

**CAMBRIDGE
WORKING
PAPERS in
ECONOMIC
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HISTORY**



Working Paper No. 25 – 2016:

THE RISE AND FALL OF THE GERMAN STOCK MARKET, 1870-1938

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This version: 21 September 2016

Abstract: The prior literature has advanced differing views on whether Germany during the late 19th and early 20th centuries was an economy supported by an equity-based as well as a bank-oriented financial system. Primarily by deploying a new IPO dataset for the Berlin Stock Exchange encompassing 1870 to 1938, we show German equity markets were well-developed as the 19th century drew to a close and remained so through the 1920s. Our analysis indicates regulation helped to foster development before 1913 but had a deleterious impact during the 1930s and suggests that there was a fruitful coexistence between large banks and markets until the Nazi era.

Acknowledgements: We would like to thank Leslie Hannah, Martin Gelter, Sibylle Lehmann, Larry Neal, Jan Otmar-Hesse, Mark Roe, and Felix Selgert for their comments on an earlier version of this paper, as well as seminar participants at the Rotterdam School of Management at Erasmus University and at the Max Planck Institute for Research on Collective Goods, Bonn. Financial support by Deutsche Forschungsgemeinschaft (grant no. BU 1805 / 7-2) is gratefully acknowledged. This paper was prepared while Cheffins was CERF Keynes Fellow and while Chambers was Academic Director of the Newton Centre for Endowment Asset Management, Judge Business School, and a CERF Keynes Fellow.

JEL-Classification:

N 23, N 24, G 18, G 24, K 22

Keywords:

Initial public offerings; Germany; Financial History; Corporate Law; Stock Markets

1. INTRODUCTION

Despite being an economically important country since unification in 1871, research on the historical development of Germany's equity market is still in its formative stages. Stock market development is often proxied by the number of listed firms per million inhabitants or the ratio of aggregate market capitalization to GDP. Our paper begins by presenting data, previously unexploited by researchers, on these proxies for a selected number of years in Germany prior to 1951¹. As revealing as this is, however, we seek to deepen our understanding of German stock market development and its major determinants by turning to an alternative and richer source of data, namely, Initial Public Offerings (IPOs) (Fama and French 2004). In this study, we construct and analyze a complete record of IPO activity on the Berlin stock market from German unification up to the end of the interwar period. While a healthy stream of IPOs is a good starting point for a country to have a well-developed stock market, it is also vital that these newly listed firms survive and at least on average are able to deliver acceptable returns to investors. We therefore examine IPO survival rates and their long-run returns relative to the overall market in addition to IPO activity. Hence, our paper offers the first comprehensive study of German IPO activity and of patterns in IPO survival over a complete span of seven decades prior to World War II.

Prior research on German stock market development has focused primarily on the efficiency of stock trading before World War I (Eube, 1998; Weigt, 2005; Baltzer, 2006; Gelman and Burhop, 2008). There have been studies of IPO activity but these cover relatively short time periods and only before 1913 (Burhop, 2011; Fohlin, 2010; Burhop, 2013; Lehmann, 2014). This study combines new data on IPO activity in the period from 1870 to 1895 and again in the 1920s with existing data on IPOs from 1896 to 1913 from Lehmann (2014). The result is a complete record of IPO activity from German unification up to the end of the interwar period, comprising 1,062 firms going public on the Berlin stock exchange.² This is the first major contribution of our paper.

¹ Such data is available for Berlin in 1873, 1881, 1900, 1911-14 and 1926-38. From 1951 onwards annual data is available for Germany (Deutsches Aktieninstitut: 2013).

² Berlin was the leading German stock market in this period (Gömmel, 1992: 147, 153-154, 161; Cassis, 2006: 113).

Our paper's second contribution is to present persuasive evidence that Germany had a well-developed stock market by the end of the nineteenth century. The literature has put forward differing views on whether it is correct to think of Germany, historically, as an economy with an equity-based as well as a bank-oriented financial system. The prevailing wisdom has traditionally been that German securities markets have been characterized as weak going back through time (Roe, 2003), with major German companies being disinclined to rely on equity markets due to having close relationships with large universal banks (Tilly, 1989: 196; Calomiris, 1995: 291-300; Edwards and Ogilvie, 1996: 429-30; Tilly, 1998; Fohlin, 1998: 329; Guinnane, 2002: 104-105, 108; Fear and Kobrak, 2010: 731). However, other scholars have suggested that Germany in fact had a well-developed stock market in the late 19th and early 20th centuries (Fohlin, 2007) and that banks played a positive role in this process (Lehmann, 2014). Our findings in this paper substantiate each of the latter views.

The next main contribution is to generate fresh insights regarding the law's impact on stock market development. The notion that Germany historically had underdeveloped equity markets fits well with the "law and finance" literature that suggested civil law countries such as Germany were less likely to have investor-friendly laws in place than common law countries and correspondingly had less robust stock markets (La Porta *et al.* 1997; La Porta *et al.* 1998). Drawing on our data set, we present evidence that regulation in fact contributed to a substantial flow of IPOs which were able to survive as public companies and which presented investors with returns that were competitive with the overall market. IPO regulation thereby helped to foster stock market development in late 19th and early 20th centuries in this civil law country.

One final important contribution of our paper concerns the "great reversal" in German stock market development towards the end of our period of study. While there is a growing body of literature on pre-World War I stock market development in Germany, the interwar era has been largely ignored. With our IPO data set extending beyond 1914 we are in a position to offer insights concerning this period. We show that the hyperinflation of the early 1920s did not have as detrimental impact on German equity markets as might be anticipated. We also document how subsequent counterproductive interventions by the Nazi government choked off IPO activity and destroyed the German stock market during the 1930s.

We set the stage for our analysis by offering a succinct overview of German stock market development from 1870 to the beginning of World War II and in so doing present new data on the populations of listed firms, their market capitalization and on share trading volume (section 2). Next we describe our new dataset covering all IPOs undertaken on the Berlin Stock Exchange between 1870 and 1938 and explain how it constitutes a suitable proxy for trends affecting German stock markets (Section 3). Section 4 discusses the law's impact on stock market development, focusing particularly on the evolution of regulation relevant to IPOs. Section 5 deals with IPO underwriters, focusing in particular on the major universal banks.. Section 6 discusses the interwar years, emphasizing in so doing a Nazi-oriented "great reversal" affecting German equity markets. Section 7 concludes.

2. THE GERMAN STOCK MARKET, 1870-1938

The Berlin Stock Exchange first emerged as a market for shares in the mid-19th century (Wormser, 1919: 18-19). As of 1869, only 72 firms had their equity listed (van der Borcht, 1883: 256-287). This was partly because incorporation was only possible by government concession before the introduction of a general corporation statute in 1870 in Prussia and some other German states.³

Prussia's new corporation statute became the operative law not only for Prussia but for all states shortly after German unification in 1871, meaning incorporation could occur throughout Germany as a matter of right. 843 corporations were formed between 1871 and 1873, thereby increasing the total number of joint-stock companies by a factor of five within three years (Reichstag, 1884: 390). Such firms were eligible to have their shares traded on a stock market once 40 percent of the issued capital had been paid up (Gareis, 1880: 185-200). Many, in fact, did go public. By 1873, there were 441 companies listed on the Berlin Stock Exchange (Engel, 1875).⁴

³ See Martin (1969) and Hopt (1980) for the history of corporate law in Germany until 1870. Some smaller states (e.g., Hamburg, Bremen and Saxony) had free incorporation before 1870.

⁴ The increase was due to cross-listings from Germany's regional stock exchanges as well as IPOs.

Following an 1873 stock market crash, German equity markets stagnated (Henning, 1992: 153-157,161) and the number of listed firms declined (Table 1). Matters changed subsequently, such that by the turn of the century just over 700 companies were listed on the Berlin Stock Exchange. The trend continued as the 20th century opened. By 1913, 922 firms with an aggregate market value representing 27 percent of German GDP were listed in Berlin, which was by some distance Germany's largest stock market.⁵

Table 1: Number and value of firms listed at the Berlin Stock Exchange,

| Year | Number of listed firms | | Market value of listed firms (percent of GDP) |
|------|------------------------|-------------------------|---|
| | Total | per million inhabitants | |
| 1873 | 441 | 10.6 | 25% |
| 1881 | 387 | 8.5 | 22% |
| 1900 | 714 | 12.8 | 28% |
| 1913 | 922 | 13.8 | 27% |
| 1921 | 721 | 11.7 | n.a. |
| 1926 | 917 | 14.6 | 26% |
| 1928 | 838 | 13.2 | 25% |
| 1930 | 767 | 11.9 | 15% |
| 1932 | 659 | 10.2 | 17% |
| 1938 | 469 | 7.9 | 13% |

