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Executive Remuneration and Firm Performance: The Case of Large German Banks, 1854–1910

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The conflict of interest between shareholders and managers is a classic example of a principal–agent relationship. The owners of a joint-stock company (principals) delegate the management work to executives (agents). Usually, the shareholders know less about the state of the business, managerial actions and firm opportunities than the executives do. This information advantage opens the possibility for the managers to maximise their own income, instead of that of the shareholders. If the principals are aware of this problem, they might design incentive compatible remuneration schemes – e.g. rewarding a profit share – for the agents. This article addresses the question whether and how the principal–agent problem was recognised, understanded and solved by nineteenth-century principals. Especially, the paper shows that principals quickly started to close incentive-related working contracts with agents and that these contracts became more complicated during the later decades of the nineteenth century.

In Germany, the first joint-stock companies with limited liability and separation of management and ownership were founded during the nineteenth century. The economic influence of joint-stock companies rose significantly during the 1850s and especially after the liberalisation of the joint-stock companies act in 1870. In the field of banking, the first joint-stock Kreditbank was the Schaaffhausensche Bankverein, founded 1848 in Cologne. During the 1850s, several banks followed, in particular the Bank für Handel und Industrie, established 1853 in Darmstadt. The large German banks of today (Deutsche Bank, Dresdner Bank, Commerzbank) were founded in the years 1870–73.

No study investigating the pay–performance link has been undertaken in German business history. Some related information has been published in contemporary or modern studies of the nineteenth-century banking sector, but this is not sufficient to establish a formal link between firm performance and executive remuneration. For example, Georg Siemens, the CEO of Deutsche Bank from 1870 to 1900, received an annual basic salary of 4,500 marks (M); later, it was increased to 12,000 M. In the beginning, the profit share or performance pay element was low.[1] His income seems very low compared with other employees at Deutsche Bank: the directors of the branch in Bremen, von der Heyde and Krüger, received an annual basic salary of 9,000 M and profit shares of 11,000 M (1878)

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and 15,000 M (1881), respectively.[2] This also indicates that performance-related pay made up a large share of total payment at the Deutsche Bank. This relationship held for the middle management too: in 1886–87, a head clerk at the Bremen branch, Corssen, received a basic salary of 6,500 M a year, a profit share of 1,750 M and a 'personal allowance' of 5,000 M.[3] At another large German joint-stock bank, the Commerz- and Disconto-Bank, Sally Werner and August Fedisch, two of the first directors, received basic salaries of 22,500 M and 12,000 M in 1871, respectively.[4] In view of the average income per head, this was a very high fixed income. Significant profit shares were paid to the unlimited partners of the Disconto-Gesellschaft – a Kommanditgesellschaft auf Aktien – the leading German bank during the late nineteenth century. Adolph Hansemann, the most important partner, received profit shares of circa 497,000 M (1870), 1,316,000 M (1871), 1,841,000 M (1872) and 973,000 M (1873).[5] This information conforms well with the figures given by Reitmayer: Hansemann of the Disconto-Gesellschaft was the only bank manager whose income was higher than one million M during the 1870s. Reitmayer also notes that the incomes of bank managers rose significantly during the 1880s.[6]

The use of incentive-related pay was not confined to the banking sector.[7] It was also pronounced in banking, insurance, food processing and heavy industry, but much less so in mining and transportation. In 1880, 65 out of 70 profitable banks paid profit shares to the executives. The average profit share was 7.7 per cent of the accounting profits. On the other hand, only seven out of 20 profitable railway companies paid profit shares to the executives, and these amounted to only 1.2 per cent of the accounting profits.[8] Like today, the payment of executives was discussed in the late nineteenth and early twentieth century. For example, Otto Warschauer, an Economics Professor at Berlin University, discussed that issue *in extenso*. Generally, he criticised the high payment of supervisory board members. According to a sample of 37 companies, the average firm paid bonuses of more than 150,000 M to the supervisory board and an average member received nearly 14,500 M, exceeding the average income per head by far.[9]

Overall, this poor knowledge about the historical development of the pay–performance link is insufficient, especially in view of many recent studies. In 1990, the seminal contribution of Jensen and Murphy showed that the total income (salary plus bonus) of top executives in the United States during 1974–86 was related to the shareholder value of their firms.[10] But they also showed that this relationship was weak and supposed that it was stronger in pre-World War II times. But they cannot present supporting evidence for this claim. On the other hand, a later study showed that the dynamic pay–performance link (the pay linked to the performance of several years) became stronger in the post-1948 years, whereas the static pay–performance link (the pay is only linked to the contemporaneous performance) became weaker.[11] The finding of a weak, but significant, pay–performance link was confirmed for other countries. For Germany, Schwalbach and Graßhoff verified the findings for a sample of industrial firms for the years 1988–92: the top manager pay was related to the

stock-market return and the revenues of the firms.[12] In addition, this relationship became stronger during the decade 1987–96.[13] These results indicate that the pay–performance link had existed for several decades, but that one might find a change in the relationship while investigating it over a very long period.

The rest of this article is organised as follows: after a short summary of principal–agent theory and the employed econometric methods (section II), the data will be described in section III. The following section investigates the working contracts of executives at the Bank für Handel und Industrie, one of the leading German joint-stock Kreditbanken. This case study informs us about the contract structures, the applied performance measures and the remuneration level of managers. Section 5 generalises results from the case study by using statistical data from the balance sheets of nine large German joint-stock Kreditbanken. The final section concludes.

II

Agency models assume that management effort and management quality are not fully observable to the principals' respective shareholders.[14] And even if the efforts were fully observable, the information costs might be considerable and therefore it could be optimal for the principals to stay incompletely informed. The information advantage of the managers opens the possibility for them to maximise their own income, instead of the principals' incomes or shareholder value. The principals can try to circumvent this problem by setting incentives for the agents: if the agents receive a part of the profits or a part of the increase in shareholder value, then they might perform their management tasks more in line with the aims of the shareholders.

Assume that the managerial effort is denoted by e and the outcome (e.g. the profit or rise in shareholder value) is labelled π. The outcome π is influenced by the management effort e, but also by random effects π (e.g. economic growth, general stock-market performance, interest rates, luck etc.). An optimal incentive scheme takes into account the outcome π and the division of risks between principal and agent. Such a contractual structure is described by equation 1:[15]

$$I(\pi) = F + \beta\pi \tag{1}$$

The agents receive a fixed basic salary F and a profit share β; the principals receive the remaining profits $(1-\beta)\pi$. Usually, the managers will not receive a loss share when the profits are negative and the fixed income is strictly non-negative. Generally, risk-neutral principals and risk-neutral or risk-averse agents are assumed.[16] In case of risk-neutral agents, it is optimal for the principals to sell π for a fixed amount to the agents ($\beta = 1$). In case of risk-averse agents it becomes optimal to offer the agents a profit share less than 1.

