Wednesday, April 16, 2025
Access the code, data, and analysis at https://github.com/j-jayes/who-is-who-etl and https://github.com/j-jayes/Swedish-annual-reports-archive

Technocrats to Tycoons

The Shift in Swedish Corporate Leadership and Its Economic Consequences in the 20th century

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ABSTRACT Understanding the impact of corporate leadership on firm outcomes is an important strand of research, yet causal evidence, particularly historical, remains scarce. This paper investigates how appointing directors with distinct backgrounds influenced firm performance and labor outcomes in Sweden from 1873-1980, using newly compiled data on large listed firms' financials and director biographies. Employing an event-study design adapted from Acemoglu, He, and Le Maire (2023), I analyze the effects of the first appointments of engineers with U.S. work experience versus directors with business/finance training. Preliminary findings suggest a potential positive correlation between appointing U.S.-experienced engineers and subsequent revenue per employee. In contrast, I find no significant effects associated with appointing business/finance directors, notably on the labor share proxy, challenging the universality of contemporary findings linking business education to reduced rent-sharing. These results highlight the context-dependent nature of managerial influence and suggest that alternative corporate objectives may have prevailed in Sweden's historical stakeholder-oriented governance system.

I. Introduction

The composition of corporate leadership is widely believed to influence firm strategy and performance, yet identifying the causal impact of specific managerial characteristics remains a challenge, particularly over the long run. This paper investigates how the backgrounds of corporate directors shaped firm outcomes during a critical period of industrial transformation in 20th-century Sweden. While

engineers, particularly those returning with experience from the United States, were pivotal in Sweden's early industrial ascent, the profile of corporate boards evolved over time, incorporating individuals with different expertise, notably in business and finance. Did these distinct types of directors—specifically, engineers with US work experience versus those trained primarily in business or finance—lead to different trajectories in firm productivity and employment?

Recent work by Acemoglu, He, and Le Maire (AHLM) (2023) finds that the appointment of managers with business degrees in the contemporary US and Denmark leads to significant declines in employee wages and the labor share, potentially driven by management practices emphasizing shareholder value maximization over rent-sharing. However, the dominance of the shareholder value paradigm, often associated with the post-1970s "Friedman doctrine," may not have characterized corporate objectives throughout much of Sweden's 20th-century industrial history, a period potentially marked by different governance models and a stronger emphasis on engineering expertise.

Therefore, I hypothesize that the effects observed by AHLM may be specific to a later type of business education and corporate environment. Specifically, I test whether the appointment of directors with business or finance backgrounds in Sweden, particularly prior to the widespread adoption of the shareholder value consensus, led to similar reductions in labor's share of firm output (proxied here by the ratio of the wage bill to revenue). If the negative wage effects are tied to a specific, later ideology often imparted through business schools, I might expect different, or null, effects from appointing business-trained directors in this earlier historical context.

To test this hypothesis, I adapt the event-study methodology used by AHLM (2023) to the historical Swedish context. Using a newly compiled dataset combining firm-level financial reports and detailed director biographies spanning from the late 1800s to 1980, my core empirical strategy exploits the timing of the first appointment of directors with specific, identifiable characteristics—engineers with US work experience, and directors with business or finance backgrounds—to a firm's board. This allows me to estimate the impact of these appointments on key firm outcomes, notably revenue per employee and the wage bill relative to revenue, while controlling for firm-specific heterogeneity and aggregate time trends.

My event-study analysis yields nuanced findings. Preliminary results suggest that the arrival of directors with US work experience may correlate positively with subsequent changes in revenue per worker, potentially aligning with historical accounts of knowledge transfer. In contrast, I find no statistically significant evidence that appointing directors with business or finance backgrounds impacted firm performance or, crucially, the proxy for the labor share. This latter null finding is consistent with my hypothesis that the impact of business-trained leadership might differ significantly in this historical setting compared to the contemporary findings of AHLM (2023). By examining these specific transitions in leadership, this study contributes novel insights into the context-dependent role of managerial expertise and international influence on Swedish corporate performance and labor utilization.

The paper proceeds as follows: Section II reviews relevant literature on managerial expertise, corporate governance, and firm outcomes. Section III describes the novel dataset and digitization process. Section IV details the event-study methodology and identification strategy. Section V presents the main results from the event-study analysis testing my hypotheses. Section VI concludes.

II. Literature Review

Engineers and Technological Change in Swedish Industry

Engineers played a pivotal role in Sweden's rapid industrialization and the management of its early 20th-century firms. As Sweden's industries expanded in technical complexity (steel, electrification, machinery), professional engineers increasingly assumed top managerial roles (Högfeldt 2005). Many large firms by the 1920s were run by engineer-CEOs with significant autonomy, reflecting the technocratic character of Swedish industry (Högfeldt 2005). Business historians note that engineers dominated executive positions in Sweden's biggest firms, especially in industrial sectors – highlighting the historical importance of technical training in corporate leadership (Henrekson, Lyssarides, and Ottosson 2021, 15). This contrasts with some other countries where legal or financial elites held sway; in Sweden the engineering profession emerged as a powerful elite driving industrial growth (Henrekson, Lyssarides, and Ottosson 2021).

A distinctive feature of Swedish industrialization was the influence of engineers who trained or worked abroad, particularly in the United States. Studies of return migration suggest a significant "brain gain" occurred: a majority of Swedish engineers who went to the U.S. (or Germany) for experience later returned home, bringing valuable knowledge (Grönberg 2003, 71). Per-Olof Grönberg's research shows these returnee engineers diffused advanced technologies and organizational innovations into Swedish firms during the country's "second industrial breakthrough" (Grönberg 2003; Magnusson 2014). They not only introduced new technical expertise but also modern management practices – notably "Taylorist efficient workflows and corporate welfare programs learned in America" (Grönberg 2003, 15). For example, at electrical firm ASEA and steelmaker Sandvik, foreign-trained engineers filled many key positions, injecting know-how that rationalized production and improved productivity (Grönberg 2003, 113).

By the early 1900s, Swedish industry actively encouraged this knowledge transfer. As Grönberg notes, American and German experience became a form of "symbolic capital" that boosted engineers' influence within firms and on the broader engineering field (Grönberg 2003, 24). Case studies confirm that returning engineers were catalysts for technology diffusion – from mining equipment to electrotechnical systems – adapting foreign innovations to domestic needs (Grönberg 2003). Engineer-entrepreneurs and internationally trained technologists were thus central to Sweden's technological adoption and industrial leadership in the first three-quarters of the 20th century. Grönberg highlights specific instances, such as Hugo Hammar (engineer-CEO of shipbuilder Götaverken) using networks to fund naval technology experiments, illustrating how engineering know-how combined with savvy management advanced key industries (Grönberg

2003, 17). This "reverse technology transfer" was a key mechanism for Sweden's industrial upgrading, as engineers brought back not just blueprints but also new organizational structures and quality control systems (Grönberg 2003). Grönberg also observes that engineers returning from U.S. firms "frequently brought home a welfare capitalist ethos (company housing, worker benefits) along with efficiency methods" (Grönberg 2003, 16). While the role of these engineers as agents of change is recognized, the specific impact of their arrival on corporate boards on firm performance and workforce dynamics, however, remains underexplored and forms a central motivation for this paper's event-study analysis.

Board Composition and Corporate Governance

Historically, Sweden's corporate governance system influenced board composition and, potentially, firm performance and strategy regarding labor. Characterized by concentrated ownership and traditionally technocratic management, especially in the early-to-mid 20th century, boards often reflected a blend of technical and financial expertise (Högfeldt 2005). Banks, like Stockholms Enskilda under the Wallenbergs, frequently held dominant shareholder positions and placed representatives on boards, working alongside career engineers in top executive roles (Högfeldt 2005). As Högfeldt notes, citing industrialist Marcus Wallenberg Sr., a perception existed that technically complex firms "lacked the competence to run the firms themselves," leading owners to install engineer-managers while maintaining financial oversight (Högfeldt 2005, 589). This created a governance structure somewhat distinct from more purely managerial or family-dominated models elsewhere in Europe or the US.

