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Amanda Gregg and Steven Nafziger

Financing nascent industry:  
Leverage, politics, and performance  
in Imperial Russia



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Amanda Gregg and Steven Nafziger

# Financing nascent industry: Leverage, politics, and performance in Imperial Russia

## Abstract

This paper explores the dynamics of corporate finance during the early stages of industrial growth by examining a newly constructed panel database of Imperial Russian industrial corporations' balance sheets. We document large differences in financial strategies and outcomes across industries, over time, over firms' life cycles, and between two Russian corporation types. Russian corporations' profits and dividend payouts followed the Russian business cycle. Russian corporate debt ratios mostly follow modern capital structure theories, but tangible assets were not associated with higher debt levels, suggesting that Russian corporate debt was short-term, that collateral was irrelevant, or that agency problems dominated. We also find evidence that investors needed to be compensated for poor protections, since dividends were valued and widely-held corporations enjoyed greater returns. While the evidence suggests the presence of these and other frictions, our findings are consistent with the Imperial Russian financial system functioning well enough to enable early industrial development.

Keywords: corporate finance, financial history, industrialization, Russia, Russian Empire

JEL Codes: N23, N63, G32

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# I Introduction

This paper seeks to understand the sources of growth during industrialization's early stages in countries that industrialize relatively late. Despite a wealth of evidence suggesting that well-developed financial markets improve prospects for economic growth (e.g., Ross and Levine), we know relatively little at the firm-level. This paper investigates how corporations financed operations in Late Imperial Russia, perhaps the quintessential late-industrializing country, using a novel database of annual balance sheets. Russian corporations faced a number of institutional barriers, such as restricted entry into the corporate form, weak investor protections, and thin markets for long-term financing. Yet, despite these obstacles, the Russian industrial sector grew rapidly. This paper explores the role of corporate financial factors in enabling this growth.

Here, we examine new empirical evidence on the financial strategies, declared profitability, dividend payouts, and market values of corporations in the early stages of industrialization in late-Imperial Russia. We apply ideas from modern corporate capital structure theories to interrogate new data on Russian corporate finances, and we ask whether Russian corporations derived predictable benefits from listing on the St. Petersburg Stock Exchange. In addition, we investigate why Russian corporations chose their particular financial strategies, given the nature of the Russian business cycle, variation in internal governance, and the set of financing options available to them. These exercises give us a holistic picture of how well the Russian financial system functioned at that time to support the high rate of industrial growth.

As financial development occurred, leading industrial economies also reduced barriers to forming corporations over the late nineteenth and early twentieth centuries. However, Imperial Russia (like many developing countries today) retained a costly system of incorporation, where each application was potentially subject to intense and heterogeneous scrutiny by Ministry of Finance officials. Owen (2002) and others have argued that these constraints on forming corporations significantly impeded late-Imperial Russian economic growth, as Russian firms could not fully benefit from the legal form's apparent financial advantages in order to adopt modern capital-intensive production technologies. The recent work of Gregg (2020) finds a causal relationship between incorporation and firm growth. However, what is missing from that analysis, and from much of the literature on the corporation, is evidence on how this growth was financed. This motivates our exploration of balance sheet information in order to understand Russian corporate financial strategies and outcomes in this period.

Costly chartering limited the number of corporations in Imperial Russia, relative to countries with more liberal incorporation mechanisms (Hannah, 2013).<sup>1</sup> The individualized chartering process, however, also resulted in substantial firm-specific differences in activities, governance, and managerial characteristics, each of which may have influenced subsequent capital structure and payout decisions. How did these organizational elements interact with the specifics of the Imperial financial system? In other work (Gregg and Nafziger, 2019), we note that incorporated firms in Imperial Russia showed considerable flexibility with respect to capital structure (i.e. debt vs. equity) and dividend payout decisions; corporations in different sectors and with different *de jure* organizational forms pursued divergent strategies. However, that paper utilizes a single cross-section of balance sheet data, which limits inference and made it difficult to explore the inherently dynamic evolution of corporate capital structures and dividend strategies.

In contrast, the analysis in this paper is based on a newly developed panel dataset of firm characteristics and financial balance sheet information for all chartered non-financial corporations in the Russian Empire between 1899 and 1914. We compile these data from yearbooks of the Ministry of Finance and match them with fixed corporate characteristics from the RUSCORP database of corporate charter information (Owen, 1992), including basic governance indicators and the personal characteristics of corporate founders, and with the final monthly share prices for listed firms on the St. Petersburg Stock Exchange Project (Yale ICF). Together, these data present a unique opportunity to explore the heterogeneous dynamics of corporate finance across different types of firms during the early stages of industrial growth, thereby shedding light on the mechanisms potentially linking organizational form and economic outcomes.

While the late Imperial Russian financial system was likely characterized by a number of imperfections, including agency problems and missing markets, our findings suggest that corporations exhibited a surprising amount of flexibility in adjusting their financing strategies. Generally, variation in Russian corporate debt ratios reflected factors – internal agency costs, external asymmetric information, etc. – emphasized by modern capital structure theories (i.e. Harris and Raviv, 1991). However, other corporate features such as the nature of a firm’s founders and the tangibility of assets mattered, often in ways contradictory to existing modern theories. Furthermore, we find that differences across corporation structures mattered for two common performance measures: firms’ return on equity and market-to-

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<sup>1</sup> In 1910, there were 10 corporations for every million people in Russia. In contrast, the United States had 2,913, France had 306, and Germany had 403 (Hannah, 2013, p. 558).

book ratios. Firms that chose a more closely-held corporate form had higher average return-on-equity and market-to-book ratios, and issuing dividends was associated with a higher market-to-book ratio. Firms with more closely-held structures likely faced fewer costly principle-agent governance problems and thus enjoyed higher profits and returns, though dividends could compensate investors for poor investor protections.

The corporate form of enterprise is often associated with the takeoff to modern economic growth (Birdzell and Rosenberg, 1986; Kuran, 2003). A long literature emphasizes the corporation's role in pooling capital, the tying of assets to a specific purpose, the shielding of owners' assets from firm creditors through limited liability, and the perpetuation of economic activities beyond the lifespan of any one individual. The usual narratives suggest that, as the scale and complexity of economic activity increased over the long nineteenth century, the benefits of this organizational form increased, leading to faster economic growth in those societies with more robust corporate law (Chandler, 1977). Our research illustrates how corporations might have financed industrial development in practice and also what could limit corporation-led growth in an underdeveloped economy such as late Imperial Russia.

In this paper, we first outline the relevant institutional, economic, and financial characteristics of the late Imperial economy and the nascent corporate sector. This provides us a starting point for thinking about the underlying drivers of Russian corporate profits, capital structures, and payout policies. We then present our new database and document broad patterns in balance sheet characteristics across different types of corporations. Drawing hypotheses from the historical context and the modern finance literature, the empirical work that follows illustrates the major determinants of corporate leverage, dividend payout strategies, changes in equity, and performance as measured by return on equity. We conclude with some broader takeaways for the financing of early industrialization and suggestions for future research.

## II The context: Corporations, the economy, and the financial system in Imperial Russia<sup>2</sup>

We focus on the Russian economy between the late 1890s and World War I. According to the national income and business cycle research of Gregory (1982) and Owen (2013), over this period the Russian economy experienced a mid-decade boom, followed by a slide into a downturn (bottoming out in 1901),

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<sup>2</sup> This section is based on Gregg and Nafziger (2019).

growth to 1905, a massive contraction following the 1905 Revolution, and a slow, erratic recovery leading up to the First World War (see Figure 1, Panel A). While per capita income changed little over the period and the economy remained largely agrarian, this period did see a critical early stage of growth in Russia's industrial sector (Kafengauz, 1994). A long line of scholarship interprets this early Russian industrial development as a consequence of various state initiatives in the economy (Gatrell, 1986; Gerschenkron, 1965; Von Laue, 1965).<sup>3</sup> The Witte System, a collection of policies designed to encourage industrialization and overall economic development, included a tariff regime, the formal adoption of the gold standard in 1897, a number of financial reforms, and investment guarantees by an activist state involved in railroads and other sectors. These were followed by the abolition of communal property restrictions after 1905, increased public investment in schooling, and rising government demand for military-related products.

At the same time, Owen (2002) and other have argued how the absence of general incorporation constrained firm expansion and output growth in this period. This argument is consistent with the recent work of Cheremukhin et al. (2017), who assert that late Imperial industrialization was constrained by excessive market power. However, a clearer understanding of corporate structure and finance is necessary to properly assess this hypothesis, since corporations constituted the central players in the modernizing sub-sectors of Russian industry (Gregg, 2020; Kulikov and Kragh, 2016). Therefore, before presenting our new dataset, we introduce relevant features of the Russian legal and financial setting that motivate our subsequent empirical work.

## II.1 The corporation in Imperial Russia

Imperial Russia failed to introduce either general incorporation or a private (non-corporate) business form that offered complete limited liability (e.g. the PLLC, as defined by Guinnane et al. 2007). Rather, the process of charter application and approval generated considerable variation in corporate structures and governance.<sup>4</sup> Although the Ministry of Finance provided some guidelines, the bargaining and idiosyncrasies of the approval process, perhaps involving bribery and/or political imperatives, meant that the details and overall coverage of the charters could substantially differ between otherwise similar

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<sup>3</sup> Some authors question whether there really was much impact from these state initiatives (in terms of replacing the otherwise absent "pre-requisites" for industrial modernization, as Gerschenkron argued) over this period (e.g. Allen, 2003; Kahan, 1989).

<sup>4</sup> This impression stems from reading a number of charters as part of our larger project on corporations in late Imperial Russia.



firms. Furthermore, when corporations wished to change elements of their charter, such as their system of governance or capitalization level, they had to return to the Ministry and obtain a formal revision. Thus, initial chartering and re-chartering were certainly costly processes, which likely limited access to incorporation by many Russian firms (Gregg 2020). However, the evident variation in form among firms that did manage to incorporate allows us to explore the implications of different governance structures for financial strategies and other outcomes (Gregg and Nafziger, 2019).

Chartered corporations in Imperial Russia self-identified into two types that were indicative of important underlying variation in organizational characteristics. When submitting their initial charters, the vast majority of corporations defined themselves as either “A-corporations” or “share partnerships.” Although the commercial code did not formally distinguish the two variants, these identifications allowed corporations to signal the nature of their enterprise to investors (and perhaps internally or to regulatory authorities).<sup>5</sup> New enterprises that sought outside financing from wider circles of investors tended to define themselves as A-corporations, while existing partnerships that incorporated (perhaps to add a small number of new investors) tended to choose the share partnership label.<sup>6</sup> For the current paper, we focus on these two classes of corporations as proxies for underlying broad differences in governance structures.<sup>7</sup> Relating such variation to subsequent corporate financial strategies sheds light on how agency issues may have mattered.

## II.2 The Imperial Russian financial system

The financial environment in late Imperial Russia structured the options faced by corporations. In general, Imperial Russia is commonly viewed as possessing weak financial markets and institutions. According to Rajan and Zingales (2003), Russia had very low bank deposits-to-GDP and stock market capitalization-to-GDP ratios in 1913.<sup>8</sup> In practice, Russian companies could rely on informal sources of credit, (possibly expensive) formal financing through a nascent state-supported commercial banking sector, or access to thin but growing securities

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<sup>5</sup> Share partnerships, though still Russian corporations formed under the concession system, possessed many characteristics of private limited liability companies, including small circles of investors and reliance on internal financing. Rozenberg’s (1912, p. 42) pamphlet on Russia’s absence of limited liability partnerships complained that the partnership was a “not a legal, but merely a practical form.”

<sup>6</sup> Owen (1991), pp. 12-13 and 152.

<sup>7</sup> In our larger research project, we are coding specific governance, ownership, and managerial characteristics of all corporations active in the period from their original charters and charter amendments.

