The Births, Lives, and Deaths of Corporations in Late Imperial Russia

Very preliminary draft – updated results and text will be available in mid-December

Comments welcome but please do not cite

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Amanda Gregg[1] and Steven Nafziger[2]

Abstract

Understanding the birth, growth, and death of firms in the early stages of industrial development is a relatively unexplored area of economic history, yet these processes are at the heart of transitions to modern economic growth. Our paper investigates the competitiveness and financial development of the Imperial Russian economy by examining patterns of entry, exit, and persistence in the corporate sector. This analysis relies on a newly developed panel database of detailed annual balance sheet information from every active corporation (N > 2500) in the Russian Empire between 1899 and 1914. In our data, firms enter the corporate sector as brand-new firms or as partnerships newly transformed into corporations, and they exit when they shut down. We examine the variation in entry patterns across industries with different levels of profitability and competitiveness, document how new and newly transformed corporations evolved over their life cycles, and construct proportional hazard models to predict firm exits based on underlying balance sheet and governance characteristics. In addition, we examine heterogeneity in corporate entry and exit patterns by the nature of political connections held by corporate founders. Overall, our findings suggest a relatively high level of flexibility and competitiveness in the Imperial corporate sector, which belies any simplistic argument regarding institutional constraints on firm growth and development in the early stages of Russian industrialization. More broadly, these findings inform our understanding of firm dynamics in developing country settings.

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[1] Middlebury College, Warner Hall 305F, 303 College Street, Middlebury, VT 05753. Corresponding author: agregg@middlebury.edu.

[2] Williams College. snafzige@williams.edu

I. Introduction

Firm entry, evolution, and exit are key attributes of an economy's overall performance, yet very little is known about these processes in historical settings. While the cross-sectional size distribution of establishments has been well documented in the United States and other leading economies over the long 19th century, the dynamics of how such variation evolved, especially at the firm level, are largely unknown outside of a few industries, especially in "late-industrializers." This is particularly unfortunate, because any understanding of the early stages of modern economic growth must grapple with the creation, growth, and destruction of firms that adopt or fail to adopt new industrial technologies, financial structures, and market strategies. This paper provides an initial foray in this direction by studying the births, deaths, and lives of corporations in late Imperial Russia, perhaps the quintessential late-industrializing economy.

The literature on late Imperial Russia may be broken down into two camps. On the one hand, writers such as Gregory (1982) and Markevich and Nafziger (2017) have argued that the late Imperial economy was relatively dynamic, with the last decades of the regime experiencing fairly high rates of industrial growth. On the other side, Allen (2003), Cheremukhin et al. (2017), and Owen (1991) have asserted that significant structural obstacles impeded Russian economic modernization before the Revolution. While the truth is perhaps somewhere in the middle, practically no empirical work has been undertaken with micro-level data to examine just how institutional and economic conditions impacted firm behavior and outcomes. Exceptions include the recent work by Gregg (2018) and Gregg and Nafziger (forthcoming), who find that firms adopting the corporate form of organization experienced considerable flexibility in their financial strategies, which translated into greater capital accumulation, investment in new technologies, and growth. Implicitly, and following Owen (1991), a tentative conclusion from these recent studies is that a more flexible and lower-cost process of incorporation would have improved the level and pace of industrial development prior to 1917.

The acceleration and spread of modern industrialization by the 19th century was accompanied by growing capital requirements, and firms increasingly adopted corporate or limited liability forms of

partnerships to ease access to financing such larger scale investments. Changes to legal and regulatory regimes enabled the rise of more flexible and long-lived forms of firm organization that, in effect, lowered capital costs, streamlined internal structures, shielded assets, and embedded limited liability. This was the case in the United States, Britain, Germany, and other industrial leaders, but it was also true in Imperial Russia. However, much existing historical work on industry, firm, and market dynamics during this period has focused, perhaps appropriately so, on establishments (plants or firms) and on the "real side" of the enterprise: output, employment, capital utilization, and productivity. There is a historical literature that examines the *financial* evolution of firms or industries over time, but such studies have typically involved small and often non-representative samples. Corporations, as an important sub-set of all firms, have received considerable attention from historians, but much of this research is non-quantitative and/or focused primarily on governance or financial matters, rather than on real outcomes. Moreover, practically no quantitative historical research on firms has focused on an economy as poor as late Imperial Russia. This paper aims to bridge these gaps by studying the entry, exit, and evolution of individual corporations between the years 1900 and 1914 through the analysis of a new panel dataset derived from published balance sheet and corporate charter information. This dataset of over 2,500 corporations represents a unique opportunity to jointly investigate the micro-structure of economic, financial, and legal development in a late-industrializing economy.

The particular features of the Imperial Russian context allow us to make new connections between the literatures on the economics of institutions, corporate governance, finance, and industrial organization. Our central focus is on documenting and analyzing the "life-cycles" of corporations, a topic that has received considerable attention among industrial economists working on the broader category of "firms."[3] Classic studies in industrial organization consider the differences between incumbents and brand-new entrants or entrants diversifying into new industries, but little research has examined how brand-new firms differ from those that change enterprise forms; for example, from partnerships to

[3] Below, we detail our distinction between firms and corporations, especially as to how we interpret the different economic considerations underpinning entry, exit, and life-cycle dynamics.

corporations. Our inclusion of both *de novo* and pre-existing (as partnerships or other organizational forms) corporations allow us to speak to this distinction. We also examine variation in life-cycle dynamics among corporations with distinct governance characteristics, as Imperial Russia possessed two distinct types of this organizational form that reflected underlying differences in institutional structure. In doing so, we document how the scale, profits, and market shares of incorporated firms of different types evolved as they aged. Finally, we investigate the drivers of exit from the corporate sector. Along the way, we pay particular attention to inter-industry differences in entry, exit, and life-cycle dynamics, which allows us to consider how variation in the net relative benefits of the corporate form may have impacted firm behavior across industries.

Therefore, our empirical study considers a series of questions related to the demographics and dynamic experiences of late Imperial corporations. While the results catalogued below are largely descriptive, we do interpret our evidence as consistent with a relatively positive assessment of the Imperial corporate sector, in which these leading firms of early Russian industrial development were able to make fairly flexible and (constrained-) optimizing decisions. Our exclusive focus on corporations does not allow us to fully address the concerns of Owen (1991) and others regarding the impediments that costly incorporation placed on the Russian economy, but we view the current study as a necessary first step in that direction.

In what follows, we move from outlining the historical and economic context to introducing and describing our new dataset, a key contribution of our larger project. Along the way, we specify a set of hypotheses regarding corporate characteristics and life-cycle outcomes. We evaluate these hypotheses using a variety of empirical approaches in the penultimate section. We conclude with brief remarks on our larger project, which studies late Imperial Russian corporate governance, finance, and performance in a more comprehensive and empirically exhaustive manner.

II. From Economic Context to Empirical Hypotheses

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), the late Imperial Russian economy experienced a mid-1890s boom, followed by a slide into a downturn (bottoming out in 1901), growth to 1905, a massive contraction following the 1905 Revolution, and a slow, erratic recovery leading up to the First World War. While per capita income changed little over the period and the economy remained largely agrarian, Russia's industrial sector did experience the early stages of growth (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).[4] 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, and investment guarantees and activist state involvement in railroads and other sectors. The abolition of rural communal property restrictions after 1905, increased public investment in schooling, and rising government demand for military-related products all lent further impetus towards at least some industrial development.

In contrast to important general accounts by Kafengauz (1994) and others, there has been relatively little work on late Imperial Russian industrial development from the microeconomic perspective of the firm. Indeed, basic facts about the micro-structure of early Russian industrialization remain largely unknown. Tugan-Baranovsky (1970) undertook a pioneering investigation of the transition to modern factory production, which drew upon rich but idiosyncratic data from a very small set of factories in the Moscow region. Various case studies and contemporary accounts have explored the experiences of specific industrial plants (e.g. Markevich and Sokolov, 2005), communities (e.g. Vorderer, 1990), firms (e.g. Grant, 1999), and sectors (e.g. McCaffray, 1996). Only very recently have works such as Gregg

[4] 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).

(2018), Gregg and Nafziger (forthcoming), and Kulikov and Kragh (forthcoming) explored larger samples of firms to better identify the factors underpinning or constraining industrial growth.

A particular value of micro-data on industrial firms is the possibility of documenting underlying drivers of entry, exit, and survival. These matter for thinking about within- and, especially, between-firm drivers of aggregate productivity growth and structural change. Micro-level information also helps to clarify market structures and the nature of competition within leading and flagging sectors, thus sharpening our understanding of the early stages of industrialization. In the context of Imperial Russia, empirical evidence on the ease of entry, level of market concentration, and dynamics of firm survival is practically non-existent.[5] The emphasis on the role of Imperial policies and financing has framed early Russian industrial development in a largely macroeconomic light. How firms reacted to the resulting incentives of the institutional environment regarding entrepreneurship, financing, input, technology adoption, merger and acquisitions, bankruptcy, and other decisions, and the consequences for market structure and sectoral change, has only been explored in a limited and largely qualitative fashion (e.g. Guroff and Carstensen, eds., 1983; McKay, 1970; Owen, 1991). This paper is a first attempt to rectify this by considering one particular set of modernizing firms: those that incorporated.

Following on Owen (1991), studies such as Gregg (2016) and Gregg and Nafziger (2017) have argued that the absence of general incorporation was a critical impediment to firm expansion and output growth in the late Imperial period. In failing to allow easier entry into incorporation, Imperial Russian policy raised the costs of financing investment, increased the riskiness of entrepreneurial activities, and limited the planning horizon for firms. Thus, by making incorporation a subjective and ultimately politicized process (see below), Imperial commercial law may have raised entry barriers and reduced competition in Russian industry. This is consistent with the recent work of Cheremukhin et al. (2017), who assert that late Imperial industrialization was slowed by excessive market power in more advanced

[5] Gregory (1982), Kafengauz (1993), and contemporary sources such as Varzar and Kafengauz, ed. (1929) do document industry sub-sector level growth between the early 1880s and 1913. In future work, we hope to consider specific patterns in our corporate micro-data in connection with more aggregate trends.

industries.[6] However, identifying whether this really was the case requires a clearer understanding of the dynamic patterns of entry, exit, and survival experienced by corporations. As corporations constituted the primary organizational form in the modernizing sub-sectors of Russian industry (Kulikov and Kragh, forthcoming), the life-cycle dynamics of these firms can speak to the broader features of industrial development.[7] Before presenting our new dataset, we describe relevant aspects of the Imperial Russian legal, financial, and industrial setting. By connecting this context to insights drawn from modern literatures, we generate a set of hypotheses regarding corporate entry, exit, and survival patterns that we can then bring to the data.

