DISCUSSION PAPER SERIES

DP17029

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ECONOMIC HISTORY

FINANCIAL ECONOMICS

CEPR

ISSN 0265-8003

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Discussion Paper DP17029
Published 10 February 2022
Submitted 07 February 2022

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www.cepr.org

This Discussion Paper is issued under the auspices of the Centre's research programmes:

- Economic History
- Financial Economics

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JEL Classification: N13, N23, G32

Keywords: Law and Finance, financial markets, Capital Structure, Industrialization

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Acknowledgements
We thank participants of the Federal Reserve Board Financial History Conference, the Economic History Society Conference, the Economic and Business History Society Conference, and the Economic History Seminar at the Paris School of Economics for helpful comments. Mark Billings, Leslie Hannah, and Steven Nafziger provided especially helpful comments and suggestions. Stefan Gissler's discussion of our paper at the FRB Financial History Conference proved especially helpful in the project's early stages. Ian Johnston provided top-notch research assistance. Gregg acknowledges funding from NSF Grant #1658877. Fohlin acknowledges funding from NSF grant SES0137937.

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Abstract

Russia and Germany both industrialized later than England and the United States, and both countries retained authoritarian autocracies until World War I. But the two countries diverged in their regulation of industrial corporations during the mid-19th century, with Russia retaining strict controls via its concession system and Germany instituting nearly free incorporation. Based on a large collection of firm-level balance sheets, this paper presents new evidence revealing the likely impact of these systematic disparities on emerging industry's access to capital. Contrary to the standard "economic backwardness" and "law and finance" literatures, we argue that authoritarian control of corporate entry significantly impeded the emergence of finance capitalism in Russia compared to the liberalized corporate financial system in Germany.

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1. Introduction

Research over the past twenty years—largely focusing on Germany (and to some extent other western European countries), the UK, the US, and Japan—has gradually altered views on financial system development. We now know, for example, that stock markets played an important role in firm development even in economies where banks supposedly dominated (e.g., Fohlin 2007 and 2012, Rajan and Zingales 2003, Allen et al. 2020). Relatively few studies, however, consider additional contexts or employ rigorous comparative historical analyses to test theories of financial development and growth.[1]

To further scrutinize historical patterns of finance, corporate law, and economic growth, this paper investigates how corporations financed industrial development by comparing two quintessential late-industrializing countries with greatly varying degrees of "backwardness:" Russia and Germany. Though both countries' GDP lagged behind the industrial leaders like Great Britain and the United States, German industrial and financial sectors developed rapidly over the late 19th century. Even into the early 20th century, Russia's economy remained much poorer and more agricultural than Germany's.[2]

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[1] In one early study, Fohlin (1994) collected and analyzed firm-level financial accounting data for German and Italian firms and their relationships to universal banks. Fohlin argued that bank relationships related most significantly to firms' stock market listings, suggesting that the capital markets in fact played a key role in those "bank-based" financial systems. Fohlin (2007) deepened the study of German corporate finance and Fohlin (2012) extended the analysis across several other countries. On Russia, Gregg (2020) collects a factory-level panel database of Imperial Russian manufacturing establishments and argues that firms that incorporated gained access to long-term financing that allowed them to purchase productivity-enhancing machines. Gregg and Nafziger (2019, 2020a, and 2020b) study the financing, entry behavior, growth, and survival of Imperial Russian industrial corporations.

[2] According to the Maddison Project Database (2020), GDP per capita in the United Kingdom (2011$) in 1900 was 7,594, in Germany was 4,758, and in Russia (former USSR) was only 1,906. (Sources: For the United Kingdom, Broadberry, Campbell, Klein, Overton, and van Leeuwen 2015; For Germany, Pfister 2011; and for Russia, Gregory 1982.)

At the same time, both countries operated under civil law, and the Russian legal system developed with French and German influence.[3] Thus, comparing these countries allows us to hold the legal origin close to constant while examining differences in corporate law, political interest groups, and the impact of politically-influenced regulations on the financing of industry. Our research also provides the first opportunity to evaluate Alexander Gerschenkron's comparisons of the role of banks and the state in the German and Russian cases empirically using corporation-level data.

In this analysis, we combine panel micro datasets detailing corporate financial accounting to assess the consequences of each country's political, legal, and financial system environments for the organization, capital structure, and performance of corporations in the two countries at the turn of the twentieth century. Imperial Russia's relatively small and underdeveloped financial sector and the government's tight restrictions on limited liability incorporation influenced corporate structure and performance, which we compare to Germany's relatively well-developed financial system, capital markets, and liberalized incorporation regulations.

We find that both Germany and Russia operated systems fundamentally built on principles of finance capitalism. In both countries, large companies took advantage of joint-stock incorporation to expand operations, partly by using outside financing in the form of bank

[3] See, for example, Wortman (1976) pp. 35-50. French influence is apparent in one of the Russian words for "company" ("*kompaniia*," from "compagnie") and "share" ("*aktsiia,"* from "action") (Owen 2002, p. 12)). Butler (2012) argues that the Russian legal system "would probably have been placed within the Romano-Germanic family of legal systems," though there is no definitive account of Russian legal origins (pp. 783-784). The development of the Russian legal system from Peter the Great through Catherine I derived influence from many countries, though French and German codifications were especially influential (p. 784). Foreman-Peck and Hannah (2015) treat Russia as a French Civil Law country.

debt, bonds and equity shares, and to allow for greater likelihood of survival through the legal personhood conveyed by incorporation. Furthermore, equity and bonds in both countries traded on freely accessible stock exchanges in major cities. However, as theorized in the more recent strands of financial development literature, legal and institutional idiosyncrasies yielded key differences between their corporate populations. Fundamentally, we argue that tight incorporation restrictions in Russia hampered firms' access to capital and impeded financial development and industrial growth compared to Germany. Restrictive chartering regulations prevented Russia from achieving a fully-functioning system of finance capitalism. In the long run, authoritarian regimes destroyed both systems in the 1920s and 1930s, and only Germany regained a significant level of corporate capitalism and active financial markets.

We begin by comparing the structure of the corporate financial systems and each government's role in regulating incorporation, securities issues, and trading. We then examine the makeup of the corporate population, compare how corporations financed themselves, and evaluate corporate performance in each context. Our findings demonstrate that congruent legal systems produced divergent corporate law and regulation, which in turn created wide disparities in the development of financial institutions, capital markets, and industrial corporations. Nonetheless, our results also undermine Gerschenkron's hypothesis that Russia's weak industrial base caused its failure to develop and employ an advanced financial system in the late 19th and early 20th centuries.

2. Finance, Institutions, and Economic Growth

Debates over the role of financial development in economic growth have addressed several fundamental questions. First, researchers have studied the causal link between financial development and economic growth (King and Levine 1993, Levine 2004, Rajan and Zingales 1998). Second, given there may be a link between finance and growth, it may be the case that certain types of financial systems (broadly, "banks v. markets") promote economic growth (Levine and Zervos 1998). And finally, the "legal origins" strand of the literature (e.g., La Porta et al. 1997 and 1998) considers how legal system origins influence financial system design, or alternatively, whether the political or economic system may be more important than the legal system. Much of this literature relies on cross-country evidence, limited timespans, and modern examples.

Furthermore, the "law and finance" literature largely ignores institutional nuances and history.[4] Rajan and Zingales (2003) point out that the relationship between legal origin and financial development appeared very different in 1913. They emphasize that political factors explain major changes in financial development in the twentieth century, arguing that states that protected incumbents against competition tended to oppose financial development. Foreman-Peck and Hannah (2015) similarly show that a country's level of overall development and quantity of exports (a measure of openness to trade) are strongly correlated with the prevalence of corporations across countries in 1910. These hypotheses correspond well to the contrasting cases of Russia and Germany. In Russia, high tariffs protected domestic producers, and

[4] See Musacchio and Turner (2013) for an extensive review of literature that criticizes the law and finance approach.

incumbents often opposed the introduction of general incorporation in the late nineteenth century, one reason the Imperial government abandoned efforts to reform the concession system.[5] Economic historians have also highlighted how, despite the emphasis on corporations and formal legal rules stressed in much of the law and finance literature, most medium-size firms chose non-corporate limited liability forms (Guinnane et al. 2007). And formal rules are only part of the story, given the enormous flexibility corporations could enjoy in writing their corporate charters (Acheson et al. 2019).