The composition of these boards likely mattered for firm strategy and outcomes. Board expertise and background are known to influence corporate direction: Henrekson, Lyssarides, and Ottosson (2021) document that while many Swedish directors and CEOs throughout the mid-20th century held engineering or science educations, later decades saw a rise in those with business or finance degrees (Henrekson, Lyssarides, and Ottosson 2021, 15). This shift is significant because different backgrounds may correlate with different priorities. Comparative studies, surveyed by Adams, Hermalin, and Weisbach (2010), suggest boards with more engineers or scientists tend to invest more in R&D and innovation, while those with more financiers often focus on cost-cutting or M&A (Adams, Hermalin, and Weisbach 2010, 92). This aligns with the central question of this paper: did the appointment of directors with business/finance backgrounds lead to different outcomes, particularly concerning labor costs relative to revenue, compared to the appointment of engineers?

The Swedish context adds another layer to this question. Högfeldt argues that Sweden, for much of the 20th century, exemplified a coordinated market economy with stakeholder-oriented governance, contrasting with the Anglo-American shareholder model (Högfeldt 2005). Boards were often insider-dominated, featuring controlling shareholders (like the Wallenbergs) or their proxies alongside key executives (Högfeldt 2005). This model, perhaps placing less singular emphasis on immediate shareholder returns compared to the later "Friedman doctrine," might imply different behavior from business-trained directors appointed *during*

this era compared to those studied by Acemoglu, He, and le Maire (2022) in more recent decades. While some convergence occurred from the 1980s onwards, with reforms emphasizing board independence (Sabelfeld and Jonäll 2023), the period under study (pre-1980) largely precedes this shift. Sluyterman and Westerhuis (2022) note a general trend across many countries in the late 20th century away from "managerial capitalism," where technical experts often held primacy, towards "investor capitalism" focused on shareholders (Sluyterman and Westerhuis 2022, 711). Examining board appointments in Sweden *before* this shift became dominant allows testing whether the impact of business-trained directors is contingent on the prevailing corporate ideology.

Historically, an engineering-trained director in Sweden might wield influence through deep firm-specific knowledge, whereas a finance-trained director could leverage external networks and capital access (Högfeldt 2005). The deliberate blending of technical and financial leadership, noted by Wallenberg Sr. as early as 1905 (Högfeldt 2005, 591), suggests a complex interplay. This study uses an event-study approach to isolate the impact of appointing directors from these different backgrounds, contributing to our understanding of how specific leadership skills and experiences shaped firm strategies and outcomes within the particular institutional context of 20th-century Sweden.

Firm Performance, Technical Change, and Managerial Background

The composition of a firm's leadership and board is thought to significantly influence its performance, especially during periods of technological change. A growing body of evidence links board composition (skills, size, diversity) to financial outcomes like productivity and profitability (Adams, Hermalin, and Weisbach 2010). Appointing directors with relevant industry or technical expertise often correlates with positive market reactions and long-run performance (von Meyerinck, Oesch, and Schmid 2016). This suggests specialized knowledge, such as engineering know-how in a technologically driven firm, is valuable.

Furthermore, executives' educational backgrounds may shape firm strategy and resource allocation. Modern studies indicate that CEOs with science/engineering training are often more innovation-oriented, correlating with greater R&D investment and patenting activity (Ghardallou, Borgi, and Alkhalifah 2020). For instance, Ghardallou, Borgi, and Alkhalifah (2020) find support for Hambrick & Mason's theory, noting that "firm R&D spending is positively related to the science and engineering education of its CEO" (Ghardallou, Borgi, and Alkhalifah 2020, 298). This implies that technically expert leaders might prioritize innovation, potentially driving productivity growth. Conversely, leaders with primarily financial backgrounds might emphasize efficiency metrics and shareholder returns, potentially affecting measures like revenue per employee or labor's share of revenue differently.

Historical analyses of Swedish companies provide context for examining these relationships. During Sweden's era of industrial ascendancy, engineer-led firms often introduced process improvements and new products that boosted output per worker (Prado and Molinder 2022). Firms like ASEA or Volvo saw rapid productivity gains as they implemented technical innovations, often under the

guidance of technically trained executives (Taalbi and Ljungberg 2015). Revenue per employee, a key outcome measure in this study, generally rose as these companies scaled up production.

However, the link between technical change, productivity, and labor outcomes is complex and has shifted over time. In the early and mid-20th century Sweden, industrial employment often expanded alongside productivity; manufacturing employment rose into the 1960s as firms grew (Taalbi and Ljungberg 2015). High productivity and output growth often coincided with job growth. After the 1970s, this relationship changed. Facing the ICT revolution and globalization, manufacturing employment peaked, and automation allowed output to grow with fewer workers (Taalbi and Ljungberg 2015). As noted by Ljungberg and Taalbi, manufacturing output continued rising despite workforce cuts, implying capital deepening and technical change drove up labor productivity but potentially reduced labor's overall share (Taalbi and Ljungberg 2015).

This evolution highlights the importance of examining *who* drove these changes and how gains were distributed. Did engineer-directors primarily focus on productivity enhancements, potentially benefiting both the firm and labor during periods of expansion? Did the later rise of business/finance-trained directors coincide with a shift towards prioritizing shareholder value, potentially leading to productivity gains (or cost-cutting) benefiting capital more than labor, as suggested by the AHLM findings in contemporary settings (Acemoglu, He, and le Maire 2022)? AHLM (2023), for instance, find that business managers reduced wages and the labor share *without* boosting output or productivity (Acemoglu, He, and le Maire 2022, 1). This study, by using an event-study methodology focusing on the *appointment* of directors with engineering (including US experience) versus business/finance backgrounds in the specific historical context of 20th-century Sweden, aims to shed light on whether these different leadership types had distinct causal impacts on both productivity (revenue per worker) and labor's share (wage bill relative to revenue), potentially revealing dynamics different from those observed in later periods dominated by different corporate objectives.

III. Data and Source Criticism

Data sources

This study draws on three interrelated data sources to examine the link between business educated and U.S.-experienced engineers on Swedish corporate boards and firm-level outcomes; firm-level financials, board composition, and biographical details of directors. The first two come from company reports, while the third is extracted from two sets of biographical dictionaries that detail the lives of prominent Swedes in the 20th century.

I access the annual reports for companies listed on the Stockholm Stock Exchange, collected from the online archives of the Swedish House of Finance at the Stockholm School of Economics (SSE). These reports span 1873–2006, and are provided in PDF form. For the present project, the focus is on data from 1873 to 1980. I extract from these reports income statement information including

revenue, cost of goods sold, operating expenses, wages, taxes, depreciation, net income, as well as balance sheet line items; total assets, current assets, fixed assets, total liabilities, current liabilities, long-term liabilities, and shareholder equity. I also extract the number of workers (sometimes disaggregated into white-collar vs. blue-collar).

I limit the sample to firms with at least 30 years of data betwen 1873 and 1980, resulting in 71 firms included. For these 71 firms, the annual reports list the names and positions of their board members (alongside auditors) near the balance sheet. Figure 1 displays the coverage by firm and year. The purpose of limiting the uumber of firms was to ensure sufficient time-series data per firm for robust panel data and event-study analysis.

Figure 1: Annual Report Coverage

To know about each director's educational background, international experience, and broader career trajectory, information was gathered from Swedish

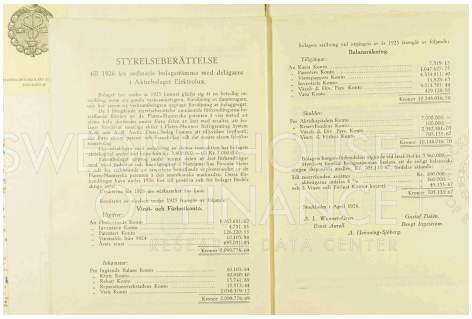
biographical dictionaries *Vem är Vem?* and *Vem är Det?*. These references document education (e.g., engineering vs. business), overseas postings or study, and other notable career milestones. I detail the digitization of this data in the third paper of my thesis, and include a summary below.