II.1: The Corporation in Imperial Russia

Late Imperial entrepreneurs could select one of a small number of organizational forms: sole proprietorship, simple partnerships, and joint-stock corporations. However, 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). As such, the process of charter application and approval generated considerable variation in corporate structures and governance.[8] Although the Ministry of Finance provided some guidelines, the bargaining and idiosyncrasies of the corporate approval process, perhaps involving bribery and/or political imperatives, meant that the details of the charters differed between otherwise similar 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 possibly limited access to incorporation for some Russian firms (Gregg, 2018).

[6] Imperial Russia's size, ongoing internal market development, and the timing of its industrialization during the "Second Industrial Revolution" might have raised the optimal scale of production. The associated increase in fixed costs would also imply growing barriers to entry. Such developments would have reinforced the possible advantages of the corporate form.

[7] According to Gregg's (2018) calculations, corporations controlled roughly 5% of all industrial establishments, but these plants generated over 40% of industrial revenue over the period 1894-1908.

[8] This impression stems from reading a number of charters, and it largely follows Owen (1991).

However, the evident variation in the charters of corporations – whether as *de novo* entities or as restructured versions of pre-existing firms – help us to explore the implications of different governance structures for financial strategies and other outcomes, including entry and exit (Gregg and Nafziger, forthcoming).

More concretely, chartered corporations in Imperial Russia self-identified as one of two types that were indicative of underlying variation in organizational characteristics. When formulating 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 likely signaled the nature of corporate enterprises to potential investors.[9] 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.[10] As Gregg and Nafziger (forthcoming) document in greater depth, A-corporations also tended to be larger (in terms of share capital), made less use of short-term credit relative to longer-term bonds, and issued smaller dividends as a share of profits. Thus, in our analysis below, we focus on these two broad classes of corporations as a proxy for underlying governance and financing characteristics.

II.2: Empirical Hypotheses[11]

Grounded in relevant historical and modern literatures, we develop a set of hypotheses to take to our new dataset, guided by the nature of our data and the specifics of the institutional and market environment. The goal of this empirical work is to develop a clearer understanding of the factors

[9] 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 "not a legal, but merely a practical form."

[10] See Owen (1991, pp. 12-13 and 152) and Gregg and Nafziger (2017).

[11] This section represents our initial attempt to formulate testable hypotheses. As such, we recognize that we have only scratched the surface of the possible empirical relationships that could be evaluated with our dataset.

underpinning corporate entry, exit, and survival as a window into the dynamics of industrial and economic development in the period.

Our analysis is deeply informed by Dunne et al. (1988), who undertook an influential empirical investigation of firm entry and exit patterns in the United States between 1963 and 1982. Indeed, our hypotheses largely derive from the patterns they observed in that context, though ours reflect the very different institutional and economic environment of late Imperial Russia. Although more recent works have explored similar entry, exit, and "survivorship" outcomes in other developed economies,[12] similar studies that investigate firms in developing countries or before World War II are largely lacking.[13] Data availability has been a critical binding constraint in historical research. Our panel dataset covering Imperial Russian corporations presents a unique opportunity to examine these dynamic relationships empirically.

With respect to rates of firm entry and exit, Dunne et al.'s (1988) study and subsequent works suggests a number of testable hypotheses.[14] In their analysis of data from a mature industrialized economy, the U.S. from the 1960s to 1980s, they find that industries with high entry rates also tend to have high exit rates, although with controls for industry, entry and exit rates are negatively correlated: years with high entry rates have low exit rates. If barriers to entry are relatively low, entry rates respond to prior or current period profit levels within a firm's industry. New entrants tend to be smaller, conditional on industry, if firms' sizes as measured by, say, nominal capitalization, total assets, or market share indicate achieved market power. Selection on firm survival would suggest that such gaps would be eliminated over time. If firm size was associated with factors that would work to deter entry by rivals, or

[12] For examples in the entry/exit literatures, see Baldwin and Gorecki (1991) on Canadian firms, Disney et al. (2003) on UK manufacturers, Bartelsman et al. (2005) for cross-OECD comparisons, and the pioneering early work by McGruckin (1972) on the U.S. This literature is surveyed in Caves (1998). We discuss works on survivorship below. Our current emphasis is on the *empirical* literatures on firm entry, exit, and survival – there is also a large relevant theoretical literature on these topics.

[13] While studies of firm creation / entry before World War II seems relatively limited (two exceptions are Baten, 2003; and Lloyd-Jones and Le Roux, 1982), there is a small literature – largely on the United States – addressing firm survival and the determinants of exit. We touch upon a few select works in this area below. Work on firm "demographics" in modern developing countries also faces considerable data constraints – see Bartelsman et al. (2004) for an early survey of what is a small literature.

[14] We are explicit about our definitions of entry and exit rates below.

was a proxy for the availability of preferential access to external finance, then exit rates would likely be negatively related to scale. We can easily examine these possibilities within our new dataset. For example, we examine distortions in entry patterns due to the concession system and map the evolution of market shares, a way to benchmark the market power distortions described by Cheremukhin et al. (2007).

Given our consideration of corporations in the Imperial Russian context, we can investigate whether underlying governance or financial characteristics were associated with differences in the rate of entry or exit. Were barriers to entry different for the two types of corporations? Was one type inherently more "stable"? Gregg and Nafziger (forthcoming) provide cross-sectional evidence suggesting that, conditional on size, industry, and other characteristics (such as age or year), the exact choice of organizational form had little relationship to profitability among Russian corporations. If we condition on a similar set of characteristics, we might expect to find little relationship between corporation type (A-corporation vs. share partnership) and entry or exit rates. However, the more dynamic perspective implied with our panel approach might suggest a residual role for underlying governance or financial differences by corporation type. For example, the more widely-held A-corporations may have responded less effectively to market downturns and may have been more fragile because of governance costs, roughly following the logic of Hilt (2006). Thus, we investigate the relationship between A-corporation status and entry or exit rates. Because A-corporations were relatively more prevalent within certain industries, we control for sector when examining corporation type.

Imperial corporations could be founded as *de novo* entities or established by existing partnerships or sole proprietorships.[15] The literature has suggested that relative to the diversification of existing firms, *de novo* entry is generally more common, although this can vary widely by industry (Dunne et al., 1988; Geroski, 1995). In our case, the alternative to *de novo* entry is a change in organizational form by

[15] One limitation of our data in their current form is that we do not observe merger activity. In many contexts, this can be an important consideration in understanding the levels and underlying determinants of entry and exit rates (i.e. Jovanovic and Rousseau, 2008). While we hope to remedy this gap in our knowledge with additional library and archival research, to our knowledge, the historical literature on Imperial Russia has not generated any definitive work on mergers or acquisitions.

incorporating an existing industrial concern. Thus, by examining whether new entrants were more or less likely to be *de novo* firms than the set of incumbent firms, we investigate a related but different question than the literature has considered. In terms of exit, Baldwin and Gorecki (1991) and other scholars emphasize that *de novo* firms, although perhaps armed with more advanced technologies or other advantages, tend to fail at higher rates as they struggle to establish customer bases and carve out market shares. However, as selection takes place, such a gap should decline over time. By coupling our balance sheet data to information from the initial chartering of our corporations, we can examine these different possible linkages. Additionally, relatively more share partnerships were created from pre-existing firms, and so we control for *de novo* status when examining corporation type.

The trajectory of *de novo* corporations relative to incorporations by pre-existing firms relates to large literatures on the dynamics of firm survival and firms' life cycles. Although we cannot hope to do justice to the richness of the theoretical models and empirical evidence on these topics, our context and data suggest several important hypotheses. One set of potential empirical relationships investigates factors that would increase or decrease the likelihood that a corporation exists to the next period. Such hazard models are standard in the industrial organization literature and have seen some historical applications with richer firm panel datasets.[16] Given our context and findings in the broader literature, we hypothesize that *de novo* status increases the probability of failure (i.e. raises the hazard ratio), size and profitability would be negatively related to failure, and corporation type would have an ambiguous effect given our comments above. Finally, as we are investigating corporations rather than other organizational forms potentially easier to dissolve, our baseline hazard may be lower than is standard in the literature.[17]

Our panel data allow us to investigate a number of other hypotheses regarding the characteristics of Imperial corporations over their life cycles. As alluded to above, selection effects lead us to expect

[16] Historical works that model firm exit using a hazard function approach to survival include Klepper (2002), Postel-Vinay (2016 – on banks), and Thompson (2005). For an early application using modern firm micro-data, see Audretsch and Mahmood (1995).

[17] The role of dissolution costs in lowering the "exit" rate of corporations relative to other organizational forms is an important point raised (and shown) in the early 20th century Egyptian context by Artunc and Guinnane (2017).

convergence of various outcomes between new corporations and incumbents over time.[18] This would possibly include market share and firm size (reflecting efficient scale).[19] The convergence of profitability is potentially more complicated, as the rate may depend on the underlying market fundamentals in a complicated fashion. Regardless, we can evaluate the pace and extent of any convergence by examining the dynamics within our balance sheet data.

More generally, the literature has posited various channels linking firm age to growth, exit, or the probability of continued survival (e.g. Kueng et al., 2014). For example, some studies note that "natural selection" might lead the most productive and resilient firms to persist, thereby generating a negative relationship (e.g. Bellone et al., 2008). On the other hand, agency theory might suggest that older corporations would be more likely to get captured by insiders, which could potentially reduce profitability and the likelihood to survive (e.g. Arikan and Stultz, 2016). Finally, although we do not explore it directly in this draft, there is a considerable literature examining the financing and capital structure decisions of firms over their life-cycles. Prominent among this work are studies that investigate a "pecking order" framework to describe decisions over debt vs. equity and the use of external vs. internal funding. We aim to document and evaluate such dynamics in related future work.[20]

We take these and closely related hypotheses to our dataset. We consider our results to be indicative of the nature of market competition in a period when scholars have argued that excessive concentration undermined Imperial industrial development (Cheremukhin et al., 2017). However, our data pertain to corporations and not to firms, establishments, or plants. This makes our study a unique contribution to the broader literatures on firm entry, exit, and life-cycle dynamics, historical or otherwise.