<sup>8</sup> The Russian savings + commercial deposits to GDP ratio was 0.21 (sample mean = 0.38), and the stock market capitalization to GDP ratio was 0.18 (sample mean = 0.57). Russia’s deposit ratio did exceed Japan’s, Spain’s, and the UK’s, although this likely reflected the role of government deposits in the banking system. Russia’s stock market development ratio was on par with that of Argentina, Italy, and Norway, although an order of magnitude below that of France (0.78) and the UK (1.09).

markets. For particularly large and successful firms, the apparent limitations of domestic sources of financing led them to turn to Western European capital markets and banks, particularly in France.<sup>9</sup>

The first Russian joint-stock bank was established in 1864, but commercial banks began extending significant financing for industrial enterprises only in the last decades of the Imperial era.<sup>10</sup> These banks provided industrial firms with payment and discounting services, and with special drawing accounts (*onkoli*) backed by corporate, mortgage, and state securities.<sup>11</sup> The State Bank and affiliated entities provided loans and discounted bills of exchange for industrial firms through the State Bank's provincial branches, local treasury offices, and funds deposited at private banks. Municipal banks, credit societies, and other savings institutions played a very limited role in industrial finance. Alexander Gerschenkron famously doubted Russian banks' ability to provide meaningful financial assistance to industrial enterprises, but more recent research suggests he greatly underestimated the efficacy of the Russian system.<sup>12</sup> The magnitude and manner in which industrial enterprises used bank credit, however, remains an empirical question.

The Russian bond market was dominated by government and land-related securities, including state-backed railroad debt, notes issued by land banks, and the mortgage-like bonds that financed serf emancipation. However, commercial banks facilitated the placement of corporate debt through special accounts, where the banks held bonds on their books and issued corresponding shares in the associated accounts to the public (Crisp 1976, pp. 144–146). Furthermore, from the mid-1890s, state banking institutions increased deposits in joint-stock banks, thus fostering an implicit guarantee for associated securities.<sup>13</sup> Much as in other settings, this does suggest that the political and social ties of corporations may have affected their financing options, which is something we can explore with our data.<sup>14</sup>

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<sup>9</sup> See Crisp (1976) and McKay (1970).

<sup>10</sup> Between 1875 and 1914, the assets of the commercial credit system (which included the State Bank, joint stock banks, mutual credit societies, and municipal banks) increased from 900 to 7200 million rubles (roughly 17.5 to 35% of national income), with most of the growth coming after 1900 (Crisp 1976, Table 5.4; and Gregory 1982).

<sup>11</sup> Crisp (1976, Chp. 5) documents the connections between banking and Russian industrialization. Anan'ich (1996) describes state reforms and the development of commercial banking.

<sup>12</sup> "The scarcity of capital in Russia was such that no banking system could conceivably succeed in attracting sufficient funds to finance a large-scale industrialization; the standards of honesty in business were so disastrously low, the general distrust of the public so great, that no bank could have hoped to attract even such small capital funds as were available, and no bank could have successfully engaged in long-term credit policies in an economy where fraudulent bankruptcy had been almost elevated to the rank of a general business practice" (Gerschenkron 1962 pp. 19-20). For a more recent view, see Salomatina (2004).

<sup>13</sup> The expansion of private commercial banking was furthered by this form of credit provided by the State Bank, rising from 287 million to over 4.5 billion rubles between 1895 and 1913 (Kahan, 1989, pp. 56-60).

<sup>14</sup> For historical examples, the financial implications of corporate political connections are explored by Okazaki and Sawada (2017) for prewar Japan and by Ferguson and Voth (2008) for Germany in the 1930s.

The rise of Russian debt markets paralleled the growth in the trade of corporate equities, either over-the-counter or on exchanges in St. Petersburg, Moscow, Kiev, Warsaw, Riga, Khar'kov, and Odessa.<sup>15</sup> The domestic markets for corporate shares appears to have been well-integrated by the last decades of the Tsarist era (Borodkin and Konovalova 2010, pp. 50–53). The period from 1861 to 1914 saw steady growth in the number of listings and the total market capitalization of firms whose shares were traded on domestic exchanges.<sup>16</sup> Similarly to debt securities, the commercial banking sector appears to have held a considerable share of these corporate equities. This intermediation likely eased the costs of information asymmetries between firms and investors, especially for firms with less tangible (and therefore collateralizable) assets.

Thus, Russian non-financial corporations could raise funds for expansion or operations through retained profits, direct loans (often in the form of short-term drawing accounts), the issuance of debt securities, or the selling of new equity. Given the apparent prevalence of foreign capital in these channels (e.g. Crisp, 1976; McKay, 1970), at least the parts of the Russian financial system accessible by the corporate sector were closely connected to intermediaries and securities' markets in Western Europe. While asymmetric information between corporations and investors was a central issue for accessing foreign financing, this gap was also there for the different sources of external domestic funding. While we have little evidence on how expensive the different sources of available financing really were (or, alternatively, how financially constrained firms were in practice), our panel balance sheet data make it possible to document how capital structure and payout policies varied across different types of corporations and over different phases of the business cycle. This is a critical first step in evaluating precisely how the corporate form interacted with the broader political and financial environment in Russia to enable or constrain the funding of investment in the early stages of industrial development.

### II.3 Reporting requirements and the corporate income tax

The Russian commercial code required corporations to submit reports of accounts to their shareholders and to the public on a regular basis. Corporations reported public accounts in commercial newspapers,

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<sup>15</sup> Roughly 400 different corporate shares were traded by the end of 1913 in six main exchanges in the Empire (the list above minus Kiev – see Borodkin and Konovalova 2010, Tables 2 and 5). On the development of stock and bond markets in Imperial Russia, see Papp (2001) and Lizunov (2004).

<sup>16</sup> By 1914, share capital of listed firms comprised roughly 20 percent of the 21-billion-ruble total capitalization of the Russian exchanges, while government and guaranteed securities were the majority of the rest (Gatrell 1986, Table 6.4). The resulting total market capitalization was comparable to national income at that time. Ol' estimates that foreign entities owned 43% of the stock in Russian companies and credit institutions in 1914, although McKay argues that this is probably an overstatement (Ol' 1983, p. 256; McKay, 1970, p. 31).

especially the *Vestnik finansov i trgovli*, an official periodical sponsored by the Ministry of Finance. The Ministry of Finance then collected the balance sheet information reported in the *Vestnik* and summarized it in tabular form in the Ministry's Yearbooks (*Ezhegodniki*). This last source provides the basis for our new panel dataset.

Did Imperial Russian corporations report this balance sheet information truthfully? This was a period when accounting norms and practices were still in flux, with considerable heterogeneity among firms (although guidelines were provided by the Ministry of Finance). Much as in Western Europe, there was a growing literature on business accounting methods in Russia, although there were little formal training or professional association activities that we are aware of. Moreover, as far as we can tell based on reading into archival and contemporary accounts, the tax inspectorate and other government officials engaged in practically no rigorous auditing beyond a tracking of the correspondence between reported profits and tax obligations.

Even if proper reporting rules were known and practiced, financial accounting practices were possibly influenced by evolving corporate income tax policies. Beginning in 1885, Russian corporations were subject to a proportional tax on net profits as reported in public accounts, which likely induced corporations to report incomes strategically (Bowman, 1993). A reform in 1898 introduced a 0.15% tax on nominal share capital and a progressive taxation scheme based on net profits as a proportion of share capital: firms whose profits represented a greater proportion of share capital faced higher tax rates. A further reform in 1906 increased the tax on share capital to 0.2%, raised overall tax rates, and added an additional tax on "excess" profits. However, Russian tax law provided only vague definitions for taxable net profits, allowed a multitude of deductions, and, as far as we know, mandated no regular auditing process for corporations.<sup>17</sup> Altogether, we believe that Russian firms likely faced little monitoring of their accounting and could relatively easily alter their reporting behavior to avoid taxation, with subsequent distortions in stated net profits and payout policies. This should be kept in mind when interpreting our results below.

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<sup>17</sup> See Bowman (1993, p. 264) for a discussion of issues related to the definition of net profits in our context.

### III Data: The balance sheet panel

This paper draws on a panel of newly compiled balance sheet data on all Imperial Russian non-financial corporations active from 1899 onwards.<sup>18</sup> We collected data for individual corporations as reported in the Ministry of Finance Yearbooks published from 1900 through 1915. Then, we matched companies over time by hand to form a panel. We also matched companies by corporation name to the RUSCORP database (Owen, 1992) to exploit the limited information on initial chartered characteristics of the corporations in that source, such as the corporation's type (A-corporation vs. share partnership) and the location of the headquarters. RUSCORP also provides data on the personal characteristics of all corporations' founders, as listed in the charters, which can be used to define whether a corporation has a founder who is a government official, noble, or member of the gentry. Finally, we match by corporation name to the monthly security prices on the St. Petersburg Stock Exchange.<sup>19</sup> From these observations, we calculate average yearly share prices and estimate the annual corporate valuation as that price times the number of shares at founding. While this may introduce some measurement error as corporations could have changed their numbers of shares after founding, unfortunately, we have found no source listing both a company's market share price and its current number of shares.

As we noted above, the Ministry of Finance compiled the balance sheet information in their yearbooks from the official commercial periodical *Vestnik finansov i torgovli*,<sup>20</sup> in which corporations issued financial statements required by the commercial code and by their individual charters. Figure 2 presents an example of entries for the Martens and Daab Partnership for the 1901 accounting year, which was eventually published in a codified form in the 1902 yearbook. Panel A of Figure 2 shows that Martens and Daab had 63,853 rubles in the "credits" column of their profit statement in the *Vestnik*, which is the number reported in the "Profits" column of the compiled Ministry of Finance balance sheet data in Panels B (and enlarged in Panel C).<sup>21</sup> In the company's "Passive" section of the balance sheet, entries for mortgage debt (*ипотечный [sic] долг на землю*), creditors (*кредиторы*, likely trade credit), and acceptances (*акцепты*) add up to 368,847.64, which rounded up to 368,848 is the creditors column in the *Vestnik*. Other such spot checks suggest that the Yearbooks did accurately consolidate data from

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<sup>18</sup> Corporate financial firms and commercial banks' balance sheets were reported separately. The Appendix provides some additional detail on how we constructed the dataset.

<sup>19</sup> These data were compiled from original sources by researchers at the Yale International Center for Finance. See <https://som.yale.edu/faculty-research/our-centers-initiatives/international-center-finance/data/historical-financial>

<sup>20</sup> *Вестник финансов и торговли. Отчеты торговых и промышленных предприятий*

<sup>21</sup> Gregg and Nafziger (2019) discuss the basics of accounting in published Russian balance sheet data of the period.

the *Vestnik* periodical, although we have no way to check the underlying quality of the publicly issued balance sheets in the latter source.<sup>22</sup>

We construct our panel dataset from balance sheet information for the accounting years 1899–1914, with some observations from earlier years.<sup>23</sup> The published balance sheet information in the Ministry’s Yearbooks almost always indicates a corporation’s age. In cases in which this source does not list age, but we have information about that corporation from previous years, we extrapolate the corporation’s age. A corporation that appears for the first time is considered “newborn,” and is given an age of 1.<sup>24</sup>

The published balance sheet data are divided into “active” and “passive” sections, which roughly correspond to modern definitions of assets and liabilities.<sup>25</sup> The active columns included property, materials, debits, other items, and loss; the passive columns included share capital, reserves, amortization, other capital, and creditors. Until the 1909 cross-section of data, the balance sheets also reported total annual revenue and total expenditure by the firm. When the difference between revenues and expenditures was positive, it was reported as Net Profit, because this account could then be used for paying dividends. After 1909, the published balance sheet information ceased to include annual revenues and expenditures and instead only reported direct measures of profit, either the difference between assets and liabilities (“balance profit” – 1910 onwards) or a measure of net profits for use as dividends (“profits for distribution” – 1911 onwards). We believe that profits for distribution mostly closely resembles the previous definition of net profit, so our preferred measure over the whole panel uses balance profits in 1910 and profits for distribution from 1911 onwards. In part because this definition changes slightly, we carefully control for the accounting year in our empirical work below.