Data Collection and Digitization

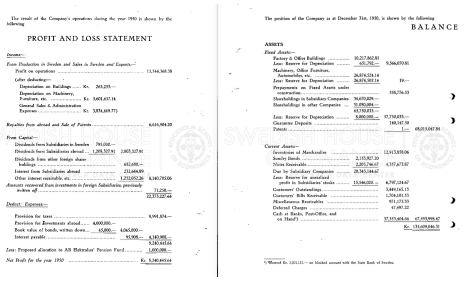
The digitization process involved scraping the scanned archival annual reports from the Stockholm School of Economics Library - which along with drawing on their own archive, collected some reports from the Royal Library and Centrum för Näringslivshistoria to fill coverage gaps. This scraping script is available in the code repository linked above.

A novel digitization process was needed to manage changes in financial reporting and layout over eight decades. Conventional Optical Character Recognition (OCR) methods proved insufficient due to inconsistent table structures, especially when reports extended over multiple pages to detail subsidiaries and international branches. Instead, the project used Large Language Models from Google's "Gemini" family, combined with a custom pydantic data schema, to extract structured information from images. This approach sidestepped the need for traditional OCR by relying on multimodal image-processing capabilities, which improved accuracy and consistency. Nonetheless, certain complexities remain. Reporting language gradually shifted from Swedish to English for some companies, and the scope of financial disclosure expanded, with some early reports totaling only two pages and later ones exceeding one hundred. Although the main income statement and balance sheet items remained comparable, firm-level coverage of current assets, current liabilities, and subsidiary performance varied from year to year. The data is made accessible in the code repository linked above, as well as in an interactive dashboard for exploration, detailed in Figure 5.

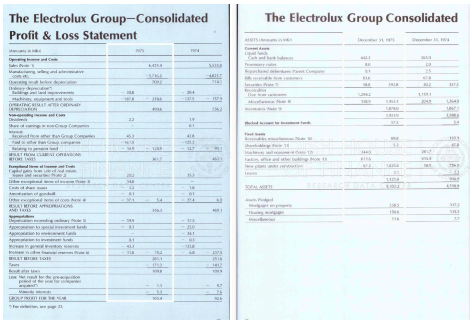
Despite these technical advances, certain challenges remained. Variations in balance sheet reporting posed difficulties, as some firms presented multi-page breakdowns of assets or liabilities across subsidiaries or international branches, making it difficult to aggregate consistently. Additionally, language changes over time added complexity; reporting language shifted from Swedish to English in the mid-20th century for some companies. This issue was partially addressed by prompting the extraction models to recognize both Swedish and English terms, as evidenced in the reproduced PyDantic data schema in the appendix.



(a) 1925



(b) 1950



(c) 1975

Figure 2: Profit and Loss Statements and Balalnce Sheets for Electrolux AB from 1925, 1950, and 1975. Souce: Swedish House of Finance at the Stockholm School of Economics Library Archives.

Board composition data were generally easier to extract, given that names and positions typically appeared in a standard location beneath the balance sheet. Individual directors' surnames, initials, full names, and any listed title (e.g., Verkställande Direktör or Ordförande) were recorded.

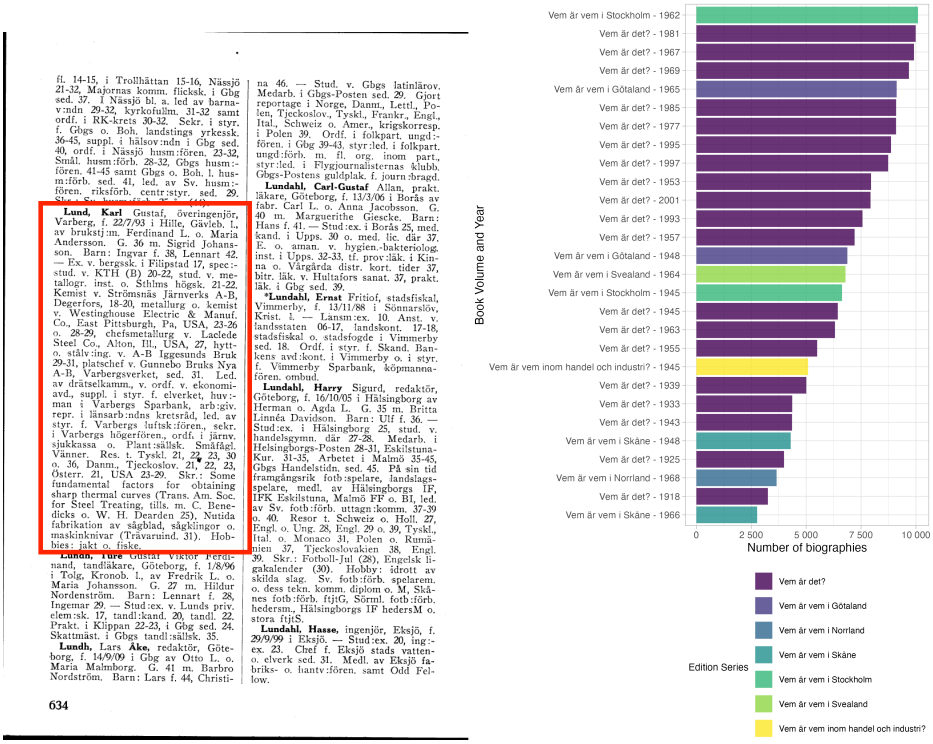
To supplement these board lists with directors' backgrounds, a fuzzy string-matching algorithm was employed to match board members against the *Vem är Vem?* and *Vem är Det?* biographical dictionaries. Approximately 72% of board members were successfully matched using surname and initials; improving upon this match rate — potentially by incorporating mentions of employers or corporate affiliations into the matching routine — remains an area for future work. In the later periods towards 1980, the match rate drops slightly as I am drawing mainly on the *Vem är Det?* biographical dictionaries, which are published later and have less coverage than the *Vem är Vem?* volumes. It would be possible to improve the match rate by expanding the search to other biographical dictionaries such as the SBL, or company archives, but this is beyond the scope of the paper at present.

An example of the biographical data is shown in Figure 3a, and the distribution of biographies across volumes and time period is shown in Figure 3b.

Source Criticism

Although these biographical dictionaries offer a valuable repository of career information, they have certain limitations. Inclusion was partly self-selective, in that individuals could pay a nominal fee to appear, and the depth of information varies from one entry to another. A comparison with the Swedish Biographical Lexicon (SBL), which selects figures on broader historical grounds, revealed that fewer than one-fifth of the sampled individuals from *Vem är Vem?* also appear in the SBL. This discrepancy implies that *Vem är Vem?* may overrepresent socially prominent individuals, but that limitation is less consequential for studying board members of listed firms, who tend to hold influential positions by definition. Nonetheless, caution is warranted when interpreting patterns of foreign training or professional networking, since those who invested in a biographical listing may differ systematically from peers who did not.

Another key limitation involves the composition of the 71 firms under study. The sample primarily includes the largest listed companies, many of which are finance and investment entities or engineering and industrial firms. According to internal categorization, finance and investment comprises 30.43 percent of the sample and engineering and industrial another 20.29 percent, with the remainder distributed across consumer goods, mining and metals, telecommunications, technology, automotive, and machinery. These proportions mean that the findings will not necessarily generalize to smaller, non-listed firms in other sectors. See Table 1 for a breakdown of the sample by broad industry classification.



(a) An example of a biogaphy from Karl Gustav Lund

(b) Number of biographies in each volume of 'Vem är Vem?' and 'Vem är Det?'

Figure 3: Example of a biographical entry from *Vem är Vem?* and the number of biographies in each volume from *Vem är Vem?* and *Vem är Det?*. Source: Projekt Runeberg scans of *Vem är Vem?* and *Vem är Det?* volumes and author's own analysis.

Table 1: Distribution of firms in sample by broad industry classification.