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[18] This is akin to the "survivor" method pioneered by Stigler (1958), which Atack (1985) subsequently applied to historical data to estimate optimal industrial plant size over the last half of the 19th century in the United States.

[19] However, Guerts and Van Biesebroeck (2016), among other scholars, point to a much more complicated interaction between entry, firm size, and firm growth, particularly if adjustment costs (in hiring factor services or obtaining additional inputs) are significant but vary across firms.

[20] The recent study by Hansen and Ziebarth (2017) examines not only business failures (i.e. bankruptcies) in the Great Depression, but it shows the underlying changes in firm finances that brought about such "exits." Given the Russian economy's macroeconomic fluctuations of our period, we hope to undertake a similar analysis in future work. More generally, we have yet to investigate commercial bankruptcy practices in the Imperial period.

We address concerns that the underlying theories of firm behavior may not apply to corporations in the same way as to establishments or plants below.

III. Data

This paper presents and analyzes a panel dataset based on newly compiled balance sheet data on all Imperial Russian non-financial corporations active from 1899 onwards.[21] We started by collecting financial data from all corporations reported in the Ministry of Finance's *Yearbooks* published from 1900 through 1915. Then, we matched these company entries over time to form an (unbalanced) panel and merged the resulting dataset with the RUSCORP database (Owen, 1992) to incorporate information from founding charters documented in that source.

The Ministry of Finance compiled the balance sheet information in their yearbooks from the official commercial periodical *Vestnik finansov i torgovli*,[22] in which corporations published financial statements as required by the commercial code and by their individual charters. Figure 1 presents an example of such an entry for the Martens and Daab Partnership for the 1900-1901 accounting year. Panel A shows that Martens and Daab had 63,853 rubles in the credit column of their balance sheet published in the Vestnik, which is the number reported in the "Creditors" column of the compiled Ministry of Finance *Yearbook* (1902 volume) balance sheet data in Panel B (and enlarged in Panel C).[23]

We construct our panel dataset from the corporate balance sheet information in the yearbooks of 1900-1915.[24] These volumes appear to provide complete data for corporations regarding the accounting years 1899-1914, with a small number of observations from earlier years.[25] We matched corporate

[21] Corporate commercial banks' balance sheets were reported separately; we have not yet fully compiled this information. Note that we use the phrase "balance sheet" as shorthand for the register of assets and liabilities noted in the historical sources, although these data diverge from modern accounting standards.
[22] *Vestnik finansov i torgovli. Otchety torgovlykh i promyshlennykh prepriiatii*.
[23] Gregg and Nafziger (2017) discuss the basics of accounting in *published* Russian financial data of the period – see below.
[24] While such public financial statements were required before 1900, only from that year did the Ministry of Finance collect and publish the relevant data in a unified manner. We end our period of analysis with the onset of Russia's involvement in World War I.
[25] Our sense is that the number of missing observations is small, although see our discussion of the 1905 data below. A key difficulty is that our identification of corporations stems from charter information (derived from Owen, 1992),

observations across time by hand to ensure that different spellings and marginal changes to corporate names over time were identified and reconciled. This process yielded a small number of duplicate observations, which we reconcile following an algorithm described in the Appendix, Section B2.

The published "balance sheets" were divided into "active" and "passive" sections, which roughly correspond to modern definitions of assets and liabilities.[26] The active columns included property, materials, debits, other items, and losses; the passive columns included share capital, reserves, amortization, other capital, and "creditors." We consider "property" to be fixed and movable forms of capital, materials to be intermediate inputs, and "debits" to be comparable to accounts receivable. "Other capital" includes bonds. "Share capital" is current nominal capital, some of which may not yet be paid in, and we deem "creditors" to be equivalent to accounts payable. Appendix Table B1 provides the correspondence between the original Russian and our translations (also see below).

Until the 1909 cross-section, the balance sheets also reported total 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 total 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 earlier definition of net profit, so our preferred measure over the whole panel uses balance profits in 1910 and profits for distribution from 1911 onwards. Because the definition changes slightly, we are careful to include controls for the accounting

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but such firms may not have immediately begun operations, if they even operated at all. Moreover, while it appears that the Ministry compiled and published all available balance sheet information issued in *Vestnik finansov i torgovli*, this is certainly not the case for the 1905 cross-section. However, we do check for the presence of corporations missing from one year in subsequent years, and we condition on cohort or year in most regression specifications.

[26] These balance sheets mix concepts related to stocks (assets and liabilities) with flows (of cash), which are typically kept separate in modern accounting practices.

year in our empirical work below. Overall, this paper relies on only a subset of the variables that we derive from the balance sheet entries.

At the same time, the two key variables of interest in this paper are the exit and entry rates of corporations, which we define *indirectly* within our dataset. A corporation is said to enter in a given year when that year is the first time it is observed in our dataset, using the 1899 cross-section as the baseline. A corporation is said to exit if it is never observed again after a given accounting year. Following Dunne, Roberts, and Samuelson (1988, p. 502), we define the aggregate entry rate for an accounting year or for a given group as the number of new corporations in year t divided by the total number of corporations in year $t-1$. Similarly, the exit rate in accounting year $t-1$ is the number of corporations in year $t-1$ that are never observed again in our data, divided by the total number of corporations in year $t-1$. Implicitly, we assume that new corporations in 1900 did not exist before our baseline year of 1899, and that exiting ones in 1913 did not return after 1914. In our empirical work, we generally truncate the sample after 1912 to ensure that we are identifying "true" exits.

Our definitions may miss two key aspects of broader notions of firm entry or exit. On the entry side, we do know whether the firm existed prior to incorporation, but we currently cannot separate mergers of existing corporations from the observationally equivalent exit of two (or more) firms and the entry of a new one into corporate status. On the exit side, we assume that disappearance from our data equates to "exit" in the sense of corporations shutting down. Although we are not aware of specific empirical evidence on the prevalence of such cases, it is possible that some of what we are calling exits were parts of mergers or other restructurings, and it may be that some corporations "went private," gave up status as a corporation (returning to sole proprietorship or partnerships forms), and stopped publicly reporting financial information to the Ministry of Finance. We do not have strong priors regarding any bias generated by the small likelihood of this type of measurement error.

III.1: The Dataset: Structure and Summary Statistics

In its entirety, our dataset describes 2,865 unique corporations observed in at least one year, for a total of 19,797 observations (Table 1). From 1700 to 1915, the Russian Ministry of Finance granted corporate charters to only 4,542 firms, of which 345 were finance corporations and hence outside our current database. Despite only covering the last 15 years of Imperial Russia, our dataset covers almost 60% of the total non-financial corporations established in the Empire.[27]

[Insert Table 1 about here]

Textiles, foods, metals, and mining represent the largest industrial categories in our data (Table 1, Panel B). Gregg's (2018) work on incorporation explains this pattern, noting that both textiles, metals, and mining were capital-intensive industries with high incorporation rates. 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-related enterprises. Finally, Table 1, 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. An exception is the year 1905, where data from only 278 firms were reported. This is most likely because of disruptions caused by the 1905 Revolution, the Russo-Japanese War, and general social unrest. We control for accounting year in our regression work to (partly) address this disparity, although we are aware that this does not fully alleviate the selection issues that might arise in reporting (or not reporting) financial data in a given year.[28]

[Insert Table 2 about here]

[27] Our data include corporations headquartered in the Polish provinces of the Empire c. 1900. In general, our dataset also excludes railroad corporations, which were mostly public entities by our time period.

[28] 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 information from two or more previous accounting years. Throughout the analysis below, we rely on the accounting year to pin down each cross-sectional observation. Many of the "disappeared" 1905 firms reappear in later years, meaning that absence in 1905 is not treated as exit in our framework. We are currently exploring the original *Vestnik finansov i torgovli* periodical for 1905 and 1906 to see if the compilation process (for the yearbooks) was to blame.

Table 2 provides summary statistics of select variables from the published corporate balance sheets and original charters (from Owen, 1992) that we utilize in this paper. Share capital is current nominal capitalization, whether paid in or not (the data do not allow us to distinguish). "Total assets" are a rough measure of the asset side of the balance sheet. "Property" is the value of movable and immovable productive capital within Total assets. "Other capital" largely includes bonded debt, and "Creditors" corresponds to accounts payable, which together we interpret to be indicative of access to credit. Profits (and Revenues) are as described above. As is standard in the corporate finance literature, we scale a number of these variables by the value of total assets. Every balance sheet item has a right-skewed distribution, with the presence of some extreme large values. Aside from these financial variables, we also draw on information from the RUSCORP database regarding the type of corporation (A-corporation or share partnership, defined by the name of an equity stake), the age of the corporation, and whether it was a new firm or not when it obtained a charter.

[Insert Table 3 about here]

Keeping the definitions noted above in mind, we employ the panel dataset to derive entry and exit rates over time and across industries. Table 3 reports the former between 1900 and 1913. Entry rates were high at the beginning and end of the period with a lull in the middle (although 1906 appears to indicate a rebound from the crisis year of 1905). Exit rates were relatively constant with a small upward trend. The very high level of exit in 1913 is an artifact of the dataset, as we cannot look beyond 1914 to check whether non-reporting corporations continued to survive. The difference between entry and exit rates is broadly suggestive of three sub-periods: entry-dominant until 1904, then a two-year period of relatively more exit, followed by a rebound in entry. Again, given our definitions, we are wary of attributing too much to the end points of our period, as there may be a mechanical reason for the observed higher rates.

Table 3 also juxtaposes the annual percentage change in real NNP from Gregory (1982) against our corporate entry and exit rates. Averaging over the period, corporations were entering and exiting at higher rates than the economy was growing: 11.5% and 8.9% vs. 3.3%. The correlations of either of these series with the percentage change in NNP are very small. While this might be because NNP captures

more than just the industrial sectors underpinning our dataset (or there may be a lagged relationship between the series), it may also reflect structural issues surrounding the incorporation process.