According to an older but widely-adopted view developed by Alexander Gerschenkron, English firms of the early phases of the industrial revolution tended to be financed privately through partnerships, while those in continental Europe's later industrialization employed large financial institutions and centralized government to funnel resources into heavy industry. Germany and Russia represented central cases in Gerschenkron's (1962) work. In his paradigm of "relative backwardness," these countries' industrial sectors developed at different rates and in very different financial and legal environments; distinct both from England and from each other. Gerschenkron argued that while Germany's more advanced economic development of the mid-nineteenth century supported the emergence of large, private industrial firms financed by banks, Russia's more agrarian economy and limited industrial base required government programs to promote industrial development.

[5] Russian tariff rates were quite high, certainly higher than Germany's (Irwin, 2002, Figure 2). The Imperial Government also abandoned efforts to reform the Concession System in moments of financial crisis (see Owen (2002), Chapter 3, for example). Owen (2002, p. 146 and pp. 164-165) notes moments when incumbent enterprises and business groups opposed the introduction of simpler registrations systems.

For decades, the notion persisted that "backward" economies failed to develop strong capital markets, and that they instead depended on large-scale, universal banks to funnel capital to industrial firms. On the other side of the banks v. markets dichotomy, highly-developed economies presumably marshaled prodigious resources via financial markets and generally relied less on banks to finance long-term investment. In the years of the post-WWII Wirtschaftswunder and the largely high-growth era prior to German reunification, the German banks did hold a significant measure of control over the German corporate economy. The idea met with little question that the banks had controlled industry and had caused the high growth rates for most of the prior century. Moreover, since German financial markets trailed those in New York and London during those post-WWII years, the hypothesis that the large universal banks in Germany impeded arms-length financial markets seemed plausible.[6]

More recent work among financial economists, such as Allen et al (2018), offers a new version of the basic Gerschenkronian idea, arguing that "the structure of an economy exerts an influence on the direction of the evolution of the financial system" (p. 397). This line of reasoning pushes the banks versus markets dichotomy, suggesting that countries with "asset-intensive" industries develop bank-heavy financial systems, whereas countries with dominant service sectors tend to create market-based systems. According to this line of reasoning, economies that evolve from manufacturing to service industries should experience a parallel evolution of their financial system from banks toward markets.

[6] Understanding the long-run consequences for the Russian economy is, of course, more complicated, since Russian economic institutions changed dramatically after 1917.

Song and Thakor (2013) theorize otherwise, studying the role of political intervention in financial systems and accounting for the complementarities between and generating coevolution of banks and markets. The key link is securitization, and the creation of risky bank capital, whereby banks connect investors to markets, and therefore market development promotes and shapes bank development and vice versa. Furthermore, Song and Thakor argue that governments intervene most during the early and late stages of development, using capital subsidies and state ownership in the former case and regulation in the latter. At the same time, they suggest that political intervention increases financial system risk without enhancing its development.

This theoretical analysis echoes historical findings. Fohlin (2007, 2012) repeatedly emphasizes the ideas of complementarities among and complexities of financial institutions and markets in Germany and more broadly in numerous countries that industrialized in the 19th and early 20th centuries. Moreover, Verdier (2001) studies the relationship between political and financial development and suggests that the extent of state centralization influences the extent to which financial systems develop large, universal banks.

Thus, a debate continues in the literature about the relationships among financial development, legal institutions, political institutions, and economic outcomes. A firm-level perspective, which would present a clearer picture of how financial and real economic outcomes interact, remains largely missing for the pre-war era. Our study provides a first firm-level comparison between two key cases of late industrial growth, which permits a clearer picture of how financial and political institutions may generate growth in the industrial economy.

3. Comparative financial systems and economic development: Germany v. Russia

During the late nineteenth and early twentieth-century industrialization period, the leading sectors tended to engage in heavy industry: mining, smelting, large-scale metalworking and heavy machinery, for example. The advent of electrification and internal-combustion engines expanded the scale of industry, requiring massive amounts of capital in order to operate efficiently. The use of limited liability, joint-stock corporations facilitated capital mobilization as it tended to open up ownership to a broader range of investors, both corporate and individual.

Germany led most of continental Europe in economic and financial development, already building a substantial capital base in the first half of the nineteenth century and establishing relatively large-scale universal banking in the early 1850s. Prussia and other German states developed legal and political institutions relatively early that could foster economic development. With the liberalization of incorporation law in Prussia and then the German Reich in the 1860s and early 1870s, Germany's corporate economy boomed, and stock markets grew rapidly to facilitate corporation finance via both bonds and equities marketed to outside investors. By World War I, Germany ranked among the most technologically and financially advanced economies in the world, with a sophisticated and highly-successful corporate finance system.

By contrast, the Russian economy began industrializing rapidly at the turn of the twentieth century but still lagged far behind Germany. Russian per capita income in 1912 was less than a third of that in Germany in 1905 (Gregory 1974). The Russian financial sector was small, only representing 26.9 percent of national assets in 1913, compared to 39.5 percent in Germany, 39.3 percent in France, and 42.9 percent in the United States. In that same year

Russian claims against financial institutions, mortgages, and bank and other credit comprised 22.4 percent of national income, while in Germany, claims against financial institutions, mortgages, loans by financial institutions, and trade credit comprised 30.8 percent of national income (Goldsmith 1985).[7] Figure 1 presents a visual representation of these national balance sheet comparisons.

The industrial entities that became corporations in Germany were fundamentally different from those that incorporated in the Russian Empire because of divergent levels of regulation over incorporation. Table 1 provides a summary of the most important legislative changes introduced in Russia and Germany, highlighting key differences. Most crucially, the Russian Empire never introduced general incorporation, in stark contrast to more successful industrializers, such as Germany, France, the United Kingdom, and the United States. Firms in the Russian Empire wishing to incorporate submitted charters to the Ministry of Finance and agreed to any changes requested, which represented an important source of inefficiency in the Russian economy (Gregg 2020). The concession system represented more than simply a rent-seeking enterprise; it gave the Ministry of Finance the authority to regulate and control large-scale enterprises, which integrated well with the autocratic government's agenda.[8] In Germany,

[7] From Goldsmith (1985) Table A6 (Germany, p. 225) and Table A16 (Russia / USSR, p. 276). Goldsmith does not provide an identical accounting of the share of national assets in the financial sector, which is why an exact comparison cannot be made. In Alexander Gerschenkron's view, Germany's "great banks" provided the key force in mobilizing the prodigious capital necessary for the country's industrialization. In particular, he argued that these universal banks took direct ownership and control of corporate capital--including on the boards of directors of the industrial firms they financed--and provided crucial monitoring and advising services that insured the most efficient use of that capital. Gerschenkron argued that Russia, however, was too backward and possessed too small a banking sector to be financed this way, so the Imperial Russian government substituted for lack of domestic demand and took a more active role in the economy.

[8] Gregg (2020) provides further discussion on this point. See Owen (1991, chapters 3 and 6) for an account of several failed efforts to abolish the concession system. Reform efforts were stifled by lobbying by

unification into the second empire (*Kaiserreich*) brought about nationwide liberalization of incorporation with the passage of the 1870 company law, similar to the Prussian company law already in effect in the 1860s While Germany revised its corporate law and regulation multiple times before World War I, Russian corporate law remained essentially unchanged after an 1836 law outlining the details of the concession system.

The Russian concession system of incorporation permitted significant variation across corporate charters. Over time, however, corporations tended to adopt two broad patterns of corporate organization and called themselves either "A-Corporations" (*Aktsionernye obshchestva)* or "Share partnerships" (*Tovarishchestva na paiakh)*, probably to signal these differences to potential shareholders. Russian A-Corporations tended to be larger firms that issued smaller-denomination shares to wider circles of investors, while share partnerships tended to be existing firms that incorporated and wanted to maintain control of their enterprises. Thus, share partnerships tended to be smaller overall and to issue shares of larger denominations to smaller groups of investors. Critically, however, both types of Russian corporations still faced the same concession process, provided all investors with limited liability, could sell shares on stock markets (though share partnerships were less likely to do so), and were subject to the same rules in the commercial code.