Broad Industry	Percentage (%)
Finance & Investment	30.43%
Engineering & Industrial	20.29%
Other	18.84%
Consumer Goods	15.94%
Mining & Metals	7.25%
Telecommunications & Technology	4.35%
Automotive & Machinery	2.90%

Constructing Variables

Constructing Variables

To implement the event study analysis, I construct the necessary variables at the firm-year level, drawing on the data sources described previously. The primary dependent variables capturing firm performance and labor outcomes originate from the digitized annual reports. Log net income per employee, calculated as the natural logarithm of total annual revenue minus expenses, divided by the reported employee headcount, serves as my main proxy for labor productivity. To investigate effects on labor's share of income, I compute the log ratio of the total wage bill to total annual revenue. Changes in workforce size are measured using the natural logarithm of the total number of employees.

Identifying the key independent variables, namely the timing of specific director appointments, involves linking annual board membership lists (from company reports) with director backgrounds detailed in the *Vem är Vem?* and *Vem är Det?* biographical dictionaries, using the fuzzy matching process described earlier. These dictionaries provide the necessary information to classify directors based on their educational background and international experience. Following a similar approach to Acemoglu, He and le Maire (2023) (Acemoglu, He, and le Maire 2022), I classify directors' educational backgrounds by searching for specific keywords within the biographical entries describing their education.[1] This allows the creation of indicator variables identifying directors with an engineering education or, alternatively, a business or finance education. Directors' international experience is also coded, with a specific indicator variable for U.S. work experience. This classification requires a specific mention in the biography of having worked for a named company or institution in the United States, distinguishing it from simple travel or brief study visits, which are also recorded in the biographies. The geographical distribution of documented foreign work or study locations for directors in the sample is illustrated in Figure **??**.

[1] [Keywords for engineering education include: 'tekniska', 'chalmers', 'kth', 'tekn', 'ingenjör', 'teknisk', 'teknolog', 'polytekn', 'engineering', 'technical'. Keywords for business/finance education include: 'handels', 'ekonom', 'handelshögskola', 'business', 'commerce', 'ekonomisk', 'handelsinstitut', 'handelsgymnasium'.]

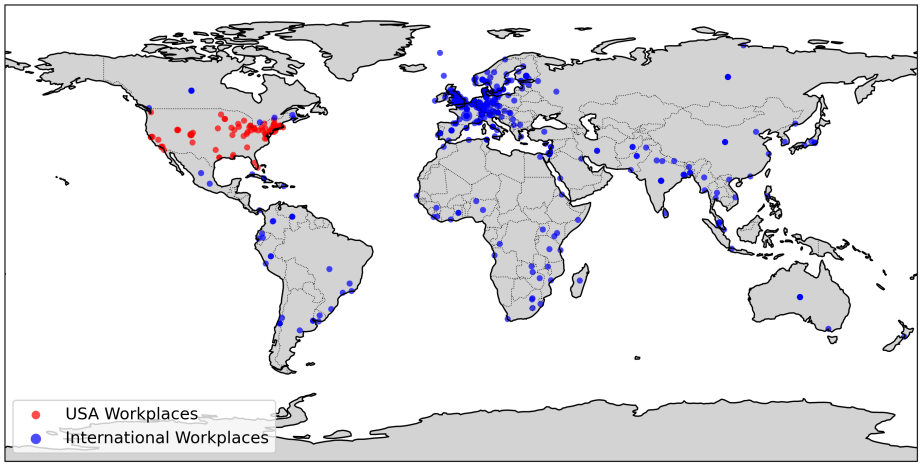


Figure 4: Map of international experience

With directors categorized by education and U.S. experience, I then determine the precise timing of the central events for the analysis for each firm. This involves identifying the specific year in which the first director with both an engineering education and U.S. work experience joins the board, and separately, the year the first director with a business or finance background is appointed. These event timings form the basis for constructing the relative time dummy variables essential for the event study specification presented in Section IV.

Finally, the control variables included in the regressions are also derived from the annual reports. Firm size is measured as the natural logarithm of total assets, while firm age is calculated as the number of years since the firm's first available annual report within the dataset. Constructing these outcome, treatment timing, and control variables enables the subsequent estimation of the dynamic effects associated with changes in board composition.

IV. Empirical Method

My primary empirical strategy employs an event-study design to estimate the causal impact of appointing directors with specific backgrounds—engineering training combined with U.S. work experience, or alternatively, business/finance training—on firm performance and labor-related outcomes (Acemoglu, He, and le Maire 2022, 10). This approach leverages the longitudinal nature of my firm-level panel data spanning 1873–1980, allowing me to analyze changes within firms following specific board appointments while controlling for unobserved heterogeneity.

Event Definition and Sample

The main events are defined as the **first appointment** of a director with a specific background profile to a firm's board, where the board previously lacked

any director with that profile (Acemoglu, He, and le Maire 2022, 10). I focus on two key event types relevant to my hypotheses:

1. **First U.S.-Experienced Engineer:** The first year a director with both an engineering education and documented U.S. work experience joins the board.
2. **First Business/Finance Director:** The first year a director with a business or finance educational background joins the board.

My "treated" group consists of firms experiencing one of these first-time appointments during the sample period. Following (Acemoglu, He, and le Maire 2022, 10), I restrict the treated sample to firms experiencing only *one* such event type (or the first instance, if a firm experiences both) and that had *no* director of that specific type prior to the event year. The "control" group consists of firms that *never* appoint a director of the specific type being analyzed throughout my sample period. This setup forms an unbalanced panel, as firms enter and exit the sample based on data availability (Figure 1).

Event Study Specification

To estimate the dynamic effects around these appointments, I use an event study specification similar to that employed by (Acemoglu, He, and le Maire 2022):

$$Y_{i,t} = \alpha_i + \delta_t + \sum_{k=-m}^{q} \beta_k D_{i,t}^k + \Gamma X_{i,t} + \varepsilon_{i,t}$$

where $Y_{i,t}$ is the outcome variable for firm i in year t. Key outcomes include log profit per employee (approximating labor productivity) and the log wage bill relative to log revenue (approximating the labor share), as well as log total employment.

α_i represents firm fixed effects, absorbing time-invariant firm characteristics (founding conditions, long-run industry focus, etc.). δ_t represents year fixed effects, capturing aggregate economic shocks and trends common to all firms.

$D_{i,t}^k$ are dummy variables indicating the time relative to the event year ($k = 0$) for firm i. k ranges from $-m$ (years before the event) to q (years after the event). The coefficients β_k capture the average change in the outcome variable k years relative to the event, compared to the control group. The pre-event coefficients (β_k for $k < 0$) serve as a test for parallel trends; insignificant pre-event coefficients support the validity of the event-study design (Acemoglu, He, and le Maire 2022, 10). I typically impose the normalization $\beta_{-1} = 0$.

$X_{i,t}$ is a vector of time-varying control variables, including the log of total assets (as a proxy for firm size) and firm age. I also include sector x year fixed effects to control for differential trends across industries (Acemoglu, He, and le Maire 2022, 10).

$\varepsilon_{i,t}$ is the idiosyncratic error term. Standard errors are clustered at the firm level to account for potential serial correlation within firms (Acemoglu, He, and le Maire 2022, 10).

For estimation, I utilize the imputation-based estimator proposed by (Borusyak, Jaravel, and Spiess 2024), following (Acemoglu, He, and le Maire 2022, 12), which provides robust estimates in the presence of two-way fixed effects and heterogeneous treatment effects.

Addressing Endogeneity Concerns

The primary identification strategy relies on the assumption that, conditional on controls and fixed effects, treated and control firms would have followed parallel trends in outcomes absent the board appointment event. I explicitly test this by examining the pre-event coefficients (β_k for $k < 0$).