The theoretical model can be tested by applying ordinary least square (OLS).[17] The outcome π can be represented by several criterions, e.g. accounting profits p,

total assets a or stock-market return r. In the case of a fixed manager wage, a constant f can be added to the equation. Furthermore, if one is interested in the development of the pay–performance relation over time, one can use first differences Δ instead of the original figures.[18] The most comprehensive equation takes then the form (with t denoting time and b denoting bank and ε an arror term):

$$\Delta I_{t,b} = f + \alpha_1 \Delta p_{t,b} + \alpha_2 \Delta a_{t,b} + \alpha_3 \Delta r_{t,b} + \varepsilon \qquad (2)$$

This pooled regression can be estimated using OLS.[19] The tables in the text present the estimated coefficients for α_i.

In addition, researchers must choose whether to measure the income I in mark M or logarithms of M. This choice determines whether the regression coefficients are interpreted as pay–performance sensitivity (estimation in M) or pay–performance elasticity (estimation in log M). The non-logarithmic representation has the disadvantage that the pay–performance sensitivity varies monotonically with firm size, whereas the elasticity is relatively invariant to firm size. On the other hand, the sensitivity represents the agent's share of value creation (e.g. accounting profit, shareholder value etc.), and is thus easy to interpret.

III

Two data sources are used for this article: Alfred Bosenick's book *Neudeutsche gemischte Bankwirtschaft*, published in 1912,[20] and working contracts for the directors of the Bank für Handel und Industrie. They are kept at the Cologne city record office, as part of the archive of Gustav Mevissen.[21] Mevissen was the chairman of the Bank für Handel und Industrie in the years 1853–76, and he kept copies of the contracts in his private files.

Bosenick's book has a detailed statistical appendix with figures from nine large German Banks: Schaaffhausensche Bankverein, Bank für Handel und Industrie, Disconto-Gesellschaft, Berliner Handels-Gesellschaft, Mitteldeutsche Creditbank, Deutsche Bank, Commerz- und Disconto-Bank, Dresdner Bank and Nationalbank für Deutschland. In 1910, the last year for which data are reported, these banks had total assets of nearly 7.9 billion M and they represented a market share of German joint-stock Kreditbanken of about 52 per cent. Generally, the data series start in 1871, but unfortunately German accounting rules did not prescribe the publication of profit and loss statements until 1884. The earliest data for the Schaaffhausensche Bankverein are therefore for 1884. The Disconto-Gesellschaft published its first data in 1885. Data series for the Dresdner Bank and Nationalbank für Deutschland start in the foundation year of the respective banks (1873 and 1881). A maximum of 309 observations are thus included in the pooled OLS estimation. The profit shares paid to the board of directors and to the members of the supervisory board are reported by Bosenick on pages 220–36. It is important to note that a strict separation between the board of directors with executive functions and the supervisory board was effective only after 1884.

Before that year, the members of the supervisory board often had executive functions. Further, the Schaaffhausensche Bankverein did not report separate profit shares for executives and supervisory board members until 1905. Therefore, the total bonus payments to the supervisory board and to the board of directors are related to the performance measure. The annual accounting profits are reported by Bosenick on pages 220–36, the total assets and the distribution of assets on pages 278–95, and the share prices on pages 314–15. One should note that the sample is not random, that it is very small and that it has a bias towards large banks. Another shortcoming of the data is the missing information about the fixed or basic salaries of the executives. Only the total administration costs, including all personal costs, were reported in the profit and loss statements. Furthermore, it is not possible to figure out how much was paid to a single executive, because profit shares were only reported jointly for all members of the boards. The use of accounting figures could be problematic if the data are not reliable. The legal rules concerning the valuation of assets and liabilities were quite clear; all assets and liabilities must be valued according the actual value.[22] The books and balance sheets were internally audited by the supervisory board; there was no external auditing process. Thus, the profit data could be biased, leading to higher profit shares for board members. Nevertheless, there is no systematic historical evidence for misbehaviour of the large joint-stock credit banks in this regard. To control for the general economic development, the net national product (NNP), the stock-market index and the real interest rate are included. All nominal data are deflated to 1913 prices. Furthermore, the average number of executive board membership years is included.

Information on the remuneration of individual executives, including information about their basic salary, were extracted from the working contracts of the directors at the Bank für Handel und Industrie.

IV

The Bank für Handel und Industrie, also known under the name Darmstädter Bank, was founded in 1853 by the Cologne private bankers Oppenheim, the Cologne businessman Mevissen and the Frankfurt banking house Bethmann.[23] A substantial part of the capital was taken by the French Crédit Mobilier. The Bank für Handel und Industrie was the first German bank operating like the Crédit Mobilier. The main activities of the bank were therefore the financial market and IPO business, whereas the regular commercial banking was only a minor activity. The bank was one of the leading joint-stock banks in Germany during the nineteenth century: Measured by total assets it ranked fourth in 1910.

The executives of the Bank für Handel und Industrie were divided into two bodies: the Administration Council (up to 1863, thereafter called the Supervisory Board), and the Direction (up to 1863, thereafter Vorstand). The duties and responsibilities of the executives were described in the statutes of the bank, which date from 4 April 1853.[24] The highest executive and control functions were

delegated to the 18-head administration council (statute 12). The members of this council were elected by the shareholders for six years. Members of the first Administration Council *ex statuto* were Gustav Mevissen (president), Abraham Oppenheim (vice-president), Dagobert Oppenheim, Victor Wendelstadt and Jacob vom Rath (statute 13). The president and vice-president were elected for one year by the Administration Council, not by the shareholders. In addition, the Administration Council – again not the shareholders – elected a standing committee of five of its members. This standing committee also had an election period of six years. The first members *ex statuto* were Gustav Mevissen, Abraham Oppenheim and Jacob vom Rath (statute 21). The Administration Council – and especially the standing committee – had far-reaching responsibilities, including the execution and supervision of all business, appointment of the directors, decision about dividends and reserves, and dismissal of the directors (statute 16). The Administration Council was thus a mix of executives (agents) and shareholder delegates (principals). The 18 administrators did not receive a fixed payment, but ten per cent of the annual net profit. The net profit was defined as the accounting profit less four per cent dividend of the paid-up capital. From this ten per cent profit share, the president and vice-president – Mevissen and Abraham Oppenheim – received a joint share of one-third, leaving two-thirds for the 16 remaining members of the Administration Council (statutes 22 and 40).