Russian A-corporations were most similar to German Aktiengesellschaften (AGs). During this period, AGs could be publicly traded or remain closely held, as long as they met the required minimum number of shareholders. Most smaller firms used private partnerships or,

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incumbent corporations and by financial crises, which strengthened the government's resolve to closely monitor large corporations, which were perceived as risky.

after its introduction in 1892, the limited liability partnership (*Gesellschaft mit beschränkter Haftung*, GmbH). AGs that wanted to trade on a German stock exchange had to meet preliminary requirements, most crucially that the firm's share capital be fully paid up. Even for companies not seeking public market trading, the 1870 company law required the full amount of an issue to be subscribed and at least 25 percent to be paid up before a new joint-stock company could be founded. The payment rose to 50 percent for shares issued at higher than nominal value. The 1870 law also required greater uniformity and consistency in corporate accounting, reporting, and governance, compared to earlier standards (Hopt 1998). In particular, the law stipulated the creation of the dual board structure, in part as a means of protecting shareholders and the public interest, independent of the management of the company.

In 1884, Germany added new regulations on corporate governance: prohibiting members of the executive board (Vorstand) from simultaneously holding positions on the same company's supervisory board (Aufsichtsrat) and explicitly requiring supervisory board members to obtain information about the company. At the same time, the 1884 law released supervisory board members from the obligation to own equity stakes; opening the door to proxy voting by banks and other shareholder representatives. A similar law in Russia, the 1901 corporation reform, removed bankers from corporate boards (a provision with many loopholes) and improved and formalized many important shareholder rights, such as the need for regular and well-publicized shareholder meetings. Gregg (2017) argues that this new reform changed the structure of corporate charters for corporations founded after the law was enacted.

Due to the very different requirements for incorporation in Germany and Russia, many more corporations were formed in Germany, and these companies tended to be less selected than Russian Corporations. In 1910, for example, there were 403 corporations per million people, and the market value of domestic securities represented 44% of German GDP. In Russia, by contrast, there were only 10 corporations per million inhabitants. However, in Russia the total market value of equity represented 18% of GDP, which while a smaller percentage than Germany's, is quite high considering the much smaller number of corporations per million people in Russia.[9] These comparative statistics point to the fact that Russian stock corporations tended to be very large enterprises, more so than German AGs.

While the corporate populations differed between the two countries, both Germany and Russia developed a set of active stock markets. By the early twentieth century, exchanges operated in most large cities: St. Petersburg, Moscow, Kiev, Odessa, and others in smaller cities throughout Russia and Berlin, Dresden, Hamburg, Frankfurt, and at least a dozen others in Germany. The St. Petersburg exchange was Russia's most active and has been the best studied. Throughout most of its history, the St. Petersburg stock exchange operated without much government intervention, though the Ministry of Finance began to take a more active role in its operation in the twentieth century (Lizunov 2015). By the turn of the twentieth century, about two hundred corporations were listed on the St. Petersburg Stock Exchange (Goetzmann and Huang 2018). At the same time, with its significant lead in publicly-traded corporations, Germany naturally surpassed Russia in stock market activity, such that Germany's largest stock

[9] Statistics on corporations per million inhabitants is from Hannah (2015). Rajan and Zingales (2003) provides stock market capitalization over GDP.

exchange, in Berlin, dealt in at least a thousand corporate stocks.[10] German and Russian industrial corporations also listed shares on foreign stock exchanges, though in relatively smaller numbers.[11]

German corporations accessed a wide range of debt, from overdrafts, to longer-term loans, to bonds. The larger corporations typically used all three sources, though debt structure varied considerably in cross section. Russian corporations, meanwhile, faced a more limited financial menu. Very few corporations used bonds, for example, and the banking sector was mainly focused on providing short-term and medium-term credit in forms such as bills of exchange (Crisp 1976). The Russian banking sector, however, was quite well integrated and supported industrial enterprises much more than Gerschenkron had argued (Salomatina 2004).

Though available sources do not permit direct comparisons of the costs of credit or capital for Russian and German corporations, data on historical discount rates in both countries suggest Russian corporations borrowed more expensively than their German counterparts. The market discount rate in St. Petersburg in 1897 was approximately 5.24 percent, while that in Berlin was 3.09 percent.[12] Thus Russian corporations faced both less-developed stock markets and higher costs of credit.

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[10] Moreover, Gehrig and Fohlin (2006) use high-frequency data to show that German stock markets functioned efficiently despite the presence of universal banks, and Fohlin (2010) shows that investors earned only small premia from German IPOs from 1882-1892, suggesting that universal banks were helpful for resolving information problems. Burhop (2011), however, finds significant underpricing in Berlin IPOs in the period 1879-96. Similar studies of liquidity or IPOs do not yet exist for the Russian case, Goetzmann and Huang (2018) use Russian monthly stock data to find evidence of momentum profits.

[11] For example, in 1914, 141 Russian securities were listed on the Brussels Stock Exchange, though only 20 represented Russian company stocks; as of December 1912, 79 stocks and 44 Russian bonds were listed on the London Stock Exchange, of which there were 55 oil enterprises, 11 mineral and coalmining enterprises, and 3 commercial and industrial enterprises (Lizunov 2015 pp. 171-2). The Paris Bourse also listed a considerable number of Russian securities.

[12] Homer and Sylla, *History of Interest Rates*, p. 605 and 262, respectively.

4. Hypotheses and Methodology

Russia's relatively fixed system of corporate law provides an interesting base for comparison with Germany's more liberalized system with increasing corporate governance protections toward the end of the 19th century. These differences in the legal environment for corporation finance lead, in theory, to significant differences in the use of the joint-stock corporate form, reliance on market-based versus bank financing, and potentially in the cost of capital and firm investment.

Specifically, we hypothesize that Russia created fewer large-scale industrial firms, especially using joint-stock incorporations, because of regulatory constraints. Further, because of restrictions on incorporation, we would expect to see fewer and less active stock markets. The lack of joint-stock corporations and fewer stock markets would constrain firms' sources of capital, leading to less access to outside equity shares and potentially also to less securitized bond finance. Thus, even among joint-stock corporations, we would expect to see less equity and potentially more bank lending in the capital structure.[13]

Finally, we note that corporations in both countries may have reported accounts strategically to avoid taxation. Beginning in 1885, the Russian government taxed corporate net profits, beginning at a rate of three percent and increasing to five percent in 1893. A further tax reform in 1898 introduced a 0.15 percent tax on corporate nominal share capital and made the corporate income tax progressive, depending on the proportion of share capital represented by

[13] In our future work, we hope to examine corporate banks in both countries to understand whether some of the same factors that induce differences in the corporate sector also impacted how banks operated.

net profits; these rates were increased in 1906 (Bowman 1993). Germany also introduced taxes on corporations beginning in 1885, when corporations became subject to a tax on share transfers (Fohlin 2002). In 1891, however, Prussia extended its income tax to corporations, taxing dividends and net earnings greater than 3.5% of paid-in capital (Hill 1892, Mares and Queralt 2020). Thus, by our period of study, both Russian and German corporate profits were subject to taxation: corporations in both countries may understate net profits. However, it is possible that in practice Russian corporations were taxed at higher rates and with less oversight.

With these institutional differences in mind, we start by comparing industrial (corporate) sectors and their patterns of financing. We compare the counts of total joint-stock corporations and the distributions of corporations by sector to get a sense of the industries in which incorporation was most valuable. Since Russia was a much poorer and less industrialized country than Germany, we expect to see a greater concentration of corporations in "high tech" industries in Germany and perhaps a greater concentration of corporations in more fundamental industries like textiles in the Russian Empire.

We then consider corporate capital structure between our two cases and across industries, for example the relative importance of debt vs. equity in corporations' financial strategies. We expect Russian corporations to rely more on debt than German corporations, given that Russian capital markets were less developed. Finally, we consider key differences between corporations that listed on stock markets vs. those that did not, to further understand how corporations' differences in performance may have correlated with the decision to list, acknowledging that decisions over listing, technology, inputs, and production may be made simultaneously.