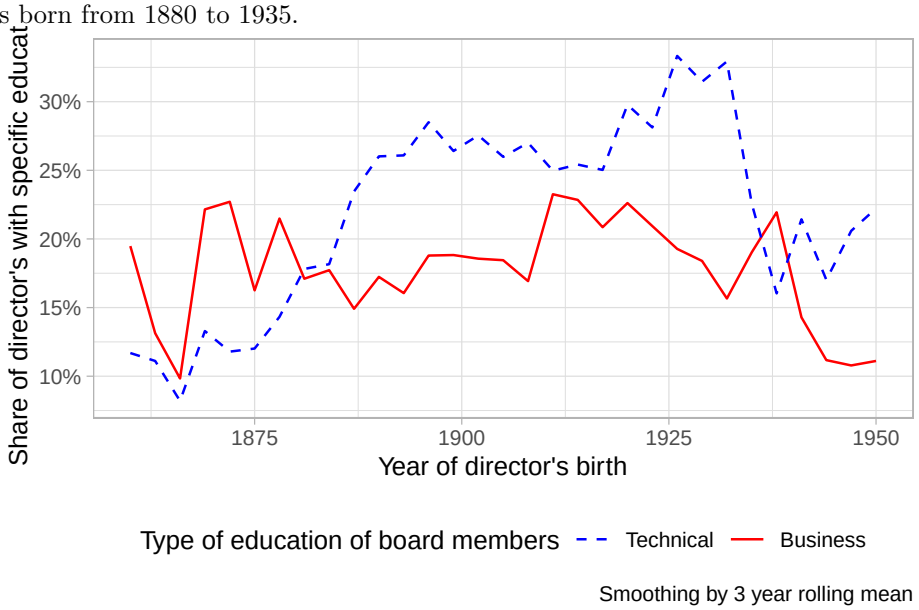
While firm fixed effects control for time-invariant unobservables, and year/sector fixed effects control for common shocks and trends, the possibility of time-varying omitted variables correlating with both board appointments and outcomes remains. For instance, firms anticipating challenging periods might be more likely to appoint directors with specific skills (e.g., business/finance for restructuring). My examination of pre-trends directly addresses this concern regarding *anticipated* changes. I do not have access to information on board retirements or deaths however, that Acemoglu, He, and le Maire (2022) exploit in an IV setting.

V. Analysis

Do we see a shift in education over time among the biographies?

I limit the sample to the 15,301 biographies of individuals with an occupation classified as a director (HISCO code 21000 to 21999).

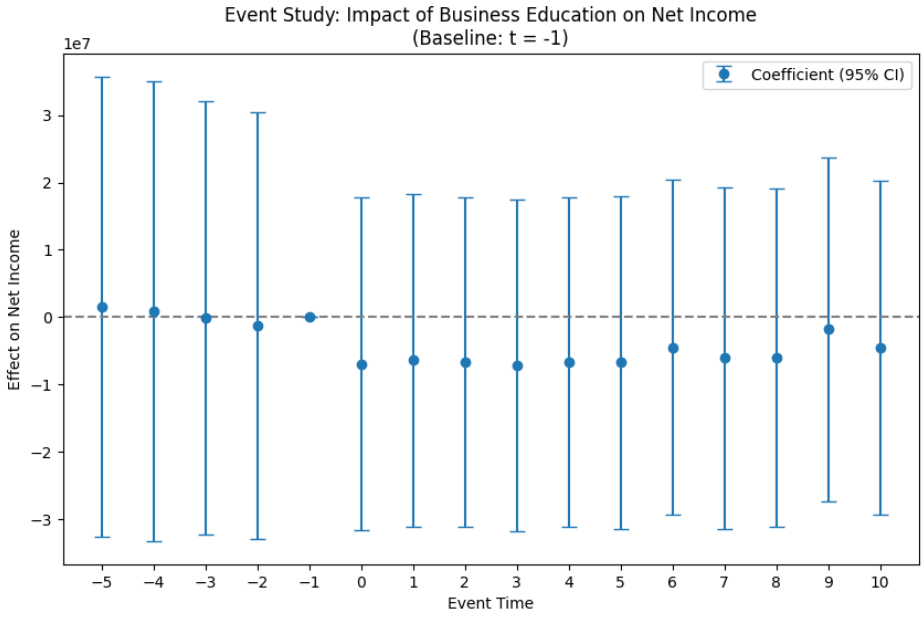
Here we see that the relative share of individuals with technical education is higher than the share of individuals with business education, at least for individuals born from 1880 to 1935.

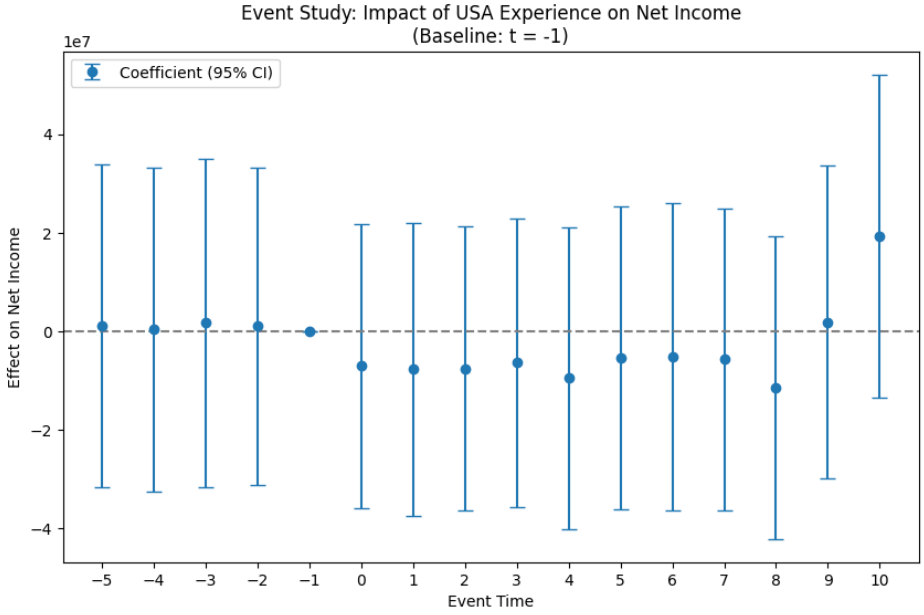


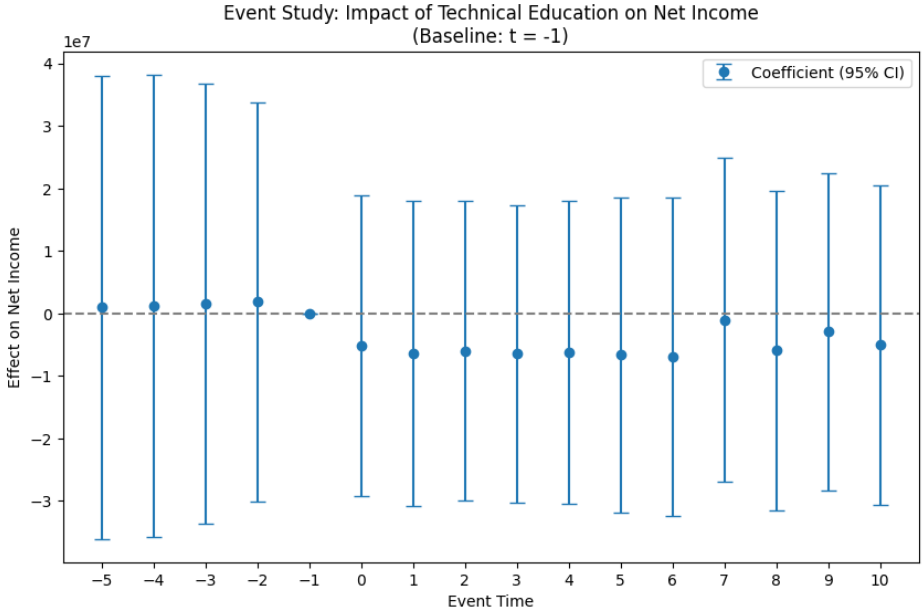
Baseline regression results

Net income First, I present the event study plots for the effect of the different variables on net income:

For business education, work experience in the USA and technical education, there is no serious difference between the pre period and the post period.