The second body of the bank was the board of directors. It had at least four members, including one president (statute 23). The directors were required to act on behalf of the Administration Council – not on behalf of the firm or the shareholders – and were responsible for executing the details of the business, whose general lines were outlined by the standing committee of the Administration Council (statute 24). The directors received a fixed salary and a profit share, both set by the Administration Council, and not bounded by statuary regulations.

The rules concerning the Administration Council were modified in 1863 and 1877. In 1863, the bank reacted to the new joint-stock companies act of the Allgemeine Deutsche Handels-Gesetzbuch (General German Commercial Law), which had been introduced in 1861. The Administration Council was re-named the Supervisory Board. The executive functions of this body were somewhat restricted, and the supervisory functions became stronger. Nevertheless, the Supervisory Board remained the final instance in all doubtful decisions. In 1877, the cause for the new statutes came from inside the bank. During the stock-market boom of the early 1870s, the executives of the bank were extremely well paid, but the high profits and high profit shares were related to a risky business structure. In the following years, substantial losses occurred, and the profits fell.[25] Thereafter, the total profit share of the Supervisory Board, which was defined in number 22 of the statutes, was reduced from ten to eight per cent of the net profits. The fraction assigned to the president and the vice-president of the Supervisory Board was reduced from one-third to one-quarter.

The archival records of the working contracts are incomplete, but they are, to the author's knowledge, the only available working contracts of mid-nineteenth-

century German bank managers. 23 contracts with 14 directors were sealed during 1853 and 1871 and copied for the head of the Supervisory Board, Gustav Mevissen. The total performance-related payments were annually reported in the balance sheets of the bank, and, on average, 75 per cent of all profit-related payments of the bank to the directors during the years 1854–78 can be explained by the passed on contracts. The remaining quarter of the total payments might be explained in two ways. First, it is possible that some working contracts were lost. Second, it seems that the standing committee of the Administration Council also received significant profit shares during the 1850s. Up to 1858, only half of the accounted-for directors' profit shares can be explained via the contracts. This proportion improves to nearly 90 per cent during the 1860s. This could be related to the introduction of the Supervisory Board in 1863, which has had fewer executive functions than the former Administration Council. Therefore, the standing committee could have not received further bonus payments. Another problem is that the total profit shares from the contracts were slightly higher than accounted payments in 1867 and 1871. Perhaps some executives died or contracts were revisited, and these occurrences were not noted in Mevissen's files

Table 1 summarises the pay–performance link at the Bank für Handel und Industrie. It shows estimated results for the linear model, as outlined in section II. At the Bank für Handel und Industrie, about 15 per cent of a profit increase was

TABLE 1
EXECUTIVE PAY–PERFORMANCE SENSITIVITIES AND ELASTICITIES, BANK FÜR HANDEL UND INDUSTRIE

Independent Variable	Dependent Variable: Δ Bonus Pay, 1854–1910 (sensitivity)	Dependent Variable: Δ ln Bonus Pay, 1854–1910 (elasticity)	Dependent Variable: Δ ln Bonus Pay, 1854–1878 (sensitivity)	Dependent Variable: Δ ln Bonus Pay, 1854–1878 (elasticity)
Regression number	1	2	3	4
Δ Accounting profits	0.1496		0.1157	
(t-value)	7.94*		6.65*	
Δ ln Accounting profits		1.4040		1.3104
(t-value)		7.68*		3.27*
ΔTotal assets	− 0.0023		− 0.0011	
(t-value)	− 1.84		− 0.39	
Δ ln Total assets		− 0.2007		− 0.1049
(t-value)		− 0.65		− 0.17
Δ NNP	0.0160		0.0075	
(t-value)	0.38		0.12	
Δ ln NNP		0.2017		0.2747
(t-value)		0.13		0.14
No. of Observations	56	48	24	18
R^2	0.5459	0.5679	0.6801	0.6011
Adj. R^2	0.5288	0.5487	0.6496	0.5479

Notes: * denotes significance at a one per cent level.
Source: Cologne City Record Office, 1073, 427.

used as bonus payment to the executives (members of the Supervisory Board and its predecessor, the Administration Council, and members of the Vorstand and its successor, the Direction) during the years 1854 to 1910 (regression 1). For the years 1854–78, for which we have contractual information, this share was only 11.9 per cent. This conforms well to the fact that the number of executives – and thus the bonus payments to them – rose during the 1870s.

The pay–performance elasticity (regressions 2 and 4) show that a one per cent profit increase led to an 1.4 per cent increase in bonus payments during 1854 to 1910, and to a 1.3 per cent profit increase during 1854–78. Both relationships, the pay–performance sensitivity and the pay–performance elasticity, became stronger during the nineteenth century, but the explanatory power of the linear model dropped slightly. Thus it seems that the payment rules were initially linear, but were supplemented with non-linear parts as time moved on.

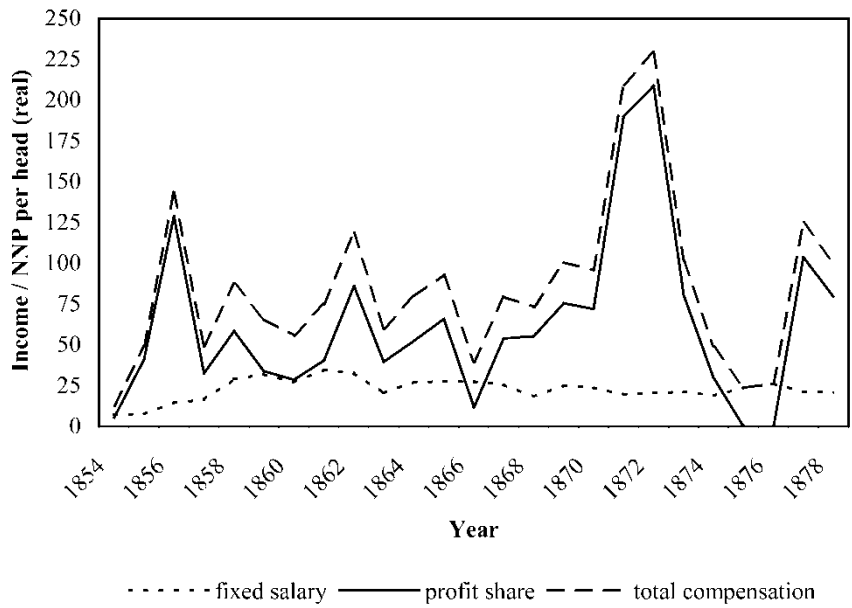
The elasticities and sensitivities became greater in the late nineteenth century, indicating larger profit shares for the agents, and lower profit shares for the principals. Further – and this is a first important result – the other performance measure, total assets, had no significant influence on performance pay. The general economic climate – represented by the NNP – did not influence the bonus payments either. Table 1 shows a negative, but insignificant, impact of the total assets on bonus payments for both periods. Therefore, the managers were not rewarded for firm growth. The incentives were very strong compared with modern corporations. The executive remuneration depended strongly and significantly on the firm performance. The executives were rewarded for effort and successful management, when this resulted in higher accounting profits. A growth strategy, leading to more assets, was not rewarded. We have thus revealed that the incentives were strong and linearly related to the accounting profits, but we do not yet know anything about the level of executive remuneration.