[Insert Table 4 about here]

Table 4 documents entry and exit rates and the difference between them for broad industries (Figure A1 in the appendix presents these rates in a bar graph). The pattern of entry and exit show that some industries have a relatively high level of "churning." Meanwhile, some industries display entry rates that exceed exit rates, perhaps indicating than an industry was still evolving and hence positive profits could still be captured. While some of the older or primary sector industries such as textiles, agriculture, paper, etc. saw relatively little corporate churning over the period, more "modern" sectors such as chemicals, transportation, and metals (along with "Miscellaneous") saw higher entry and exit rates, with the former exceeding the latter. Perhaps most striking is the large (net) entry of corporations engaged in trade. This group included shipping companies, wholesalers, and companies engaged in foreign trade. Overall, this pattern of high churning in new sectors is suggestive of a shift of productive factors into higher growth corporate sectors.

IV. Empirical Evidence

Our new dataset covers the universe of industrial corporations in late Imperial Russia. The resulting dynamic picture of corporate development in a relatively poor historical economy constitutes a unique opportunity to dig deeper into the forces driving firm creation, destruction, and survival during the early stages of industrialization. Figure 2 presents the patterns we are investigating. Each dot represents mean log profits as a share of total assets in comparison to mean entry (top panel) or exit (bottom panel) rates in an industry. Consistent with our interpretation of Table 4, and with evidence from modern developed economies, both entry and exit rates are positively related to industry profitability, signaling greater churning among firms in higher-growth fields. Such broad patterns lead us to explore the factors associated with entry, persistence, and exit at the firm level by drawing on the hypotheses outlined above.

The subsequent regression exercises are not exhaustive but do lead us to a set of important findings and further questions regarding the role of the corporation in early Russian industrialization.

IV.1 Entry

We start by considering the characteristics of new entrants into corporate status. Table 5 depicts results from a series of regressions of logged financial characteristics – total share capital, profits relative to share capital, and credit relative to share capital – on different sets of dummy variables and interactions. The key explanatory variable is a dummy for whether the observed firm is a new entrant in a given year, as we define above. Each specification in this table controls for the accounting year. Those reported in Columns 1, 2, 5, 6, 9, and 10 all include a set of dummies for each corporation's industry and for the macro-regions whether corporate headquarters were located.[29] Of these, Columns 1, 5, and 9 report simple OLS regressions, while 2, 6, and 9 report between estimates. These latter specifications essentially compare mean financial characteristics between corporations that existed throughout the period and those that entered at some point. In contrast, the specifications reported in Columns 3, 7, and 11 control for corporation fixed effects, which subsume the headquarter and industry dummies. Implicitly, these regressions compare entrants with themselves when incumbents. Finally, Columns 4, 7, and 12 document fixed effect models that include interactions between entry status and dummies for whether a corporation was chartered *de novo* or founded as an A-corporation. The specifications In Table 5 differ in the number of observations due to missing observations of the outcome variables and of these fixed firm characteristics.

[Insert Table 5 about here]

A number of the coefficient estimates in Table 5 are noteworthy. In general, an entrant (or a firm experiencing corporate "entry" over the period in the between regressions) possessed lower/worse financial attributes than incumbents. As measured by the (log) share capital, entrants were, on average,

[29] There are 14 regions in the data, including the Polish provinces, Finland, and outside of the Empire. Controlling separately for corporations headquartered in Moscow or Petersburg does not change any of our results. The regional breakdown of the corporations and our observations is available upon request.

smaller than incumbents (Columns 1-3), although the fixed effect model with interactions suggest that this was more the case for *de novo* firms, which increasingly adopted the A-corporation organizational form over our period.[30] Conditional on size (share capital), entrants were less profitable than incumbents, especially when the firm was newly established. Finally, entrants had less access to credit (i.e. were more reliant on equity financing) than incumbents, with *de novo* firms showing particular difficulties. The broad type of corporate form was only marginally associated with any of these financial outcomes, which is consistent with optimizing behavior by firm entrepreneurs (i.e. choosing a particular form did not generate extra benefits). In general, these findings are consistent with standard life cycle perspectives on firm characteristics.

IV.II Corporate Life-Cycles

We can further explore the dynamics of corporate characteristics following entry by utilizing the panel structure of the dataset. We focus on evidence that surviving firms experienced a process of convergence to mean levels for the incumbents in their industry, consistent with a selection process of market competition. The underlying regression is a simple linear one, specified as:

$$Y_{ijtr} = \beta_0 + \gamma_{it} + \eta_i + \mu_t + \theta_r + \lambda_j + \epsilon_{ijt}$$

where Y is the outcome (log (scaled) revenue, log (scaled) profit, or market share in the firm's industry) for firm i in year t, gamma is a set of controls for the age of firm, eta is a set of cohort controls for firm i, mu is a set of accounting year controls, theta indicates region r, and lambda controls for industry j. Given this specification, convergence can be seen by examining the pattern of estimated gamma coefficients. Given that many of our corporations were founded prior to 1900, we can identify a long range of these coefficients.

[Insert Table 6 about here]

[30] In our dataset, entrants were more likely to be A-corporations and less likely to have existed as concerns prior to incorporation, consistent with prior work on the time patterns in incorporations over the period (Gregg and Nafziger, forthcoming; Owen, 1991).

Table 6 presents the results from this exercise employing the three different characteristics of corporations as our dependent variables. As is clear for all three, new Russian corporations started with lower revenues, profits, and market share but experienced a significant amount of convergence to incumbents within their industry conditional on survival, even controlling for cohort. The results are perhaps most striking for market share, which we define as the portion of industry-by-year revenue that a corporation generates.[31] The pace of convergence in market share is depicted in Figure 3, which indicates the evolution of the coefficients on the different age variables (standard errors are indicated in Table 6). Although these regressions may not imply full convergence to the incumbents (represented as the omitted category of corporations older than 15 years at any point in time), the dynamics of market share, revenues, and profits do imply a positive selection process. While comparable estimates of the rate of convergence of such firm characteristics are not available for other historical economies (as far as we are aware), our sense is that the life-cycle experience of Russian corporations did follow a logic consistent with standard theories of market structure.

IV.III Exit

We then turn to an examination of corporate exit, again defined as complete disappearance of a firm from our panel dataset. Following the same setup as Table 5 (with year and industry OR firm fixed effects), Table 7 reports findings for a set of simple regressions of financial attributes on corporate characteristics, including whether a firm will have exited by the following period. We drop *de novo* status from our framework, but in Columns 1, 2, 5, 6, 9, and 10 we control for the age of the firm. This is defined from the date of founding, rather than the charter date. Overall, the specifications in Table 7 are intended as basic checks that corporations about to exit were financially "weaker" than those that subsequently survive.

[Insert Table 7 about here]

[31] We assign a value of one for missing observations of revenue for this exercise. As we include accounting year effects, this effectively conditions on the fact that we do not observe revenue after 1909. Thus, the first and third specifications in Table 8 are only identifying effects over the years 1899-1909.

In general, this is what we find. "Exiter" status was negatively associated with share capital, even within a given firm, while profitability was lower among firms about to exit. However, firms chartered as A-corporations were relatively more profitable prior to exit. In terms of access to credit, we find more mixed evidence suggesting that exiting firms may have been more indebted, particularly if they were chartered as A-corporations. The heterogeneity of corporate financial characteristics prior to exit among firms of different organizational types is worth exploring in more depth, although we speculate that it may relate to the growing adoption of A-corporation forms across cohorts as aggregate industrialization and financial development took place.[32]

The results in Table 7 on the age of the corporation – negatively related to "exiter" status in the cross section – suggest that older firms were larger, more profitable, and had greater access to credit. This is consistent with processes of selection and market churning whereby new entrants also exited more quickly. Indeed, the maturity of firms likely proxied for a variety of unobserved incumbency advantages that grew over a firm's life. Given this, the simple specifications of Table 7 do not consider the dependence of the incidence of exit in a current period on a firm's prior history.

[Insert Table 8 about here]

The first three columns of Table 8 present estimates from a Cox Proportional Hazard framework, a standard way to model such conditional survival processes. In these estimates, coefficients greater than 1 imply an increase in the likelihood of exit relative to the baseline hazard, and coefficients less than 1 imply the opposite.[33] In these specifications, we condition on fixed characteristics (whether the corporation was *de novo,* whether it was chartered as an A-corporation, and regional and industry controls) and on the changing level of (scaled) profits. Including profits lets us directly explore the pattern

[32] A-corporations were not only more likely to be entrants, but they were also more often "exiters" in our panel. This is consistent with the greater dependence of such firms on uncertain external financing from a larger circle of investors (Gregg and Nafziger, forthcoming).

[33] Standard errors reported in estimates of Cox Proportional Hazard models are exponentiated. Our Table reports the (asymptotic) confidence intervals reported by STATA. One of the advantages of this type of hazard model is that the functional form of baseline hazard is not explicitly assumed.

we see in the bottom panel of Figure 2. We compare the estimates from these hazard models with those from a simple probit model of exit (Column 4), and results are similar.

The results of these exercises are largely consistent with the more naïve models presented in Table 7 and elsewhere, and with the hypotheses proposed in Section II. More profitable and larger corporations (defined in terms of share capital) were less likely to exit.[34] A-corporations were (slightly) more likely than share partnerships to exit, as were firms that existed prior to incorporation. While considerably more remains to be done to unpack these findings, we view the results of Table 8 as again consistent with a relatively competitive Imperial corporate sector that was at the forefront of Russia's initial stages of industrial development.

V. Conclusions and Future Work

This paper engages in a series of empirical exercises that, in sum, suggest that Imperial Russian corporate behavior was largely consistent with observed and hypothesized patterns of firm entry, exit, and life-cycle dynamics in modern and historical literatures. Despite Russia's apparent backwardness, we were able to link the industry, age, size, profitability, and governance structure of corporations to the births, deaths, and lives of these firms in a manner that echoes the patterns documented in studies like Dunne et al. (1988). While Owen (1991) and others have argued that the Imperial Russian incorporation process was inefficient and largely politically determined, our results speak to at least a modicum of flexibility and responsiveness of firms selecting into this particular organizational form. Of course, it was typically more costly and time-consuming to become or dissolve a corporation than "simpler" types of firms such as partnerships or sole-proprietorships, which implies that the entry and exit rates we observe in our data are certainly lower bounds on the likely demographics of all late Imperial Russian firms.