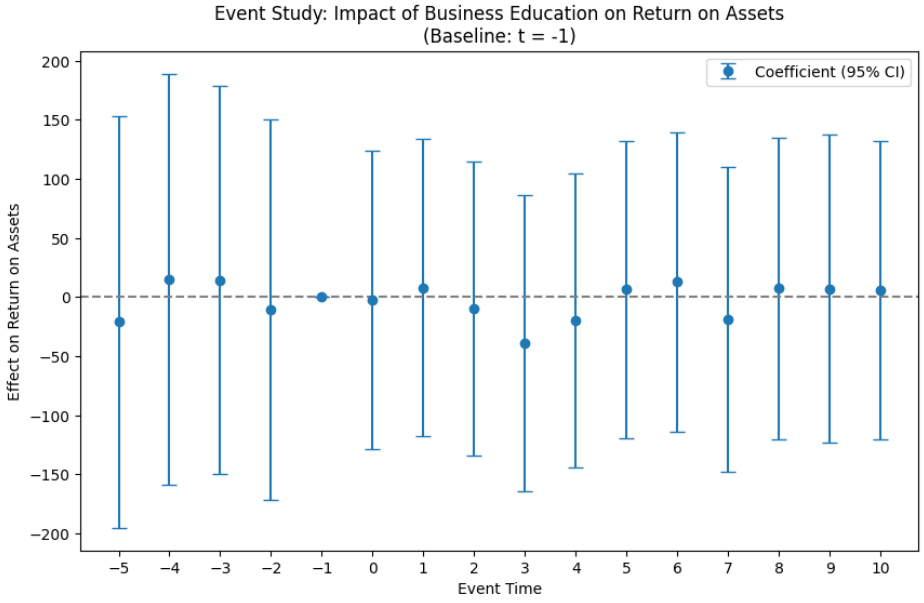

Event Study: Impact of Business Education on Net Income
(Baseline: t = -1)
1e7
Coefficient (95% CI)
Effect on Net Income
Event Time

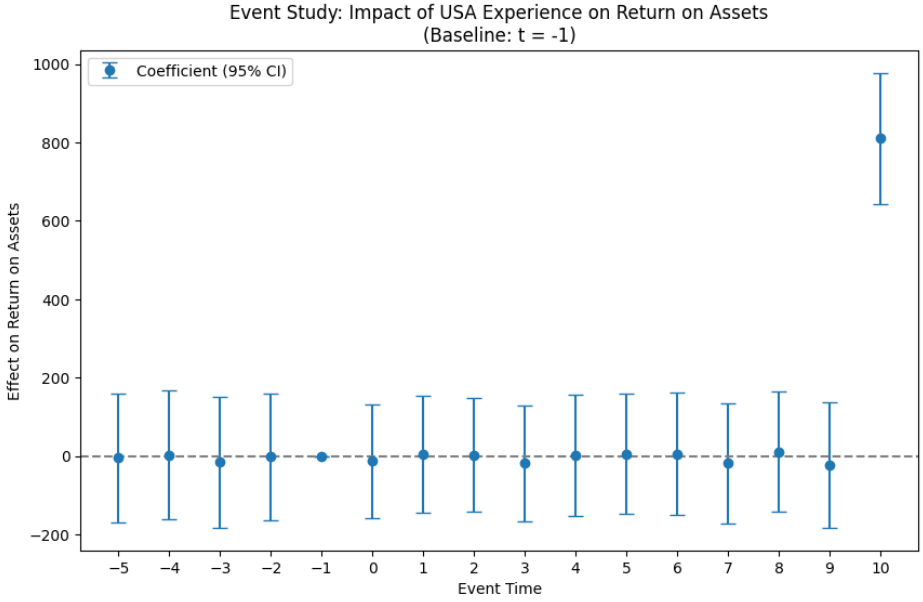

Event Study: Impact of USA Experience on Net Income
(Baseline: t = -1)
1e7
Coefficient (95% CI)
Effect on Net Income
Event Time

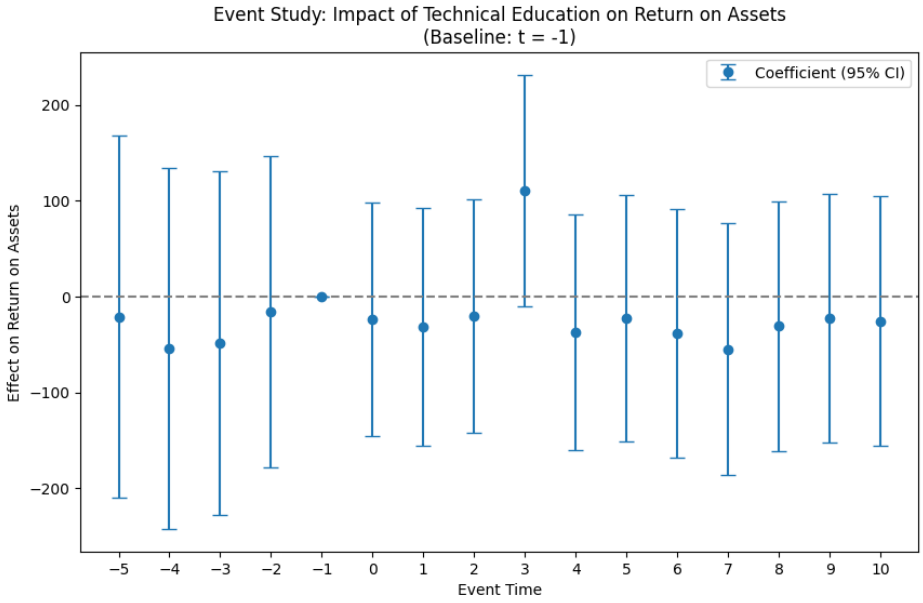


Return on Assets Second, I show the event study plots for the effect of the different variables on the return on assets:

Again, for business education, work experience in the USA and technical education, there is no real difference between the pre period and the post period.