In fact, the directors of the Bank für Handel und Industrie were very well paid. During the years 1854–78 the average director received a mean annual total remuneration of 32,004 M. The fixed salary amounts to 7,557 M, the profit share amounts to 24,447 M. Thus, more than three-quarters of the total remuneration was profit shares. To draw a comparison: the average net national product per head was around 320 M in those years.[26] The executive remuneration exceeded the average income by a factor of 100. The average income of directors peaked in 1872. In this year, the nine executives covered by the sample received an average remuneration of 93,116 M, of which 84,800 M or 91 per cent was profit-related. The executive income was nearly 230 times the national average. This extraordinary high remuneration was due to the stock-market boom and the general economic upturn of the early 1870s. After reforming the joint-stock companies act on 11 June 1870, the German economy saw a boom in the establishment of such companies. The general stock-market index doubled in two years, and the Bank für Handel und Industrie participated in this boom. Total assets grew from 53.8 million M in 1869 to 151.9 million M four years later, profits reached nearly eight million M in 1872, and the average

dividend in the six years 1869–74 was nearly 12 per cent of the paid-up capital. But after the stock-market crash of 1873, the executives felt significant income risk. In the recession following the crash, the profits of the bank fell sharply and no profit shares were paid in 1875 and 1876. Due to this, the average executive remuneration decreased to 10,284 M (1875) and 11,141 M (1876), only 25 times the national average. A similar, but weaker in its results, development can be reported for the 1850s. During the stock-market boom of 1856–57 the profits of the bank and the profit shares of the executives were high, but in the year of the stock-market crash, 1857, their remuneration went down. The directors received an average remuneration of 37,202 M in 1856 (90 per cent stemming from profit shares), but only 11,963 M in 1857. This means that the total income was 146 times the average national income per head in 1856, but only 47 times in 1857.

The relative remuneration of the bank directors or Vorstandsmitglieder is summarised in Figure 1. It depicts the fixed, variable and total remuneration of the directors relative to the net national product per head of the respective year. The fixed or base salary was more or less stable at around 25 times the average national income per head. Total income was dominated by the profit share, which fluctuated between zero and 200 times the average national income per head. Only

FIGURE 1
RELATIVE INCOME OF THE DIRECTORS



Sources: Cologne City Record Office, 1073, 427; and W.G. Hoffmann, *Das Wachstum der deutschen Wirtschaft seit der Mitte des 19. Jahrunderts* (Berlin, 1965), p.825.

in three years – 1867, 1875 and 1876 – was the fixed salary higher than the profit share.

We now turn to the remuneration of the Administration Council (later the Supervisory Board), whose members only received profit shares. In consequence, the income of the Supervisory Board members was more variable, than those of the directors. The board members did not get remuneration in 1859–60 and 1875–76. Nevertheless, the mean income of ordinary board members was high, but far exceeded by the remuneration of the president and vice-president of the supervisory board. Averaged over the years 1854–78, ordinary board members received a mean annual profit share of 6,755 M, the president and vice-president as much as 25,146 M. One should keep in mind that the board members also had sources of income. For example, the vice-president of the supervisory board, Abraham Oppenheim, was co-owner of the Cologne private banking house Sal. Oppenheim jun. & Cie., one of the largest private banking houses in Germany. His brother Dagobert Oppenheim was board member at the Bank für Handel und Industrie, co-owner of the banking house, and head of the Supervisory Board of the Cologne-Minden Railway, one of the largest German railway corporations. Further examples could be given for other members of the Supervisory Board.

The regression results (Table 1) indicate that the performance pay was linearly related to the accounting profits, but were complemented with non-linear elements over time. These can be examined further via the contracts of individual directors. The first contracts were signed with Lazarus Hess and Theodor Wendelstadt in 1853.[27] The contract with Hess ran from 1 May 1853 to 31 December 1857, the contract with Wendelstadt from 31 May 1853 to 31 May 1858. In both cases, the contract duration was approximately five years, a duration which would become a standard for the bank: 14 out of the 23 contracts under investigation had a contract period of five years. During the 1860s and 1870s, several contracts were closed with an initial contract period of five years and an option for another five years or the contracts ran from the beginning for ten years. Eight contracts have had a contract period of ten years. The only exception to this pattern was the 1868 contract with Ciron Niederhofheim, head of the Frankfurt branch of the Bank für Handel und Industrie. In his case, the contract period was eight years, and the contract ran from 1 January 1869 to 31 December 1876.[28]

The first contracts with Hess and Wendelstadt from 1853 differed particularly in one way. The contract with Hess set a fixed salary of 2,000 florins (about 3,428 M), but no profit share.[29] On the other hand, the contract with Wendelstadt prescribed no fixed salary, but a profit share of two per cent of all net profits exceeding a return on equity of four per cent. This means that Hess received, independent of his efforts, 2,000 florins, whereas Wendelstadt only received a payment at all when the profits were higher than the threshold performance. Therefore, Hess had no incentive to work hard, and Wendelstadt had a very high income risk, but a strong incentive. In the years 1854–57, Hess got his fixed income of 3,428 M, but he did not participate in the successful development of the bank; during the economic upturn and stock-market boom

of the mid-1850s, the total assets of the bank rose from 8.7 million M (1854) to 51.9 million M (1857), and the average dividend was more than nine per cent during the period 1854–57. In 1856, the dividend reached its all-time peak of 21 per cent, the profits stood at 3.3 million M that year. Wendelstadt participated in the success and his profit shares were immense: he received profit shares of 2,603 M (1854), 18,561 M (1855), 52,342 M (1856) and 11,945 M (1857).[30] In these four years, Hess earned an average salary of 3,428 M and Wendelstadt got an average profit share of 21,363 M. Wendelstadt received payments more than six times those of Hess. The income difference between the two directors was immense.[31] In addition, one should keep in mind that the average net national product per head was about 240 M in the mid-1850s. Hence, while Hess's income exceeded the average income per head more than 14 times, Wendelstadt's was 89 times higher.