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<sup>22</sup> Our sense is that regulatory oversight and formal audits were limited in our period, but we have no evidence that accounting practices were better or worse than in other historical contexts, even with the presence of the corporate income tax. Unfortunately, Imperial Russian corporate archival records are extremely limited. We do check the accuracy of our data in the aggregate by comparing them with other macroeconomic indicators below.

<sup>23</sup> See Appendix Table A2 for a breakdown of observations by publication year vs. accounting year. From roughly comparing to the original source (*Vestnik finansov i torgovli*), our sense is that the number of missing corporations in the published tables is small, although see our discussion of the 1905 data below.

<sup>24</sup> We define “age” in this way, rather than based on the date of charter, as corporations often began operation well after their date of charter.

<sup>25</sup> See Appendix Table A1 for the original Russian terms, our translations, and our definitions of key financial ratios. These balance sheets appear to mix concepts related to stocks (assets and liabilities) with flows (of cash), which are typically kept separate in modern accounting practices.

### III.1 The structure of the dataset

In its entirety, our dataset describes 2,868 unique corporations observed in at least one year. From 1700 to 1915, the Russian Ministry of Finance granted charters to only 4,542 corporations, of which 345 were finance corporations and hence not covered by our current database.<sup>26</sup> Thus, our dataset covers almost 60% of the total non-financial corporations established in Imperial Russia. Table 1 presents an overview of the dataset by industry and accounting year. Our data includes 19,795 balance sheet observations. Textiles, foods, and metals represent the largest industrial categories (Panel B). Gregg's (2020) work on incorporation explains this pattern, noting that both textiles and metals were capital-intensive industries with high incorporation rates relative to the size of the industries. Moreover, Imperial Russia possessed a large foods industry, in terms of both incorporated and non-incorporated enterprises, so it is not surprising that such a large number of our balance sheet observations document food enterprises. Mining, which was also capital-intensive, is well represented in the database as well. Finally, Panel C shows that the implied annual number of corporations in our database was relatively stable except for some reporting of earlier accounting years in the 1900 Ministry of Finance yearbook. The smallest number of corporations reporting balance sheets between accounting years 1899 and 1914 was 278, and the maximum was 1,712. Only 278 firms reported accounts for the year 1905, most likely because of disruptions caused by the 1905 Revolution, Russo-Japanese War, and general social unrest. We control for year effects in our regression work to (partly) address this disparity, although we are aware that this does not fully address the selection issues that might arise in reporting (or not reporting) financial data in a given year.<sup>27</sup>

### III.2 Balance sheet items across industries, years, and corporation types

We begin our analysis by unpacking the interrelationships among the items reported in the Ministry of Finance Yearbooks. Table 2 presents descriptive statistics for the balance sheet items, scaled by total assets. On average the largest items on the active side included total property, materials and debts, while

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<sup>26</sup> We believe that our dataset captures practically all non-financial corporations founded during our time period, which is unsurprising given reporting requirements at the time. However, railroads, under heavy state control if not outright ownership in our period, typically did not report their financial information in the same way, and so we largely exclude them.

<sup>27</sup> We provide a breakdown of the accounting years featured in each Ministry of Finance yearbook in Table A2. Most of the accounting years before 1899 appear in the 1900 Ministry of Finance yearbook. In each subsequent yearbook, most observations cover the preceding accounting year, though a small number report two or more previous accounting years. Other than 1905, practically no corporations with missing balance sheets in a given year provide data in following years. Therefore, we view non-1905 missing data as largely indicative of corporate dissolution or exit.

the passive side's largest items were share capital and creditors. Aside from these overall descriptive statistics, we are interested in the evident cross-sectional and temporal variation across firms.<sup>28</sup>

How did Russian corporate financial strategies differ across industries and over time? Our data include corporations in a variety of sectors with very different capital requirements, market structures, and demand patterns. As such, we expect to find substantial differences across industries, scaling by underlying differences in firm size (total assets). Table 3 shows that this is the case. Corporations varied greatly in their property, credit, assets (relative to share capitalization), and profits across industries. The industries with the most property relative to total assets were the municipal services (infrastructure), mining, and transportation industries, but those industries did not necessarily have a large amount of credit relative to assets, suggesting a greater reliance on equity and retained earnings. The most profitable industries tended to be newer, more technologically advanced industries of the Second Industrial Revolution or those with larger scale economies, such as chemicals, mining, and transportation. These key balance sheet items also changed quite a bit over time, as demonstrated in the figures of Panel B. Corporate property declined after the 1905 Revolution, while, in general, total assets and credit increased each year. The pre-1910 net profits as a share of assets showed a downward trend over the period. All of these trends may reflect significant credit expansion and investment in building firm assets over this early period of industrial development. Finally, Panel C indicates the large average financial differences between the two Russian corporation types. Share Partnerships were much more likely to finance operations out of credit, despite have lower levels of real property. This difference was associated for greater asset accumulation by such firms. However, even without controlling for industry or age, both types were equally profitable on average. Given the large differences across industry, year, and corporation type demonstrated by Table 3, we turn to examine these dimensions in a regression framework below.

Before embarking on those exercises, we verify our data's consistency with what is known about the Imperial economy by examining whether our balance sheet information tracks the Russian business cycle, as measured by sources external to our dataset. Panel A of Figure 1 presents three-year moving averages of Russian GDP per capita and GDP per capita annual percentage changes. We see that the Russian economy experienced a downturn beginning in 1899, recovered slowly after 1901, went through a major decline after the 1905 Revolution, and then saw a period of slow recovery to the war.

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<sup>28</sup> We control for the region that the corporation was headquartered throughout our work below. The vast majority of observations were from the central, northern, and southern regions of European Russia, or from the Polish and Baltic provinces of the Empire. Slightly more than 20% of all balance sheet observations could not be matched to RUSCORP, which means they are missing information on headquarters, founder, and corporation type.



Though the dividend/profit ratio fluctuates after the 1905/1906 downturn, the profit/capital ratio largely follows the overall business cycle (Figure 1 Panel B). Indirectly, these macroeconomic indicators provide external confirmation that our data have real content and are not fundamentally distorted by financial reporting practices or tax evasion.

## IV How were Russian corporations financed? Bonds, credit, and leverage

In this section, we examine a variety of standard debt ratios (as well as changes in equity) to understand the basics of Imperial Russian corporate capital structures. Following the empirical corporate finance literature (e.g., Rajan and Zingales 1995) and what we know about the Imperial Russian context, we estimate variants of:

$$y_{it} = \beta_0 + \beta_1 \log Age_{it} + \beta_2 \left( \frac{Property}{Assets} \right)_{it} + \beta_3 \left( \frac{Profits}{Assets} \right)_{it} + \beta_4 \log(Assets)_{it} \quad (1)$$

$$+ \beta_5 MarkettoBook_{it} + Industry'_{ij} \gamma + Region'_{ij} \delta + \mu_i + \zeta_t + \epsilon_{it}$$

In this regression,  $y_{it}$  for corporation  $i$  in year  $t$  is a measure of the company's leverage, either the presence or amount of borrowing, credit/asset ratios, the book value of leverage, an estimate of the market value of leverage; or it represents the amount of (or the change in) a firm's share capital. The right hand-side variables are various factors that history or theory suggests may have influenced these key characteristics of a corporation's capital structure. We estimate this regression using random effects and fixed effects panel methods, where in the random effects regressions we cluster standard errors by firm ID and in the fixed effects regressions we cluster by industry.<sup>29</sup>

Overall, the coefficient estimates for our independent variables of interest help us generate a better understanding of the underlying drivers of the financial strategies – embodied in the capital structure – employed by Russian corporations during the early decades of modern industrial development. By focusing on factors emphasized in the finance literature, we are asking, in essence, whether these corporations were “modern” in their use of finance. Our analysis here is not exhaustive in examining

<sup>29</sup> Importantly, the use of random effects allows for the inclusion of fixed corporate characteristics. Examples of studies that use random effects models include Deloof and van Overfelt (2008). Some prominent earlier studies, for example Rajan and Zingales (1995) and De Jong et. al. (2008), use OLS or logit models, which yield similar results.

every factor driving Imperial corporate capital market decisions, but we focus on a few key dimensions that are reflected in our data. Moreover, it is important to note that these empirical exercises are descriptive in nature, as our outcomes and a number of the right hand-side variables of interest were likely jointly determined by corporations making capital structure decisions – a point we return to below.

#### IV.1 Modern capital structure theory and Imperial Russian corporations

The modern literature generally predicts a positive relationship between asset tangibility (real property divided by assets) and a company's level of debt, because companies can use tangible assets as collateral to secure lower cost borrowing (Harris and Raviv 1991, Rajan and Zingales 1995), even in some historical contexts (De Loof and Van Overfelt 2008). However, depending on the nature of tangible assets and features of the debt market, a negative (or at least non-positive) relationship between asset tangibility and debt could emerge. For example, real assets may not be helpful in securing more short-term borrowing if liquidation costs are high, leading to little relationship between tangible assets and overall debt levels (Degryse et. al 2012, Morellec 2001). Furthermore, if principals (shareholders) are concerned that managers may exploit less tangible assets for their personal benefit, companies may structure themselves or enact policies to achieve higher debt levels in order to discipline the managers (by reducing their control of cash flows), in which case a negative relationship between asset tangibility and debt levels may be observed (Grossman and Hart 1982). Given the few protections afforded to investors, and the likely agency issues within firms in the Imperial period, we may very well see such a negative relationship.

Theory makes opposing predictions regarding the relationship between profits and debt levels. In the static tradeoff model, companies with higher profits will use more debt (with deductible interest) to avoid taxes. However, in the pecking order model of Myers and Majluf (1984), firms face lower costs for internal finance from re-investing their own profits than external debt finance due to information asymmetries. Thus, firms with higher profits may have lower relative debt levels. Since Imperial Russian corporations were subject to taxation (but the likelihood of audits seems to have been low), while information gaps were certainly large, the sign of the association between profits and leverage requires empirical evidence.

For a variety of reasons (information asymmetries; the absence of collateral; etc.), firms may use equity rather than debt finance to take advantage of new investment opportunities (Myers 1977). In many empirical settings, the relative ease of equity financing is proxied by a firms' market-to-book ratio.

In our setting, we measure this ratio as the firm's total market valuation divided by the par value of share capital, where valuation is the current share price times the corporation's number of shares at founding. We have to use the initial number of shares in both numerator and denominator because we do not know how many new shares the firm issues after its initial chartering. This variable is only definable for the subset of corporations (and corporation-years) listed on the St. Petersburg stock exchange. We would expect to find a negative relationship between this market-to-book ratio and our measures of debt or leverage.

The modern literature provides a number of reasons why a firm's capital structure decisions might depend on its size or vary over its life cycle. Larger and older firms may be less risky, having established something of a track record, possessing more collateralizable assets, or possibly engaging in projects with less uncertain outcomes. These features would make it "easier" (reducing the relative costs) for such companies to get debt finance. However, larger and older firms may be more "visible," which can make it easier to attract equity finance.<sup>30</sup> Moreover, "pecking order" theories of capital structure tend to emphasize that growing financing needs of larger and older firms may exceed the capacity of lenders or debt markets, leading to a greater reliance on equity (Baskin and Miranti, 1997; Myers, 1984). In our Russian context, we get at the role played by such life cycle considerations by controlling for a corporation's age and for its size as measured by the book value of total assets.

Finally, it is likely that a number of particular historical factors were associated with variation in corporate capital structures in our context. In particular, whether a corporation's charter denoted it to be of the widely-held type with smaller shares (A-corporation, defined as whether an equity share was referred to as an *aktsiia*) and whether a corporation was listed on the St. Petersburg stock exchange (for each firm-year observation) were both likely associated – endogenously – with a relatively lower cost of equity finance, conditional on size, industry, and other characteristics of the firm. And given the constraints on information flows and weaknesses of the legal and administrative capabilities of the Imperial state, the principal-agent issues inherent in corporate governance of the period – i.e. the information asymmetries between outside investors or lenders and corporate insiders – likely meant that the identity of the corporate founders mattered for the firm's access to external financing. This leads us to also control for indicators of the corporate founder's social status: whether the corporation had a founder who was a government official, held a noble title, or was a member of the gentry.