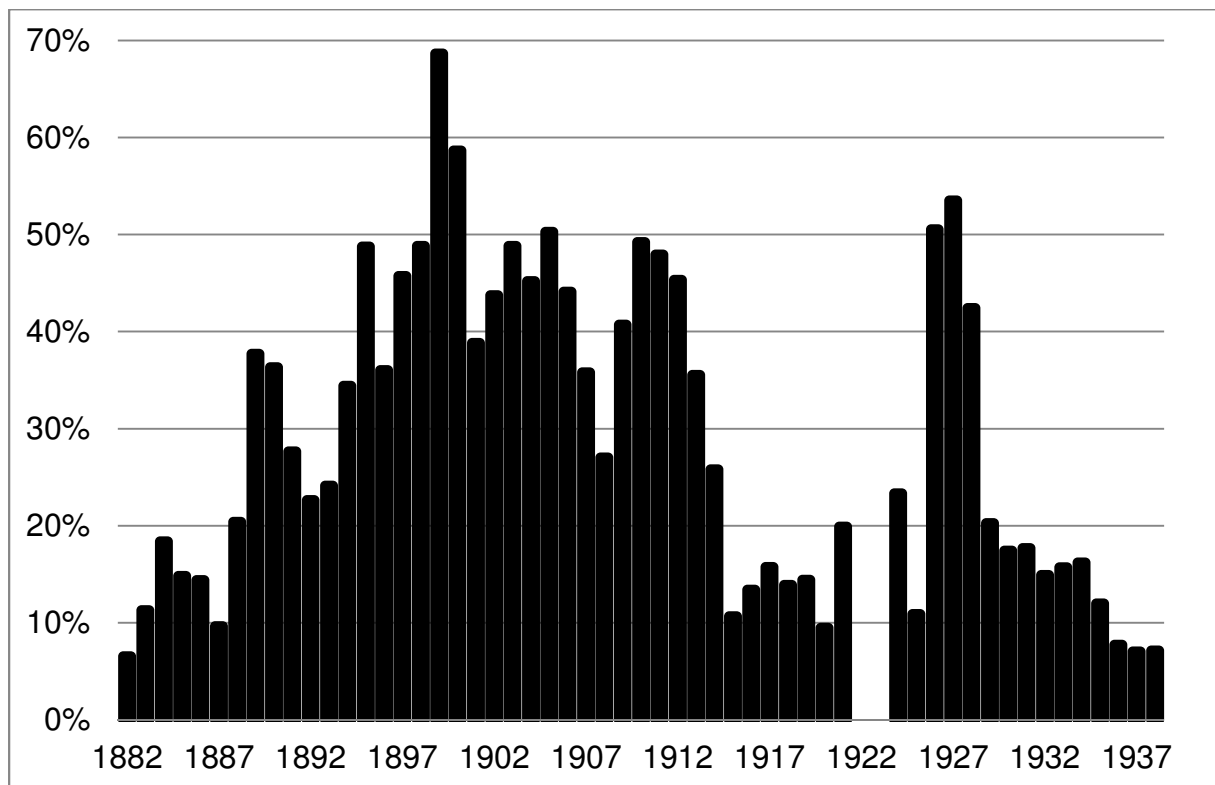
Sources: Van der Borght (1883) for 1881. Engel (1875) for 1873, Hannah (2007) for 1900; Königlich-Preussisches Statistisches Landesamt (1915) for 1913; Preussisches Statistisches Landesamt (1923) for 1921, Statistisches Reichsamt (1939) for 1926-39. Sources contain information about the number of firms listed and their value. We express this data in per capita terms and as a fraction of GDP.

Heretofore uncollated share turnover data for the Berlin Stock Exchange tells a similar story. Annual trading volume at the Kassenverein, the clearing house of the Berlin Stock Exchange, increased steadily as a percentage of GDP from the 1880s through to the end of the 19th century when it reached a peak (Figure 1). Share turnover levels

⁵ The second most important German stock exchange, located in Frankfurt, listed only 269 domestic firms in 1912, many of them cross-listed with Berlin (Wormser, 1919: 208). Moreover, the turnover of the Berlin Stock Exchange was about 15 times larger than the turnover of the Frankfurt Stock Exchange in the early 20th century (Wormser, 1919: 229).

then declined in the years prior to World War I but generally speaking remained higher than in the 1880s.

Figure 1: Annual trading volume at the Berlin Stock Exchange clearing house (“Kassenverein”) as a percentage of GDP, 1882-1938



Source: Annual report of the Bank des Berliner Kassenverein (various years).

World War I and its immediate aftermath had an adverse impact on the Berlin Stock Exchange, with the number of listed companies falling by around one-fifth between 1913 and 1921 (Table 1). By 1926, however, the number of public companies had recovered to the peak levels recorded just prior to World War I. Thereafter, the number of companies listed began to fall, initially due primarily to the delisting of firms due to mergers (Fiedler, 2002: 217; Beer, 1999: 132). Share turnover increased rapidly, however, during the late 1920s, briefly reaching levels not seen since the turn of the century (Figure 1). A pronounced share price decline beginning in 1929 and a banking crisis in 1931 had a debilitating impact on German equity markets, a pattern confirmed both by declines in the stock market market's value as a proportion of GDP and in share turnover on the Berlin Stock Exchange (Table 1, Figure 1). Despite substantial economic growth from 1933 onwards, these trends accelerated through the 1930s.

Aggregate data we have compiled on equity finance relative to bank loans substantiates the foregoing account of the rise and fall of the stock market in Germany. Data is unavailable for the years 1914 to 1924 but we have collated for the periods 1884-1913 and 1925-38 the inflation-adjusted market value of newly issued shares of German companies on all German stock exchanges, including Berlin (Deutsche Bundesbank, 1976: 293), as well as changes in total outstanding loans made by banks (Deutsche Bundesbank, 1976: 56, 60-61 and 77).⁶ Between 1884 and 1913 more than two-fifths of the capital raised externally by German public companies was raised from equity markets, with most of the remainder being raised from banks (Table 2). Thus, up to World War I, a strong banking sector was operating in tandem with a well-developed stock market.⁷

During the years immediately following the 1923 hyperinflation, German banks wanted to rebuild their loan portfolios. Borrowing correspondingly became markedly more important for corporations as a source of finance than did share issuances. Nonetheless, the stock market continued to be a meaningful source of industrial finance in Germany by providing one third of the amount of money raised externally, with the remainder again being raised largely from banks.

⁶ Definitions change slightly over time, but in 1913, when both series are available, one series shows a level of loans of 21.5 billion Mark, whereas the other shows a level of 28.6 billion Mark. Since we are interested in flows, we calculate the first differences of both series to get a rough measure of the amount of new money raised by loans between 1884 and 1913 as well as between 1925 and 1938.

⁷ This supports the finding by Tilly (1998: 21) that equity finance was more important for German listed firms compared to British listed firms before World War I.

Table 2: Bank and Stock Market Finance in Germany, 1884-1938

| Period | New money raised by equity (in million Mark / RM, 1913 prices) | New money raised by bank loans (in million Mark / RM, 1913 prices) | Share of equity funding in total funding |
|-----------|--|--|--|
| 1884-1938 | 22,657 | 34,397 | 40% |
| 1884-1913 | 16,272 | 21,587 | 43% |
| 1925-1938 | 6,385 | 12,810 | 33% |

Sources: *Deutsche Bundesbank* (1976: 56, 60-61, 77, 293), *Hoffmann* (1965: 599-601).

Own calculations.

Cross-border data confirms that Germany had a well-developed stock market in global terms as the 20th century began but had slipped substantially by 1938. According to annual data collected by Moore (2010: Table II), among 12 major stock exchanges around the world, between 1900 and 1925 Berlin consistently ranked second after London for the number of companies listed for trading and ranked third for aggregate market capitalization before moving into second ahead of the Paris Stock Exchange in 1905 (Moore, 2010: Table IV). Rajan and Zingales (2003), who provide data on aggregate stock market capitalization/GDP and listed firms per million inhabitants for 1913, 1929 and 1938 report that Germany's aggregate stock market capitalization/GDP ratio was 0.44 in 1913, 0.35 in 1929 and 0.18 in 1938. Among the ten countries for which Rajan and Zingales provide data for all three years, Germany was placed fourth, sixth and tied for eighth respectively, a significant decline.⁸ Germany had, according to Rajan and Zingales, 28, 20 and 11 listed firms per million inhabitants in 1913, 1929 and 1938, which ranked Germany sixth, sixth and eighth among the twelve countries for which they provide data for all three years. .

3. BERLIN STOCK EXCHANGE IPOs, 1870-1938

⁸ La Porta et al. (2013: 474-75) employ data collected by Goldsmith (1985) to provide stock market capitalization/GDP ratios for 17 countries from 1805 to 1978 and in so doing report data for ten countries for 1913, nine countries in 1929 and six in 1939. The German figures for these years were 0.37, 0.29 and 0.17 respectively, which ranked Germany somewhat lower among the countries listed than was the case with Rajan and Zingales.

While there is aggregate annual data available for the Berlin Stock Exchange regarding the number of listed companies and equity market capitalization for various years between 1870 and 1938, large chronological gaps remain that compromise analysis of the historical development of German equity markets. To address this problem we draw upon a hand-collected dataset of IPOs which took place on the Berlin Stock Exchange between June 1870 and December 1938. With IPOs being essential for a country to have a well-developed stock market, our IPO data provides us with a robust alternative measure of stock market development in Germany. We begin by identifying our IPO data sources and by describing basic time trends. We then elaborate upon why our IPO data is a suitable proxy for gauging the historical development of German equity markets.

3.1 DATA SOURCES

For the purposes of constructing our dataset we treat an IPO as having occurred when any stock, not previously listed and advertised by a prospectus, is issued to the general public by a stock corporation (Aktiengesellschaften, or “AG”) or a limited joint-stock partnership (Kommanditgesellschaft, or “KGaA”), and its price is quoted following the issue.⁹ We identify an IPO by the year in which a company first appears in a stock market manual, *Saling’s Börsenpapiere*, available for each year between 1870 and 1938, with a few exceptions in the 1870s.¹⁰ For this decade, we therefore supplement this data source with others described in Appendix Table A1.