The Bank für Handel und Industrie hired a third director in 1856. August Parcus signed a contract which started on 1 February 1856 and ended 1 February 1861. His contract was a mix of the two above-mentioned contracts: a fixed salary of 5,000 florins (8,570 M) *per annum* and a profit share of two per cent. His income risk was lower than Wendelstadt's, and his incentives were stronger than Hess's. It seems that the bank quickly learned to set incentives for its agents and to guarantee them an adequate fixed salary. In 1858, Wendelstadt's contract was extended and modified, Hess's contract was not extended and, for him, Hermann Hirschberg became the new director. Wendelstadt's new contract promised him a profit share of two per cent and a minimum – not fixed – payment of 8,000 florins. His income risk was now lower, but the incentives remained. Hirschberg's contract was significantly better, because he would receive a fixed salary of 12,000 florins per annum, a profit share of two per cent and a guaranteed minimum profit share of 5,000 florins.[32] Hermann Hirschberg was obviously a very well qualified bank manager, because the equivalent contract agreed with Friedrich von Wittgenstein, the fourth director, prescribed only a profit share of two per cent and a minimum profit share of 5,000 florins, and no fixed salary.[33] The conclusion from these contracts is clear: the Administration Council of the bank promised profit shares to the directors to give them strong incentives to work successfully for the bank. The profit share of two per cent became standard in the contracts of the Bank für Handel und Industrie during the 1850s to 1870s: 15 out of 23 contracts promised this. In addition, a fixed payment of 5,000 florins became another standard, applied to ten contracts. The contracts of the 1850s were very modern. They had a linear incentive structure and the directors (and the Administration Council) only received incentive pay after a performance threshold (a return on equity of four per cent) was reached.

But some directors of the bank were not satisfied with the contracts. On 1 January 1861, nearly two and half years before his contract expired, Wendelstadt and the bank negotiated a new ten-year contract with a fixed payment of 4,000 florins and a profit share of two per cent.[34] He now received a fixed salary, but his guaranteed minimum profit share of 8,000 florins was swept away. In 1867, this

contract was annulled and, from 1 January 1868, Wendelstadt got a new, five-year contract with a fixed salary of 5,000 florins and a profit share of two per cent.[35]

Two other contracts were also prematurely renewed. Heinrich Bopp and Georg Schmoller became directors of the bank on 1 January 1868. Both had ten-year contracts with a fixed salary of 2,500 florins and a profit share of one per cent.[36] During the late 1860s, the business of the Bank für Handel und Industrie expanded. The total assets rose from 31.2 million M (1867) to 53.8 million M (1869), the dividend rose from 6.5 per cent to ten per cent. In addition, a large reform of the German joint-stock companies act was in sight. After the reform of the General German Commercial Law on 11 June 1870, it became possible to establish joint-stock banks in the whole of Germany without concession. This law, the favourable business climate, the large reparation payments after the Prussian–French war of 1870–71 and the foundation of the German Empire in 1871 led to a stock-market boom and to the establishment of more than 100 joint-stock banks in Germany.[37] During these years, human capital became increasingly scarce and the newly founded joint-stock banks searched for experienced bank managers. This situation might have led the Supervisory Board of the Bank für Handel und Industrie to offer more attractive contracts to Bopp and Schmoller. Starting on 1 January 1870, both agreed new ten-year contracts.[38] Both contained a benefit package with increasing returns to the managers. The fixed salary, which was 2,500 florins in the old contract, was set at 3,000 florins in 1870, 3,500 florins in 1871, 4,000 florins in 1872, 4,500 florins in 1873, and 5,000 florins thereafter. The profit share rose in the same way. It was one per cent in the old contract, but now it increased from 1.2 per cent in 1870 to two per cent in 1874 (the steps were 0.2 per cent annually). This contract structure with increasing incentives was also used for the initial contract between the bank and Johannes Kaempf in 1871.[39] Compared with this, Franz Dülberg initially received a ten-year contract, starting 1 July 1871, with a fixed salary of 5,000 florins and a profit share of two per cent.[40] One can interpret the rising salaries and incentives as an approach designed to keep managers at the bank, to offer them future rewards for loyalty.

A last remarkable point is the close pay–performance link established by the Bank für Handel und Industrie at its Frankfurt branch. After the foundation of the Bank in Darmstadt (near Frankfurt) in 1853, the Administration Council wanted to establish a branch in Frankfurt. The senate of Frankfurt, then a free town, refused.[41] The bank therefore decided to open an agency in Frankfurt to carry out its large stock-market business. The agent of the bank was the private Frankfurt banking house of Niederhofheim. In 1864, the Bank für Handel und Industrie bought this banking house – the first takeover of a private bank by a joint-stock bank in Germany – and the owner of the bank, Ciron Niederhofheim, became manager of the now established Frankfurt branch. His first contract ran from 1 January 1864 to 31 December 1868; he got a fixed salary of 6,000 florins and a profit share of one per cent.[42] His second contract, which ran from 1 January 1869 to 31 December 1876, again prescribed a fixed income of 6,000 florins, but now

the profit share was five per cent of the net profit of the Frankfurt branch.[43] With the new contract, Ciron Niederhofheim now felt his efforts were more directly reflected in his income. The Frankfurt branch was very profitable.

V

This section tries to answer the question as to how far the results found for the Bank für Handel und Industrie can be generalised to a sample of banks.[44] We would expect to find a good fit of the linear model, while relating the bonus payments to the accounting profits. In addition, it is possible that other banks employed other performance measures, for example the total assets or the share price. Again, we have to control for several economic variables (NNP, stock-market index, real interest rate). In addition, the average number of membership years of executives. For the nine banks in the sample, the average bonus payments during the 40 years investigated (1871 to 1910) reached 764,656 M annually per bank. This is an enormous amount: the average net national product per head was about 345 M in 1871 and 705 M in 1910. Even if a bank paid bonuses to 30 executives, the average executive would have received more than 25,000 M per annum or nearly 50 times the average income. On average, 10.9 per cent of the accounting profits were paid out as executive bonuses.

Table 2 shows the estimated results for the pay–performance elasticities (estimation in log). These elasticities inform us about the change in bonus pay when the independent variable, such as the accounting profit, rises by one per cent. In accordance with the outlined bonus rules at the Bank für Handel und Industrie, the accounting profits are important in explaining the variation of bonus pay. Regression 1 of Table 2, a simple linear regression with the accounting profits as the only explaining variable, shows that when the accounting profits increased one per cent the bonus pay rose more than 1.44 per cent. This relationship is highly significant, and a large part of the variance is explained ($R^2 = 0.76$).[45] Employing a richer econometric model reduces this elasticity to about 1.36, and the share of explained variance drops slightly.