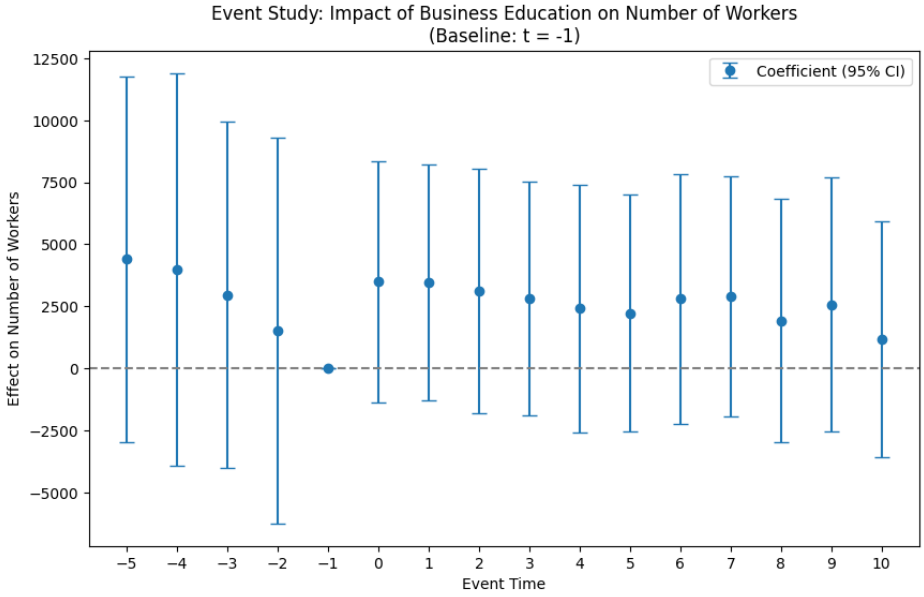


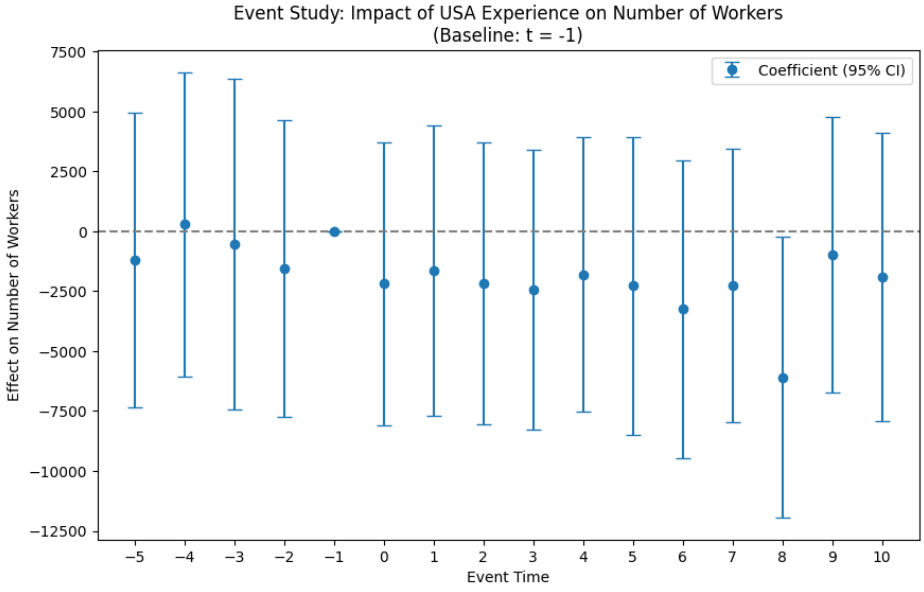


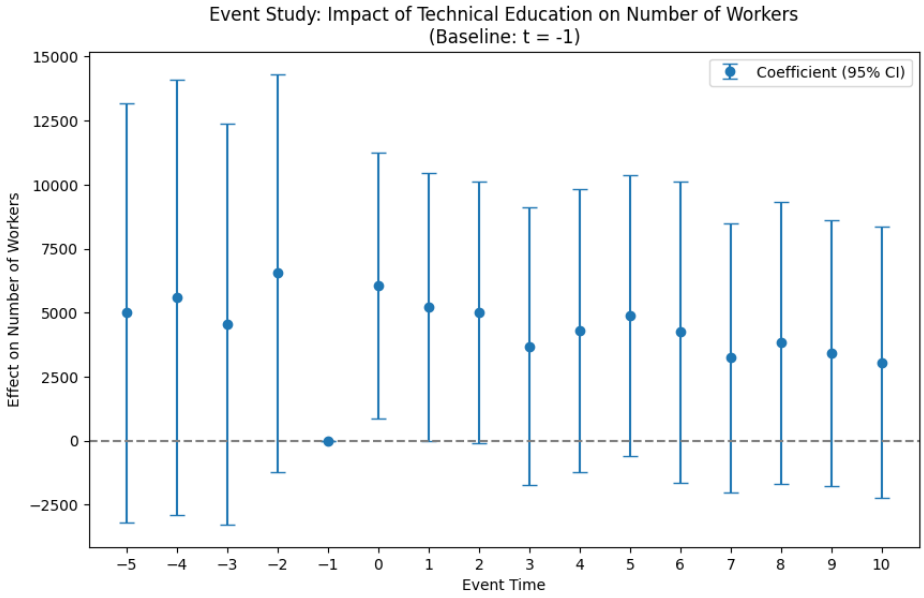


Number of workers Third, I look at the effect of the different variables on the number of employees at each firm.

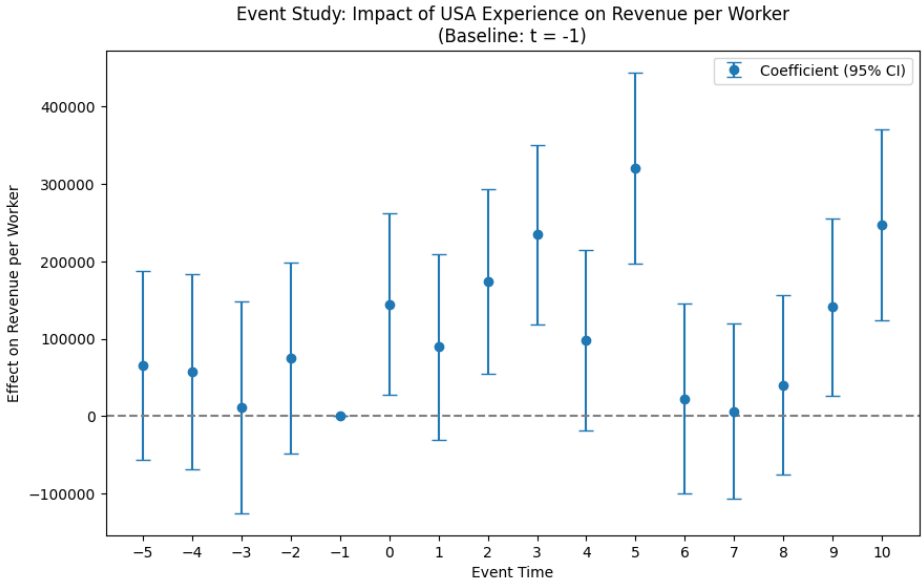
Here, one could argue that there is a slight effect for a board member joining with technical education on the number of employees, but this is not entirely convincing.


Event Study: Impact of Business Education on Number of Workers
(Baseline: t = -1)
Coefficient (95% CI)
Effect on Number of Workers
Event Time


Event Study: Impact of USA Experience on Number of Workers
(Baseline: t = -1)
Coefficient (95% CI)
Effect on Number of Workers
Event Time



Revenue per worker Finally, when we look at revenue per worker, we see a small effect of a board member with work experience in the USA joining the board on the revenue per worker.



Effects on Profitability and Employment

Beyond the primary analysis of productivity and labor share proxies, I extended the event study methodology to examine the impact of appointing

U.S.-experienced engineers and business/finance directors on measures of firm profitability and overall employment. Specifically, I estimated the event study specification using the natural logarithm of net income, return on assets (ROA, calculated as net income divided by total assets), and the natural logarithm of the total number of workers as dependent variables.

The results for firm profitability mirror the findings for productivity. The analyses reveal no statistically significant changes in either log net income or return on assets in the years following the first appointment of a director with U.S. engineering experience or one with a business/finance background. The estimated coefficients tracking the post-event dynamics for both director types hover around zero and lack statistical significance (see Appendix Figures [Insert Figure Reference for Net Income ES Plot] and [Insert Figure Reference for ROA ES Plot]). This suggests that, within the limitations of the data and methodology, these specific changes in board composition did not translate into detectable shifts in overall firm profitability during the period studied.

Furthermore, the examination of the total number of workers confirms the lack of significant labor market adjustments associated with these appointments. Consistent with the findings for revenue per employee and the labor share proxy, the event study for log employment shows no statistically significant deviation from the pre-event trend after the arrival of either U.S.-experienced engineers or business/finance directors (see Appendix Figure [Insert Figure Reference for Employment ES Plot]). This indicates that these appointments did not systematically trigger workforce expansions or contractions within the firms in the sample.

Taken together, the absence of discernible impacts across multiple dimensions—productivity (revenue per employee), labor share proxy (wage bill/revenue), profitability (net income, ROA), and employment levels—reinforces the main conclusion. It suggests that the influence exerted by directors with these specific backgrounds, within the context of large Swedish firms during the late 19th and early-to-mid 20th centuries, may have differed considerably from effects observed in other settings or periods, or perhaps manifested in ways not captured by these standard financial and employment metrics.

VI. Discussion and Conclusion

This paper investigated how the appointment of directors with distinct backgrounds—specifically, engineers with U.S. work experience versus individuals with business or finance training—influenced firm performance and labor outcomes in large Swedish listed companies between 1873 and 1980. Leveraging newly digitized historical data and employing an event-study methodology inspired by Acemoglu, He, and Le Maire (2023) (Acemoglu, He, and le Maire 2022), the analysis examined changes within firms following the first appointment of these director types.