Some evidence on this possibility is provided in Table A1, which utilizes data on *all* Russian industrial establishments observed in 1894, 1900, and 1908 to document entry and exit rates over these

[34] In specifications not reported here, size (as measured by revenue) reduced the likelihood of exit.

multi-year periods for corporate and non-corporate entities (Gregg, 2018). Clearly, the overall entry rates of corporations, which were relatively few in number compared to the thousands of other firms, were an order of magnitude lower than the corresponding rate for non-corporations. What is especially intriguing, however, is that corporate exit rates were apparently quite high over this period. This, again, is consistent with a rather dynamic view of the Russian corporate sector, one that does not quite correspond to the assertions of market power and inflexibility asserted in works like Cheremukhin et al. (2017).

In future work, we hope to expand our analysis in more explicitly comparative ways between the Russian experience and firm demographics in other historical and modern settings. We can then better diagnose whether the entry and exit rates that we observe in our dataset really are relatively low or high, and whether the life-cycle events among Russian corporations are driven by similar factors as in other contexts, for example by age, sector, and productivity. Moreover, we hope to take additional advantage of the uniqueness of our panel of corporate balance sheet information to document and evaluate the linkages between governance structures, financial strategies, and outcomes like entry, exit, investment, employment, and market valuations.[35] This broader project will make important contributions towards an understanding of the corporation's role in the early stages of modern industrial development, both in Imperial Russia and in other low-income countries.

[35] Some preliminary results in this direction are presented in Table A2, which considers entry and exit among corporations with politically connected founders. We find that political connections seem to allow founders to establish slightly weaker corporations, though we see no differences in exit patterns.

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Table 1: Numbers of Corporations by Accounting Year and Industry

Panel A: Number of Observations and Unique Firms

	Number
Total Observations	19,797
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

Note: The source of these data is *Ezhegodnik ministerstva finansov* [Ministry of Finance Yearbook], 1900-1915. See the text for further discussion.

Table 2: Descriptive Statistics on Select Balance Sheet Entries (Nonzero Values Only) and Other Corporate Characteristics

Variable	Obs.	Mean	Std. Dev	Median	Min	Max
Share Capital	19,795	1,685,624	2,620,916	800,000	1,123	74,800,000
Total Assets	19,789	4,808,307	14,500,000	1,964,828	11,360	507,000,000
Property / Total Assets	19,631	0.49	0.24	0.49	0.00000210	1.00
Creditors / Total Assets	19,532	0.31	0.25	0.29	0.00000026	12.60
Net Profit / Total Assets	15,706	0.06	0.08	0.05	0.00000152	5.43
Revenues	8853	1,492,380	4,170,876	491367	5	112,000,000
Age of Corporation	19,794	13.33	12.48	10	1	83
De novo at founding	2053	0.286	0.452	0	0	1
A-corporation	2,394	0.579	0.494	1	0	1

Note: The source of these data is *Ezhegodnik ministerstva finansov* [Ministry of Finance Yearbook], 1900-1915. "Share capital" is current nominal (paid and unpaid) capitalization. "Total Assets" are defined as Property + Goods and Materials + Accounts Receivable + various other assets. "Creditors" is roughly equivalent to accounts payable. Profit in 1910 is "Balance Profit", and Profit after 1911 is "Profits for Distribution. Revenues are only defined to 1909 and not for all firms. These financial variables are summarized for observations > 0. The Age of the corporation is defined from the date of founding OR the date of entry into the balance sheet data if the former is unknown. "De novo" indicates whether the firm existed prior to receiving a corporate charter (=1) or not (=0). "A-corporation" indicates whether the firm was this type of corporation, as opposed to one that utilized the word "pai" for its shares. De novo and corporate form are unknown for some corporations in the data. See the text for additional discussion.

Table 3: Number of Corporations, Entry Rates, and Exit Rates by Accounting Year

Year	Number of Corporations	Number of Entrants	Number of exiting corporations	Entry Rate	Exit Rate	Entry Rate – Exit Rate	Growth Rate in NNP in 1913 Rubles
1900	1102	211	39	0.223	0.035	0.187	0.001
1901	1190	157	36	0.142	0.030	0.112	0.041
1902	1249	87	53	0.073	0.042	0.031	0.103
1903	1273	100	61	0.080	0.048	0.032	-0.056
1904	1126	97	87	0.076	0.077	-0.001	0.122
1905	278	20	34	0.018	0.122	-0.105	-0.096
1906	1260	83	35	0.299	0.028	0.271	-0.032
1907	1280	42	37	0.033	0.029	0.004	-0.019
1908	1370	95	95	0.074	0.069	0.005	0.110
1909	1154	84	72	0.061	0.062	-0.001	0.076
1910	1454	158	110	0.137	0.076	0.061	0.095
1911	1474	145	99	0.100	0.067	0.033	-0.059
1912	1590	207	139	0.140	0.087	0.053	0.107
1913	1712	242	810	0.152	0.473	-0.321	0.069

Note: The source of these data is *Ezhegodnik ministerstva finansov* [Ministry of Finance Yearbook], 1900-1915; and Gregory (1982). A corporation is said to enter the data in a given year when that year is the first time the corporation is observed in the dataset, using the 1899 cross-section as the baseline. A corporation is said to exit the data if it is never observed again after a given accounting year. Following Dunne, Roberts, and Samuelson (1988, p. 502), the entry rate for accounting year t is the number of new corporations in year t divided by the total number of corporations in year $t-1$. The exit rate in accounting year $t-1$ is the number of corporations in year $t-1$ that are never observed again divided by the total number of corporations in year $t-1$. The high exit numbers for 1913 reflect the truncation of the dataset in 1914. The growth rate in NNP is simply defined as the percentage change from the previous year – the value for 1900 is the percentage change from 1899 to 1900. Year here refers to the accounting year.

Table 4: Entry and Exit by Industry Group, 1900-1912

Group	Entry Rate	Exit Rate	Difference
Agriculture	0.040	0.060	-0.020
Animals	0.132	0.085	0.047
Ceramics	0.124	0.077	0.047
Chemicals	0.165	0.061	0.103
Food	0.067	0.032	0.035
Metals	0.134	0.082	0.052
Mining	0.142	0.070	0.072
Miscellaneous	0.214	0.053	0.161
Mun. Services	0.193	0.092	0.101
Paper	0.114	0.047	0.067
Textiles	0.076	0.035	0.041
Trade	0.263	0.031	0.232
Transportation	0.156	0.092	0.064
Wood	0.137	0.066	0.071
Average	0.130	0.057	0.073

Note: The source of these data is *Ezhegodnik ministerstva finansov* [Ministry of Finance Yearbook], 1900-1915. These data represent unweighted mean entry and exit rates by industrial group across years (1900 to 1912, inclusive). The definitions of entry and exit are as in Table 3.

Table 5: Entrants vs. Incumbent Corporations, 1900-1913

	Log Total Share Capital				Log Profit / Share Capital				Log Creditors / Share Capital			
	OLS	BE	FE	FE	OLS	BE	FE	FE	OLS	BE	FE	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(7)	(9)	(10)	(11)	(12)
Entrant	-0.285***	-0.222**	0.015	0.052*	-0.357***	-0.221**	-0.096*	-0.068	-0.391***	-0.302***	-0.278***	-0.162**
	(0.027)	(0.068)	(0.011)	(0.020)	(0.039)	(0.072)	(0.042)	(0.077)	(0.040)	(0.091)	(0.027)	(0.052)
De Novo * Entrant				-0.029				-0.405**				-0.396***
				(0.027)				(0.123)				(0.070)
A-Corp. * Entrant				-0.025				0.022				-0.107
				(0.025)				(0.101)				(0.065)
Constant	12.816***	11.915***	13.914***	13.933***	-3.075***	-3.768***	-2.118***	-2.111***	-0.541***	-0.654	-0.600***	-0.473***
	(0.106)	(0.534)	(0.009)	(0.009)	(0.157)	(0.663)	(0.029)	(0.033)	(0.130)	(0.700)	(0.021)	(0.022)
Obs	17,512	17,512	17,512	13,753	13,746	13,746	13,746	11,170	17,282	17,282	17,282	13,605
R2	0.125	0.109	0.060	0.086	0.061	0.084	0.070	0.063	0.141	0.152	0.030	0.038
Ind. FE	YES	YES	NO	NO	YES	YES	NO	NO	YES	YES	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	NO	NO	YES	YES	NO	NO	YES	YES	NO	NO	YES	YES
N. Firms	X	2,646	2,646	1,781	X	2,295	2,295	1,608		2,627	2,627	1,775

Note: *** p<0.001, ** p<0.01, * p<0.05. Robust standard errors are in parentheses. The variable "entrant" denotes whether a firm in period *t* was a new entrant, compared to *t – 1*. Industry controls are a set of dummies covering 14 industries (see Table 4). Year controls are for the accounting year of the associated corporate data. Region controls indicate the location of the corporate headquarters in one of 14 macro-regions, including Poland, Finland, and abroad.