3.2 DESCRIPTIVE STATISTICS

Our 1870-1938 IPO dataset comprises 1,062 companies.¹¹ This implies that 15 firms per year went public in Berlin but there was considerable year-on-year variation (Figure 2). German IPOs occurred with the same wave-like pattern exhibited by IPOs on modern stock exchanges (Lowry, 2003), with the first major surge in IPO activity occurring during the early 1870s. During the peak IPO year of 1872, 168 companies went public. IPOs then tailed off dramatically but occurred with regularity between the

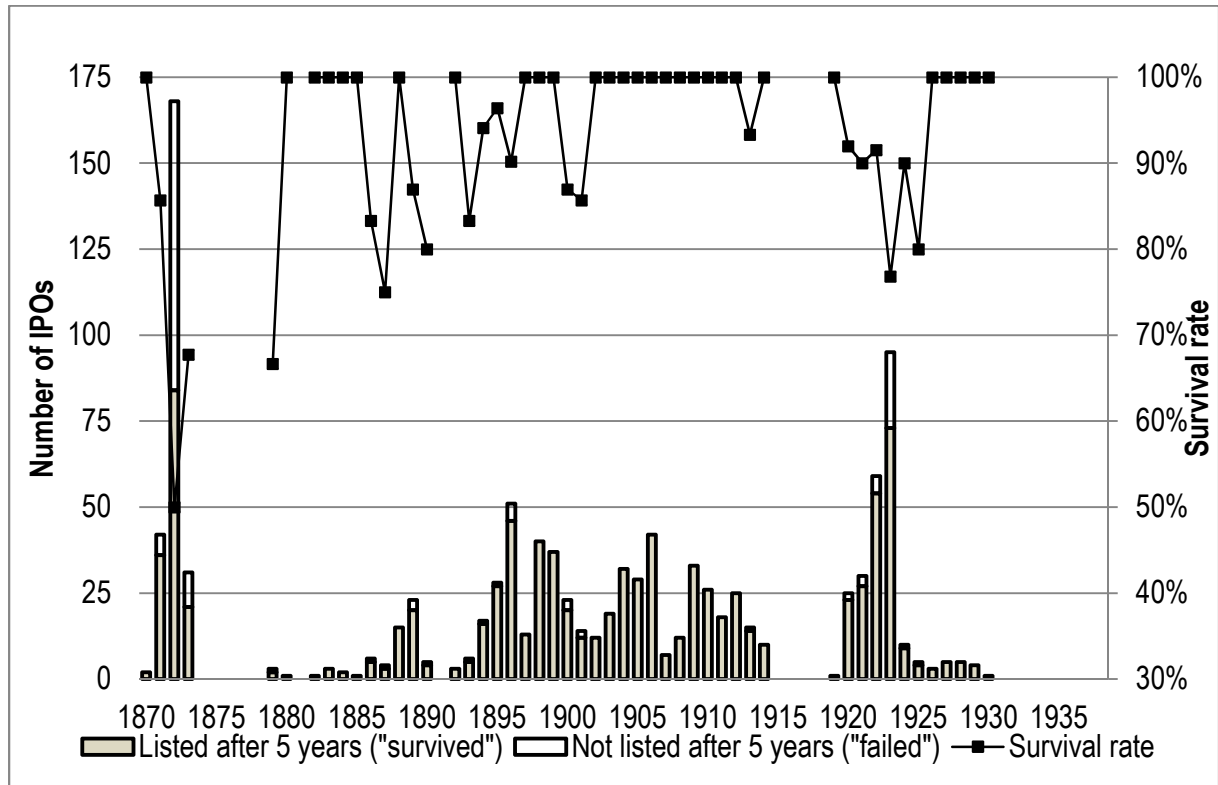
⁹ *Bergrechtliche Gewerkschaften* are not included.

¹⁰ Stock market manuals for the provincial stock exchanges are available since 1900. Thus, identification of cross-listing is sometimes difficult before 1900.

¹¹ Our original sample contains 1,155 firms. Firms are excluded because we do not observe the year of incorporation (29 firms), the share capital (one firm), or the end-of-IPO-year market price (or a price close to this date, 63 firms). The final sample consists of 1,062 firms.

early 1890s and the beginning of World War I. There was a major burst of IPO activity during the early 1920s, peaking in 1923. IPOs took place during most years between 1870 and 1938, with the exception of the mid-1870s, World War I and the 1930s.

Figure 2: Number of IPOs per year, 1870-1938, and their survival rate



Source: IPO database; own calculation.

For each IPO, we collected information on firm age, firm size at the end of the IPO year, industry sector and the name of the lead underwriter. Table 3 summarizes firm characteristics and industry breakdown across the whole period of our study as well as for selected sub-periods. Our chosen breakpoints reflect the two major regulatory changes before World War I, namely, an overhaul of German corporate law in 1884 and the coming into force of a new stock exchange act in 1897. We discuss both these regulatory changes in detail in section 4. Our post-World War I breakpoint is the hyperinflation of 1923.

Prominent firms operating in heavy industry such as Bayer (1885), Siemens (1899) and BMW (1926) went public in the late 19th and early 20th centuries. Our data confirms that German stock markets played a significant role in the development of heavy industry, with 54 per cent of the companies that went public in our dataset being from this sector (Table 3). IPOs from lighter industries (textiles, clothing, food, drink, and

tobacco) were also numerous. Service sector (financial and non-financial) IPOs were considerably less common. There were also very few utilities and transportation IPOs, reflecting primarily a dearth of public offerings in a railway sector affected by the most important lines being taken into public ownership between 1875 and 1880 (Ziegler, 1996: 74, 94-95, 109, 112, 194-230).

Table 3 : Descriptive Statistics for Berlin IPOs, 1870-1938

| | Overall | 1870-83 | 1884-96 | 1897-1914 | 1919-23 | 1924-38 |
|---|---------|---------|---------|-----------|---------|---------|
| No. of IPOs | 1,062 | 251 | 161 | 407 | 210 | 33 |
| Industry breakdown : | | | | | | |
| Heavy industry: | 54% | 51% | 48% | 54% | 60% | 48% |
| Chemical, Electrical & mechanical engineering | 21% | 23% | 17% | 18% | 26% | 27% |
| Mining, iron & steel production | 15% | 18% | 12% | 19% | 9% | 3% |
| Other manufacturing | 17% | 10% | 19% | 17% | 25% | 18% |
| Light industry: | 28% | 28% | 34% | 27% | 26% | 30% |
| Textiles & clothing | 8% | 6% | 8% | 8% | 10% | 9% |
| Food, drink & Tobacco | 11% | 10% | 20% | 9% | 10% | 12% |
| Construction & real estate | 9% | 12% | 6% | 11% | 7% | 9% |
| Services: | 19% | 21% | 18% | 19% | 14% | 21% |
| Financial | 8% | 13% | 7% | 6% | 4% | 15% |
| Utilities & transportation | 8% | 6% | 9% | 10% | 6% | 3% |
| Other services | 3% | 3% | 2% | 3% | 4% | 3% |
| Firm Characteristics: | | | | | | |
| Age at issue (in months) | 107 | 2 | 36 | 111 | 357 | 284 |
| Real market value (mil. M, 1913 prices) | 6.2 | 4.0 | 5.0 | 7.4 | 7.3 | 6.8 |

Source: Own calculation from IPO database.

Our data indicate that over time companies going public became older and larger. Between 1870 and 1883, most companies going public were newly incorporated but from the late 1890s onwards firms joining the stock market were well-seasoned. This pattern is what one would anticipate finding, given that incorporating without a government concession only became feasible in 1870.

The average size of an IPO, measured by a company's end-of year IPO market value, increased from four million Mark in the 1870s to approximately seven million from 1897

onwards, calculated using 1913 prices.¹² As of the early 20th century, the average size of Berlin IPOs was similar to companies going public on the London Stock Exchange during the same period (Burhop et al., 2014: 67). Despite IPO firms growing in size, not surprisingly established listed companies remained substantially larger than firms at the time of going public.¹³

3.3 IPO DATA AS A PROXY FOR STOCK MARKET DEVELOPMENT

While numerous IPOs are essential for a country to have a well-developed stock market, simple count data on the occurrence of IPOs is only a crude proxy for stock market development. Most obviously, companies that fail shortly after going public do little to bolster equity markets. Post-IPO returns matter too. An IPO market could be categorized a success despite a sizeable failure rate if a significant number of the survivors deliver outstanding returns. Conversely, even if the survival rate is high the IPO market will tend to exaggerate the overall strength of the stock market if returns are markedly below those generated by seasoned public companies.

We take two steps to correct for these potential difficulties. First, having identified the companies carrying out IPOs we ascertain whether they survived, defined by whether or not they were still listed on the Berlin Stock Exchange five years after the IPO.¹⁴ Second, we compute long-run IPO returns from 1870 to 1910. In the years following, we are unable to estimate returns with any degree of accuracy due to severe limitations in the data discussed below.

The choice of a five year threshold when measuring IPO survival makes our results comparable to the results provided by Chambers (2010) and Burhop et al. (2014) for early 20th century IPOs on the London Stock Exchange and by Simon (1989) for U.S. stock markets at the time federal securities regulation was introduced in the early 1930s. We treat any company acquired within five years of its IPO as a failure even

¹² In general, inflation rates were low and averaged only about one percent annually before the War. Whenever we deflate data to 1913 constant prices, we use Hoffmann's (1965: 598-601) net national product deflator for the years 1870-1914 and 1924-38 and the official deflator of the Reichsregierung (1924: 59) for the hyperinflation period 1919-1923.