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<sup>30</sup> Rajan and Zingales (1995) consider both possible directions of the relationship between size and leverage. Deloof and Van Overfelt (2008) stress how older firms are more visible to investors, which would predict a negative relationship between age and leverage.

## IV.2 Results

We present our estimates of Equation 1 in Table 4 (for debt and leverage outcomes) and Appendix Table A4 (for similar measures of equity finance). Consider Table 4. Unsurprising, whether a corporation was listed on the Petersburg exchange and whether it was an A-corporation were both negatively associated with debt ratios and (for the former) overall leverage (Columns 1–6); thus, it seems that such corporations relied more on equity finance (confirmed in Columns 1 and 2 of Appendix Table A4). Firm age is mostly unrelated to debt or leverage levels (or when it is, the coefficient is small), while the size as measured by the log of asset values was strongly and positively associated with debt ratios. This suggests that larger firms may have engaged in less risky projects, had more collateral on hand, and/or were engaged in substantial short-term borrowing. For the subset of corporation-year observations for which we can construct our measure of the market-to-book ratio, we find a negative relationship with our leverage measures (especially in Columns 8 and 9), consistent with a particular role for equity financing of new investment opportunities. Across Table 4, profits as a share of assets are negatively related to debt or leverage, which echoes pecking order theories of capital structure rather than tax concerns. Finally, while asset tangibility – in the form of the property/asset ratio – is associated with a greater likelihood to issue bonds (Column 1), it is also associated with a lower overall level of debt and leverage, suggestive of the prevalence of short-term borrowing and the significant role that agency issues may have played in these corporations.<sup>31</sup>

Overall, we find the results in Table 4 (and those reported in the Appendix) to be suggestive of the relevance of the capital structure theory of Harris and Raviv (1991) and the pecking order model of Myers and Majluf (1984) for understanding how Imperial Russian corporations financed themselves. Equity financing appears to have played a relatively large role in capital structures, which may also endogenously be reflected in the fairly high listing rate among Russian corporations. At the same time, the context mattered in other ways, as several Russia-specific institutional variables – particularly corporation type – provide explanatory power when it comes to the variation in how firms financed themselves.<sup>32</sup> To get a richer sense of the differences in corporate financing and the effects this generated, we move on to consider payout and “performance” related outcomes.

<sup>31</sup> As noted earlier, our measure of credit (“creditors”) is likely dominated by short-maturity trade credit. We do not separately observe longer-term bank credit, such as mortgage lending.

<sup>32</sup> Appendix Table A5, Panels A, B, and C break out the regression in Column 2 of Table 4 by industry, corporation type, and headquarter city. While many of the results are similar to the baseline regression in Table 4, we do see significant heterogeneity across specifications for certain variables, particularly corporation type across industries, firm age across corporation types, and asset tangibility across the two capital cities.

## V Profits, dividends, and the market’s view of the “performance” of Imperial corporations

What was the relationship between a firm’s *financial* performance and its fixed characteristics or capital structure? Here, we focus on several such outcomes as documented in the balance sheet data: profitability, dividend policy, returns on equity (profits divided by share capital), and the market-to-book measure discussed above. We do this sequentially by outcome, bringing up possible theoretical and historical factors associated with each outcome when relevant. We again note that the empirical work is largely suggestive, given that many of these outcomes were jointly determined with other financial and governance characteristics of the firms. Our modest intention is to illustrate how mechanisms proposed in the modern corporate finance literature and specifics of the historical context are relevant for understanding corporate performance in early Russian industrialization.

### V.1 Corporate dividend policy

Table 5 documents how dividend/profit ratios varied by industry, over time, and by corporation type. Corporations in newer, more technologically advanced or potentially riskier industries such as chemicals and transportation tended to pay higher dividends as a ratio of firm profits. As shown previously in Figure 1, Russian corporate dividends and profitability tended to vary over the business cycle. A-corporations tended to pay more dividends than share partnerships, a phenomenon we previously noted in a single cross-section from 1914 (Gregg and Nafziger, 2019). This could indicate that A-corporations compensated investors for their inherently more complex governance structures (though the difference is not very large).

We consider the factors associated with corporate dividend/profit ratios in Table 6, where, controlling for industry, the accounting year, and the headquarter region, we estimate:

$$\begin{aligned} \log\left(\frac{\text{Dividend}}{\text{Profit}}\right)_{it} & \\ &= \beta_0 + \beta_1 ACorporation_{it} + \beta_2 \log(\text{Assets})_{it} + \beta_3 \log(\text{Creditors})_{it} + \beta_4 \log(\text{Age})_{it} \\ &+ \text{Controls} + \epsilon_{it} \end{aligned} \tag{2}$$

Subject to the availability of individual variables by corporation-year, this regression includes various factors we believe to be important factors underlying the variation Imperial Russian corporate dividends.<sup>33</sup> Given their more complicated structure and diffused ownership, A-Corporations may have issued greater dividends to compensate distant, anonymous investors for their inability to directly monitor management, or lower dividends (and greater managerial control of assets) if incentivizing managers to take on risky projects was important (La Porta et al., 2000). Alternatively, more tightly held share partnerships, where owners and managers largely overlapped, may have seen larger dividends as a way to extract rents from the corporation. Older or larger corporations may also issue dividends differently, because they may not finance investments out of profits in the same manner as younger or smaller corporations (or because they need to make less use of dividends as a signaling device, as was evident in Victorian Britain - see Campbell and Turner, 2011). However, age may also be associated with lower risk projects and, therefore, less need for investors to discipline managers by requiring higher dividends.<sup>34</sup> Finally, in these models we include a measure of a corporation's debt (labelled creditors here). We may expect the corporation to disburse less dividends if it has to dedicate more of gross revenues to paying off more debt, although the standard tax argument for debt over equity saw little support in Table 4. Of course, current dividend payout policy was enacted jointly with the particulars of the capital structure (and possibly even the initial governance structure of the firm in this context, since the ability to issue bonds and aspects of firm assets were often written into the charters.

The results presented in Table 6 reveal several important correlates of Russian corporate dividends. Whether a corporation was an A-corporation or not does not appear to have a meaningful relationship with the dividend/profit ratio, even in Column 1 where no other independent variables are included. In Column 2, which includes controls for industry, year, and region and the other independent variables described above, we see that older corporations and corporations with less debt as measured by the creditors variable tend to issue greater dividends as a fraction of profits. The debt finding is consistent with standard dividend stories, while the former result supports an agency theory of dividend issuance in this context (as with La Porta et al., 2000). However, once firm fixed effects are included in Column 3, these differences largely disappear, meaning that a corporation's tendency to pay out dividends was somewhat a fixed characteristic of the individual corporation. Modern accounts of dividends

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<sup>33</sup> These factors are emphasized in the considerable modern literature on the determinants of corporate dividend payout policies (a good summary is Allen and Michaely, 2003) *and* in the much smaller number of historical studies on the topic (e.g. Braggion and Moore, 2011; and Campbell and Turner, 2011). Our data do not allow us to cleanly explore some theories of dividend variation, such as the underlying volatility of cash flows emphasized in Chay and Suh (2009).

<sup>34</sup> Indeed, La Porta et al. (2000) find that older firms do tend to pay higher dividends in modern settings.

emphasize the financing advantages of low payout volatility (Allen and Michaely, 2003); our results seem to be supportive of this idea.

Our measure of dividends shows considerable variation across firms. In the original data, some corporations issue extremely high dividends by any comparative standard. Thus, we also present our results where the left-hand-side measure of dividends has been trimmed, excluding observations above the 99<sup>th</sup> percentile and below the 1<sup>st</sup> percentile. The results in Column 4 are very similar to what we saw in Column 2, but now in the fixed effects regression of Column 5, a corporation’s level of debt (creditors) is negatively and significantly correlated with the dividend/profit ratio. This suggests that debt obligations may have been treated as “senior” in the payout strategies of Imperial Russian firms, despite some signs that investors treated interest and dividends similarly at the time (Baskin and Miranti, 1997).

## V.2 Returns on equity and market-to-book ratios

Our final set of exercises considers the economic importance (as measured in the balance sheets themselves) of the capital structure and financing differences we have described across corporations. We consider two outcomes: return on equity (ROE), as measured by the ratio of a corporation’s profits to its share capital; and the market-to-book ratio, measured as before by the corporation’s market share price multiplied by the number of shares at founding, divided by share capital (at par value). We first estimate the model below, which relates a company’s return on equity to its corporation type, several key accounting ratios, and controls for region, industry and year.

$$\begin{aligned}
 ROE_{it} = & \beta_0 + \beta_1 ProfitMargin_{it} + \beta_2 AssetTurnover_{it} + \beta_3 FinancialLeverage_{it} + \beta_4 ACorporatio \quad (3) \\
 & + \beta_5 Listed + \beta_6 NobleFounder + \beta_7 GovernmentFounder + \beta_8 GentryFounder \\
 & + Industry'_{it}\boldsymbol{\gamma} + Region'_{it}\boldsymbol{\delta} + \mu_i + \zeta_t + \epsilon_{it}
 \end{aligned}$$

We are particularly interested in whether companies that labelled themselves A-Corporations had higher or lower ROE than share partnerships. Following the large literature on agency issues within corporations, we predict that, given the likely higher governance costs encountered in A-Corporations, this type may see lower ROE. While typically larger, A-Corporations tended to be newer corporations, and may take advantage of high-return investment opportunities, thereby raising ROE. Therefore, we control for

firm age and size (total assets).<sup>35</sup> Also, given our results above, we investigate whether corporations listed on the St. Petersburg Stock Exchange (the *Listed* dummy) or those with particular kinds of founders differed in their ROE. Finally, following the accounting literature, we also include several terms that essentially decompose corporate ROE into its net profit margin (profits over revenue), asset turnover (revenue over assets), and financial leverage (assets over equity as measured by share capital).<sup>36</sup>

Columns 1 through 4 in Table 7 present our results from estimating Equation 3. Columns 1 and 2 show a strong negative relationship between the A-Corporation dummy and ROE.<sup>37</sup> Though we find no relationships between ROE and founder status, corporations that were listed on the St. Petersburg stock exchange have higher ROE. The positive relationship between ROE and Listing could simply indicate positive selection into stock market listing, or it could imply that the additional financing provided by listing on the St. Petersburg stock exchange allowed listed corporations to take advantage of high-return opportunities. As in our previous paper, we find, somewhat surprisingly, that ROE rose with firm age (Column 2). This would be consistent with a story of incumbent market power and the presence of substantial entry barriers, as argued for the period by Cheremukhin et al. (2017). Such a possibility would also help explain the positive association of revenue and assets with ROE.

We find no relationship between performance and corporation type in Column 3, which replicates our previous study (Gregg and Nafziger, 2019) by only including observations from the 1914 accounting year. The difference between the coefficient on corporation type in Columns 2 and 3 may reflect the changing relative share of A-corporations over time (and over the business cycle), with a larger number in 1914 when profit levels had fallen. Even in this single year of observations, however, Listing still has an important relationship with performance. Finally, Column 4 presents similar regressions that include all years but where we use the logarithm of a trimmed version profit/capital ratio (i.e., in which values of the profit/capital ratio above the 99<sup>th</sup> percentile or below the 1<sup>st</sup> percentile are omitted) as the outcome variable to exclude possible outliers. Column 4 shows similar relationships to those in Column 2, though with slightly less noise.

<sup>35</sup> In our previous work (Gregg and Nafziger, 2019), we found no relationship between corporation type and ROE once we controlled for firm age (which was *positively* associated with ROE in that sample).