Table 6: Firm Characteristics over the Corporate Life Cycle, 1900-1913

VARIABLES	(1) Log Revenue	(2) Log Profit	(3) Market Share
Firm is 1 year old	-2.519***	-0.221***	-0.013***
	(0.173)	(0.063)	(0.002)
2 years	-0.884***	-0.115***	-0.006***
	(0.075)	(0.031)	(0.001)
3 years	-0.543***	-0.069***	-0.004***
	(0.048)	(0.020)	(0.000)
4 years	-0.280***	-0.060***	-0.003***
	(0.035)	(0.015)	(0.000)
5 years	-0.201***	-0.044***	-0.002***
	(0.028)	(0.013)	(0.000)
6 years	-0.101***	-0.039***	-0.001***
	(0.023)	(0.011)	(0.000)
7 years	-0.068***	-0.033***	-0.001**
	(0.020)	(0.009)	(0.000)
8 years	-0.026	-0.021**	-0.001***
	(0.018)	(0.008)	(0.000)
9 years	-0.004	-0.017**	-0.001*
	(0.014)	(0.007)	(0.000)
10 years	0.005	-0.008	-0.000
	(0.013)	(0.005)	(0.000)
11 years	-0.008	0.002	-0.000
	(0.011)	(0.005)	(0.000)
12 years	-0.003	-0.002	-0.000
	(0.010)	(0.005)	(0.000)
13 years	0.014	-0.006	-0.000
	(0.008)	(0.004)	(0.000)
14 years	-0.006	-0.005	-0.000
	(0.009)	(0.004)	(0.000)
15 years	-0.002	-0.001	-0.000**
	(0.009)	(0.004)	(0.000)
Constant	11.789***	-3.762***	0.165***
	(0.372)	(0.167)	(0.023)
Observations	17,512	13,745	10,128
R-squared	0.793	0.046	0.183
Year Controls	YES	YES	YES
Industry Controls	YES	YES	YES
Cohort Dummies	YES	YES	YES
Region Controls	YES	YES	YES

Note: *** p<0.001, ** p<0.01, * p<0.05. Robust standard errors in parentheses. The dependent variables are denoted above the columns. We add one to revenues before logging and utilize this adjustment in calculating market shares (of total sectoral revenue). The row variables are dummies for corporations of that age. The omitted category are corporations older than 15 years.

Table 7: Exiting Corporations vs. Incumbent Corporations, 1900-1913

	Log Total Share Capital				Log Profit / Share Capital				Log Creditors / Share Capital			
	OLS	BE	FE	FE	OLS	BE	FE	FE	OLS	BE	FE	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Exiting	-0.002	0.400***	-0.037**	-0.040*	-0.050	0.333***	-0.052	-0.265***	0.071	-0.147	0.083**	-0.116*
	(0.032)	(0.068)	(0.012)	(0.020)	(0.047)	(0.075)	(0.048)	(0.078)	(0.078)	(0.146)	(0.029)	(0.049)
Log Age	0.194***	0.301***			0.218***	0.297***			0.204***	0.203***		
	(0.008)	(0.026)			(0.010)	(0.026)			(0.015)	(0.036)		
A-Corp. *				0.011				0.254**				0.222***
Exiting				(0.023)				(0.093)				(0.058)
Constant	12.303***	11.887***	13.932***	13.949***	-3.613***	-4.510***	-2.088***	-2.064***	-1.003***	-1.276**	-0.629***	-0.485***
	(0.117)	(0.457)	(0.011)	(0.010)	(0.140)	(0.650)	(0.038)	(0.041)	(0.138)	(0.461)	(0.026)	(0.027)
Obs	17,511	17,511	17,512	13,753	13,745	13,745	13,746	11,316	17,281	17,281	17,282	13,828
R2	0.154	0.148	0.061	0.086	0.085	0.130	0.069	0.062	0.146	0.156	0.024	0.027
Ind. FE	YES	YES	NO	NO	YES	YES	NO	NO	YES	YES	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	NO	NO	YES	YES	NO	NO	YES	YES	NO	NO	YES	YES
N. Firms	X	2,646	2,646	1,781	X	2,295	2,295	1,749	X	2,627	2,627	1,985

Note: *** p<0.001, ** p<0.01, * p<0.05. Robust standard errors are in parentheses. The variable "exiting" denotes whether a firm in period *t* ceased to be recorded in the balance sheet data, compared to *t – 1*. Industry controls are a set of dummies covering 14 industries (see Table 4). Year controls are for the accounting year of the associated corporate data. Region controls indicate the location of the corporate headquarters in one of 14 macro-regions, including Poland, Finland, and abroad.

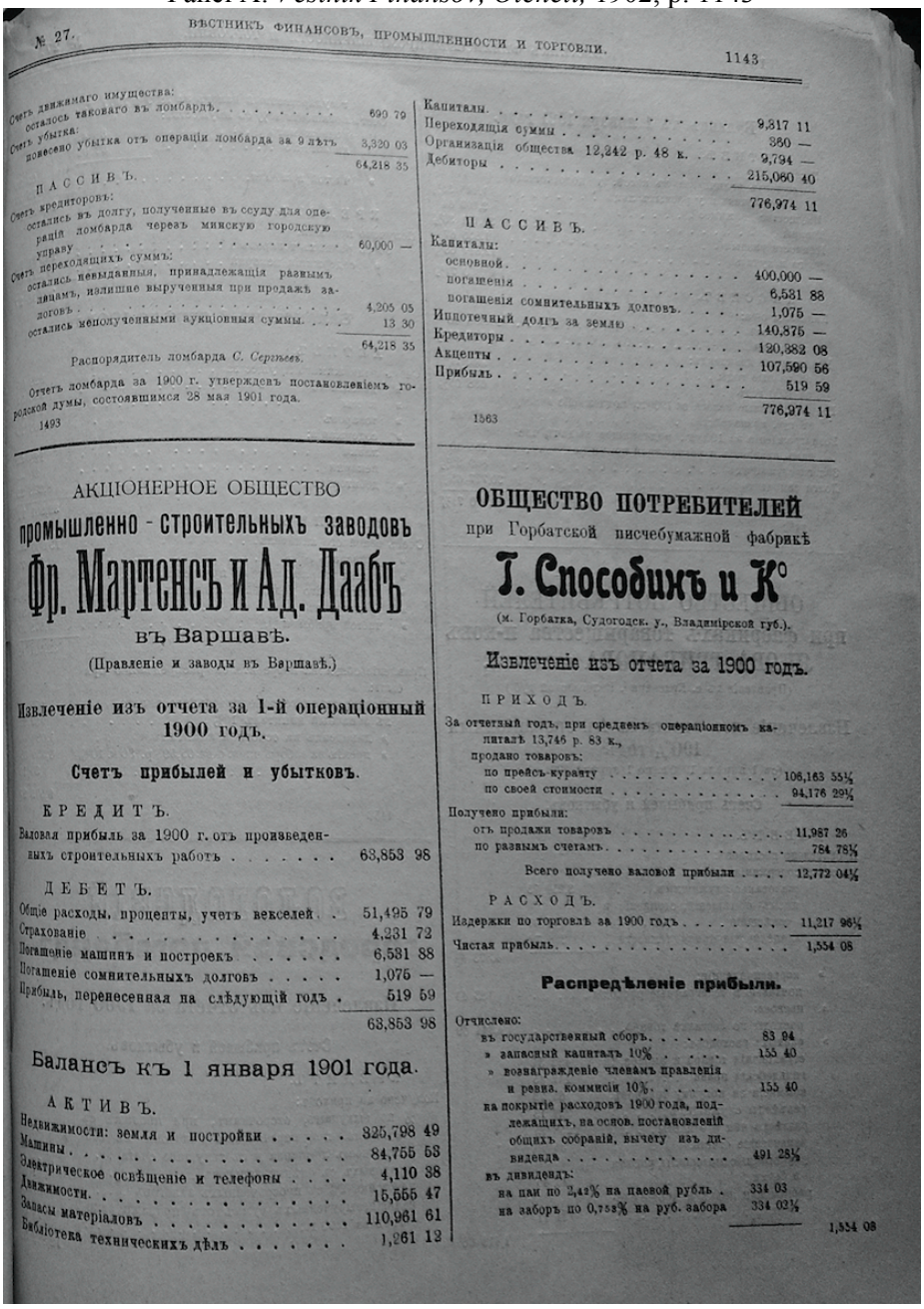
Table 8: Regressions Predicting Exit, 1900-1912

	Cox Proportional Hazard Time to Corporate "Exit"				Probit
				Founded After 1899	P(Exit)
Variables	(1)	(2)	(3)	(4)	(5)
Corporation was Founded as a New Firm	1.341*	1.178	1.221	1.171	0.031
	(0.178)	(0.170)	(0.186)	(0.231)	(.066)
Firm is of the A-Corporation Type	1.386*	1.216	1.239	1.283	.181*
	(0.230)	(0.213)	(0.233)	(0.287)	(.076)
Log (Share Capital)	0.817**	0.836*	0.870	1.021	-0.112***
	(0.054)	(0.059)	(0.065)	(0.096)	(0.031)
Log (Profit/Total Assets)	0.865***	0.863***	0.850***	.887*	-.101***
	(0.033)	(0.033)	(0.033)	(0.044)	(.019)
Has a Politically Connected Founder			0.982		
			(0.203)		
Observations	9,866	9,866	8,561	3,293	10,167
Region Controls	YES	YES	YES	YES	YES
Industry Controls	NO	YES	YES	YES	YES
Year Controls	NO	NO	NO	NO	YES

Note: *** p<0.001, ** p<0.01, * p<0.05. Robust standard errors in parentheses. Industry controls are a set of dummies covering 14 industries (see Table 4). Region controls indicate the location of the corporate headquarters in one of 14 macro-regions, including Poland, Finland, and abroad. Unlike Table 7, these specifications drop observations for 1913 to better identify true "exit."

Figure 1: Excerpts from *Vestnik Finansov i torgovli* and Ministry of Finance Yearbook for the Partnership of Martens and Daab (1900-01 Accounting Year)

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



№ 27. ВѢСТНИКЪ ФИНАНСОВЪ, ПРОМЫШЛЕННОСТИ И ТОРГОВЛИ. 1143

Счетъ движимаго имущества:
осталось такового въ ломбардѣ 690 79
Счетъ убытка:
понесено убытка отъ операціи ломбарда за 9 лѣтъ 3,320 03
64,218 35

ПАССИВЪ.

Счетъ кредиторовъ:
остались въ долгу, полученные въ ссуду для операція ломбарда чрезъ минскую городскую управу . . . . . 60,000 —
Счетъ переходящихъ суммъ:
остались невыданныя, принадлежащія разнымъ лицамъ, излишне вырученныя при продажѣ заложовъ 4,205 05
остались неполученными аукціонныя суммы. . . . 13 30
64,218 35

Распорядитель ломбарда *С. Сергѣевъ.*

Отчетъ ломбарда за 1900 г. утвержденъ постановленіемъ городской думы, состоявшимся 28 мая 1901 года.