¹³ Data provided by van der Borcht (1883) for 1881 and by the Statistische Reichsamt for the years 1925 to 1938 indicates that established firms were about four to five times the size of newly listed firms during the 1870s and about three times the size of newly listed firms during the interwar period.

¹⁴ In any year, firms with an end-of-year share price or known to have made a dividend announcement are treated as surviving.

though shareholders of such firms may have received consideration for their shares due to an acquisition. We do so because of a lack of information concerning the terms of mergers during the period. Mergers and acquisitions were unimportant in Germany before the late 1890s (Kling: 2006). Since this is the exact same period when a substantial majority of the failed IPOs in our dataset occurred, only twelve of the 155 failed firms disappeared due to merger or acquisition. Our methodology therefore introduces only a small downward bias in our estimated survival rate.

Overall, 85 percent of the IPOs in our dataset across the whole period 1870-1938 survived for at least five years (Table 4). The failure rate of about 15 percent is similar to that experienced by well-developed stock markets during the late 20th and early 21st century (Carpentier and Suret, 2011: 104). It was also similar to the failure rate for other stock markets for which data is available in the early 20th century. London Stock Exchange IPO failure rates were 13 percent between 1900 and 1913 (Burhop et al., 2014: 68) and 18 percent between 1919 and 1938 (Chambers 2010: Table 5). The failure rate for NYSE IPOs occurring between 1926 and 1940 was 10 percent before federal securities regulation was introduced and 7 percent thereafter, while IPOs undertaken at other U.S. stock exchanges displayed failure rates of nearly 33 percent before regulatory reform and just under 12 percent in the years following (Simon, 1989: 300).

Table 4 : IPO Survival

| | Overall | 1870-83 | 1884-96 | 1897-1914 | 1919-23 | 1924-38 |
|--------------------|---------|---------|---------|-----------|---------|---------|
| No. IPOs | 1,062 | 251 | 161 | 407 | 210 | 33 |
| No. surviving IPOs | 907 | 150 | 147 | 401 | 178 | 31 |
| No. failed IPOs | 155 | 101 | 14 | 6 | 32 | 2 |
| IPO survival rate | 85% | 60% | 91% | 99% | 85% | 94% |

Source: Own calculation from IPO database.

Table 4 provides a breakdown of IPO survival by sub-period. IPO survival rates were lower between 1870 and 1883 than in any other subsequent period. In 1872, the year in which the most IPOs occurred (168) fully half of companies going public failed within five years. The IPO survival rate increased markedly both after 1884 and 1897, reaching 99% for IPOs occurring between 1897 and the start of World War I. Although considerably lower than that for the period 1884-1914, the subsequent survival rate of

85 percent for IPOs occurring between 1919 and 1923 was in line with the average for the whole period. After the hyperinflation of the 1920s subsided, the survival rate increased to 94 percent, albeit with relatively few firms going public.

Overall, the substantial number of IPOs occurring between 1870 and 1938 combined with a high survival rate indicates that the IPO market provided a platform for a well-developed equity market in Germany. We next turn to evidence on the long-run stock market performance of IPOs to confirm the point. We define performance in terms of market-adjusted or abnormal IPO returns equivalent to the raw IPO total return (price change plus dividends) less the Berlin stock market total return. It is critical to include dividend payments when estimating the stock market total return since they account for around one-third of the overall return prior to 1913 (Eube, 1998: 150). We report abnormal returns for IPOs carried out between 1871 and 1910 but data limitations prevent us from doing so thereafter.¹⁵

For each IPO, we first estimate the raw total return from the date of the IPO until the end of the first calendar year of its life as a listed company and over each of the following four calendar years. We then deduct the total return on the market from the raw IPO return to derive the abnormal IPO return for each period. The long-run cumulative abnormal return (CAR) for each IPO is derived by compounding the abnormal return for the partial first year (“IPO year”) with each of the subsequent four years (“long-run return”). We report in Table 5 the equally weighted average CAR, for both the IPO year and the long-run return, along with the proportion of IPO companies displaying positive abnormal returns, “winners”, among all IPOs. For IPOs carried out between 1871 and 1910, the average CAR was statistically significant -7.2% and only 39% generated a positive long-run abnormal return. This IPO underperformance, however, can be attributed to one disastrous era for IPOs, 1871-1883, which should not be surprising given that this period displayed the highest failure rate. Thereafter,

¹⁵ Stock market total return estimates incorporating dividend payments are only available for the period January 1871 to July 1914 (Eube, 1998; Weigt, 2005). Dividend data are not sufficiently available for the interwar years. Moreover, the closure of the Berlin stock exchange during World War I precludes us from calculating long-run IPO returns for any IPO occurring between 1911 and 1918.

IPO stocks performed in line with the overall market over the long-run with the proportion of “winners” being slightly exceeded by that of “losers”.¹⁶

Table 5: Post-IPO Long-run Cumulative Abnormal Returns, 1871-1910

| Period | No. Obs | | Equally-weighted mean | |
|-----------|---------|-----------------------------|-----------------------|--------------|
| | | | IPO year return | Long-run CAR |
| 1871-1883 | 266 | CAR | -3.1% | -25.2%*** |
| | | % IPOs with positive return | 44% | 25% |
| 1884-1896 | 161 | CAR | 4.3%** | 0.0% |
| | | % IPOs with positive return | 58% | 44% |
| 1897-1910 | 364 | CAR | 6.2% | 0.7% |
| | | % IPOs with positive return | 53% | 45% |
| 1871-1910 | 791 | CAR | 2.7% | -7.2%** |
| | | % IPOs with positive return | 51% | 39% |

Cumulative abnormal returns (CAR) are defined as the cumulative returns (price change plus dividends) from date of IPO until the end of the first calendar year (“IPO year”) and until the end of the fourth full calendar year after the IPO year (“Long-run”) adjusted for the performance of the Eube-Weigt stock market index over the same periods.

*** , *** indicates 5% and 1% percent significance levels.*

Given high IPO survival rates and IPO returns that were at least as good as those of the overall stock market following the dismal IPO performance of the early 1870s, our Berlin Stock Exchange IPO dataset offers us a reliable proxy for general trends in German stock market development. Our IPO data is particularly instructive for periods where other data sources are lacking. In particular, as we saw above, before 1900 statistics on number of listed firms and total market capitalization are available only very sporadically. When set alongside the limited empirical data currently available regarding the rapid expansion of German equity markets during the final three decades of the 19th century, our IPO dataset provides potentially valuable fresh insights. Accordingly, we draw upon our IPO data to assess the validity of certain aspects of conventional wisdom concerning the development of German equity markets in the late 19th and early 20th centuries. We begin by considering German corporate and securities law.

¹⁶ Weigt (2005: 168) came to a similar conclusion regarding the short- and long-run performance of a smaller sample of 288 IPOs carried out between 1882 and 1913. However, this sample only includes firms which survived to 1913, suffers from considerable survivor bias and therefore will upwardly bias long run return estimates.

4. CORPORATE AND SECURITIES LAW

4.1. THEORETICAL CONTEXT

Legal protection of outside investors has been identified as a key mechanism underlying the functioning of a flourishing financial system (La Porta *et al.*, 2000: 4). According to this “law and finance” approach the extent to which a country’s laws promote investor confidence by protecting minority shareholders and constraining corporate insiders does much to explain cross-border stock market patterns (Djankov *et al.* 2008). The underlying logic is that in a country with laws that effectively protect minority shareholders from overreaching by dominant shareholders, outside investors should feel “comfortable” buying shares. Entrepreneurs, aware of investor demand for equity, should also be more inclined to go public than in a more *laissez-faire* environment (Cheffins, 2008: 34).

The law and finance literature suggests additionally that civil law countries are less likely to introduce laws that protect minority investors and as such are less hospitable to stock market development than are common law countries (La Porta *et al.*, 1998). Present day Germany appears to conform to this hypothesis. It is a civil law country with an equity market that is underdeveloped given other features of its economy and one that has typically not scored highly with corporate and securities law indices constructed to test law and finance theories (Franks, Mayer and Wagner, 2006: 544-53).

The law and finance logic is also applicable to IPOs, in the sense that the quality of legal protection afforded to outside investors seems likely to influence the success of IPO markets (Doidge *et al.*, 2013). If the law leaves outside shareholders with little protection, successfully launching IPOs will be problematic due to worries that the IPO proceeds will be dissipated by unscrupulous promoters, self-serving dominant shareholders or managerial dishonesty. In contrast, in countries with “good” corporate and securities law, investors should be well-positioned to evaluate potential IPO candidates and should have meaningful protection against problematic transactions and egregious mismanagement. IPOs can then occur with reasonable frequency and those companies that go public should enjoy a higher probability of survival.

The corporate and securities law indices that have been relied upon to test law and finance theories only take into account a small sample of potentially relevant rules (Cheffins, 2008: 39). However, theoretically any form of corporate or securities law that constrains the diversion of corporate wealth by managers and/or controlling shareholders could theoretically help to foster stock market development. In the context of IPOs, rules mandating disclosure by those carrying out IPOs are likely to be of particular importance (Stulz 2009), given potentially acute information asymmetries that can result in a counterproductive market for “lemons” (Akerlof 1970). Correspondingly, a country, by mandating disclosure in the context of public offerings of shares, can theoretically promote the long-term development of IPO markets and help to channel funds to higher-productivity projects (Shleifer and Wolfenzon 2002; Stulz 2009). Law and finance research indeed indicates that IPO activity is statistically correlated with robust investor protection (La Porta et al., 1997; La Porta et al., 2006; Djankov et al., 2008; Doidge et al., 2013).