Adding further variables, a constant, or fixed effect (regressions 2 to 4) to the estimation equation gives us other insights. The share price is significantly positively related to bonus payments, whereas the total assets are negatively – and insignificantly – correlated with the bonus payments. Thus, it seems that the executives were rewarded for high profits and these high profits led to high returns for the shareholders, the principals. The general economic environment had no influence on the bonus payments. It is important to note that a long average board membership is significantly negatively correlated with bonus payments. This might be explained via the accumulation of firm-specific human capital by the managers, for which no bonus is rewarded, since the human capital is firm-specific and would not yield an income for the managers on the general labour market. Another explanation is the better co-ordination of firm activities and executive functions by experienced managers. Both, the higher firm-specific

TABLE 2
EXECUTIVES' PAY–PERFORMANCE ELASTICITIES

Regression No.	1	2	3	4
Description	Simple	Multiple	With Constant	Fixed Effects
Constant			0.024	
Δ ln Accounting profits	1.4445	1.3659	1.3660	1.3549
(t-value)	27.49**	11.49**	11.35**	12.01**
Δ ln total assets		−0.2893	−0.3421	−0.3584
(t-value)		−1.56	−1.64	−1.74
Δ ln share price		0.4697	0.4673	0.4514
(t-value)		3.07**	2.96**	2.86**
Δ ln stock market index		0.4866	0.4961	0.5452
(t-value)		1.65	1.69	1.88
ln NNP		−0.2184	−0.6139	−0.6376
(t-value)		−0.57	−1.24	−1.30
Δ ln real interest rate		−0.0041	−0.0095	−0.0090
(t-value)		−0.22	−0.50	−0.48
Δ ln membership duration		−0.1181	−0.1334	−0.1402
(t-value)		−2.13*	−2.28*	−2.31*
Number of Observations	273	209	209	209
R^2	0.7615	0.7404	0.7398	0.7495
adjusted R^2		0.7327	0.7307	0.7300

Notes: ** denotes significance at a one per cent level.
* denotes significance at a five per cent level.
Sources: A. Bosenick, *Neudeutsche gemischte Bankwirtschaft – Ein Versuch zur Grundlegung des Bankwesens, Vol.1* (Munich, 1912), pp.220–315; W.G. Hoffmann, *Das Wachstum der deutschen Wirtschaft seit der Mitte des 19. Jahrhunderts* (Berlin, 1965), p.825.

human capital and the decreasing intra-firm friction could lead to higher profits without increasing the bonus payments.

Table 3 shows the pay–performance sensitivities for bonus payments to executives. As expected, the change in bonus payments is positively and highly significant related to the change in accounting profits. About 11 per cent of extra profits were paid out as bonuses to the managers. In addition, the share price variation and the total assets have a significantly positive influence on bonus payments. Now, the general economic climate, measured via the variation of NNP, was significantly negative with the bonus payment correlated. This is difficult to understand, since an economic upturn should be correlated with rising profits and thus with rising bonus payments. On the other hand, the real interest rate and the general stock-market development are insignificant. Furthermore, it is now not possible to make a clear-cut statement about the influence of the average board membership duration on performance pay. But two conclusions can be drawn: accounting profits and share prices were positively and significantly correlated with executive remuneration.

It is important to note the considerable differences between the banks. At the Bank für Handel und Industrie, the bonus was only influenced by the accounting profits. But at the Deutsche Bank – a very successful bank, founded in 1870 and the market leader in 1910 – the bonus payment was not correlated with the

TABLE 3
EXECUTIVES' PAY–PERFORMANCE SENSITIVITIES

Regression No. Description	1 Simple	2 Multiple	3 With Constant	4 Fixed Effects
Constant			4.6258	
Δ Accounting profits	0.1233	0.1095	0.1098	0.1096
(t-value)	19.01**	11.20**	11.17**	11.16**
Δ total assets		0.0007	0.0006	0.0007
(t-value)		2.32*	2.09*	2.24*
Δ share price		1.4070	1.3959	1.3994
(t-value)		−3.68**	3.62**	−3.57**
Δ stock market index		0.2237	0.2847	0.2752
(t-value)		0.99	1.19	1.17
Δ NNP		−0.0076	−0.0010	−0.0105
(t-value)		−2.28*	−2.25*	−2.34*
Δ real interest rate		−2.2285	−2.0233	−1.9722
(t-value)		−1.44	−1.34	−1.35
Δ membership duration		0.0602	−0.1155	−0.3925
(t-value)		0.03	−0.063	−0.21
Number of Observations	309	308	308	308
R^2	0.6684	0.6778	0.6781	0.6856
adjusted R^2		0.6714	0.6706	0.6695

Notes: ** denotes significance at a one per cent level.
* denotes significance at a five per cent level.
Sources: A. Bosenick, *Neudeutsche gemischte Bankwirtschaft – Ein Versuch zur Grundlegung des Bankwesens, Vol.1* (Munich, 1912), pp.220–315; W.G. Hoffmann, *Das Wachstum der deutschen Wirtschaft seit der Mitte des 19. Jahrhunderts* (Berlin, 1965), p.825.

accounting profits. Instead, all other explanatory variables were highly significant, especially the share price. At the Disconto-Gesellschaft, the leading German bank during the late nineteenth century, the accounting profits and the average number of board membership years were positively correlated with the bonus payments. At the Dresdner Bank, the accounting profit and the share price positively influenced the bonus payments, whereas seniority of the board members negatively influenced performance pay. Finally, at the Commerz- und Discontobank – today the Commerzbank – the bonus pay was significantly positively correlated with the accounting profit and the share price, whereas the total assets negatively influenced the bonus pay.[46]

Another challenge results from the fact that 40 years of data are covered. Modern research shows that the pay–performance sensitivity rose significantly from 1970 to 1996.[47] One might expect a variation of the sensitivity or elasticity during 1871 to 1910 as well. I decided to separate the whole period into two sub-periods: 1871–84, and 1885 to 1910. The cut-off point is the year of the new German joint-stock companies law.[48] This new law was a consequence of the stock-market and banking crisis of 1873. It prescribed the formation of reserves, therefore dividends declined and the profit share remaining within the bank rose.[49] In addition, the publication of profit-loss statements became mandatory, making better control of the principals by the agents possible. Already during the late

1870s, the liability structure of banks shifted from stock-capital to deposits, and the asset structure shifted from stock-market business to short-term credits. In addition, the re-allocation of capital significantly increased during the 1880s.