<sup>36</sup> This method of decomposition, the DuPont Analysis, is summarized in Soliman (2008). Our focus on these accounting measures of capital structure and financial strategy is also motivated by the literature regarding ways that real world firms – particularly in developing countries – depart from the “irrelevance” arguments of Modigliani and Miller (e.g. 1958). See, for example, Ratha et al. (2003).

<sup>37</sup> Note, again, that following the literature we employ a random effects specification in Table 7, which allows us to include fixed firm characteristics as covariates.



Finally, we investigate whether a corporation's fixed characteristics like type or founder status, as well as varying factors like age and size, were correlated with the market-to-book ratio. We are particularly interested in the association between a corporation's dividend-profit ratio and the MB ratio. Campbell and Turner (2011) find that 19<sup>th</sup> century British corporations with higher dividends also had higher market to book ratios. They argue that corporations distributed dividends to compensate investors for poor legal protections, thereby increasing demand for equity and raising firm valuations. We speculate that dividends may have served a similar function in the Russian context.

In particular, we estimate the regression model below, which relates a corporation's market-to-book ratio to its dividend/profit ratio, type, age, size, industry, location, and year of observation.

$$MB_{it} = \beta_0 + \beta_1 ACorporation_{it} + \beta_2 DividendProfitRatio_{it} + \beta_3 Age_{it} + \beta_4 Size_{it} + Industry'_{it}\boldsymbol{\gamma} \quad (4) \\ + Region'_{it}\boldsymbol{\delta} + \mu_i + \zeta_t + \epsilon_{it}$$

We measure the market-to-book ratio two ways: first, as the log of the ratio of the corporation's market price times its number of shares at founding to the total par value of capital at founding, and second, as the log of the ratio of a share's market price to the par price at founding.<sup>38</sup> Table 8, Columns 1 through 4 display the results of these estimates. In Column 3, when we include a full set of firm characteristics, we find that A-corporations have slightly lower market-to-book ratios (though that relationship is insignificant), and larger firms (as measured by total assets) have lower market-to-book ratios. We see a different relationship between corporation type and the market-to-book ratio in Column 4, where our measure of the market-to-book ratio is simply the market price divided by the par price, possibly suggesting some variation by corporation type in the issuance of new equities after founding. Most importantly, however, we find that the dividend/profit ratio is robustly and positively related to a firm's log market to book ratio. This suggests that Campbell and Turner's (2011) argument that dividends may compensate for poor legal protections and thus increase firms' market valuations may also be relevant in the Russian case.

<sup>38</sup> As we focus exclusively on listed corporations to estimate Equation 4, our sample size declines sharply in Table 8.

## VI Conclusion

In this paper, we document the basic financial structure and dynamics for a panel of all non-bank corporations in the Russian Empire between 1899 and 1914. We find large differences across industries, over time, over firms' life cycles, and between corporation types. Many of these patterns follow the predictions of standard corporate finance theory and reflect what we know about the process of development in the late Imperial Russian economy.<sup>39</sup> For example, Russian firms' profits and dividend payments largely followed the Russian business cycle. The relative use of leverage or equity financing was associated with factors like asset tangibility and organizational form in ways consistent with the role of internal agency costs and external information asymmetries, much as in other historical and modern contexts. Dividend payout policies appear to have helped address such issues, as they influenced the valuation of firm equity. While individual corporate founder identities appear to have influenced funding costs, the evidence broadly suggests that the Imperial Russian financial system functioned well enough to enable early corporate industrial development.

Our empirical work relies on a uniquely large and comprehensive dataset of corporate financial characteristics in an important historical emerging market. Indeed, these data are arguably better than those available for leading contemporary economies. However, we wish to note some important caveats to our results. Although the use of panel data is an improvement upon our earlier cross-sectional work (Gregg and Nafziger, 2019), we remain hesitant to make causal claims given the complicated interconnections between capital structure, governance, payment decisions, and profitability. Furthermore, since our results describe only industrial corporations, our findings apply to a relatively small subset of all firms in the Russian Empire. On the other hand, these were the leading firms of the Empire and were precisely those for which the choices of governance and financing were most relevant.

Many studies that pursue similar methods to those employed in this paper also examine bank relationships and internal governance issues in greater depth. While primary sources may not permit a systematic examination of banking relationships, qualitative studies could provide important clues about how Russian corporations interacted with the banking sector. We hope to follow on the work of Salomatina (2004) and others in this direction. In future papers, we also aim draw on more detailed information on the governance provisions of Russian corporate charters to study whether, for example, cor-

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<sup>39</sup> Future iterations of this paper and subsequent ones will be much more explicit about the connections between our methods and findings and those in the historical and modern corporate finance literatures.

porations that granted stronger rights to minority shareholders chose different capital structures or enjoyed greater firm valuations. These and other ongoing research projects would benefit greatly from similar studies of early corporate finance in other economies, in order to understand what is specifically Russian and what is more broadly true about capital structure and performance in late industrialization.

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## Tables

Table 1 Numbers of corporations by accounting year and industry

Panel A: Number of observations and unique firms

	Number
Total observations	19,795
Unique firms	2,865

Panel B: Number of corporate observations by industry, 1896–1914

Industry	Number	Percentage	Percentage of total share capital
Agriculture	94	0.47	0.15
Animals	296	1.50	1.02
Ceramics	885	4.47	2.60
Chemicals	975	4.93	4.30
Food	3,553	17.95	9.17
Metals	2,408	12.16	16.89
Mining	2,283	11.53	20.13
Miscellaneous	904	4.57	4.38
Municipal serv.	1,494	7.55	6.38
Paper	726	3.67	1.82
Textiles	3,514	17.75	21.21
Trade	1,387	7.01	5.19
Transportation	818	4.13	5.63
Wood	458	2.31	1.14
Total	19,795	100	100

Panel C: Number of corporate observations by accounting year, 1896–1914

Accounting year	Number	Percentage	Accounting year	Number	Percentage
1896	1	0.01	1906	1,260	6.37
1897	7	0.04	1907	1,280	6.47
1898	215	1.09	1908	1,370	6.92
1899	947	4.78	1909	1,154	5.83
1900	1,102	5.57	1910	1,454	7.35
1901	1,190	6.01	1911	1,474	7.45
1902	1,249	6.31	1912	1,590	8.03
1903	1,273	6.43	1913	1,712	8.65
1904	1,126	5.69	1914	1,113	5.62
1905	278	1.40			
			Total	19,795	100

Source: *Ezhegodnik ministerstva finansov* [Ministry of Finance Yearbook], 1900–1915. See the text for further discussion.

Table 2 Descriptive statistics: Share capital, total assets, and nonzero balance sheet entries

Variable	Obs	Mean	Std. Dev	Median	Min	Max
<b>Balance sheet entries</b>						
Share capital	19,795	1,685,624	2,620,916	800,000	1,123	74,800,000
Total assets	19,795	4,806,850	14,500,000	1,964,542	0	507,000,000
Share capital/ assets	19,789	0.50	0.65	0.46	0.0018967	73.06
Total property/ assets	19,631	0.49	0.24	0.49	0.0000021	1.00
Materials / assets	17,949	0.20	0.15	0.19	0.0000002	0.98
Debits / assets	19,409	0.20	0.16	0.17	0.0000004	1.00
Other / assets	17,929	0.09	0.12	0.05	0.0000007	1.00
Loss / assets	4,457	0.09	0.11	0.05	0.0000014	1.00
Reserves / assets	15,453	0.07	2.75	0.02	0.0000059	341.67
Amortization / assets	12,963	0.13	0.16	0.10	0.0000004	8.88
Other capital / assets	9,124	0.07	0.12	0.01	0.0000003	2.25
Creditors / assets	19,532	0.31	0.25	0.29	0.0000003	12.60
Other passive / assets	11,071	0.05	0.08	0.02	0.0000002	0.92
Net profit / assets	9,404	0.05	0.04	0.04	0.0000015	0.87
Dividend amt/ assets	11,299	0.04	0.04	0.03	0.0000074	2.37
Total balance / assets	17,374	1.03	0.93	1.00	0.0000010	88.25
<b>Fixed characteristics</b>						
A-corporation	15,954	0.506	0.500	1.000	0.000	1.000
Has noble founder	15,619	0.106	0.308	0.000	0.000	1.000
Has gov't founder	15,619	0.190	0.392	0.000	0.000	1.000
Has gentry founder	15,619	0.176	0.381	0.000	0.000	1.000
<b>Market and par values</b>						
Market price	591	395.41	502.51	230.25	15.00	3,687.25
Par price	15,633	1,378.84	2,219.53	500.00	0.00	25,000.00
Num. shares	15,538	3,039.28	6,959.15	1,000.00	0.00	120,000.00
Mkt valuation	591	2,918,333	8,428,475	394,756.9	1,337.50	82,800,000
Market-to-book	591	1.82	6.0012	0.19	.00011	59.03

Source: Ezhegodnik ministerstva finansov [Ministry of Finance Yearbook], 1900–1915. Profit in 1910 is “Balance Profit”, and Profit after 1911 is “Profits for Distribution.” Russian balance sheets were divided into “active” and “passive” sections, which roughly correspond to assets and liabilities. Active columns included property, materials, debits, other items, and loss; passive columns included share capital, reserves, amortization, other capital, and creditors. The reported par value of shares is Owen’s (1989) standardized measure. Other variables are defined and discussed in the text and the Appendix.

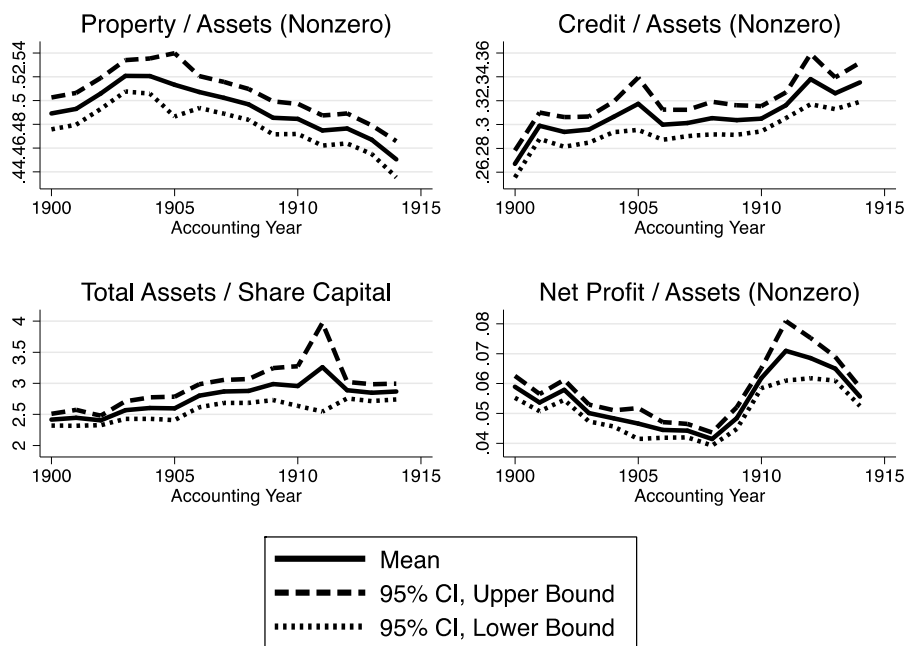


Table 3 Summary statistics by industry, year, and corporation type:  
For nonzero balance sheet items scaled by total assets

Panel A: By industry

Industry	Property/assets		Creditors/assets		Assets/share C.		Net profit/assets	
	Mean	St. Dev	Mean	St. Dev	Mean	St. Dev	Mean	St. Dev.
Agriculture	0.346	0.271	0.331	0.205	1.982	0.726	0.035	0.025
Animals	0.367	0.180	0.334	0.199	2.544	1.641	0.047	0.049
Ceramics	0.608	0.181	0.204	0.153	1.869	1.202	0.045	0.040
Chemicals	0.453	0.197	0.271	0.184	2.249	1.139	0.055	0.049
Food	0.464	0.180	0.362	0.197	3.246	4.269	0.052	0.041
Metals	0.457	0.193	0.289	0.202	2.381	2.675	0.050	0.043
Mining	0.664	0.214	0.216	0.282	2.121	1.577	0.051	0.055
Miscellaneous	0.458	0.241	0.349	0.466	2.528	2.587	0.045	0.038
Mun. serv.	0.713	0.267	0.211	0.249	2.378	4.370	0.047	0.038
Paper	0.519	0.185	0.305	0.163	2.925	2.555	0.040	0.032
Textiles	0.407	0.165	0.345	0.207	3.046	1.736	0.050	0.043
Trade	0.198	0.272	0.412	0.243	3.621	14.447	0.052	0.042
Transportation	0.671	0.229	0.233	0.224	3.841	7.061	0.057	0.074
Wood	0.423	0.228	0.366	0.315	2.326	1.118	0.053	0.043

Panel B: By year



Panel C: By type

Corp. type	Property/assets		Creditors/assets		Assets/share C.		Net profit/assets	
	Mean	St. Dev	Mean	St. Dev	Mean	St. Dev	Mean	St. Dev
Share part.	0.401	0.221	0.369	0.262	3.220	6.344	0.051	0.041
A-corporation	0.542	0.228	0.270	0.222	2.446	2.512	0.050	0.046

Source: *Ezhegodnik ministerstva finansov* [Ministry of Finance Yearbook], 1900–1915. In all panels, Profit in 1910 is “Balance Profit”, and Profit after 1911 is “Profits for Distribution.”

