

<b>Panel A: Germany</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
1 Electrical industry	0.58	0.46	0.37	0.27	0.33	0.23
2 Steel	0.46	0.59	0.46	0.31	0.41	0.22
3 Mining	0.38	0.46	0.42	0.26	0.32	0.20
4 Chemical industry	0.27	0.29	0.24	0.40	0.23	0.21
5 Mechanical engin.	0.32	0.39	0.31	0.23	0.31	0.22
6 Banks	0.25	0.24	0.22	0.24	0.24	0.29
<b>Number of firms (N)</b>	12	37	34	22	25	59

<b>Panel B: United States</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1 Power stations	0.72	0.04	0.03	0.23	0.05
2 Banks	0.04	0.05	0.08	0.05	0.09
3 Railways	0.03	0.07	0.16	0.04	0.04
4 Utilities	0.22	0.05	0.04	0.16	0.03
5 Electrical industry	0.06	0.07	0.04	0.03	0.13
<b>Number of firms (N)</b>	15	46	39	20	10

Note: Only cells with the highest density are shown in Table 2 (submatrices). Figures in the diagonal give *intrasectoral* density (directed + undirected interlocks); figures off-diagonal give *intersectoral* density. N: Number of firms in each economic sector. Intersectoral density was computed as follows: number of ties/(N<sup>2</sup>); intrasectoral density: number of ties/[N\*(N-1)]. Complete matrices are available upon request from the author. The number of firms (N) also gives the size of the (intrasectoral) network. This size varies considerably between industrial sectors. When (intrasectoral) densities are compared, the different network size should be taken into account.

In the US, the highest *intrasectoral* densities are found among power stations, utilities, and railways. These companies are ‘network specialists’ which are regulated by special federal/national laws. However, the densities in each cell are considerably

lower than those for Germany. For most industries in the US, the *intrasectoral* densities are zero or close to zero.

Summarizing the results we can say that in Germany the *intrasectoral* density was relatively high and increased steadily between 1896 and 1938. The corporate network was used – parallel to the cartels – as an instrument to coordinate the market (regulated competition). The relatively high *intersectoral* density in Germany between several sectors of heavy industry (coal, steel, chemical, mechanical engineering) indicates that the corporate network was either used as a substitute for vertical integration or became the precursor of a vertical combine. German banks were very well interconnected with the sectors of heavy industry, although they did not have the highest density when compared with other business sectors.

In 1992, the *intrasectoral* densities were still high compared to the United States, even though the figures are on a lower level. The German Parliament never passed a law corresponding to the US-Clayton Act (1914) making interlocks between competing firms illegal. Coal mining, the oil industry, power stations, iron and steel, and the chemical industry were among the sectors with the highest *intrasectoral* densities. The financial sector (banking) had the highest *intersectoral* densities; in other words, it was closely connected with almost every other non-financial sector.<sup>28</sup>

## 7. Conclusions

Figure 3 (above) presents panel data for the density of the German corporate network during the 20<sup>th</sup> century. There seems to be no clear trend in the data. A change in density between sample years seems to be determined to a large extent by period-specific historical contingencies.

The period from the late 19<sup>th</sup> century to the First World War was a take-off period for the corporate network in Germany. It was during these years that the central economic institutions of organized capitalism were created. During the 1920s, network density increased substantially, reaching a peak in 1928; the large German corporations were closely connected by many interlocks. It was argued that this dense network was probably a protective device against an external and internal threat. The density decreased thereafter but remained at a relatively high level during the 1930s, at least in comparison to the United States. After the Second World War, the US-occupation enforced the decartelization of German industry. The strong decline in network density was probably a spill-over effect of the decartelization process. After the year 2000, we see the almost complete dissolution of the corporate network in Germany; the density falls below the level of 1896.

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<sup>28</sup> A detailed analysis of the inter-/intrasectoral densities for 1992 is given in Windolf (2002, 71, Table 3.5).

How can we explain the sharp decline of network density after the end of the 20<sup>th</sup> century? During the 1920s, when network density reached its highest level in Germany, there were no legal obstacles that prevented companies from coordinating their behavior. Also, there was no Code that inhibited managers from accepting as many supervisory board positions as were offered to them. However, during the 1990s, the *closed* German corporate network and the cross-shareholdings of large corporations were made responsible for the weak economic performance of Germany and the high unemployment rate.<sup>29</sup> In 2000, the German company Mannesmann was taken over by Vodafone. This hostile takeover was perceived as a warning that signaled the end of solidarity in the network. A final blow for the network was the German Corporate Governance Code which requires that no manager take on more than three positions on the supervisory board of other companies. This was the end of the big linker, who had typically held ten or more positions in the network

In section 2, it was argued that functional interdependencies are important for the stability of the network. Bankers had many positions on the supervisory board of debtor companies to monitor their level of risk-taking. In the 1990s, however, new financial techniques allowed banks to sell off their loans (securitization of debt) and banks could buy a credit insurance to protect themselves from credit losses (credit default swap). Therefore, there was no longer any need to send bank directors to sit on the supervisory board of debtor companies; the bank had sold off the risk.

German banks used to control many proxy votes of large companies (Baums and Fraune 1995). Proxies provided block votes to banks and enabled them to get their directors elected to the supervisory boards. Bank directors not only monitored their customers, they also protected them against hostile takeovers. This changed when German banks entered the investment banking business; they were no longer interested in blocking hostile takeovers. On the contrary, they earned a lot of money by *promoting* takeovers. This is a further example that illustrates how the dissolution of functional interdependencies weakened the German corporate network (Höpner and Krempel 2004).

Many authors have argued that there is no 'one best way' to achieve economic efficiency, but that there are different models of capitalism. Systems of economic institutions vary between countries due to cultural differences and historical heritage (Hall and Soskice 2001; Chandler 1990). The rise of neoliberalism has put the issue of the *convergence* of national systems of capitalism on the agenda once again. The global integration of markets, the rise of the 'new economy' and the implementation of global standards of corporate governance have put pressure on governments and economic actors to adopt a neoliberal program of deregulation and to dismantle rent-

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<sup>29</sup> "Germany Inc." (Deutschland AG) was frequently used as a shorthand term for the German corporate network. The early stage of its dissolution is analyzed in Beyer (2003).

seeking institutions. The corporate network is regarded as one of those rent-seeking institutions that should be replaced by free markets and unfettered competition.

Figure 3 shows that the density of the German corporate network continuously declined after the Second World War. By 2010, the network has been effectively dismantled and the difference between Germany and the United States has disappeared. However, it would be premature to conclude that the economic institutions in Germany and the United States have converged completely, even though we observe a *partial* convergence due to the deregulation of markets. At the same time, the re-regulation of financial markets may create new forms national differences.

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