1493

Капиталы 9,317 11
Переходящія суммы . . . . . 360 —
Организація общества 12,242 р. 48 к. . . . 2,794 —
Дебиторы 215,060 40
776,974 11

ПАССИВЪ.

Капиталы:
основной . . . . . 400,000 —
погашенія 6,531 88
погашенія сомнительныхъ долговъ. . . . 1,075 —
Ипотечный долгъ за землю . . . . . 140,875 —
Кредиторы 120,382 08
Акцепты 107,590 56
Прибыль 519 59
776,974 11

1563

АКЦІОНЕРНОЕ ОБЩЕСТВО
промышленно - строительныхъ заводовъ
Фр. Мартенсъ и Ад. Даабъ
въ Варшавѣ.
(Правленіе и заводы въ Варшавѣ.)

Извлеченіе изъ отчета за 1-й операціонный 1900 годъ.

Счетъ прибылей и убытковъ.

КРЕДИТЪ.

Валовая прибыль за 1900 г. отъ произведенныхъ строительныхъ работъ 63,853 98

ДЕБЕТЪ.

Общіе 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

Балансъ къ 1 января 1901 года.

АКТИВЪ.

Недвижимости: земля и постройки 325,798 49
Машины 84,755 53
Электрическое освѣщеніе и телефоны 4,110 38
Движимости 15,555 47
Запасы матеріаловъ 110,961 61
Библіотека техническихъ дѣлъ 1,261 12

ОБЩЕСТВО ПОТРЕБИТЕЛЕЙ
при Горбатской писчебумажной фабрикѣ
Т. Способихъ и К°
(м. Горбатка, Судогодск. у., Владимірской губ.).

Извлеченіе изъ отчета за 1900 годъ.

ПРИХОДЪ.

За отчетный годъ, при среднемъ операціонномъ капиталѣ 13,746 р. 83 к.,
продано товаровъ:
по прейсъ-куранту 106,163 55½
по своей стоимости 94,176 29½
Получено прибыли:
отъ продажи товаровъ 11,987 26
по разнымъ счетамъ 784 78½
Всего получено валовой прибыли 12,772 04½

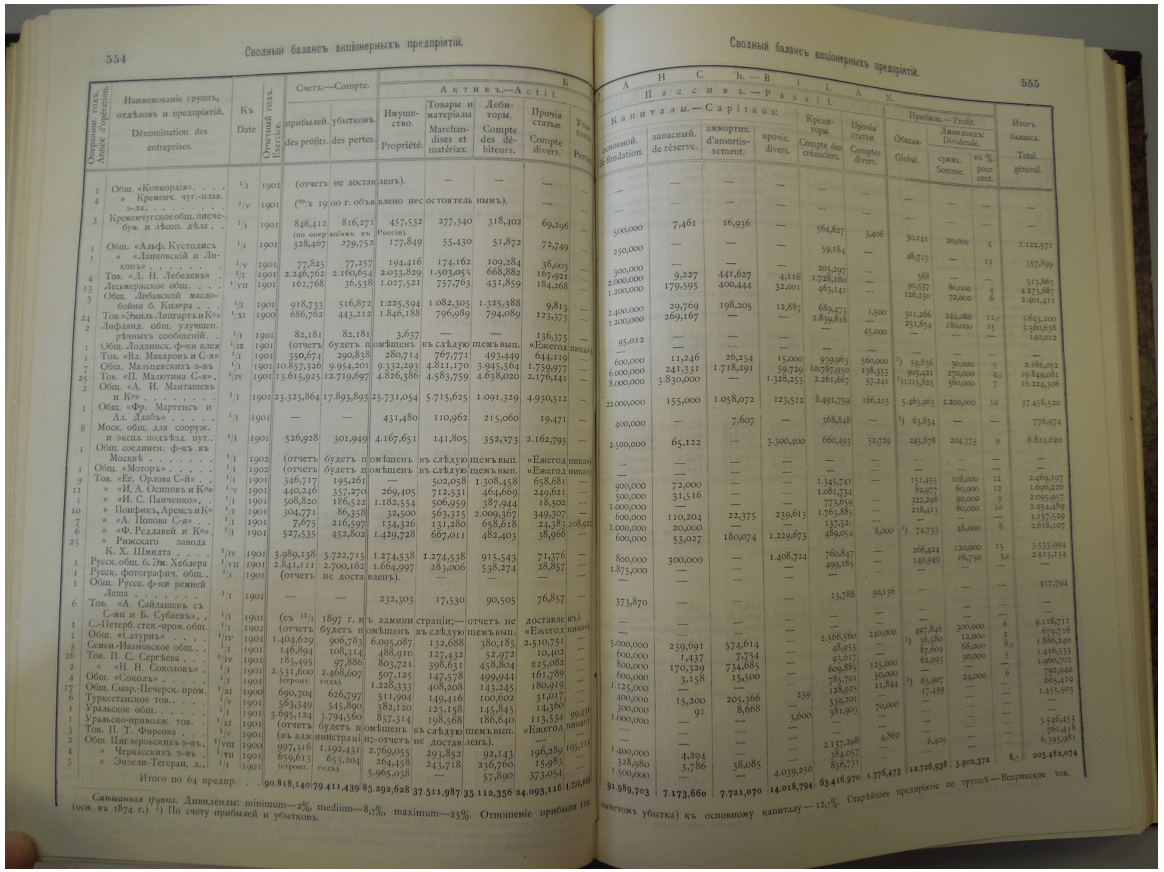
РАСХОДЪ.

Издержки по торговлѣ за 1900 годъ 11,217 96½
Чистая прибыль 1,554 08

Распредѣленіе прибыли.

Отчислено:
въ государственный сборъ 83 94
» запасный капиталъ 10% 155 40
» вознагражденіе членамъ правленія и ревиз. коммиссіи 10% 155 40
на покрытіе расходовъ 1900 года, подлежащихъ, по основ. постановленій общихъ собраній, вычету изъ дивиденда 491 28½
въ дивидендъ:
на паи по 2,42% на паевой рубль . 334 03
на заборъ по 0,758% на руб. забора 334 02½
1,554 08

Panel B: *Ezhegodnik Ministerstva Finansov*, 1902



Panel C: Zoomed in row for Martens and Daab

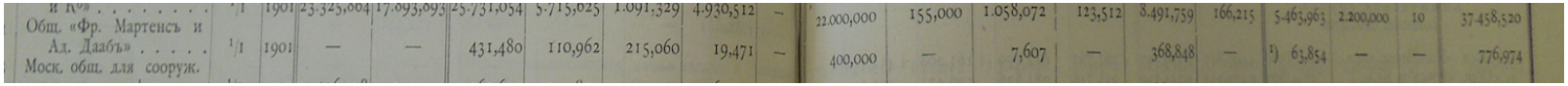
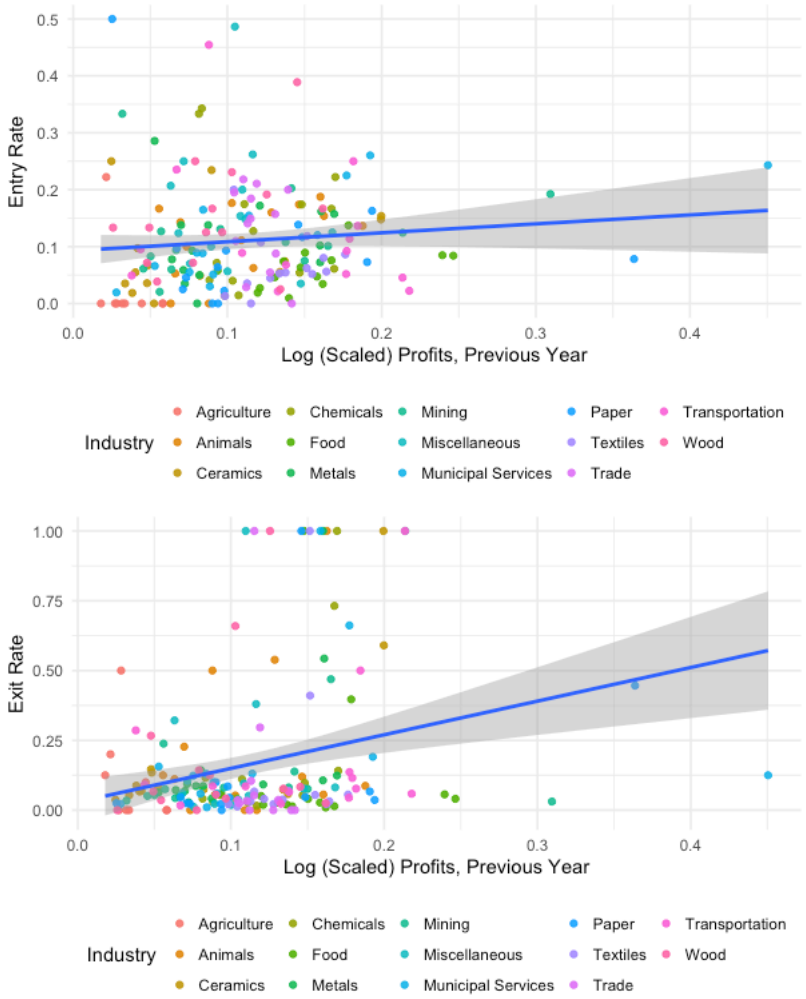
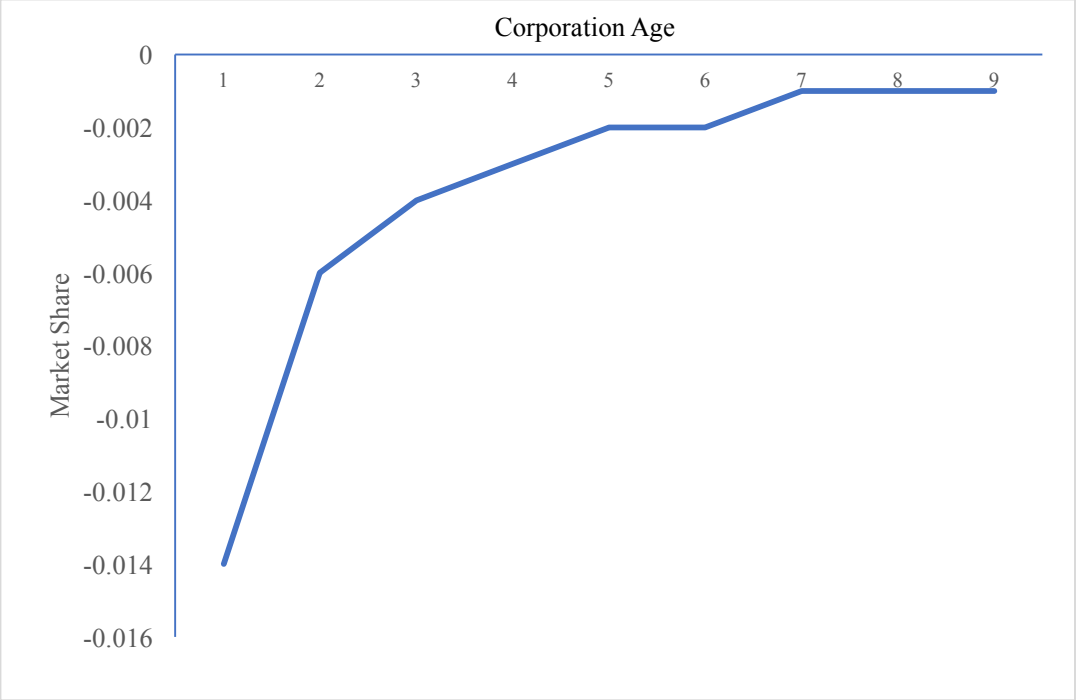