Table 4 The underpinnings of Imperial Russian corporate debt, credit, and leverage

Model	RE	RE	FE	RE	RE	RE	RE	RE	RE
Dep. variable	Probit bonds	Log creditors/ assets	Log creditors/ share cap.	Log creditors/ assets	Log credit + bonds	Book leverage	Book leverage	Market leverage	Debt market leverage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Share = aktsiia	0.431*** (0.128)	-0.172*** (0.0607)	-0.262*** (0.0745)		-0.0908 (0.0582)	0.022 (0.023)	-0.038 (0.052)	-0.083 (0.080)	-0.110 (0.078)
Log firm age	-0.0692* (0.0389)	-0.00686 (0.0175)	0.0719*** (0.0210)	0.0554 (0.0381)	0.00112 (0.0193)	-0.001 (0.011)	-0.019 (0.019)	-0.059* (0.031)	-0.080** (0.032)
Property / assets	1.136*** (0.202)	-0.395*** (0.111)	-0.556*** (0.128)	-0.296** (0.118)	-0.476*** (0.126)	-0.302*** (0.078)	-0.277*** (0.071)	-0.047 (0.052)	-0.182** (0.079)
Net profit / assets	-1.342 (0.964)	-1.505*** (0.347)	-1.609*** (0.394)	-1.284*** (0.254)	-1.248*** (0.376)	-0.160 (0.184)	-0.440* (0.245)	-0.794** (0.337)	-0.948** (0.388)
Log (assets)	0.312*** (0.0437)	0.196*** (0.0304)	0.515*** (0.0358)	0.150*** (0.0485)	0.202*** (0.0315)	-0.011 (0.035)	0.052*** (0.018)	0.057*** (0.019)	0.039* (0.021)
Listed	0.0195 (0.167)	-0.168*** (0.0608)	-0.255*** (0.0686)	-0.155*** (0.0411)	-0.160** (0.0635)	-0.035** (0.015)			
Corporation has noble		-0.0466 (0.0809)	-0.0784 (0.0990)						
Corporation has gov't		-0.196*** (0.0673)	-0.195** (0.0808)						
Corporation has gentry		0.0863 (0.0592)	0.145* (0.0745)						
MB ratio							-0.002 (0.002)	-0.030*** (0.007)	-0.025*** (0.007)
Constant	-16.72*** (0.138)	-3.934*** (0.608)	-7.978*** (0.703)	-4.111*** (0.890)	-4.360*** (0.673)	0.627 (0.574)	-0.187 (0.287)	0.293 (0.331)	0.503 (0.372)
Observations	15,286	15,161	15,161	19,182	11,388	11,479	397	397	397
R-squared	0.211	0.176	0.248	0.026	0.162	0.0273	0.408	0.546	0.416
Ind.controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Reg. controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
No. firms	x	1,861	1,861	2,841	1,766	1,769	102	102	102

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Standard errors clustered by firm in parentheses, except in column 4, where standard errors are clustered by industry (fixed from the firm's first observation). Profits are only reported before 1910.

Table 5 Dividend/profit ratios by industry, year, and corporation type

## Panel A: Dividend profit ratios by industry

Industry	Number	Mean	Std. Dev	Median	Min	Max
Agriculture	61	0.351	0.371	0.000	0.000	0.901
Animals	236	0.531	1.329	0.479	0.000	20.295
Ceramics	618	0.361	0.797	0.353	0.000	18.585
Chemicals	826	1.265	24.475	0.393	0.000	702.782
Food	3,034	0.579	3.737	0.498	0.000	192.308
Metals	1,845	0.656	12.102	0.399	0.000	520.000
Mining	1,387	1.031	26.297	0.292	0.000	979.592
Miscellaneous	723	0.455	0.871	0.463	0.000	21.633
Municipal serv.	1,173	0.585	3.910	0.503	0.000	132.219
Paper	588	0.387	0.530	0.376	0.000	8.911
Textiles	3,107	0.533	2.676	0.416	0.000	92.379
Trade	1,148	0.523	0.335	0.592	0.000	3.120
Transportation	618	1.001	9.926	0.338	0.000	191.304
Wood	343	0.481	0.469	0.527	0.000	6.665
Total	15,707	0.643	10.907	0.440	0.000	979.592

## Panel B: Dividend profit ratios by accounting year

Accounting year	Number	Mean	Std. Dev	Median	Min	Max
1899	815	1.163	18.200	0.603	0.000	520.000
1900	914	0.499	1.072	0.504	0.000	29.042
1901	941	0.437	0.437	0.471	0.000	6.739
1902	934	0.387	0.411	0.371	0.000	6.240
1903	986	0.420	0.778	0.399	0.000	21.633
1904	874	0.601	4.488	0.443	0.000	132.219
1905	184	0.459	0.349	0.458	0.000	1.000
1906	938	1.586	31.996	0.495	0.000	979.592
1907	1,007	0.529	0.928	0.569	0.000	20.295
1908	1,009	0.812	6.704	0.559	0.000	192.308
1909	873	2.047	25.566	0.470	0.000	702.782
1910	1,226	0.360	0.333	0.380	0.000	5.233
1911	1,234	0.355	0.259	0.398	0.000	2.051
1912	1,261	0.350	0.256	0.393	0.000	1.073
1913	1,365	0.366	0.261	0.408	0.000	1.000
1914	963	0.360	0.277	0.389	0.000	1.000
Total	15,707	0.643	10.907	0.440	0.000	979.592

## Panel C: By corporation type

Type	Number	Mean	Std. Dev	Median	Min	Max
Share part.	6,748	0.676	12.231	0.485	0.000	979.592
A- corporation	6,029	0.706	11.684	0.437	0.000	702.782
Total	12,777	0.690	11.976	0.461	0.000	979.592

Source: Ezhegodnik ministerstva finansov [Ministry of Finance Yearbook], 1900–1915. Profit in 1910 is “Balance Profit”, and Profit after 1911 is “Profits for Distribution.”

Table 6 Factors associated with corporate dividends / profits

Model	OLS Log (Div/prof)	OLS Log (Div/prof)	F.E. Log (Div/prof)	OLS Log (Div/prof), trimmed	F.E. Log (Div/prof), trimmed
Dep. variable	(1)	(2)	(3)	(4)	(5)
Share = aktsiia	0.0191 (0.0227)	-0.00584 (0.0321)		-0.0150 (0.0132)	
Log (total assets)		-0.00197 (0.0176)	0.0240 (0.0432)	-0.00156 (0.00919)	0.0314 (0.0271)
Log (creditors)		-0.0241** (0.00957)	-0.0101 (0.00986)	-0.0272*** (0.00614)	-0.0220* (0.0121)
Log (age)		0.0463*** (0.0117)	0.00427 (0.0277)	0.0385*** (0.00786)	0.0180 (0.0163)
Constant	-0.506*** (0.0150)	-0.0922 (0.223)	-0.755 (0.542)	-0.204 (0.161)	-0.789** (0.355)
Observations	5,830	5,768	5,768	5,693	5,693
R-squared	0.000	0.062	0.050	0.086	0.076
R-squared	0.000	0.062	0.0304	0.086	0.0297
Industry controls	NO	YES	N/A	YES	N/A
Year controls	NO	YES	YES	YES	YES
Region controls	NO	YES	YES	YES	YES
Unique firms	X	X	1,072	X	1,071

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Standard errors clustered by firm ID in parentheses in columns 1, 2, and 4. Standard errors clustered by industry in parentheses in columns 3 and 5.

Table 7 Performance regressions: Corporate return on equity (ROE)

Variables	(1) ROE RE	(2) ROE RE	(3) ROE 1914 RE	(4) ROE, trimmed RE
Share = aktsiia	-0.260*** (0.0453)	-0.224*** (0.0752)	0.0186 (0.123)	-0.226*** (0.0744)
Log firm age		0.0875*** (0.0231)	0.272*** (0.0446)	0.0744*** (0.0231)
Net profit margin		0.557 (0.391)		0.539 (0.384)
Revenue / total assets		0.478*** (0.134)		0.458*** (0.131)
Total assets / share capital		0.0929*** (0.0136)	0.0558 (0.0491)	0.117*** (0.0198)
Listed		0.247*** (0.0846)	0.430*** (0.125)	0.253*** (0.0849)
Corp. has noble founder		0.00519 (0.0831)		
Corp. has gov't official founder		-0.0917 (0.0742)		
Corp. has gentry founder		-0.0490 (0.0751)		
Div/prof ratio, trimmed				
Log total assets				
Constant	-2.479*** (0.0317)	-3.587*** (0.754)	-2.438*** (0.549)	-3.738*** (0.762)
Observations	12,777	6,818	726	6,756
R-squared	0.0108	0.180	0.119	0.166
Number of firms	1,705	1,247	x	1,245
Industry controls	NO	YES	YES	YES
Year controls	NO	YES	NO	YES
Region controls	NO	YES	YES	YES

Table 8 Performance regressions: The market-to-book ratio

Variables	(1) Log(MB) RE	(2) Log(MB) RE	(3) Log(MB) RE	(4) Log(p / par) RE
Share = aktsiia			-0.485 (0.740)	0.791*** (0.253)
Log firm age		0.269* (0.155)	0.254 (0.162)	0.109 (0.0862)
Net profit margin				
Revenue / total assets				
Total assets / share capital				
Listed				
Corp. has noble founder			-0.111 (0.618)	0.485** (0.244)
Corp. has gov't official founder			0.361 (0.507)	0.0390 (0.155)
Corp. has gentry founder			-0.961 (0.712)	0.129 (0.259)
Div/prof ratio, trimmed	0.460*** (0.161)	0.458*** (0.149)	0.453*** (0.150)	0.542*** (0.117)
Log total assets		-0.656*** (0.197)	-0.653*** (0.200)	-0.0620 (0.0869)
Constant	-5.660*** (0.147)	3.643 (2.861)	4.138 (2.689)	-1.149 (1.286)
Observations	524	524	524	521
R-squared	0.181	0.266	0.289	0.190
Number of firms	112	112	112	111
Industry controls	YES	YES	YES	YES
Year controls	YES	YES	YES	YES
Region controls	NO	NO	NO	NO

Standard errors clustered by Firm ID in parentheses.