In a historical setting, law and finance logic implies that sustained IPO activity, together with stock market development more generally, would be most likely to occur when the law ameliorated information asymmetries and afforded substantial protection to outside investors. Furthermore, one would expect IPO survival rates, all else being equal, to have been higher because dubious ventures would have been less likely to gain the investor support required for a successful public offering (Burhop et al. 2014). In the case of the United Kingdom and the United States, historical analysis suggests legal reforms did not affect capital market development in the manner the law and finance approach would predict (Cheffins, 2001; Cheffins et al., 2013; Coyle and Turner, 2013). Leading law and finance scholars have conceded that historical arguments pose a difficult challenge to their characterization of the inter-relationship between law and stock market outcomes (La Porta et al., 2013: 465). Nevertheless, in the case of IPOs in Germany in the late 19th and early 20th centuries, the evidence accords in significant respects with the law and finance view.

Consistent with a present-day pattern where a relatively weak stock market and mediocre legal protection seem to be correlated, numerous observers have suggested that historically legislation enacted in Germany had a generally negative impact on

equity markets (Baliga and Polak, 2004: 132, n. 6). Coffee (2001: 55-58), for instance, claims that paternalistic regulation and taxes on stock exchange transactions introduced during the mid-1890s severely hampered securities markets and had a deleterious impact lasting to the present day. Others have challenged this account, however. In particular, Fohlin (2007) has suggested that Germany is an example of a civil law country that does not accord with the legal origins theory advanced from a law and finance perspective. Our IPO analysis corroborates this view. As we will see now, the chronology of German corporate and securities law in the late 19th and early 20th centuries indeed suggests that laws enacted had a positive impact on stock market development, even if the laws were of a different type than those upon which law and finance scholars have focused.

4.2 KEY DEVELOPMENTS WITH GERMAN CORPORATE AND SECURITIES LAW

The dismal IPO success rate associated with the “hot” IPO market of 1872 occurred in a broader context of widespread corporate failure. Two out of every five joint-stock companies incorporated during the early 1870s had gone out of business by 1883 (Reichstag, 1884: 404-405, 408-409). This poor track record triggered a prolonged debate about the rules applicable to joint-stock companies that ultimately resulted in significant reform (Engel, 1875; Reichstag, 1884), most notably the German Stock Corporation Act of 1884.

The 1884 Act, remaining largely unchanged before its replacement in 1937, neglected to introduce those shareholder protections which were subsequently considered as important and were coded in indices constructed a century later by law and finance scholars to measure the quality of corporate law (Franks, Mayer and Wagner, 2006: 542, 544, 554). This seems to confirm the law and finance logic that shareholder protection tends to be weak in civil law countries. Two important caveats need to be made, however. First, Germany was in no way an outlier. Historically oriented law and finance research indicates that during the early 20th century, countries – both common law and civil law -- pretty much uniformly scored poorly as compared with the present-day (Musacchio and Turner, 2013: 530-33).

Second, German investors were in no way bereft of legal protection during the late 19th and early 20th centuries. Instead, there was meaningful regulation along various dimensions not captured by law and finance indices (Franks, Mayer and Wagner, 2006: 544, 554). For instance, the 1884 corporation law tightened considerably the requirements for incorporating companies, regardless of whether a move to the stock market was contemplated. The Act required, for instance, that fledgling companies publish their corporate charter, a profit-and-loss account, information about asset valuation and an audited report about incorporation, including a balance sheet. If documentation associated with an application to incorporate was not fair and truthful the incorporators and other interested parties, such as the underwriter, could be held liable for losses suffered by initial shareholders relative to the issue price during the first two years after incorporation (Gareis, 1888: 261-262, 290-292).

As well as tightening the rules governing incorporation, the 1884 Act bolstered shareholder rights (Bayer and Burhop, 2009). For example, every shareholder was given the right to attend shareholder meetings and every shareholder was guaranteed voting rights.¹⁷ Moreover, each corporation had to publish not only a balance sheet (this had been compulsory since 1861), but also a profit-and-loss statement. Both documents, moreover, had to be scrutinized by a company's supervisory board, which was now elected by the shareholders (Franks et al., 2006: 540).

The protection afforded to German stock market investors was not restricted to corporate legislation. In 1882 the Berlin Stock Exchange's listing rules were amended to set down for the first time specific requirements for public offerings of securities.¹⁸ While stock exchange listing rules can function as a self-regulatory substitute for statutory intervention (Mahoney, 1997; Cheffins, 2001: 473-76), such rules in Germany were developed under governmental auspices, with the state in which a stock exchange was based (Prussia in the case of Berlin) signing off on all listing rule amendments. By virtue of the 1882 reforms, firms seeking to go public on the Berlin Stock Exchange had to have a minimum share capital of one million Mark (about

¹⁷ This does not mean that a one share one vote rule was implemented. Nearly all firms explicitly restricted the voting power of blockholders before 1884; the practice became much less common thereafter (Bayer and Burhop (2009: 472). Our IPO data indicates that multiple voting shares were popular in the early 1920s but quite rare otherwise.

¹⁸ The Berlin Stock Exchange overhauled its rules and regulations in 1866 but refrained from introducing rules concerning IPOs (BLHA, file Rep. 1, 456).

\$240,000) and had to provide to Exchange officials copies of its corporate constitution, its commercial register and its last annual report. Those organizing an IPO were required additionally to issue a prospectus disclosing prescribed information, including the objects of the company going public, the composition of its capital, its recent dividend track record, the membership of the management and supervisory boards and the most recent balance sheet and profit and loss account. Each application for a listing was screened by a stock exchange admission committee, which could demand any further information deemed necessary to assess a public offering (Beisert, 1890) and reject even a formally complete prospectus (and thus an IPO).

Between 1884 and the 1930s, the key regulatory development was the enactment of the 1896 Stock Exchange Act. This legislation was described at the time as “the most elaborate attempt ever made to regulate speculative markets” (Emery 1898: 286). Franks, Mayer and Wagner have said of the Act, “Germany had enacted a corporate code that provided more extensive corporate governance than existed in virtually any other country at the time (2006: 583).”

Regulation of public offerings was an important topic dealt with by the 1896 legislation. For instance, every German stock exchange was required to adopt admission procedures akin to those put in place by the Berlin Stock Exchange in 1882 (Pfleger and Gschwindt, 1897: 113, 126, 202), which should have precluded regulatory arbitrage. The rules applicable to Berlin were also tightened. For instance, those who organized an IPO and underwrote it were deemed to be liable if false statements were made or relevant facts were suppressed, either purposely or through gross negligence (Emery 1898: 313). The admission boards of all stock exchanges also became obliged to ensure that all pertinent facts in regard to an equity offer were disclosed to the public as fully as possible, and it became common practice for admission boards to rely on their powers to request additional information from those organizing public offerings (Obst, 1921, vol. 1, 385; vol. 2, 511-12). An admission board was required additionally to reject a public offering of shares which would cause the investing public to be defrauded and could only list a company rejected by the board of another German stock exchange if the latter consented (Loeb 1897: 403, 405).

While the provisions of the 1896 Stock Exchange Act dealing with public offerings strengthened investor protection Coffee (2001) has argued that the 1896 legislation set the stage for the stagnation and decline of German equity markets. There were indeed features of the 1896 Act that likely were detrimental to stock market development, including the barring of forward and future transactions for most stocks and the introduction of rules requiring “speculators” trading on future and forward markets to register publicly if they wanted to keep the right to litigate counterparties in case of disputes (Eube, 1998: 45-48). These reforms disrupted securities trading and were repealed in 1908 (Baker, 1970: 8).

4.3 IMPACT OF REGULATORY REFORM

There are a number of pioneering studies of the relationship between regulatory reform and IPOs focusing on the enactment of the 1933 Securities Act in the US (Stigler, 1964; Jarrell, 1981; Simon, 1989). Among them, Simon (1989) finds that this legislation substantially lowered the failure rate for non-NYSE IPOs but did not do so for NYSE IPOs. More recent research on IPOs on the London Stock Exchange indicates that higher survival rates were correlated with more substantial regulation both before (Burhop et al 2014) and after World War I (Chambers 2010). If law matters for IPOs in the manner law and finance theory predicts, we would similarly expect to find improvements in IPO survival rates for Germany after progressively tougher regulation was introduced in the 1880s and 1890s, with the caveat that 1896 reforms detrimental to stock market development may have cancelled out at least partly the effects of more robust regulation.

When testing empirically the effects of regulation on survival, firm characteristics should be taken into account. Firm age (Sutton, 1997; Caves, 1998) and firm size (Audretsch and Mahmood, 1995) have been found to be important determinants of IPO survival with smaller, younger firms having a lower survival probability. The type of industrial activity an IPO company engages in is also important (Agarwal, 1997) Correspondingly, we control for each of these features to assess the impact of regulation on IPOs in Germany. Similarly, we control for IPO market conditions because IPOs occurring during the hot markets of 1872 and 1923 exhibit a higher likelihood of failure.