5. Data on Russian and German Corporations and Empirical Strategies

For Germany we analyze a panel of more than 300 industrial joint-stock corporations (*Aktiengesellschaften*) from 1895-1912, with very detailed information on location, year, industry, bank interlocks, financial statements (balance sheets and income statements), and stock exchange listings and share prices. The dataset represents a random sample of all German non-financial AGs in existence in 1904.[14]

The Russian data are less detailed than the German corporation data but represent a larger number of corporations and still permit key comparisons. The core of the Russian data consists of balance sheets (share capital, assets, liabilities), income statements, and dividends for every industrial corporation (roughly 2,500) in the Russian Empire from 1899 to 1914, collected from data printed in the Ministry of Finance Yearbooks. The dataset is matched to the RUSCORP Database (Owen 1992), which provides additional information collected from corporate charters, including some governance provisions, a proxy for whether the company is widely-held, and information on any restrictions on raising capital.

The Russian data is also matched to the St. Petersburg Stock Exchange Project database, which provides monthly securities prices for all corporations listed on the St. Petersburg Stock Exchange. For the Russian data, corporations are said to be "listed" in years where a price for their securities can be located in the St. Petersburg Stock Exchange data. This contrasts with the German data, which provide separate information on stocks that are listed vs. traded. However,

[14] Datasets for both countries exclude financial corporations such as banks and insurance companies. Financial firms were doubtless important components of the overall corporate sector, but their behavior might be quite different from the industrial corporations we describe.

most German securities that are listed in a year are also traded, so the measures are approximately equal. This method of measuring listing rates slightly underestimates Russian listing, especially since we only consider one of several Russian stock exchanges.

We combine these datasets and harmonize their information by identifying corresponding variables between the Russian and German balance sheets and by creating new industrial categories that best span key differences across corporations in both countries. Appendix Table A1 summarizes these variable definitions and industry breakdowns. Some of the key variables we harmonize between Russia and Germany are values of debt, equity, profits, income, and capitalization. On the German balance sheets, "debt" corresponds to the sum of short-term and long-term debt (the German balance sheets refer to this total as "outside capital"). On the Russian balance sheets, we calculate "debt" to match this German definition, by summing "creditors," which includes loans and other short-term debt; bonds; and additional, miscellaneous forms of credit. The capitalization ratio is then all items on the liabilities side of the Russian and German balance sheets minus these debt items divided by the total balance (total assets or liabilities). We calculate return on assets (ROA) as the profits (revenues minus costs) divided by total assets.[15] The German balance sheets indicate fixed assets; in the Russian case, we use the item on the assets side of the balance sheet labeled "property" as our measure of fixed assets. When we make size comparisons based on income or share capital, we convert both to rubles using Denzel (2010).[16] Because many of the variables are an imperfect match, in

[15] The relationships we find are similar if we calculate ROA instead as (profits – dividends) / total assets.
[16] Denzel provides exchange rates for rubles and marks for each year on pp. 371-2. Exchange rates are listed as "rubles per 100 marks." A German corporation's income in rubles is thus calculated as its income times rubles per 100 marks divided by 100.

our analyses we present versions of our results with all corporations combined but also consider analyses that treat each country separately.[17]

In these analyses that follow, we consider the industrial breakdowns and financing patterns of German and Russian corporations. We begin by considering simple tabulations, descriptive statistics, and comparisons of mean to get a sense of the broad differences and similarities between German and Russian corporations. Since these crude comparisons disregard the many underlying differences between corporations in these two very different countries, we proceed by conducting multivariate analyses of corporate debt-equity ratios and capitalization ratios. Following much of the literature, particularly the example of historical balance sheets presented by De Loof and Van Overfelt (2008), Fohlin (2007), and Gregg and Nafziger (2020a), we analyze leverage ratios using random effects regressions, which allow us to consider these corporations' fixed characteristics.

6. Results

We begin our analysis by considering how Russian and German corporations were distributed across industrial sectors. Such a breakdown reveals an equilibrium outcome connecting the demand for incorporation and the overall industrial composition of each country.

Table 2 reveals the scale of each panel dataset while displaying the sector distribution of corporations in each context. In both places, capital-intensive industries like metals, mining, chemicals, and transportation were well-represented in the corporate sector. German and

[17] One particular source of potential mismatch is due to the Bonds variable. The Russian Ministry of Finance yearbooks did not include information on bonds in the publication years 1900, 1901, 1902, or 1906. In the results we present, we interpolate bonds values for years where bonds are not reported.

Russian corporations, however, do show important differences with respect to representation across industries. For example, corporations were well-represented in the Russian textiles industry, especially in cotton, but only accounted for a total of 4.22 percent of the German sample. Alcohol production (particularly breweries) constituted approximately 16.51 percent of German joint-stock corporation observations. In Russia, alcohol production (especially vodka production) accounted for about 6 percent of corporate observations, which while a smaller percentage than that in Germany still represented a substantial share of corporations.

Russian and German corporations differed along several dimensions, including size, age, listing rates, and capital structure. Because Russian corporations faced much stronger entry barriers than German corporations, the average Russian corporation was larger than the average German corporation, whether size is measured as total share capital or revenues (income) (converted to rubles).[18] German corporations, however, tended to be older, and were more likely to be listed.[19] Profit rates (return on assets) for companies in both countries are relatively similar, though German profits rates are slightly higher at approximately 5 percent compared to the Russian rate of about 3 percent. The second page of Table 3 presents descriptive statistics for listed Russian and German corporations, which considers another layer of selection. For both countries, listed companies were older and larger, though Russian listed corporations seem even more selected than German listed corporations. Still, however, for this subset, profits rates are

[18] Currencies are converted using Denzel (2010).

[19] Recall that the numbers reported in Table 3 underestimate Russian listing rates, since they represent years in which a corporation's price appears in the St. Petersburg Stock Exchange data. The proportion of Russian corporations that ever trade a security, though, is only 7.85 percent, which is far below the German number. Note, however, that for these numbers we include Russian share partnerships but excluded German GmbHs.

about the same, between four and seven percent, with German corporations achieving slightly higher profit rates. We next investigate the divergent capital structures of corporations in each country despite similar profit rates, given the other dimensions upon which the corporations differ.

The comparison presented in Figure 2 shows that corporate firms in the two countries used relatively greater debt finance compared to modern firms in Germany, Japan, or the United States.[20] As we hypothesized, given the more advanced development of the German securities markets in the pre-WWI era, German corporations accessed a larger share of their financial needs from the capital market, compared to Russian firms. Russian debt-equity ratios were much higher than German debt-equity ratios, and German firms were more capitalized, where capitalization is measured as the book value of share capital and reserves divided by the book value of total assets. Similarly, Russian corporations had more debt as a fraction of total assets. Russian and German corporations also allocated their capital differently. Russian corporations held more of their capital in reserves,[21] as shown by their much higher ratios of debt to share capital and of share capital to total assets. However, using nominal share capital, which was particularly rigid in the Russian case, may exaggerate these differences.

The difference does not just hold because Russian corporations include a closely-held type: as shown in Panel B, Russian A-corporations also had very high debt-equity ratios. However, the overall means presented in Figure 2 likely hide important sources of heterogeneity

[20] A tabular version of these results is shown in the appendix in Table A3. For additional comparisons, see Rajan and Zingales (1995), Table III Panel A (page 1430). The mean (book) debt-equity ratios in the Germany, Japan, and the United States in their dataset were 0.39, 0.52, and 0.37.

[21] For Russian corporations, "reserves" denotes reserve capital, amortization (a kind of "sinking fund" allowing corporations to save for future capital purchases), and other capital.

between the Russian and German corporations, including their different industrial composition and corporate ages. Given the many differences between Russian and German corporations, our analysis continues with multivariate regressions in Table 4.

Table 4 considers a wider set of correlates of German and Russian firm leverage, as measured by the log of debt divided by equity.[22] The first regression, reported in Column 1, replicates our finding from Figure 2: Russian corporations have much higher debt-equity ratios than German corporations. Moreover, though that difference is indeed reduced when industry controls are introduced in the second column, the difference has not disappeared.