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0

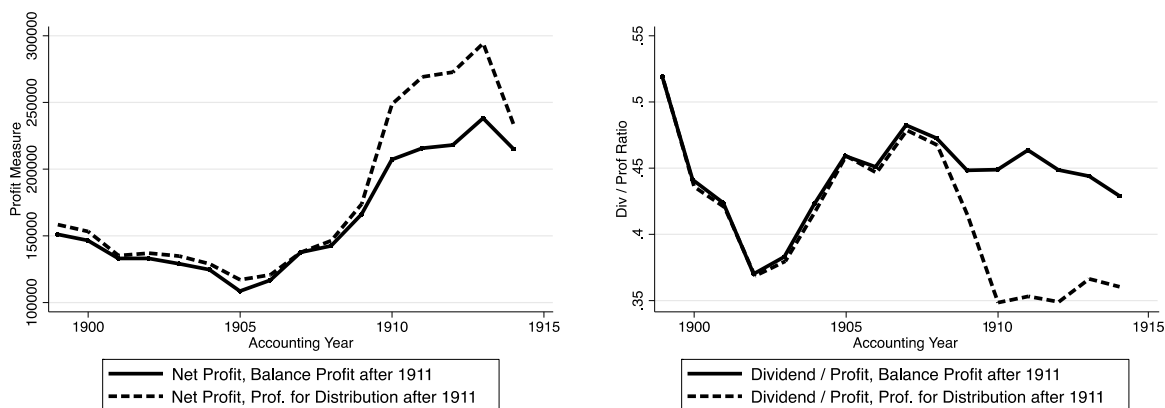
# Figures

Figure 1 Russian GDP, profits, and dividends over time

Panel A: GDP per capita and annual percentage changes (three-year moving averages)



Panel B: Two measures of profit / share capital and dividend / profit ratios



Sources: Maddison Project Database (2018) and Ministry of Finance Yearbooks, 1900–1915. Net profits using Profits for Distribution after 1911 is our preferred measure of net profits in the paper, since its definition and role on the balance sheet is most similar to the measure of net profit reported in previous volumes. Values in Panel B are trimmed below the bottom 1% and above the top 99%.

Figure 2 Excerpts from Vestnik Finansov financial reports and Ministry of Finance Yearbook for Partnership of Martens and Daab, 1902.

Panel A: Vestnik Finansov, Otcheti, 1902, p. 1143

№ 27. ВѢСТНИКЪ ФИНАНСОВЪ, ПРОМЫШЛЕННОСТИ И ТОРГОВЛИ. 1143	
<p><b>Счетъ движимаго имущества:</b>                      осталось такового въ лонбардѣ . . . . . 690 79                      Счетъ убытка:                      понесено убытка отъ операци лонбарда за 9 лѣтъ . . . . . 3,320 03                      64,218 35</p>	
<p><b>П А С С И В Ъ.</b></p>	
<p><b>Счетъ кредиторовъ:</b>                      осталось въ долгу, полученное въ ссуду для операці лонбарда черезъ мяскую городскую управу . . . . . 60,000 —                      Счетъ переходящихъ суммъ:                      осталось невыданнымъ, принадлежащимъ разнымъ лицамъ, излишне вырученнымъ при продажѣ залоговъ . . . . . 4,205 05                      осталось непополченными аукционныя суммы . . . . . 13 30                      64,218 35</p>	
<p>Распорядитель лонбарда С. Сергеевъ.                      Отчетъ лонбарда за 1900 г. утвержденъ постановленіемъ городской думы, состоявшимся 28 мая 1901 года.                      1493</p>	
<p><b>КАПИТАЛЫ.</b>                      Переходящія суммы . . . . . 9,317 11                      Организация общества 12,242 р. 48 к. . . . . 9,794 —                      Дебиторы . . . . . 215,060 40                      776,974 11</p>	
<p><b>П А С С И В Ъ.</b></p>	
<p><b>Капиталы:</b>                      основной . . . . . 400,000 —                      погашенія . . . . . 6,531 88                      погашенія сомнительныхъ долговъ . . . . . 1,075 —                      Ипотечный долгъ за землѣю . . . . . 140,875 —                      Кредиторы . . . . . 130,882 08                      Акценты . . . . . 107,590 56                      Прибыль . . . . . 519 59                      776,974 11</p>	
<p>1583</p>	
<p><b>АКЦИОНЕРНОЕ ОБЩЕСТВО</b>  <b>ПРОМЫШЛЕННО-СТРОИТЕЛЬНЫХЪ ЗАВОДОВЪ</b>  <b>Фр. Мартенсъ и Ад. Даабъ</b>                      въ Варшавѣ.                      (Управленіе и заводы въ Варшавѣ.)</p>	
<p>Извлеченіе изъ отчета за 1-й операционный 1900 годъ.  <b>Счетъ прибылей и убытковъ.</b></p>	
<p><b>БРЕДИТЪ.</b>                      Выдана прибыль за 1900 г. отъ произведенныхъ строительныхъ работъ . . . . . 63,853 98</p>	
<p><b>ДЕБЕТЪ.</b>                      Общие расходы, проценты, учетъ векселей . . . . . 51,495 79                      Страхованіе . . . . . 4,231 72                      Погашеніе машинъ и построекъ . . . . . 6,531 88                      Погашеніе сомнительныхъ долговъ . . . . . 1,075 —                      Прибыль, перенесенная на слѣдующій годъ . . . . . 519 59                      63,853 98</p>	
<p><b>Балансъ къ 1 января 1901 года.</b></p>	
<p><b>А К Т И В Ъ.</b></p>	
<p>Недвижимости: земля и постройки . . . . . 825,798 49                      Машины . . . . . 84,755 58                      Электрическое освѣщеніе и телефоны . . . . . 4,110 88                      Движимости . . . . . 15,555 47                      Запасы матеріаловъ . . . . . 110,961 61                      Выблотовка техническихъ дѣлъ . . . . . 1,261 12</p>	
<p><b>ОБЩЕСТВО ПОТРЕБИТЕЛЕЙ</b>                      при Горбатской писчебумажной фабрикѣ  <b>Т. Спосодихъ и К<sup>о</sup></b>                      (м. Горбатка, Судогодск. у., Владимирской губ.).</p>	
<p>Извлеченіе изъ отчета за 1900 годъ.</p>	
<p><b>П Р И Х О Д Ъ.</b></p>	
<p>За отчетный годъ, при среднемъ операционномъ капиталѣ 13,745 р. 83 к.,                      продано товаровъ:                      по прейсъ-курранту . . . . . 106,163 35¼                      по своей стоимости . . . . . 94,176 29¼</p>	
<p>Получено прибылей:                      отъ продажи товаровъ . . . . . 11,987 26                      по разнымъ счетамъ . . . . . 784 78¼                      Всего получено валовой прибыли . . . . . 12,772 04¼</p>	
<p><b>Р А С Х О Д Ъ.</b></p>	
<p>Идержки по торговлѣ за 1900 годъ . . . . . 11,217 96¼                      Чистая прибыль . . . . . 1,554 08</p>	
<p><b>Распределеніе прибыли.</b></p>	
<p>Отчислено:                      въ государственный сборъ . . . . . 83 94                      » запасный капиталъ 10% . . . . . 155 40                      » вознагражденіе членамъ правленія и ревиз. комисіи 10% . . . . . 155 40                      на покрытие расходовъ 1900 года, подлежащихъ, на основ. постановленій общихъ собраній, вычету изъ дивиденда . . . . . 491 28¼                      въ дивидендъ:                      на пай по 2,42% на паевой рубль . . . . . 334 03                      на заборъ по 0,75% на руб. забора . . . . . 334 03¼                      1,554 08</p>	



Panel B: *Ezhгодnik Ministerstva Finansov, 1902*

Panel C: Zoomed in row for Martens and Daab

Общ. «Фр. Мартенс и А. Дааб» . . . . .	1/1	1901	—	—	431,480	110,962	215,060	19,471	—	22,000,000	155,000	1,058,072	123,512	8,491,759	166,215	5,465,963	1,200,000	10	37,458,520
Моск. общ. для сооруже-	1/1	1901	—	—	—	—	—	—	—	400,000	—	7,607	—	368,818	—	61,854	—	—	776,974

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## Appendix Additional details on data cleaning and robustness

### Duplicate observations and the structure of the dataset

Matching corporations over time yielded a small number of duplicate observations, which we reconcile as follows. First, we noted several instances of separate balance sheet entries for subdivisions of a company's activities; for example, balance sheet information for the company's factory in Moscow. Such observations begin with the words "Same for..." (*Tozhe*). We dropped these subsidiary observations, because it appears that their information is included in the total balance for the whole company. Second, some companies' data for a given accounting year are reported in two or more different published volumes. Usually, the entries across volumes are identical, but in some cases, there are small differences, and in others, only one published volume includes certain entries. We believe that repeated reporting of balance sheets for the same accounting year represent revisions and corrections. Thus, we take the latest observation. Third, some companies are reported several times within the same published volume across multiple industries, with identical balance sheet numbers reported in each repeated entry. In such cases, we consolidate the information into one single entry for what appears to be the primary industry and drop the other observations. For companies reported in different industries with totally different balance sheet entries that have been assigned the same firm identifier, we generate a new unique firm id for each one. There are few corporations (less than 1% of the sample) that fit this category.

Table A1 The Russian balance sheets and the ratios we use

## Panel A: Items on the Russian balance sheet, with translations

Left hand page		Right hand page	
<b>Счет</b>	Account (total)	<b>Пассив</b>	Passive (liabilities)
Прибылей	Revenue	Основной капитал	Share capital
Убытков	Expenditures	Запасный капитал	Capital reserves
		Амортизация (sic)	Amortization (and depreciation)
		Прочие капиталы	Other capital (including bonds)
		Облигации	Bonds
<b>АКТИВ</b>	Active (Assets)	Кредиторы	Accounts payable
Имущество	Property	Прочие статьи	Other items
Товары и материалы	Goods and materials		
Дебиторы	Accounts receivable	<b>Прибыль</b>	Profit
Прочие статьи	Other items	Общая	Net profit
Убыток	Loss	Дивиденд: Сумма	Dividend sum
Наличность и ценные бумаги	Cash and commercial paper	Дивиденд: %	Dividend percentage

## Panel B: Definitions of accounting terms used in the paper

Standard term	Our definition using the Russian data
Total assets	Property + goods and materials + accounts receivable + loss (active) + other items (active) + commercial paper (when listed)
Valuation	Market share price * number of shares (at founding)
Total debt	Accounts payable + other items (passive) + bonds
Total book leverage	Total debt / total assets
Total market leverage	Total debt / (valuation + total assets)
Book-based bond ratio	Bonds / total assets
Book-based debt ratio	Bonds / (valuation + total debt)
Market-based debt ratio	(Accounts payable + other items) / (valuation + total debt)
Market-to-book ratio	Valuation / share capital
Asset tangibility	Property / total assets
Log size	Log (total assets)
Net profit margin	Log net profit / revenue
Asset turnover	Revenue / total assets
Financial leverage	Total assets / share capital

Table A2 Accounting years by Ministry of Finance Yearbook publication year

Pub year	Accounting year																		
	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914
1900	1	7	213	757	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1901	0	0	0	186	893	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1902	0	0	1	3	206	997	0	0	0	0	0	0	0	0	0	0	0	0	0
1903	0	0	0	0	0	186	1,035	0	0	0	0	0	0	0	0	0	0	0	0
1904	0	0	0	0	0	1	206	1,056	0	0	0	0	0	0	0	0	0	0	0
1905	0	0	0	0	0	0	0	201	1,104	0	0	0	0	0	0	0	0	0	0
1906	0	0	0	1	3	4	5	11	13	253	1,017	0	0	0	0	0	0	0	0
1907	0	0	0	0	0	0	1	0	3	13	227	1,037	0	0	0	0	0	0	0
1909	0	0	1	0	0	0	1	2	3	8	8	226	847	0	0	0	0	0	0
1910	0	0	0	0	0	0	0	0	0	1	3	11	508	837	0	0	0	0	0
1911	0	0	0	0	0	0	0	0	1	1	1	1	8	298	879	0	0	0	0
1912	0	0	0	0	0	0	0	1	1	1	2	2	5	17	564	885	0	0	0
1913	0	0	0	0	0	2	1	0	0	0	1	2	1	2	9	580	947	0	0
1914	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	7	626	1,019	0
1915	0	0	0	0	0	0	0	2	1	1	1	1	1	0	0	2	17	693	1,113