We model IPO survival using a probit model. Our dependent variable, survival (s_i), takes the value 1 when a firm i is still listed five years after its IPO. Our explanatory variables consist of firm characteristics (size, age, and sector), and “hot market” dummy variables for the years 1872 and 1923. Hence, we estimate the following model:

$$\text{Prob}(s_i=1|X) = \Phi(\beta X')$$

with Φ denoting the cumulative density function of the normal distribution, β the vector of estimated coefficients, and $X' = \{\text{size}_i, \text{age}_i, \text{sector}_i, \text{hot market}\}$ the vector of explanatory variables.

Table 6 summarizes the results. As expected, the positive coefficients on Size and Age indicate that larger and older firms in the late 19th and early 20th century had a higher survival rate than other firms (regressions 1 and 2). The survival rate of firms which went public during the hot markets of 1872 and 1923 were significantly lower than the survival rate of firms going public during times of normal or low IPO activity, even after firm characteristics are controlled for (regression 3). In regression 4, we include industry sector dummies based on the categories in Table 3 but do not report results since all dummies are insignificant. Regressions 5 and 6 provide evidence on survival rates for the years before and after World War I respectively. In the interwar period, the firm age coefficient is not statistically significant and the coefficient on firm size is only significant at the ten percent level.

TABLE 6: FUNDAMENTALS AND IPO SURVIVAL (AVERAGE PARTIAL EFFECTS)

We employ a probit regression model where the dependent variable is equal to 1 if a firm survived five years after the IPO, and 0 if it failed. Size is the log of market value of an IPO firm in 1913 prices. Age is the log of months since the IPO firm was incorporated. ***, **, * indicates significance on 1, 5, and 10 percent level, respectively. Standard errors are clustered by year of issue.

| Regression | 1 | 2 | 3 | 4 | 5 | 6 |
|--------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Period | 1870-1938 | 1870-1938 | 1870-1938 | 1870-1938 | 1870-1914 | 1919-1938 |
| Size | 0.055** | 0.056*** | 0.030*** | 0.029*** | 0.040*** | 0.023* |
| Age | | 0.044*** | 0.025** | 0.026** | 0.035*** | 0.020 |
| IPO in 1872 | | | -0.262*** | -0.250*** | -0.197*** | |
| IPO in 1923 | | | -0.173*** | -0.183*** | | -0.102*** |
| Sector dummies | No | No | No | Yes | Yes | Yes |
| Number of observations | 1,062 | 1,062 | 1,062 | 1,062 | 821 | 241 |
| Chi ² (p-value) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.005 |
| Fraction correctly predicted | 0.051 | 0.162 | 0.236 | 0.246 | 0.313 | 0.121 |
| McFadden pseudo R ² | 0.760 | 0.786 | 0.806 | 0.810 | 0.821 | 0.778 |

Having identified hot markets, firm size and age as important determinants of the fate of IPOs, we turn to the role of the law. To ascertain the effect of corporate law and stock exchange reforms on IPO survival in Germany we distinguish three regulatory regimes: the free-market period from 1870 to the early 1880s, the period between the early 1880s and 1896, and the period of the full regulation from 1897 onwards.

We employ the same probit model used as above to examine the impact of regulation on IPO survival. The results, set out in Table 7, provide support for the hypothesis that stricter regulation is associated with a higher IPO survival rate in Germany and thereby promoted stock market development. First, we assess the impact of the 1882/1884 reforms by comparing IPOs made between 1882 and 1896 with those made between 1870 and 1881.¹⁹ At first glance, the baseline results (regression 1) do not show an effect of stricter rules on survival rates. However, when we control for two specific rules in regressions 2 and 3, we see an effect. In 1882, the Berlin Stock Exchange raised the minimum size for firms listed at the exchange to one million marks, which served to exclude small issues from the market. In 1884, the new corporate law statute fostered lawsuits by investors against underwriters and incorporators if an IPO failed within two years after incorporation (Gareis 1888: 261-263). We account for these specific rules by including interaction effects between the period dummies proxying the regulatory regimes in 1882-1896 and post-1896 on the one hand, and size, and age, on the other. The coefficient on the dummy for IPOs between 1882 and 1896 indicates that survival rates increased by about 61 percent compared to the previous period, which suggests the rule precluding small IPOs had a significant effect. However, the coefficient on the interaction between the period dummy and size suggests that this effect is weaker for larger firms.

In regressions 3 and 4, we assess the impact of the 1896 Stock Exchange Act by comparing IPOs made after 1896 with those made between 1882 and 1896. Regression 3 looks at all IPOs between 1882 and 1938, whereas regression 4 focuses on IPOs up to World War I. Both sets of results point to the 1896 legislation being associated with higher survival rates even after making allowances for size, age and industry.

¹⁹ With only four firms going public in 1882-83 it is not possible to separate the effects of the self-regulation by the stock exchange and the stricter corporate law enacted by the government.

TABLE 7: REGULATION AND IPO SURVIVAL (AVERAGE PARTIAL EFFECTS)

We employ a probit regression model where the dependent variable is equal to 1 if a firm survived five years after the IPO, and 0 if it failed. Size is the log of market value of an IPO firm in 1913 prices. Age is the log of months since the IPO firm was incorporated. ***, **, * indicates significance on 1, 5, and 10 percent level, respectively. Standard errors are clustered by year of issue.

| Regression | 1 | 2 | 3 | 4 | 5 |
|--|-----------|-----------|-----------|-----------|-----------|
| Period | 1870-1896 | 1870-1896 | 1882-1938 | 1882-1914 | 1870-1938 |
| Size (log of market value, in 1913 prices) | 0.076*** | 0.095*** | 0.012** | -0.001 | 0.030*** |
| Age (log of months since incorporation) | 0.004 | -0.003 | 0.002 | 0.004 | -0.002 |
| IPO between 1882 and 1896 | 0.150 | 0.614*** | | | 0.275*** |
| IPO between 1882 and 1896 * Size | | -0.101** | | | -0.040 |
| IPO between 1882 and 1896 * Age | | 0.010 | | | 0.008 |
| IPO after 1896 | | | 0.062** | 0.062*** | 0.232*** |
| IPO in 1872 | -0.185** | -0.175** | | | -0.134** |
| IPO in 1923 | | | -0.176*** | | -0.182*** |
| Sector dummies | Yes | Yes | Yes | Yes | Yes |
| Number of observations | 412 | 412 | 811 | 568 | 1,062 |
| Chi ² (p-value) | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 |
| Fraction correctly predicted | 0.680 | 0.684 | 0.887 | 0.937 | 0.812 |
| McFadden pseudo R ² | 0.190 | 0.196 | 0.148 | 0.186 | 0.266 |

In regression 5, we investigate the impact of both the 1882 and 1896 reforms simultaneously by looking at the whole period. Our main result is unchanged. The regulatory reforms enacted in the early 1880s and in 1896 are correlated with a higher IPO survival rate. The implication of the foregoing analysis is that law “mattered” with respect to IPO survival in Germany, even after controlling for firm characteristics and hot market conditions. We consider next whether the involvement of banks in IPO markets affects our results.

5. UNIVERSAL BANKS

Some argue that equity markets suffer in a bank-dominated economy. Germany is often characterized as an exemplar of a bank-based financial system (Allen and Gale, 1995; Levine, 1997) and bank dominance of the financial system has been said to have hindered stock market development in Germany during the late 19th and early 20th centuries (Mowery, 1992: 20-21; Guinnane, 2002). Growing awareness, however, that German equity markets were far from moribund during the late 19th and early 20th centuries has helped to prompt a reassessment of the inter-relationship between banks and equity markets (e.g. Calomiris, 1995: 291-292; Tilly, 1998: 21). Hard evidence regarding the relationship between banks and German equity markets remains, however, in rather short supply. Our IPO data helps to fill this gap.

The analysis of our IPO data points towards two main conclusions. First, the inter-relationship between banks and equity markets changed over time. Major banks played only a minor role in IPO underwriting initially but grew into dominant players thereafter. Second, the fact that large banks apparently had a beneficial impact on IPOs indicates that bank dominance of the financial system was not antithetical to stock market development in Germany.

During our period of study it was standard for banks, whether small or large, to operate as universal banks and engage in both commercial and investment banking.²⁰ The largest banks were prime examples, as they offered both commercial and investment

²⁰ Saving banks were the exception and were not allowed to offer investment banking services until 1921 (Guinnane, 2002: 81-82, 88-89, 101).

banking services to clients and as such would ultimately act as underwriters of numerous IPOs. Leading universal banks nevertheless had plenty of competitors in the underwriting of public offerings of shares, at least to begin with.

A total of 252 underwriters sponsored the 1,062 IPOs in our dataset, in comparison with only 56 firms underwriting the 590 IPOs taking place on the German stock market between 1995 and 2010 (Migliorati and Vismara, 2014: 898). Moreover, while in our dataset Germany's largest banks, the four "D-Banks" (Deutsche Bank, Dresdner Bank, Discontogesellschaft, and Darmstädter Bank), handled a sizeable 26 percent of the IPOs (Table 8), Deutsche Bank alone underwrote 47 percent of all IPOs in Germany from the 1960s to the 1980s. Between 1995 and 2010 the four largest IPO underwriters carried out 42 percent of IPOs in Germany (Wasserfallen and Wittleder, 1994: 1515; Migliorati and Vismara, 2014: 902).²¹ Thus, the largest banks were important back in the late 19th and early 20th centuries, but less important than today.