We proceed by exploring a wider range of characteristics that might differ between the German and Russian corporations, including how they perform, how large they are, whether they access stock markets, and the year in which we observe their balance sheets. Column 3 begins by introducing controls for fixed assets over total assets, the return on assets, corporate age, and whether the corporation is listed on the Berlin or St. Petersburg Stock Exchange. Here, the difference in debt ratios between Russian corporations and German corporations is sufficiently reduced to no longer hold statistical significance: the controls we introduce in this column explain much of the difference between German and Russian corporations. Moving beyond the cross-country comparison, however, this regression shows which characteristics determined debt ratios for these corporations. First, return on assets (profit divided by total assets) is strongly negatively related to leverage. Firms with greater profits may have less leverage because they can finance operations out of revenues rather than needing to obtain

[22] Appendix Table A1 provides additional information on how we harmonized the Russian and German variables for these regressions.

debt financing.[23] Older corporations had slightly larger debt ratios, but given the instability of this coefficient across specifications, we hesitate to draw definitive interpretations.[24] Finally, German and Russian firms that listed on relevant stock exchanges had lower leverage. Most likely, firms that could list on exchanges were able to obtain equity financing more easily. However, given how few Russian corporations listed on exchanges, the estimate is somewhat noisy, and we cannot rule out the possibility that listed firms were simply selected on dimensions correlated with having lower leverage, for example the relative skill or personality of management.[25]

Column 4 of Table 4 represents additional efforts to establish harmony between the German and Russian datasets. Column 4 corrects for differences in the timing and survival rates of corporations in the two datasets by introducing year controls, by including a year trend, and by establishing a balanced panel by removing any corporation that does not appear for at least the ten years of 1899 to 1909 (inclusive). As in Column 3, the Russia dummy has greatly diminished in size and has lost statistical significance. Therefore, much of the difference between these two countries' corporations arises from differences in timing and variation in survival of corporations.[26] Note, however, that this sample of long-lived corporations is itself a rather selected group.

Columns 5 includes an additional control for firm size, as measured by log income. Log income is measured in currency units, which we convert to rubles using Denzel (2010). Both

[23] Though we cannot observe literal plowing-back of profits in both countries, firms in both countries likely used this strategy.
[24] And much of the literature disagrees on the predicted relationship between age and leverage.
[25] Such unobservables are captured somewhat by including profitability.
[26] In future work, we hope to investigate correlates of corporate survival in these two contexts.

countries' adherence to the Gold Standard in this period makes fluctuations in exchange rates small, such that including this control for corporation size is reasonable. After including these size controls, and an interaction of log income with the Russia dummy, the difference between Russian and German corporate leverage becomes very large, even in a balanced sample. Additionally, Column 5 shows that we cannot restore the difference between Russian and German corporations in the balanced sample by including an interaction between fixed assets and the Russia indicator, to account for the very different use of fixed assets on Russian balance sheets compared to German balance sheets.

There remains an additional fundamental difference between the German and Russian datasets: the German data represents a random sample, while the Russian dataset consists of all corporations for which the Ministry of Finance printed data. Column 6 checks whether this difference in sample structure explains any of the differences we see. Here, the Russian data are sampled in a similar manner to the German: we take a random sample of 300 Russian corporations in 1904 and match them over time. Column 6 shows that this alteration makes very little difference in the results, though given the new balance between the German and Russian observations, the relationship between tangible assets and log debt is positive, as one would usually predict.

The next two columns of Table 4 present split-sample regressions for German and subsequently for Russian corporations. These results clearly demonstrate one important difference between the financing of Russian and German corporations: While German corporations show the usual negative relationship between fixed assets and leverage, Russian corporations with more fixed assets (as measured by their "property" column) have less

leverage. This finding could reflect the fact that, while German firms could use debt to finance the purchase of fixed assets, Russian firms could not .

The final column includes corporation fixed effects to further control for static differences between Russian and German corporations and to demonstrate how changes in right-hand-side variables impact the debt-equity ratio.[27] Here we see that, as corporations added tangible assets and earned higher profits, their debt ratios decreased. Also, corporations that switched into "listed" status had less debt as a proportion of equity.

A further set of results, presented in Table 5, considers the correlates of German and Russian corporations' capitalization ratios, which in essence are the inverse of leverage. Similarly to the results displayed in Table 4, we find that Russian corporations have lower capitalization ratios, even controlling for industry. When we control for ROA and age, however, this difference is greatly diminished. Corporations' capitalization ratios correlate positively with return on assets in both countries, but the relationship is only statistically significant for corporations in Russia .

In future work, we plan to consider the determinants of corporations' changes in capital over time, though in both countries, share capital seemed to change quite slowly. This is especially true of corporations in the Russian Empire, who in many cases were required to formally revise their charters in order to change the company's total amount of share capital.

In this paper, we focus on financial differences between German and Russian firms, rather than differences in performance. However, the profits firms may plow back into their ventures, or their ability to offer generous dividends to potential shareholders, could influence their

[27] This column omits Log(Income) in order to maximize the number of observations displayed in the table, since Income is not reported for Russian corporations after 1909.

financial outcomes. As we have already documented, listing on stock exchanges can strongly relates to a corporation's trade-off between debt and. equity. We examine these dimensions briefly in Table 6.

We first consider how return on assets, dividends as a proportion of profits, and the dividend-adjusted stock return vary depending on German firms' listing status. Firms listed on the Berlin stock exchange differ on many dimensions: they have higher ROA and higher dividends compared to unlisted corporations or those listed elsewhere, and higher dividend-adjusted stock returns compared to corporations listed elsewhere. Patterns are similar in the Russian case (though, of course, we have no dividend-adjusted stock return for unlisted companies in the Russian case, since we only know whether corporations were listed in St. Petersburg). In both countries, listed corporations differed significantly from unlisted corporations, likely due to both positive selection and the financial advantages enjoyed by corporations listing on stock exchanges.

As a final analysis, we perform a similar comparison of Russian A-corporations vs. share partnerships, the secondary literature often asserts that A-corporations were much more likely to list on stock exchanges like St. Petersburg's. However, the universe of Russian A-corporations shows important differences relative to the small subset of listed corporations. Russian A-corporations actually earned smaller returns on assets, which may have reflected additional governance costs associated with this more widely-held corporation type. A-corporations paid out a smaller proportion of their profits as dividends. However, A-corporations perhaps compensated their investors through higher stock returns.

7. Concluding Remarks

Our fine-grained analysis of firm-level balance sheet data from two of the key cases of late industrialization reveals distinctly divergent patterns of corporate finance. Through a direct comparison of corporate law in the two cases, we attribute the distinct paths of development to stark but idiosyncratic differences in the behavior of the two autocratic regimes. Russia's heavier-handed control, through a concession system that favored extremely large corporations, tightly limited the ability of industrial firms to incorporate. This constraint on corporate development hindered the use of outside equity and thereby prevented broad dispersion of equity ownership and simultaneously slowed the development of active financial markets. The opposite chain of events took place in Germany: liberalization of incorporation led to the founding of thousands of publicly-traded joint-stock corporations, which led to thriving markets for equity capital and, in turn, relatively easy access to financial markets. These new results contribute to the long-standing debate in both economic history and contemporary development economics over the role of political and legal institutions in financial development and economic growth.

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Tables

Table 1: Institutional Framework Facing German and Russian Corporations

	Germany	Russia
Enterprise Forms / Company Law	1870 Company Law (Requirements if company wants to issue shares) 1892: GmbH created	1836: Formalization of the Concession System
Taxes	1885: Institution of percentage tax on stock transfers 1891: Prussian income tax extended to corporations: tax on dividends and net earnings greater than 3.5% of paid-in capital	1885: proportional tax (3%) on net profits as reported in public accounts 1893: net profit tax increased to 5% 1898: 0.15% tax on nominal share capital and a progressive taxation scheme based on net profits as a proportion of share capital: 1906: increased the tax on share capital to 0.2%, raised baseline profit tax rates, and added an additional tax on "excess" profits.
Shareholder Protections	1884 Law: New regulations on corporate governance; provisions creating possibilities for proxy voting	1901 Law: Increases rights of small shareholders, removes bankers from boards of directors (many loopholes)
Stock Exchange Law	1896: Stock exchange law: prohibition on futures trading, waiting period. Formalization of unified price system, tighter requirements, and broader liability on new issues 1908: New stock exchange law; reinstating futures trading	1836 corporation law banned futures trading. 1893: futures trading restored, but other restrictions on trading implemented 1900: order creating a "securities department" at the St. Petersburg Exchange, overseen by the Ministry of Finance (further rules in 1902 and 1909)

Sources: Fohlin (2002) for German tax on stock transfers, shareholder protections, and stock exchange law; Hill (1892) and Mares and Queralt (2020) on 1891 Prussian income tax reform, Fohlin (2020) for German; Guinnane et. al (2007) for German company law; Owen (2002) for Russian concession system; Bowman (1993) for Russian corporate income tax; Owen (2002) and Gregg (2017) for 1901 law on shareholder protections; and Lizunov (2015) for Russian stock exchange laws.