Table 4 shows the pay–performance elasticities for the pooled OLS estimation with fixed effects. It shows a remarkable change in the incentive structure during the late nineteenth century: during the first sub-period (1871–84), the accounting profits are the only statistically significant variable explaining variations in bonus payments. During the years 1871–84, a one per cent profit increase led to a nearly two per cent bonus pay increase. On the other hand, a multiple incentive structure seems possible for the second sub-period, since accounting profits and share price (shareholder value) had a significantly positive influence on the profit share. As already shown in the case study, a growth strategy was not rewarded, since asset growth led to a falling bonus payment. The general stock-market performance only influenced the bonus payments during the second sub-period. Another point is the declining R^2 value in the second sub-period, a fact already observed at the Bank für Handel und Industrie. Thus, the linearity of the incentive structure seems to decline in the German banking sector in the late nineteenth century. Perhaps non-linear contracts or the profit centre concept – like the Frankfurt branch of the Bank für Handel und Industrie – was also used by other large German joint-stock banks.

TABLE 4
EXECUTIVES' PAY–PERFORMANCE ELASTICITIES FOR TWO SUB-PERIODS (FIXED EFFECTS)

Regression No. Description	1 1871–1884	2 1885–1910
Δ ln Accounting profits	1.9920	1.2534
(t-value)	6.90**	9.91**
Δ ln total assets	−0.1776	−0.4067
(t-value)	−0.46	−1.71
Δ ln share price	−0.0870	0.4551
(t-value)	−0.32	2.50*
Δ ln stock market index	−0.2776	1.1792
(t-value)	−0.63	2.68**
Δ ln NNP	0.2651	−0.9713
(t-value)	0.25	−1.60
Δ ln real interest rate	−0.024	0.0078
(t-value)	−0.44	0.36
Δ ln membership duration	−0.0940	−0.0772
(t-value)	−0.86	−0.96
Number of Observations	31	178
R^2	0.9324	0.7356
adjusted R^2	0.8808	0.7112

Notes: ** denotes significance at a one per cent level.
* denotes significance at a five per cent level.

Sources: A. Bosenick, *Neudeutsche gemischte Bankwirtschaft – Ein Versuch zur Grundlegung des Bankwesens, Vol.1* (Munich, 1912), pp.220–315; W.G. Hoffmann, *Das Wachstum der deutschen Wirtschaft seit der Mitte des 19. Jahrhunderts* (Berlin, 1965), p.825.

VI

This article discusses the link between executive remuneration and firm performance during the years 1853 and 1910 for large German joint-stock Kreditbanken. It shows that the conflict of interest between shareholders and executives was mitigated by implementing incentive-related payment rules in the working contracts of board members (Vorstandsmitglieder). A case study investigates the contract structures at the Bank für Handel und Industrie during the years 1854–78. The results of this case study are generalised by using data for a sample of nine large German joint-stock Kreditbanken, and by applying pooled OLS regressions.

The first directors of the Bank für Handel und Industrie received a profit share *or* a fixed income. But after only three years, the contractual structure was changed, and the directors got a profit share *and* a fixed payment. Nevertheless, the income risk of the directors remained high, because three-quarters of the total income was profit shares. The Supervisory Board members received only a profit share, and this led to an even greater fluctuation of their income. The total income of the directors – and of the Supervisory Board members – was very high: during the years 1854–78, the mean annual remuneration for a director exceeded the average net national product per head by a factor of 100.

The directors and Supervisory Board members of the Bank für Handel und Industrie received a profit share which was linearly related to the annual accounting profits of the bank. Before paying a bonus, a threshold performance had to be reached. This linear relationship between bonus payments and accounting profits holds for the sample of banks too. Furthermore, the share price (shareholder value) was positively correlated with the bonus payments. The influence of the general economic environment – measured via the net national product, the long-term real interest rate and the general stock-market index – was low. Compared with modern corporations, the pay–performance elasticities and pay–performance sensitivities were high for nineteenth-century German joint-stock banks. During the nineteenth and early twentieth century, the elasticity and the sensitivity became stronger, at least at the Bank für Handel und Industrie. The executives grasped a rising share of accounting profits. On the other hand, the linearity of the relationship between bonus payments and accounting profit was generally smaller in the later decades. The falling linearity of the relationship is confirmed by the working contracts of the Bank für Handel und Industrie. This article thus ends with the conclusion that even during the nineteenth century bank managers were very well, and incentive-related, paid.