Table 8: IPO Underwriting by German Banks, 1870-1938

| | Overall | 1870-83 | 1884-96 | 1897-1914 | 1919-23 | 1924-38 |
|--|---------|---------|---------|-----------|---------|---------|
| No. of unique lead underwriters | 252 | 114 | 59 | 76 | 50 | 30 |
| Market share of largest underwriter (no. IPOs) | 9% | 6% | 7% | 12% | 16% | 39% |
| Market share of largest underwriter (market value) | 23% | 14% | 11% | 27% | 26% | 30% |
| Market share of four D-Banks (no. IPOs) | 26% | 3% | 18% | 27% | 58% | 70% |
| Market share of four D-Banks (market value) | 45% | 15% | 34% | 45% | 72% | 46% |

Our IPO data draws attention to a significant time trend with respect to the involvement of large banks in Germany equity markets over time. While the four D-Banks banks would ultimately become important underwriters, they were rarely involved in IPOs in the 1870s and early 1880s (Table 8). Thereafter, the D-banks became much more

²¹ By value, the market share of the four largest underwriters was 55 percent between 1995 and 2010.

prominent, acting as underwriters in handling IPOs occurring between 1884 and 1896 and between 1897 and 1914 representing respectively 34% and 45% of the total market value of public offerings in each period. This increase in the latter period was partially due to the 1896 Stock Exchange Act, which fostered the development of banks as independent markets for tradeable securities by imposing restrictions on stock market trading (Franks, Mayer and Wagner, 2006: 542). The process of market concentration continued following World War I, with the D-Banks handling well over half of IPOs.

Major banks had an outsized impact on the development of German equity markets, with the biggest banks associated with larger IPOs (Table 8). The IPOs they organized were also more likely to succeed. Of the 275 IPOs underwritten by the four D-Banks, only 18 (6.5 percent) failed within five years. The track record of the underwriters outside the top four D-Banks was markedly worse, with a failure rate of 17 percent for the 787 IPOs in question. This finding agrees with contemporary views in the early 20th century that the quality of the lead underwriter signalled the quality of German issuers (Jeidels, 1905: 128, 163; Riesser, 1911: 285; Moral, 1914: 43). Furthermore, it conforms with claims that prestigious underwriters are more incentivised to sponsor successful public offerings than their less well-established rivals because of higher reputational costs associated with failure (Chemmanur and Fulghieri, 1994).

The descriptive statistics we have provided suggest that large banks had a positive impact on the development of IPO markets. Once other variables are controlled for, however, matters are more ambiguous. Probit regressions that take into account firm size, age, hot market effects and the regulatory regime reveal that involvement of D-banks had no independent statistically significant impact on IPO survival (Table 9).

The impact of banks should not be discounted too readily, however. This is because factors affecting the survival rates were correlated with the underwriter choice in a way that makes the interrelationship difficult to disentangle. In particular, larger firms were more likely to go public using the service of a D-bank (Table 9, regressions 3 and 4), and larger firms were more likely to survive. Was the survival rate higher because of firm size or because of D-bank involvement? It is impossible to say. Moreover, since practically all IPOs underwritten by a D-bank survived, a lack of variation in our

outcome variable precludes us from unravelling fully the interrelationship between underwriter choice and regulation. Nevertheless, the continued economic and statistical significance of our sub-period dummy variables when including the D-bank dummy variable suggests that regulation played a role in IPO survival independent of underwriter quality.

TABLE 9: D-BANKS AND IPO SURVIVAL (AVERAGE PARTIAL EFFECTS)

We employ a probit regression model where the dependent variable is equal to 1 if a firm survived five years after the IPO, and 0 if it failed. D-Bank is a dummy variable which is 1 if the underwriting bank is Deutsche Bank, Dresdner Bank, Discontogesellschaft or Darmstädter Bank. Size is the log of market value of an IPO firm in 1913 prices. Age is the log of months since the IPO firm was incorporated. ***, **, * indicates significance on 1, 5, and 10 percent level, respectively. Standard errors are clustered by year of issue.

| Regression | Impact of D-banks on survival | | Factors explaining D-bank selection | |
|--|-------------------------------|-----------|-------------------------------------|-----------|
| | 1 | 2 | 3 | 4 |
| Period | 1870-1938 | 1870-1914 | 1870-1938 | 1870-1914 |
| Size (log of market value, in 1913 prices) | 0.030*** | 0.041*** | 0.056** | 0.123*** |
| Age (log of months since incorporation) | -0.003 | 0.010 | 0.041*** | 0.023* |
| Lead underwriter is D-bank | 0.034 | 0.044 | | |
| IPO between 1882 and 1896 | 0.276*** | 0.316*** | -0.358*** | 0.039 |
| IPO between 1882 and 1896 * Size | -0.047* | -0.058** | 0.111** | 0.006 |
| IPO between 1882 and 1896 * Age | 0.008 | -0.007 | 0.014 | 0.021 |
| IPO after 1896 | 0.228*** | 0.169** | 0.183** | 0.171** |
| IPO in 1872 | -0.133** | -0.111** | -0.018 | 0.026 |
| IPO in 1923 | -0.194*** | | 0.272*** | |
| Sector dummies | Yes | Yes | Yes | Yes |
| Number of observations | 1,062 | 819 | 1,062 | 819 |
| Chi ² (p-value) | 0.000 | 0.000 | 0.000 | 0.000 |
| Fraction correctly predicted | 0.813 | 0.825 | 0.692 | 0.767 |
| McFadden pseudo R ² | 0.267 | 0.342 | 0.194 | 0.236 |

6. GERMANY'S GREAT REVERSAL

By the end of the 1930s Germany had “experienced an emasculation” of its domestic securities market (Michie, 2006: 188). Rajan and Zingales correspondingly correctly include Germany as one of a number of countries that suffered a financial sector “great reversal” between World War I and World War II but, other than briefly mentioning

Hitler and the Nazi Party, say little about what occurred (2003: 206-7, 212). Plausible explanations for the “great reversal” include the after-effects of Germany’s defeat in World War I, disruption to financial markets due to the acute hyperinflation occurring in 1923 and the tumultuous politics of the Nazi era. We draw upon our IPO data to provide evidence that the 1930s, and in particular the period the Nazis were in power, were decisive.

6.1. THE 1920s

Germany’s interwar equity market “great reversal” conceivably could have been traced back to Germany’s defeat in World War I, as serious military setbacks have been identified as a predictor of weak stock market development (Roe 2006: 499-501). Germany’s traumatic experience with hyperinflation in the early 1920s also could have precluded a sustained return to pre-World War I circumstances. Perotti and von Thadden (2006) have suggested that among developed countries differences in present-day stock market development can be explained at least partly on the basis of whether a country suffered a historically sharp acceleration in inflation following World War I. Countries so afflicted, they maintain, have poorly developed stock markets today in comparison with countries where inflation remained within historical norms.

While there were reasons to anticipate that German equity markets may have never recovered after World War I or were side-swiped with lasting effect by the hyperinflation of the early 1920s, German equity markets were not compromised fundamentally. As Section 2 described, despite shrinking over the course of World War I, the number of companies listed on the Berlin Stock Exchange had fully recovered to pre-war levels by 1926. Similarly, the ratio of aggregate market capitalization to GDP was only slightly lower in 1926 (26%) and 1928 (25%) than it was in 1913 (27%) (Table 1) and share trading volume in the late 1920s was considerably higher than the norm (Figure 1). Hence, throughout the 1920s, “Berlin remained a very active centre” with respect to stocks (Cassis, 2006: 144).

Our IPO data generally confirms this pattern. IPO activity surged after World War I. Between 1920 and 1923 the number of IPOs averaged just over 40 per year, well above what was typical between 1870 and 1938. This IPO activity was fuelled partly

by the belief among contemporary investors that shares could act as a hedge against inflation (Henning, 1992: 219, 225-228; Feldman, 1993: 390, 606-7). IPO activity during the 1920s peaked in 1923 with 95 firms going public, the second most IPOs in any single year in our dataset. Companies then continued to go public throughout the remainder of the 1920s, albeit at a modest rate compared to most of the pre-World War I era.

6.3 THE 1930s

With German equity markets not being compromised fundamentally by hyperinflation or other events occurring during the 1920s, the “great reversal” affecting Germany markets during the interwar years was primarily a 1930s phenomenon. This was not because of macroeconomic performance. Germany’s GDP had returned to and even surpassed pre-Great Depression levels by 1935. Nevertheless, share prices that fell dramatically when the stock market crashed between 1929 and 1931 did not rebound (Statistisches Reichsamt, 1939: 440; Ritschl, 2002: Table B.9; Beer, 1999: 330, 337). This drove downwards the aggregate stock market capitalization/GDP ratio as the 1930s began, and the downward trend continued throughout the decade (Table 1). Moreover, the number of companies listed on the Berlin Stock Exchange fell more than 40% between 1930 and 1938 (Table 1).

Our IPO data confirms the precipitous decline of German equity markets in the 1930s. Hochofenwerk Lübeck, a steel firm, went public on the Berlin Stock Exchange in June 1930. This would be the one and only IPO carried out during the entire decade. There were some public issuances of shares during the 1930s but these were carried out by companies that were already publicly traded and for most of the Nazi era any capital raised on the stock market was providing support for militarization (Beer, 1999: 267-268, 290-291; Hof, 2008: 131-132).

Why was the “great reversal” so pronounced in the 1930s? A banking and currency crisis occurring in 1931-32 adversely affected German equity markets but the effects may well have been temporary. However, reforms made after the Nazis came to power in 1933 had long-lasting adverse repercussions (Mertens, 2007; Hof, 2008: 48-50).