Table 2: Distribution of Russian and German Corporation-Year Observations by Industry

	Germany		Russia		Both	
Industry	No.	Col. %	No.	Col. %	No.	Col.%
Agriculture (including hunting and fishing)	10	0.2	107	0.54	117	0.47
Alcohol Production	815	16.51	693	3.51	1,508	6.11
Animal Products (Leather,etc)	18	0.36	283	1.43	301	1.22
Ceramics and Porcelain	286	5.79	516	2.62	802	3.25
Chemicals	303	6.14	1,003	5.08	1,306	5.3
Construction	0	0	574	2.91	574	2.33
Cotton	100	2.03	1,625	8.24	1,725	6.99
Entertainment	152	3.08	118	0.6	270	1.09
Foods Processing (Sugar, flour mills, etc.)	453	9.18	2,945	14.93	3,398	13.78
Infrastructure	0	0	694	3.52	694	2.81
Metals, Machinery, Shipbuilding	879	17.81	2,996	15.19	3,875	15.71
Mining and Fuel Production	806	16.33	1,999	10.13	2,805	11.37
Misc	39	0.79	909	4.61	948	3.84
Paper and Printing	382	7.74	719	3.64	1,101	4.46
Textiles, Except Cotton	108	2.19	2,201	11.16	2,309	9.36
Transportation	442	8.95	1,202	6.09	1,644	6.67
Warehousing, Trade, and Wholesale	24	0.49	625	3.17	649	2.63
Wood	119	2.41	517	2.62	636	2.58
Total	4,936	100	19,726	100	24,662	100

Notes: Source for Germany is Fohlin's (2007) panel of German corporations (a random sample of all German AGs in existence in 1904, matched backwards and forwards to form a panel). Source for Russia is Russia, Ministry of Finance Yearbooks (1900-1915). Industries in the Omitted category (see Appendix Table A2 are not included). Table includes only observations for corporations in operation that year.

Table 3: Descriptive Statistics for German and Russian Corporation-Year Observations (Non-Zero Values Only)

	N	Mean	Standard Dev.	Median	Minimum	Maximum
All Corporations						
Debt-Equity Ratio	24,082	0.8026	3.6332	0.5107	0.0000	526.2181
Capitalization Ratio	24,472	0.6683	0.2599	0.6688	0.0019	15.7606
Fixed over Total Assets	24,278	0.5126	0.2421	0.5141	0.0000	1.0000
Return on Assets	23,635	0.0333	0.1277	0.0375	-1.0000	9.6047
Income in Rubles	13,937	1,182,179	3,510,356	359,279	-459	112,000,000
Share Capital in Rubles	23,878	1,588,480	2,906,811	750,000	1,123	84,900,000
Age	24,661	13.7949	12.5012	10.0000	-1.0000	86.0000
Listed (Berlin or St. Petersburg)	24,664	0.0585	0.2347	0.0000	0.0000	1.0000
Germany						
Debt-Equity Ratio	4,515	0.6293	0.6999	0.4503	0.0001	10.8154
Capitalization Ratio	4,747	0.6976	0.1967	0.7006	0.0846	1.9950
Fixed over Total Assets	4,671	0.6043	0.2195	0.6125	0.0004	1.0000
Return on Assets	4,554	0.0505	0.2135	0.0438	-0.9556	9.6047
Income in Rubles	4,041	420,892	1,063,196	160,863	-459	28,300,000
Share Capital in Rubles	4,150	1,144,608	4,056,534	458,600	12,810	84,900,000
Age	4,933	15.8206	12.5048	13.0000	-1.0000	86.0000
Listed (Berlin)	4,936	0.1558	0.3627	0.0000	0.0000	1.0000
Russia						
Debt-Equity Ratio	19,567	0.8426	4.0156	0.5272	0.0000	526.2181
Capitalization Ratio	19,725	0.6613	0.2725	0.6598	0.0019	15.7606
Fixed over Total Assets	19,607	0.4908	0.2421	0.4901	0.0000	1.0000
Return on Assets	19,081	0.0292	0.0961	0.0359	-1.0000	5.4336
Income in Rubles	9,896	1,493,048	4,069,416	500,229	5	112,000,000
Share Capital in Rubles	19,728	1,681,854	2,591,525	800,000	1,123	74,800,000

Age	19,728	13.2884	12.4493	10.0000	0.0000	83.0000
Listed (St. Petersburg)	19,728	0.0342	0.1817	0.0000	0.0000	1.0000
Germany, Listed						
Debt-Equity Ratio	739	0.4508	0.3977	0.3770	0.0001	3.3176
Capitalization Ratio	761	0.7407	0.1738	0.7368	0.2316	1.9950
Fixed over Total Assets	733	0.5193	0.2238	0.5301	0.0004	0.9728
Return on Assets	740	0.0674	0.0549	0.0630	-0.4391	0.4721
Income in Rubles	648	1,256,595	2,299,766	584,340	7,264	28,300,000
Share Capital in Rubles	662	3,818,780	9,327,450	1,373,100	96,182	84,900,000
Age	769	20.2081	11.9752	19.0000	-1.0000	55.0000
Russia, Listed						
Debt-Equity Ratio	673	0.6425	1.0244	0.4412	0.0018	14.7930
Capitalization Ratio	673	0.7010	0.2091	0.6976	0.0607	2.2965
Fixed over Total Assets	673	0.5666	0.2100	0.5807	0.0016	0.9782
Return on Assets	661	0.0492	0.0698	0.0471	-0.4178	0.4563
Income in Rubles	398	3,842,445	7,028,324	1,132,466	708	47,000,000
Share Capital in Rubles	674	3,975,823	4,782,411	2,000,000	120,000	41,200,000
Age	674	18.5846	16.1485	13.0000	1.0000	78.0000

Notes: Marks are converted to Rubles using Denzel (2010). The table lists corporation-year observations.

Table 4: Correlates of Firm Leverage: Germany and Russia (Random Effects and Fixed Effects Regressions)

	Dep Variable: Log (Debt / Equity)								
Sample:	All	All	All	Balanced	Balanced	Samples	Germany	Russia	All
Model:	RE	RE	RE	RE	RE	RE	RE	RE	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Country = Russia	0.212***	0.155**	0.120	-0.0915	6.375***	0.0831			
	(0.0756)	(0.0771)	(0.0771)	(0.326)	(1.952)	(0.114)			
Fixed Assets /			-0.451***	-0.955***	1.824	0.313	1.251***	-0.798***	-0.586***
Total Assets			(0.115)	(0.242)	(1.218)	(0.244)	(0.324)	(0.118)	(0.133)
Return on Assets			-1.558***	-2.523***	-2.817***	-2.439***	-3.822***	-1.898***	-1.565***
			(0.225)	(0.412)	(0.507)	(0.344)	(0.571)	(0.255)	(0.211)
Corporation Age			0.00848***	-0.00579*	-0.00605**	0.0162***	-0.0173***	-0.00464*	-0.00321
			(0.00191)	(0.00320)	(0.00309)	(0.00353)	(0.00472)	(0.00258)	(0.00472)
Listed on Berlin /			-0.168**	-0.378***	-0.318***	-0.148	-0.303*	-0.203***	-0.169**
St. Pete Stock Ex.			(0.0739)	(0.132)	(0.111)	(0.130)	(0.177)	(0.0696)	(0.0712)
Log (Income)					0.508***		0.225***	0.109***	
					(0.127)		(0.0384)	(0.0152)	
Log (Income) *					-0.435***				
Russia					(0.129)				
Russia * Fixed / TA					-2.774**				
					(1.234)				
Constant	-1.117***	-0.861***	-0.622**			-1.322*	-6.036***	-2.895***	-0.333***
	(0.0717)	(0.238)	(0.243)			(0.783)	(0.354)	(0.377)	(0.122)
Observations	24,082	24,081	23,383	5,263	4,415	7,791	3,851	9,587	18,946
R-squared	0.00313	0.0580	0.0851	0.197	0.241	0.0489	0.196	0.175	0.0796
Number of firmid	3,151	3,150	3,092	540	540	607	310	1,727	2,783
Industry Controls	NO	YES	YES	YES	YES	YES	YES	YES	NO
Year Controls	NO	NO	NO	YES	YES	NO	YES	YES	YES
Year Trend	NO	NO	NO	YES	YES	NO	NO	NO	NO