NOTES

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1. H. Wallich, 'Aus der Frühgeschichte der Deutschen Bank', in M. Pohl (ed.), *Beiträge zu Wirtschafts- und Währungsfragen und zur Bankengeschichte* (Mainz, 1984), p.407.
2. The basic salary did not change between 1871 and 1881. The profit shares are only given for the two years in the text. M. Pohl and A. Raab-Rebentisch, *Die Deutsche Bank in Bremen 1871–1996* (Munich, 1996), p.27.
3. Pohl and Raab-Rebentisch, *Bremen*, p.28.
4. D. Krause, 'Die Anfänge der Commerz- und Disconto-Bank in Hamburg', *Bankhistorisches Archiv*, Vol.23 (1997), p.28. There is no information about profit shares given.
5. Calculated in accordance with information given in O. Glagau, *Der Börsen- und Gründungsschwindel in Deutschland* (Leipzig, 1877), p.523.
6. M. Reitmayer, *Bankiers im Kaiserreich* (Göttingen, 1999), p.114. Reitmayer explains that the managers received a base salary and a profit share, but he says nothing about the relative proportions of the two. He only mentions the income of some bank managers, acquired from tax office files. This source is useless for an examination of the pay–performance link, because other sources of income (e.g. interests, dividends, income from supervisory board mandates etc.) are included.
7. Own calculations. The data are taken from R. van der Borght, *Statistische Studien über die Bewährung der Aktiengesellschaften* (Jena, 1883), pp.290–323.
8. The relations in the other sectors are as follows: mining, 25 out of 46 companies, 5.2 per cent; heavy industry, 21 out of 28 companies, 11.0 per cent; food, 17 out of 21 companies, 11.3 per cent; transportation, 12 out of 14 companies, 5.6 per cent. An ongoing research project at the Institute for Economic and Social History (University of Münster) is investigating the pay–performance link for a sample of 50 industrial companies for the years 1880 to 1910.
9. O. Warschauer, *Die Reorganisation des Aufsichtstratwesens in Deutschland* (Berlin, 1902), pp. 37–61.
10. M.C. Jensen and K.J. Murphy, 'Performance Pay and Top-Management Incentives', *Journal of Political Economy*, Vol.98 (1990), pp.225–64.
11. J.F. Boschen and K.J. Smith, 'You Can Pay Me Now and You Can Pay Me Later: The Dynamic Response of Executive Compensation to Firm Performance', *Journal of Business*, Vol.68 (1995), pp.577–608.
12. J. Schwalbach and U. Graßhoff, 'Managervergütung und Unternehmenserfolg', *Zeitschrift für Betriebswirtschaftslehre*, Vol.67 (1997), pp.203–17.
13. K. Kraft and A. Niederprüm, 'Ist die Vergütung von Managern im Zeitablauf flexibler geworden?', *Zeitschrift für betriebswirtschaftliche Forschung*, Vol.51 (1999), pp.787–804.
14. A recent survey of the literature is K.J. Murphy, 'Executive Compensation', in O. Ashenfelter and D. Card, *Handbook of Labor Economics, Vol.3B* (Amsterdam, 1999), pp.2485–563. For a recent critique of the employed econometric tools see A. Börsch-Supan and J. Köke, 'An Applied Econometrician's View of Empirical Corporate Governance Studies', *German Economic Review*, Vol.3 (2002), pp.295–326. I abstract from the fact that the shareholders delegate work to the supervisory board and this body delegates management tasks to the board of directors.
15. B. Holmstrom and P. Milgrom, 'Aggregation and Linearity in the Provision of Intertemporal Incentives', *Econometrica*, Vol.55 (1987), pp.303–28.
16. The principals are assumed to be risk-neutral because they can diversify their investment portfolios, whereas the agents nearly entirely rely on their working incomes.
17. It is possible to employ more advanced econometric tools, such as dynamic panel estimators. C. Bayer and C. Burhop, 'A Corporate Governance Reform as a Natural Experiment for Incentive Contracts', Working Paper, University of Dortmund, using the Arrelano-Bond and Baltagi-Wu estimators, show that the results are not sensitive to the econometric method.
18. First differences remove unit-root properties from the data. Furthermore, all data are transformed to 1913 constant prices.
19. On the other hand, if each bank has certain characteristics, a fixed-effects model might be appropriate. In this case a dummy variable for each bank is added to equation 2. See, for example, Baltagi, *Econometrics*, p.307, on this.
20. A. Bosenick, *Neudeutsche gemischte Bankwirtschaft – Ein Versuch zur Grundlegung des Bankwesens, Vol.1* (Munich, 1912).
21. Cologne City Record Office, 1073, 427 (hereafter CCRO).

22. In practice, the valuation of assets and liabilities was much more complex: see R. Hanf, 'Veröffentlichte Jahresabschlüsse von Unternehmen im Deutschen Kaiserreich. Bedeutung und Aussagewert für die wirtschaftshistorische Analyse', *Zeitschrift für Unternehmensgeschichte*, Vol.23 (1978), pp.145–72.
23. The history of the Bank für Handel und Industrie is described by F.-L. Knips, *Entwicklung und Tätigkeit der Bank für Handel und Industrie* (Leipzig, 1912).
24. CCRO, 1073, 434 and 435 contain the statutes of 1853, the revisions of 1857 and 1863, and the annual reports from the shareholder meetings 1854–78.
25. A discussion of the German banking business in the 1870s is provided in C. Burhop, 'Die Kreditbanken in der Gründerzeit' (unpublished Ph.D. thesis, University of Bonn, 2002).
26. Calculated in accordance with information given in W.G. Hoffmann, *Das Wachstum der deutschen Wirtschaft seit der Mitte des 19. Jahrhunderts* (Berlin, 1965), p.825.
27. CCRO, 1073, 427, pp.139, 141.
28. Ibid., p.255.
29. The south German states used the florin until 1873, when the new mark currency was introduced. I use here the later exchange rate of 1.714 M per florin.
30. I do not know how much was in fact paid to him. The figures are based on my own calculations, for which I used the balance sheet and the contract.
31. It should be mentioned that both received an additional income from the Bank für Süddeutschland. This was a private bank of issue, founded in 1856 by the same people who founded the Bank für Handel und Industrie. The boards of the two banks were identical, but I have no information about the payment structures at the Bank für Süddeutschland.
32. CCRO, 1073, 427, p.147.
33. Ibid., p.149.
34. Ibid., p.213.
35. Ibid., p.287.
36. Ibid., pp.241, 243.
37. See, for example, H. Kiesewetter, *Industrielle Revolution in Deutschland 1815–1914* (Frankfurt am Main, 1989), pp.75, 286.
38. CCRO, 1073, 427, pp.321, 325.
39. Ibid., p.275.
40. Ibid., p.277.
41. The senate, under pressure of influential private bankers, had also prevented the establishment of the Bank für Handel und Industrie in Frankfurt itself. See Knips, *Bank für Handel und Industrie*, p.69.
42. CCRO, 1073, 427, p.225.
43. Ibid., p.255.
44. Working with time series of cross-sections brings two econometric problems: first, time series are autocorrelated; second, cross-sections are heteroskedastic. I removed the first problem by working with first differences of the original series. The second problem was solved by using White-Heteroskedasticity-consistent standard errors and covariances.
45. These values are very high. Murphy, 'Executive', p.2524, correlates the remuneration of US managers during the years 1970–96 with the stock-market return of the managed firm. The highest elasticity he reports is 0.49, and the highest R^2 is 0.19. The maximum sensitivity he reports is 0.17, and the highest R^2 is 0.15.
46. The results are available on request.
47. Murphy, 'Executive', p.2525.
48. Bayer and Burhop, *Corporate Governance Reform*, investigate this structural break hypothesis using recent econometric methods. This article shows that the influence of the 1884 legal reform was significant. On the other hand, C. Fohlin, 'Regulation, Taxation and the Development of the German Universal Banking System, 1884–1913', *European Review of Economic History*, Vol.6 (2002), pp.221–54, shows that the (minor) legal reforms of the years after 1884 had no influence on the behaviour of banks.
49. The balance sheet structure of German joint-stock banks is investigated by C. Burhop, 'Die Entwicklung der deutschen Aktienkreditbanken von 1848 bis 1913: Quantifizierungsversuche', *Bankhistorisches Archiv* (vol. 23 (2002), pp. 103–28.). In addition, C. Fohlin, 'The Balancing Act of German Universal Banks and English Deposit Banks, 1880–1913', *Business History*, Vol.43 (2001), pp.1–24, presents evidence for a stable asset–liability structure after the mid-1880s.