The German government closed all German stock exchanges in July 1931 following the bankruptcy of the country's second and third largest banks, the Darmstädter- und Nationalbank (Danatbank) and the Dresdner Bank. The stock exchanges reopened a couple of months later but quickly closed again as the government sought to protect the currency when Britain left the gold standard in September 1931 (Beer, 1999: 225). The German government sought to counter the blow to investor confidence when introducing an emergency order that bolstered shareholder protection by making it easier for shareholders to amend the corporate constitution, by compelling shareholder appointment of the auditors and by introducing new requirements relevant to the preparation of a balance sheet and a profit-and-loss statement. Nevertheless, the stock exchanges themselves remained closed until April 1932 (Beer, 1999: 225) and foreign investment in German shares was crippled by exchange controls introduced between November 1931 and April 1932 that made it virtually impossible for foreigners to transfer money out of Germany for the rest of the decade (Beer, 1999: 259-260, 277).

It is theoretically possible that investor confidence in German equity markets could have been restored if government intervention at the beginning of the 1930s was perceived as a crisis-driven necessity. However, the Nazis' rise to power in January 1933 foreclosed any such possibility. The Nazis ran a "directed market economy" (Buchheim and Scherner, 2006: 411) under which equity markets would suffer greatly. Nazi intervention in the allocation of capital was perhaps the most serious blow (Temin, 1991: 576, 580; Buchheim and Scherner, 2006: 390). To help the government to finance rearmament, the Nazis put in place between May 1933 and February 1935 rules requiring all security issuances, including equity IPOs, to be approved by the Ministry of Finance, the Ministry of Economics and the Reichsbank (Spoerer, 1996: 165). Only firms deemed important for the preparation for war could, in practice, obtain permission to issue securities.

The bias in favour of rearmament impacted adversely on German equity markets in another significant way. Legislation introduced between March 1934 and February 1935 required all joint-stock companies with rising profits or a return on equity in excess of six percent to invest part of their "excess profits" in government bonds. Companies in this position retained ownership of the bonds but management of the bonds was

entrusted to a government agency, the *Golddiskontbank* (Beer, 1999: 293-295; Hof, 2008: 125-131).²² The only way to circumvent this regulation was a change of the legal form of enterprise. Consequently, over two-fifths of existing joint-stock companies, including many of which were listed, were wound up between 1933 and 1938 and reformed as partnerships or private limited companies (Beer, 1999: 295; Mertens, 2007: 106).²³

Nazi rule dealt other serious blows to German equity markets, for instance, the tax reforms introduced on three fronts in October 1934. First, a wealth tax imposed on shares was doubled from 0.5 to 1 percent of market value. Second, the minimum period for an investor to hold securities to avoid taxes on “speculation” was extended from three months to one year. Finally, capital gains on the sale of corporate securities became taxable (Beer, 1999: 301; Hof, 2008: 133-134).

It may be that “big business was an active partner in many key facets of Hitler’s National Revolution” (Tooze, 2006: 134). Investors, on the other hand, were clear losers, as “the Nazi regime made pariahs of shareholders and tried to keep key corporate information secret” (Fear and Kobrak, 2006: 7). Correspondingly, when the Nazis turned their attention to corporate law, culminating in the enactment of a new corporate law in 1937, managerial authority was expanded at shareholders’ expense (Levy, 1950: 215). While the 1937 legislation codified various shareholder-friendly measures in the emergency order issued in 1931 a predominant theme was to shift powers away from shareholders acting collectively by way of resolutions and from the supervisory board to the head of the management board (Kessler, 1938). This was done in accordance with the tenets of “*Führerprinzip*”, with the idea being to have companies run by a strong leader, undistracted by shareholder intervention, to the benefit of employee welfare, the People, and the Reich (Mertens, 2007).²⁴ For instance, shareholders lost the right to vote on dividend policy and on the dismissal of directors (Mertens, 2007: 95-96). Moreover, the government was empowered to dissolve any corporation deemed to endanger the national welfare without the need to compensate shareholders (Mertens, 2007: 101).

²² This rule was tightened in 1941 and abolished in 1952 (Mertens, 2007: 107, 110).

²³ During the years 1935-38, only 142 new joint-stock companies were established in Germany, while 3,869 corporations were dissolved (Statistisches Reichsam, 1939: 455).

²⁴ “*Führerprinzip*” was not an entirely novel idea in the 1930s but instead was inspired partly already established corporate practice (Gelter 2011: 691).

The Nazi era not only badly damaged German equity markets that had developed substantially over the previous sixty or so years but would compromise the operation of equity markets in the post-World War II era. As with many rules, regulations, and laws enacted during the Nazi period, the 1937 German Stock Corporation Act continued to operate largely intact for a substantial period after the end of World War II (Ritschl, 2005). Hence, as the post-war German economy was being rebuilt, its company legislation was not shareholder-friendly in the manner the “law and finance” thesis would suggest is conducive to stock market development (Mertens, 2007: 110-115). Indeed, Germany’s equity market declined still further in the aftermath of World War II, with the number of firms listed on at least one of Germany’s stock markets declining from 661 in 1953 to 442 in 1983 (Deutsches Aktieninstitut, 2013). Various factors potentially contributed to the underdevelopment of equity markets in the Germany after World War II, with its “stakeholder economy”, buttressed by employee involvement in corporate governance (“codetermination”), being an obvious contender (Roe, 2003: 71-76, 79-80; Tirole, 2006: 56-64). Nevertheless, any historically oriented explanation of post-World War II stock market development in Germany is seriously incomplete without due recognition of the detrimental effects of the Nazi politics of the 1930s.

7. CONCLUSION

An extensive literature has developed over the past 20 or so years that seeks to explain stock market development around the world. Historical analysis has proved illuminating in this process (La Porta et. al: 2013: 476-77). Germany, as a leading industrial power, stands out as an obvious candidate for more historical investigation in this particular regard. This paper, underpinned by a new comprehensive data set on IPOs over seven decades, constitutes a substantial move in this direction. Our study provides evidence that certain aspects of conventional wisdom relevant to Germany’s stock market development likely are off-base. For instance, contrary to the message conveyed by the law and finance literature, Germany had well developed equity markets in the late 19th and early 20th centuries as proxied by IPO activity despite being a civil law country that scored poorly on law and finance measures of shareholder protection. At least until the 1930s, German equity markets also prospered despite

laws that theoretically could have had a detrimental impact on stock market development, most prominently the anti-speculation measures introduced in 1896. The new and extensive evidence provided by our IPO data suggests that, in fact, the 1896 legislation, together with reforms introduced in the early 1880s, helped to promote the development of equity markets in Germany by improving survival rates of companies joining the stock market and by allowing companies to go public which performed as well as the overall market.

Our study also considers the role played by the German D-banks in taking firms public. The fact that only a very small proportion of companies where underwriters were major D-banks failed implies that, contrary to received wisdom, Germany's bank-oriented financial system worked effectively in tandem with equity markets. However, we note that ascertaining the impact of D-bank underwriters upon IPO survival is complicated by the fact that the D-banks acted on behalf of firms that were typically older and larger than the average firm going public in this period.

While Germany's bank-oriented financial system did not handicap the development of German equity markets, events occurring in the 1930s clearly did. It might have been thought that the hyperinflation occurring in the early 1920s would have already sideswiped the stock market in Germany. In fact, along a variety of measures, stock market development in the mid- and late-1920s compares quite favourably with the years immediately prior to World War I. For Germany the "great reversal" that afflicted stock markets during the interwar years was instead primarily a 1930s phenomenon. The 1931-32 banking and currency crisis provided a rocky start but the Nazi era provided the decisive blow. Various measures the Nazis introduced had a deleterious impact on equity markets, a pattern illustrated by the virtual absence of IPOs in Germany throughout the 1930s. Additional work is required to disentangle the adverse impact the Nazis had on post-World War II stock market development from post-World War II variables such as codetermination. Nevertheless, our study has contributed in various important ways to our understanding of stock market development in the late 19th and early 20th centuries in one of the world's major economies.

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Table A1: Data Sources

| | 1870-1879 | 1880-1938 |
|--|---|---|
| Name of the IPO, Share capital, end-of-IPO year share price, firm age, industry branch | Prospectus: Berliner Börsenzeitung (1870-79), Historical Archive Deutsche Bank, Frankfurt City Record Office, Bethmann archive, Sal. Oppenheim jun. & Cie Archive; Stock market manuals & Statistical publications: Meyer (1873) Saling's Börsenpapiere, Vol. 3 (1875), Engel (1875), van der Borght (1883) | Saling's Börsenpapiere, Part 2, Vol. 4 (1880) to 64 (1941) |
| Name of the lead underwriter | Meyer (1873), Berliner Börsenzeitung (1870-79), Historical Archive Deutsche Bank, Frankfurt City Record Office, Bethmann archive, Sal. Oppenheim jun. & Cie Archive, Saling's Börsenpapiere, Vol. 3 (1875), Engel (1875), van der Borght (1883) | Saling's Börsenpapiere, Part 2, Vol. 4 (1880) to 64 (1941), Börsenenquetekommission (1892), Christians (1893), Vierteljahrshefte zur Statistik des Deutschen Reichs, Vol. 6 (1897) to 23 (1914) |
| IPO survival over five years | van der Borght (1883), Saling's Börsenpapiere, Part 2, Vol. 4 (1880) to 8 (1884) | Saling's Börsenpapiere, Part 2, Vol. 4 (1880) to 64 (1941) |
| Cross-listing with provincial market | n.a. | Saling's Börsenpapiere, Part 3, Vol. 1 (1900) to 32 (1932) |