Notes: *** p<0.01, ** p<0.05, * p<0.1. Leverage is the ratio of book values of debt to equity. Standard errors clustered by firm id in parentheses. Age of firm is number of years since registration as a joint-stock company. The Russian natural log of income is the natural log of revenue. Income for both countries' corporations is converted to rubles using Denzel (2010). "Balanced" denotes that the sample included is a balanced panel, where we have removed any corporation that does not appear for at least the ten years of 1899 to 1909 (inclusive). "Samples" denotes that, for both countries, we have randomly sampled Russian corporations from 1904 and then matched them backwards and forwards in time, to bring the Russian data to parity with the German data.

Table 5: Correlates of Capitalization, Russia and Germany

Model: OLS						
Dep. Variable:	Log Capitalization Ratio					
Sample	All	All	All	Samples	Germany	Russia
	(1)	(2)	(3)	(6)	(4)	(5)
Russia	-0.0769***	-0.0549***	-0.0152	-0.0288		
	(0.0175)	(0.0183)	(0.0189)	(0.0274)		
ROA			0.405**	0.257	0.184	0.678***
			(0.187)	(0.184)	(0.137)	(0.141)
Age			0.00191***	0.00327***	0.00456***	0.00132**
			(0.000538)	(0.000956)	(0.00129)	(0.000575)
Constant	-0.407***	-0.387***	-0.314***	-0.211	0.00911	-0.712***
	(0.0158)	(0.0847)	(0.0807)	(0.135)	(0.0257)	(0.0856)
Observations	24,472	24,470	23,734	8,061	4,655	19,079
R-squared	0.006	0.043	0.072	0.095	0.157	0.075
Industry Controls	NO	YES	YES	YES	YES	YES
Year Controls	NO	NO	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by corporation in parentheses.

Table 6: ROA and Dividends in Russia and Germany

Panel A: German ROA and Dividends by Berlin Listing

		ROA			Dividend / Profit Ratio			Dividend-adjusted stock return		
		Obs	*Mean*	*Std Dev*	*Obs*	*Mean*	*Std Dev*	*Obs*	*Mean*	*Std Dev*
Berlin	0	3,913	0.046	0.239	2,580	0.61	3.80	533	0.12	0.41
	1	748	0.067	0.055	483	0.66	0.41	472	0.14	0.44
	Total	4,661	0.049	0.003	3,063	0.61	3.49	1,005	0.13	0.43

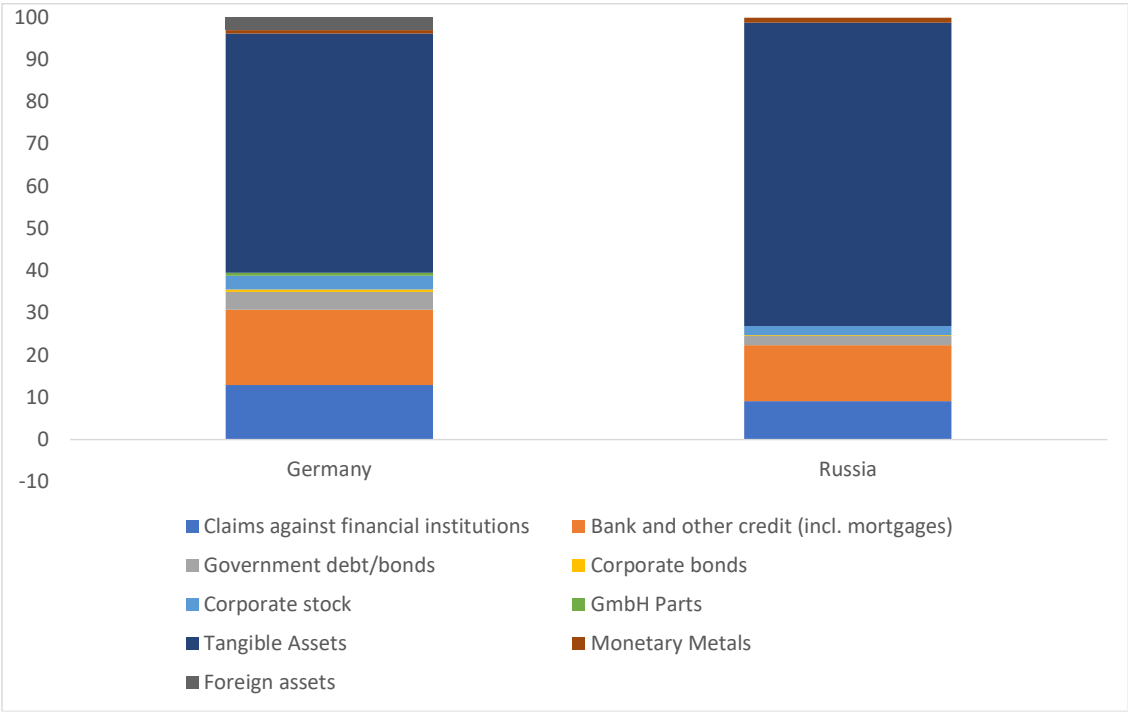
Panel B: Russian ROA and Dividends by St. Petersburg Listing and Corporation Type

		ROA			Dividend / Profit Ratio			Dividend-adjusted stock return		
		Obs	*Mean*	*Std Dev*	*Obs*	*Mean*	*Std Dev*	*Obs*	*Mean*	*Std Dev*
St. Pete	0	18,420	0.028	0.097	8,929	0.437	0.348			
	1	661	0.049	0.070	390	0.497	0.324		n/a	
	Total	19,081	0.029	0.096	9,219	0.440	0.347			
A-Corp	0	8,112	0.036	0.072	4,344	0.488	0.330	35	0.320	0.597
	1	8,474	0.025	0.091	3,863	0.420	0.352	192	0.882	6.64
	Total	16,586	0.030	0.082	8,207	0.456	0.342	227	0.795	6.116

Notes: "Berlin" equals one if the firm lists on the Berlin Stock Exchange. "St. Pete" equals one if the firm lists on the St. Petersburg Stock Exchange. A-Corp equals one if the corporation is an A-Corporation, i.e. if the firm uses the word "Aktsiia" instead of "Pai" to denote "Share." Russian dividend/profit ratios are winsorized (trimmed) to remove the bottom and top 1 percent of observations to account for extreme values in the original data.