Source: Ezhegodnik ministerstva finansov [Ministry of Finance Yearbook], 1900-1915

Table A3 Profit/capital ratios by industry and accounting year

## Panel A: Profit/capital ratios by industry

Industry	Number	Mean	Std. Dev	Median	Min	Max
Agriculture	91	0.04	0.05	0.03	0.00	0.24
Animals	274	0.11	0.13	0.07	0.00	0.88
Ceramics	826	0.08	0.11	0.05	0.00	0.80
Chemicals	916	0.12	0.14	0.09	0.00	1.36
Food	3,290	0.16	0.18	0.12	0.00	3.20
Metals	2,206	0.11	0.15	0.08	0.00	2.93
Mining	1,884	0.12	0.62	0.05	0.00	26.02
Miscellaneous	830	0.10	0.19	0.08	0.00	4.72
Mun. services	1,335	0.13	0.51	0.07	0.00	12.87
Paper	666	0.14	0.54	0.08	0.00	13.26
Textiles	3,364	0.14	0.15	0.11	0.00	2.67
Trade	1,206	0.12	0.12	0.09	0.00	1.91
Transportation	745	0.14	0.25	0.09	0.00	2.04
Wood	403	0.10	0.10	0.08	0.00	1.00
Total	18,036	0.13	0.30	0.09	0.00	26.02

## Panel B: Profit/capital ratios by accounting year

Accounting year	Number	Mean	Std. Dev	Median	Min	Max
1899	947	0.13	0.15	0.09	0.00	1.71
1900	1,102	0.14	0.80	0.08	0.00	26.02
1901	1,190	0.11	0.16	0.07	0.00	2.81
1902	1,249	0.11	0.16	0.06	0.00	2.99
1903	1,271	0.10	0.14	0.06	0.00	1.54
1904	1,123	0.10	0.15	0.06	0.00	1.91
1905	276	0.09	0.12	0.05	0.00	0.83
1906	1,256	0.09	0.15	0.05	0.00	3.20
1907	1,266	0.09	0.12	0.06	0.00	1.42
1908	1,211	0.09	0.11	0.06	0.00	1.73
1909	873	0.14	0.26	0.09	0.00	4.72
1910	1,226	0.17	0.21	0.13	0.00	2.93
1911	1,234	0.19	0.53	0.14	0.00	12.87
1912	1,261	0.17	0.40	0.13	0.00	13.26
1913	1,365	0.16	0.14	0.13	0.00	1.93
1914	963	0.15	0.15	0.11	0.00	1.85
Total	18,036	0.13	0.30	0.09	0.00	26.02

Source: Ezhegodnik ministerstva finansov [Ministry of Finance Yearbook], 1900–1915. Profit in 1910 is “Balance Profit”, and Profit after 1911 is “Profits for Distribution.”

Table A4 Correlates of changes in equity

Dep. variable:	Share capital	Share capital	D.Share capital	D.Share capital	D.Share capital
Model:	OLS	FE	RE	RE	RE
	(1)	(2)	(3)	(4)	(5)
Share = aktsiia	0.124*** (0.0313)		0.000452 (0.00598)	0.00186 (0.00523)	0.00265 (0.00595)
Log total assets				0.0256*** (0.00384)	0.0259*** (0.00410)
Listed		0.0997*** (0.0238)			0.0153 (0.0134)
Named shares					0.0112 (0.00864)
Bonds allowed					-0.0123 (0.00904)
Constant	13.19*** (0.278)	13.91*** (0.157)	0.0291*** (0.00378)	-0.322*** (0.0748)	-0.345*** (0.0880)
Observations	15,591	15,591	12,337	12,335	12,325
R-squared	0.159	0.113	0.000	0.015	0.016
Industry controls	YES	YES	YES	YES	YES
Year controls	YES	YES	YES	YES	YES
Region controls	YES	YES	YES	YES	YES
Unique firms	X	1,870	1,604	1,604	1,602

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Standard errors clustered by industry and year in parentheses in column 1 and by industry in remaining columns.

Table A5 The underpinnings of Imperial Russian corporate credit: additional split-sample regressions

## Panel A: Split-sample regressions by industry

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Industry	Services	Agriculture	Animals	Ceramics	Chemicals	Food	Metals
Model:	RE	RE	RE	RE	RE	RE	RE
Share = aktsiia	-0.365 (0.374)	-7.76e-05 (0.284)	-0.206 (0.158)	-0.512 (0.313)	-0.319 (0.229)	-0.0203 (0.0935)	0.114 (0.159)
Log firm age	-0.0863 (0.0927)	0.449** (0.198)	0.128** (0.0586)	0.0393 (0.109)	0.0185 (0.0791)	-0.115*** (0.0288)	0.0225 (0.0475)
Property / assets	-0.577 (0.405)	0.608 (0.704)	-0.998*** (0.265)	0.437 (0.367)	0.441 (0.434)	-0.284* (0.166)	-0.329 (0.301)
Net Profit / assets	-5.971* (3.049)	4.535 (5.760)	-3.758* (2.229)	-1.632 (2.016)	-2.163** (1.089)	-2.259*** (0.628)	-2.942*** (0.730)
Log (assets)	-0.0154 (0.119)	-0.0113 (0.174)	-0.207** (0.0963)	0.174* (0.0950)	0.0906 (0.0997)	0.409*** (0.0711)	0.141** (0.0560)
Listed	-0.369 (0.356)		0.272 (0.217)	-0.152 (0.101)	-0.153 (0.148)	0.0684 (0.0601)	-0.0872 (0.0803)
Corporation has noble	0.0632 (0.347)	1.390*** (0.530)	-0.445 (0.524)	-0.438* (0.233)	-0.239 (0.316)	-0.0807 (0.0939)	-0.140 (0.199)
Corporation has gov't	-0.165 (0.252)	0.367 (0.342)	-0.633*** (0.173)	-0.0663 (0.257)	-0.0775 (0.251)	-0.0122 (0.0928)	-0.264* (0.151)
Corporation has gentry	0.911*** (0.221)	0.0352 (0.299)	0.232 (0.229)	0.0598 (0.215)	-0.466 (0.496)	0.185*** (0.0661)	0.122 (0.111)
Constant	-1.287 (1.691)	0.178 (2.171)				-6.801*** (1.099)	-3.292*** (0.892)
Observations	816	79	216	631	753	3,097	1,698
R-squared	0.185	0.670	0.482	0.0750	0.134	0.198	0.0787
Unique firms	120	11	35	92	119	341	261
Industry controls	NO	NO	NO	NO	NO	NO	NO
Year controls	YES	YES	YES	YES	YES	YES	YES
Region controls	YES	YES	YES	YES	YES	YES	YES

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Standard errors clustered by firm ID in parentheses

Panel A: Split-sample regressions by industry (cont...)

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Industry	Mining	Miscellaneous	Paper	Textiles	Trade	Transportation	Wood
Model:	RE	RE	RE	RE	RE	RE	RE
Share = aktsiia	0.178 (0.256)	-0.440* (0.233)	-0.310*** (0.118)	-0.0910 (0.233)	-0.102 (0.206)	-0.0801 (0.489)	0.349 (0.236)
Log firm age	0.151** (0.0669)	-0.0739 (0.0802)	0.0736 (0.0601)	-0.0375 (0.0364)	0.134** (0.0567)	0.00893 (0.128)	0.0459 (0.0925)
Property / assets	0.0221 (0.283)	-1.210*** (0.347)	0.729*** (0.212)	-0.321 (0.401)	-1.348*** (0.439)	0.101 (0.414)	-0.0799 (0.334)
Net profit / assets	0.952 (0.888)	-3.082*** (0.821)	-1.088 (1.762)	-1.271** (0.556)	-0.985 (1.484)	-0.709 (1.781)	-4.097*** (1.096)
Log (assets)	0.223** (0.0905)	-0.0824 (0.113)	0.144* (0.0821)	0.189** (0.0886)	0.280** (0.109)	0.351*** (0.0819)	0.132** (0.0663)
Listed	-0.185 (0.135)	0.0436 (0.112)	-0.146 (0.137)	-0.172 (0.213)	-0.175 (0.249)	-0.0292 (0.162)	-0.0682 (0.184)
Corporation has noble	-0.283 (0.328)	1.081*** (0.325)	0.328** (0.140)	-0.445** (0.201)	0.282 (0.414)	0.550 (0.619)	-0.313* (0.185)
Corporation has gov't	-0.104 (0.229)	-0.753* (0.417)	-0.233 (0.146)	-0.0832 (0.104)	-0.336 (0.297)	-0.421 (0.430)	-0.497 (0.478)
Corporation has gentry	-0.397 (0.247)	0.156 (0.260)	0.264* (0.151)	0.0637 (0.125)	-0.356 (0.402)	-0.309 (0.512)	-0.233 (0.230)
Constant	-6.198*** (1.378)	1.383 (1.706)		-3.425** (1.573)	-4.886*** (1.591)	-8.159*** (1.193)	
Observations	1,427	724	643	3,094	1,136	533	314
R-squared	0.0880	0.200	0.240	0.0818	0.221	0.233	0.380
Unique firms	223	144	84	324	199	81	52
Industry controls	NO	NO	NO	NO	NO	NO	NO
Year controls	YES	YES	YES	YES	YES	YES	YES
Region controls	YES	YES	YES	YES	YES	YES	YES

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Standard errors clustered by firm ID in parentheses



Panel B: Split-sample regressions by corporation type

Corporation type: Model	(1) A-corp RE	(2) Share part RE
Log firm age	0.0256 (0.0277)	-0.0480** (0.0218)
Property / assets	-0.292** (0.149)	-0.503*** (0.165)
Net profit / assets	-1.084** (0.499)	-2.011*** (0.438)
Log (assets)	0.170*** (0.0391)	0.234*** (0.0480)
Listed	-0.156** (0.0686)	-0.227* (0.132)
Corporation has noble	-0.0803 (0.102)	0.0436 (0.125)
Corporation has gov't	-0.190** (0.0931)	-0.212** (0.0911)
Corporation has gentry	0.125 (0.0796)	0.0229 (0.0882)
Constant	-4.028*** (0.814)	-3.521*** (0.742)
Observations	7,509	7,652
R-squared	0.113	0.180
Unique firms	1,032	830
Industry controls	YES	YES
Year controls	YES	YES
Region controls	YES	YES

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Standard errors clustered by firm ID in parentheses

## Panel C Split-sample regressions by Moscow vs. St. Petersburg

Headquarters location Model	(1)	(2)
	Moscow RE	St Petersburg RE
Share = aktsiia	-0.0505 (0.158)	-0.146 (0.135)
Log firm age	-0.0196 (0.0332)	0.0645 (0.0396)
Property / assets	-0.711*** (0.178)	-0.180 (0.247)
Net profit / assets	-1.886*** (0.586)	-2.743*** (0.900)
Log (assets)	0.142** (0.0581)	0.198*** (0.0637)
Listed	-0.0375 (0.102)	-0.0308 (0.0620)
Corporation has noble	-0.168 (0.273)	-0.142 (0.176)
Corporation has gov't	-0.158 (0.135)	-0.230* (0.130)
Corporation has gentry	-0.173 (0.160)	0.119 (0.189)
Constant	-3.468*** (0.897)	-4.113*** (1.058)
Observations	3,773	3,359
R-squared	0.144	0.128
Unique firms	468	457
Industry controls	YES	YES
Year controls	YES	YES
Region controls	NO	NO

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Standard errors clustered by firm ID in parentheses

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