Figure 2: Entry and Exit Rates for Industry / Year Groups vs. Log Profits (Scaled by Total Assets) in the Previous Year



Note: These figures indicate the relationship between entry/exit rates by industrial group and mean (log) profits scaled by total assets in the previous year. Each dot is an industry-year observation.

Figure 3: Evolution of Market Share by the Age of the Corporation



Note: This picture depicts the coefficients estimated on the age-of-the-corporation variables in the model of Table 8 that utilizes corporate market shares (out of total revenues in broad industry) in a given year as the dependent variable. These industries are those noted in Panel B of Table 1. Standard errors can be inferred from the Table.

Appendix

Table A1: Entry and Exit Rates by Enterprise Form from Gregg's (2018) Factory Data

Panel A: Entry Rates

Year	Overall Entry Rate	Corporations	Non-Corporations
1894	--	--	--
1900	.4484	.0237	.4383
1908	.3875	.0122	.3870

Panel B: Exit Rates

Year	Overall Entry Rate	Corporations	Non-Corporations
1894	.6774	.4134	.6854
1900	.4749	.3127	.4859
1908	--	--	--

Note: These rates are calculated in the same fashion as Tables 3 and 4, although they pertain to factories (owned by corporations or not) rather than individual firms. Moreover, the rates in the cells refer to aggregations over 6 and 8 years, rather than year to year exits and entries.

Table A2: Regressions with Data on Corporation Founders

Panel A: Entering Corporations

	Log Share Capital		Log Profit / Share Capital		Log Creditors / Share Capital	
	OLS	FE	OLS	FE	OLS	FE
	(1)	(2)	(3)	(4)	(5)	(6)
Entrant	-0.353***	0.021	-0.385***	-0.075	-0.389***	-0.308***
	(0.034)	(0.013)	(0.047)	(0.052)	(0.050)	(0.034)
Pol. Connections *	0.164	0.025	-0.256	-0.417*	-0.229	-0.201*
Entrant	(0.105)	(0.038)	(0.179)	(0.164)	(0.201)	(0.096)
Constant	13.128***	13.921***	-2.942***	-2.115***	-0.759***	-0.482***
	(0.118)	(0.009)	(0.185)	(0.035)	(0.147)	(0.024)
Obs	12,042	12,042	9,714	9,714	11,920	11,920
R2	0.137	0.082	0.061	0.061	0.144	0.041
Ind. FE	YES	NO	YES	NO	YES	NO
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	NO	YES	NO	YES	NO	YES
N. Firms	X	1,607	X	1,445	X	1,601

Panel B: Exiting Corporations

	Log Share Capital		Log Profit / Share Capital		Log Creditors / Share Capital	
	OLS	FE	OLS	FE	OLS	FE
	(1)	(2)	(3)	(4)	(5)	(6)
Exiting	-0.034	-0.033*	-0.179**	-0.105	0.013	0.022
	(0.041)	(0.014)	(0.060)	(0.062)	(0.056)	(0.036)
Log Age	0.221***		0.214***		0.163***	
	(0.009)		(0.012)		(0.013)	
Pol. Connections *	0.080	-0.048	-0.123	0.006	-0.093	0.073
Exiting	(0.111)	(0.034)	(0.190)	(0.156)	(0.161)	(0.088)
Constant	12.597***	13.937***	-3.467***	-2.064***	-1.124***	-0.479***
	(0.119)	(0.011)	(0.183)	(0.044)	(0.152)	(0.028)
Obs	12,042	12,042	9,714	9,714	11,920	11,920
R2	0.174	0.083	0.083	0.060	0.151	0.031
Ind. FE	YES	NO	YES	NO	YES	NO
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	NO	YES	NO	YES	NO	YES
N. Firms	X	1,607	X	1,445	X	1,601

Note: *** p<0.001, ** p<0.01, * p<0.05. Robust standard errors are in parentheses. The variable "entrant" denotes whether a firm in period *t* was a new entrant, compared to *t – 1*. The variable "exiting" denotes whether a firm in period *t* was ceased to exist in the balance sheet data, compared to *t – 1*. Industry controls are a set of dummies covering 14 industries (see Table 4). Year controls are for the accounting year of the associated corporate data. Region controls indicate the location of the corporate headquarters in one of 14 macro-regions, including Poland, Finland, and abroad.

Figure A1: Entry and Exit Rates by Sector (Bar Graph)

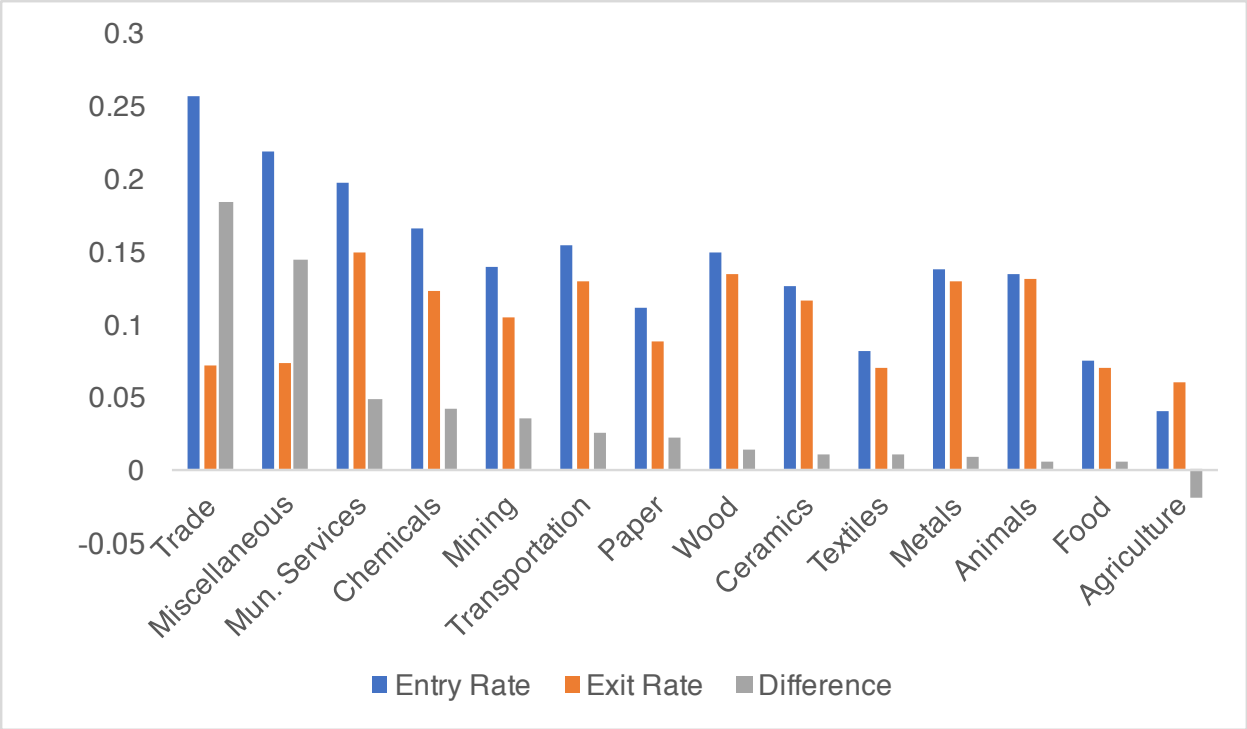


Table B1: Items on the Russian Balance Sheet, with Translations

Left Hand Page		Right Hand Page	
Счет:	Account (Total)	**Пассив**	Passive (Liabilities)
Прибылей	Revenue	Основной капитал	Share Capital
Убытков	Expenditures	Запасный капитал	Capital Reserves
		Аммортизация (sic)	Amortization (and Depreciation)
Актив	Active (Assets)	Прочие капиталы	Other Capital (Including Bonds)
Имущество	Property	Кредиторы	Accounts Payable
Товары и материалы	Goods and Materials	Прочие статьи	Other Items
Дебиторы	Accounts Receivable		
Прочие статьи	Other Items	**Прибыль**	Profit
Убыток	Loss	Общая	Net Profit
		Дивиденд: Сумма	Dividend Sum
		Дивиденд: %	Dividend Percentage

Note: These variables are generally all provided across the cross-sections of balance sheet data reported in the Ministry of Finance *Ezhegodniki*. Some small variants did exist across years – we discuss these in the text where relevant.

B2: Reconciling Duplicate Observations in the Panel 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' balance sheets 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, when a company's accounts for the same accounting year are reported in two or more published volumes, 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 then 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 very few corporations (less than 1% of the total sample) that fit this category.