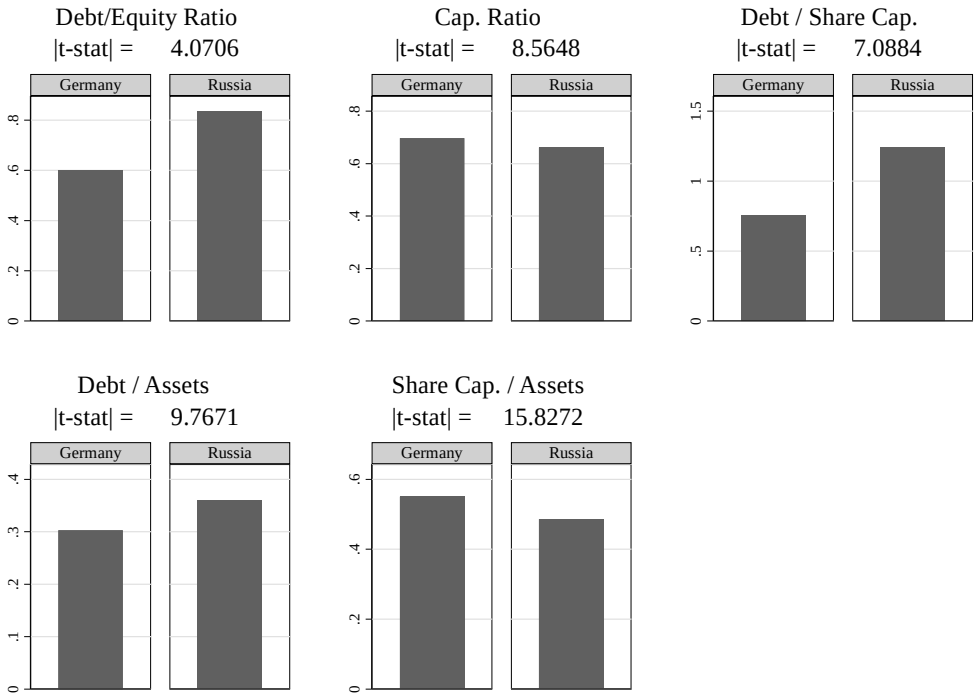
Figures

Figure 1: Comparative National Balance Sheets for Germany and Russia (Goldsmith)



Source: Goldsmith (1985), Table A6 (Germany, p. 225) and Table A16 (Russia / USSR, p. 276).

Figure 2: Key Financial Ratios in Russia and Germany
Panel A: Comparing All Russian and German Corporations



Panel B: Comparing Russian A-Corporations and German Corporations

Notes: Source for Germany is Fohlin's panel of German corporations. Source for Russia is Russia, Ministry of Finance Yearbooks (1900-1915). "T-stat" reports the result from a two-sample t-test.

Appendix

Table A2: Precise Variable Definitions and Industry Categories to Harmonize German and Russian Data

Panel A: Definitions of Key Variables

Variable	German Definition	Russian Definition
Par Value of Share Capital	Total Current Share Capital at Par	Total Share Capital
Par Share Capital at Founding	Par Value of Initial Share Capital at Incorporation	Share Capital from charter
Outside Capital	Short-Term Debt + Long-Term Debt	Creditors (debt on the balance sheet) + Bonds + "Other Articles" (Passive)
Inside Capital	Share Capital + Reserves + Other Forms of Capital	Share Capital + Reserve Capital + "Amortization" + Other Capital
Debt / Equity Ratio	Outside Capital / Inside Capital	Outside Capital / Inside Capital
Fixed Assets	Fixed Capital	Property
Income	Total Income	Revenue
Capitalization Ratio	Inside Capital / Total Liabilities	Inside Capital / Total Assets
Dividend Profit Ratio	Dividend / Profit	Dividend Amount / (Positive) Profits
Profit	Revenues minus Costs	Profit or Loss (essentially, revenue minus costs)
Return on Assets (ROA)	Profit / Total Assets	Profit or Loss / Total Assets

Panel B: Industrial Categories

Industrial Category	German Component Industries	Russian Component Industries
Agriculture (including hunting and fishing)	Fisheries	Farming Fishing and Hunting
Alcohol Production	Breweries Spirits	Bear and Mead Wine Spirits Wine and Spirits

Animal Products (Leather,etc)	Leather working	Animal Products Fur Tannery Other (Animal Products)
Ceramics and Porcelain	Ceramic Ceramics Clay Porcelain Glass Other Products (code group too)	Porcelain Pottery Glass
Chemicals	Chemicals Fertilizer (both) (Gun)Powder Dyes Rubber Potash	Charcoal Chemical Chemical Plants Laboratories Salts and Acids Soda Paints and Varnishes Oils and Ointments Gunpowder and Explosives Chemical Products Rubber Matches Mixed Production (Chemicals) Mixed (Chemicals)
Construction	(None)	Construction Materials Housebuilding
Cotton	Cotton	Cotton
Entertainment	Baths Theaters Zoos Sports	Bath House Gramophones and Cinemas Hotels
Foods Processing (Sugar, flour mills, etc.)	Chocolate Fats(for food,margarine,etc) Water and ice Sugar Malting Grain milling, bread	Confectionary Creamery Flour Sugar Mineral Water Tobacco

		Other Products (Food)
Infrastructure	(None)	Water Supply Telephones Sanitation Mixed Lighting Lighting-Electric Lighting-Gas
Metals, Machinery, Shipbuilding	Machinery Metal working Ship building Electrical-technical	Machine Building Machines and Tools Mechanical Plants Metal Metal Factories Metal Products Ironworks Steel Rolling Stock Shipbuilding Elevators Jewelry Electrotechnical Plants Other Products (Metals)
Mining and Fuel Production	Mining Coal mining Gas Gas, petroleum Stone works Oil Petroleum Salt Marble Cement	Coal Extraction and Processing of Metal Other Than… Minerals Other Minerals Mining Kerosene Oil Salt Mixed (Foods)
Misc	Various	Miscellaneous
Paper and Printing	Printing Paper	Papermaking Papermaking and Printing Printing Other Products (code group too)
Textiles, Except Cotton	Flax / linseed	Flax

	Hat making Jute Textiles-specialty makers Wool Rope wares	Flax, Hemp, and Jute Textiles Fabrics Hemp Silk Wool Mixed
Transportation	Steam ships Railroad Electric streetcar Street rail	Steamboat-Marine Steamboat-River Steamboats Tramways Transport Transportation Canalization Railroad Carriages Pavement
Warehousing, Trade, and Wholesale	Warehouse	Colonial Trade Commission Houses Retail Space Warehouse Other Products (Wholesale)
Wood	Wood	Sawmill Wood Wood Products Cellulose Other Products (Wood)
Dropped (Omitted) Industries	Musical Instruments Academic corps and student homes Charitable organizations Co-ops n/a Patent utlization licensing or sale of intellectual property) Housing, private and public	Lombards

Table A2: Number of Shares (*Dividendenpapiere*) Listed on Top German Exchanges, Circa 1910

	Domestic securities		Foreign securities	
	Entities	Issues	Entities	Issues
Berlin	914	996	56	62
Dresden	211	223	2	2
Duesseldorf	78	78	-	-
Essen	68	68	-	-
Frankfurt	269	291	45	51
Hamburg	131	143	17	17
Koeln	121	122	8	8
Leipzig	134	151	1	1
Muenchen	95	99	4	4

Sources: Calculated from Wormser (1919, from official *Kursblätter* of the respective exchanges), p. 221, and *Krupkes Konversationslexikon*, 1910-1912, adapted from Fohlin (2007, Table 7.2).

Table A3: Mean Financial Ratios for Germany and Russia

	Germany	Russia	|t-value|
Debt-equity ratio	0.5985 (0.0101)	0.8357 (0.0285)	4.0706
Capitalization (Inside Capital / Total Assets)	0.6972 (0.0029)	0.6612 (0.0019)	8.5648
Debt / Share Capital	0.7534 (0.0132)	1.240 (0.033)	7.0884
Debt / Total Assets	0.3029 (0.0029)	0.3600 (0.0028)	9.7671
Share Capital / Total Assets	0.5504 (0.0027)	0.4858 (0.0019)	15.8272
	Germany	Russian A-Corps	|t-value|
Debt-equity ratio	0.5985 (0.0101)	0.7156 (0.015)	5.2616
Capitalization (Inside Capital / Total Assets)	0.6972 (0.0029)	0.6904 (0.0027)	1.5981
Debt / Share Capital	0.7534 (0.0132)	0.9716 (0.0218)	6.9695
Debt / Total Assets	0.3029 (0.0029)	0.3295 (0.0043)	4.2658
Share Capital / Total Assets	0.5504 (0.0027)	0.5305 (0.0020)	4.7978

Notes: Source for Germany is Fohlin's panel of German corporations. Source for Russia is Russia, Ministry of Finance Yearbooks (1900-1915). Standard errors in parentheses.