The central finding emerging from the event study estimations is the absence of statistically significant effects. The appointment of either the first director with U.S. engineering experience or the first director with a business/finance

background did not lead to discernible changes in subsequent years in key firm outcomes, including revenue per employee, the wage bill relative to revenue, or total employment. The coefficients tracking post-event dynamics remained statistically insignificant across the main specifications.

This pattern of null results contrasts intriguingly with some expectations derived from both historical narratives and contemporary studies. While qualitative accounts emphasize the importance of returning engineers for knowledge transfer (Grönberg 2003), this study does not find evidence that their arrival on boards systematically translated into measurable firm-level productivity or employment gains detectable with this methodology. Perhaps more notably, the lack of a significant impact from directors with business/finance training, particularly on the proxy for the labor share (wage bill/revenue), stands in contrast to the findings of AHLM (2023) (Acemoglu, He, and le Maire 2022), who document negative effects on wages and the labor share following the appointment of business-educated managers in the contemporary U.S. and Denmark.

My initial hypothesis proposed that the historical context of 20th-century Sweden—characterized by a different corporate governance landscape potentially less singularly focused on shareholder value (Högfeldt 2005) and likely featuring a different type of business education—might yield different results. The absence of a negative effect associated with business directors in my findings is consistent with this hypothesis, although null results must be interpreted with caution.

Tentatively, these findings suggest that the effects of managerial background may be highly context-dependent. The lack of discernible impact, especially from business-trained directors on the labor share proxy during this period in Sweden, lends support to the idea that the prioritization of shareholder value maximization, potentially linked to specific shifts in business education and ideology post-1970s (Sluyterman and Westerhuis 2022), is not necessarily a universal or ahistorical feature of business leadership. It implies that alternative models for running successful enterprises, possibly balancing stakeholder interests differently, may have prevailed or co-existed, even among directors with formal business training. This reinforces the notion that there can be more than one effective way to manage a firm, and that maximizing shareholder value need not be the sole objective guiding corporate strategy, regardless of educational paradigms that might emphasize it.

Of course, these conclusions remain tentative and are subject to limitations inherent in historical data analysis. Potential measurement error in historical financial or biographical data, the focus on large listed firms which may not be representative, or unobserved heterogeneity across firms and directors could mask underlying effects. Furthermore, these director types might have influenced other important firm dimensions not captured by my chosen outcome variables, such as innovation patterns, product diversification, or long-term strategic positioning.

Despite these caveats, this study contributes by providing quantitative historical evidence on the impact of shifting board compositions in Sweden. By applying a causal inference framework to newly compiled data, it complicates narratives suggesting deterministic effects of specific managerial backgrounds and highlights the crucial role of historical context and institutional settings in mediating the

influence of corporate leaders. Future research could expand the sample, refine variable measurement, or explore alternative outcome variables to further probe the complex relationship between leadership, governance, and economic consequences over the long run.

Appendix

List of Companies in the Dataset

Company Name	Classification/Industry
AGA	Industrial gases & chemical technology
ASEA	Electrical engineering & industrial technology
Addo	Office machines & calculators
AlfortCronholm	Wholesale trade (hardware and tools)
Arvikaverken	Heavy machinery / industrial engineering
Astra	Pharmaceuticals & healthcare
Atlantica	Insurance services
Bahco	Hand tools & metalworking equipment
Baltic	Shipping / maritime services
Beckers	Paints & coatings
Beijerinvest	Investment & holding company
Billerud	Pulp, paper & packaging
Billman	Engineering components (industrial valves)
Boxholm	Steel production & metal fabrication
Coronaverken	Iron & steel works
Custos	Investment & holding company
Diamantbergborrning	Mining & drilling (mining services)
Diligentia	Real estate & property management
Drott	Real estate & property management
Electrolux	Home appliances & consumer electronics
Emissionsinstitutet	Environmental research & consultancy
Ericsson	Telecommunications & networking equipment
Esselte	Office products & stationery
Exportinvest	Investment & export finance
Fagersta	Steel & metallurgical engineering
Fannyudde	Engineering & manufacturing (marine equipment)
Ford	Automotive manufacturing (Swedish operations)
Forshaga	Chemical industry (plastics and resins)
Heimdall	Security services
Hennes	Fashion retail (origin of H&M)
Hufvudstaden	Real estate & property management
Iggesund	Iron & steel, later pulp and paper
Incentive	Investment & holding company
Investor	Investment & holding company
Invik	Investment & finance
JW	Engineering & manufacturing (industrial equipment)
Kilsund	Maritime engineering & metal works
Kinnevik	Investment & holding company
Kopparfors	Forestry & paper industry
Kreditbanken	Banking & finance
Lux	Consumer goods (lighting/appliances)

Company Name	Classification/Industry
Marabou	Confectionery & food production
Metallverken	Metalworking & industrial manufacturing
Neptun	Maritime services (tugboats and salvage)
Nessim	Investment & finance
Nordbanken	Banking & finance
Norrlandsbanken	Banking & finance
Optimus	Portable stoves & heating equipment
PLM	Packaging & containers
Papyrus	Stationery & paper products
Pripps	Brewery & beverage production
Providentia	Investment & holding company
Pumpseparator	Industrial equipment (fluid handling)
Ratos	Investment & holding company
SEBanken	Banking & finance
Sandvik	Engineering (materials technology & mining tools)
Skandia	Insurance & financial services
Skaraborgsbanken	Banking & finance
Sonesson	Consumer goods (food production)
Stockholmsbryggerier	Brewery & beverage production
Sulitelma	Mining (zinc and copper)
Sundsvallsbanken	Banking & finance
Tarkett	Flooring & building materials
Tjenstemannabanken	Banking & finance (service bank)
Trelleborg	Industrial engineering (polymer-based products)
Uddeholm	Tool steels & metallurgical production
Uplandsbanken	Banking & finance
Volta	Electrical appliances (vacuum cleaners)
Volvo	Automotive & heavy machinery manufacturing

Summary of companies

Broad Industry	Percentage (%)
Finance & Investment	30.43%
Engineering & Industrial	20.29%
Other	18.84%
Consumer Goods	15.94%
Mining & Metals	7.25%
Telecommunications & Technology	4.35%
Automotive & Machinery	2.90%

```python
# --- Pydantic Models ---

class IncomeStatement(BaseModel):
    """
    Standard representation of an Income Statement.
    Note: In many older reports, board member names are listed below this statement.
    """
    revenue: Optional[float] = Field(
        None, description="Total revenues or sales. (Swedish: Intäkter)"
    )
    cost_of_goods_sold: Optional[float] = Field(
        None, description="Cost of goods sold. (Swedish: Kostnad såld vara)"
    )
    operating_expenses: Optional[float] = Field(
        None, description="Total operating expenses. (Swedish: Rörelsekostnader)"
    )
    wages_expense: Optional[float] = Field(
        None, description="Total wages and salaries expense. (Swedish: Lönekostnader)"
    )
    tax_expense: Optional[float] = Field(None, description="Tax expense. (Swedish: Skatt)")
    depreciation: Optional[float] = Field(None, description="Depreciation (Swedish: Avskrivn
    net_income: Optional[float] = Field(
        None, description="Net income (profit or loss) for the period. (Swedish: Årets resul
    )


class BalanceSheet(BaseModel):
    """
    Standard representation of a Balance Sheet.
    """
    total_assets: Optional[float] = Field(
        None, description="Total assets at period end. (Swedish: Tillgångar)"
    )
    current_assets: Optional[float] = Field(
        None, description="Current assets. (Swedish: Omsättningstillgångar)"
    )
    fixed_assets: Optional[float] = Field(
        None, description="Long-term or fixed assets. (Swedish: Anläggningstillgångar)"
    )
    total_liabilities: Optional[float] = Field(
        None, description="Total liabilities. (Swedish: Skulder)"
    )
    current_liabilities: Optional[float] = Field(
        None, description="Current liabilities. (Swedish: Kortfristiga skulder)"
    )
```

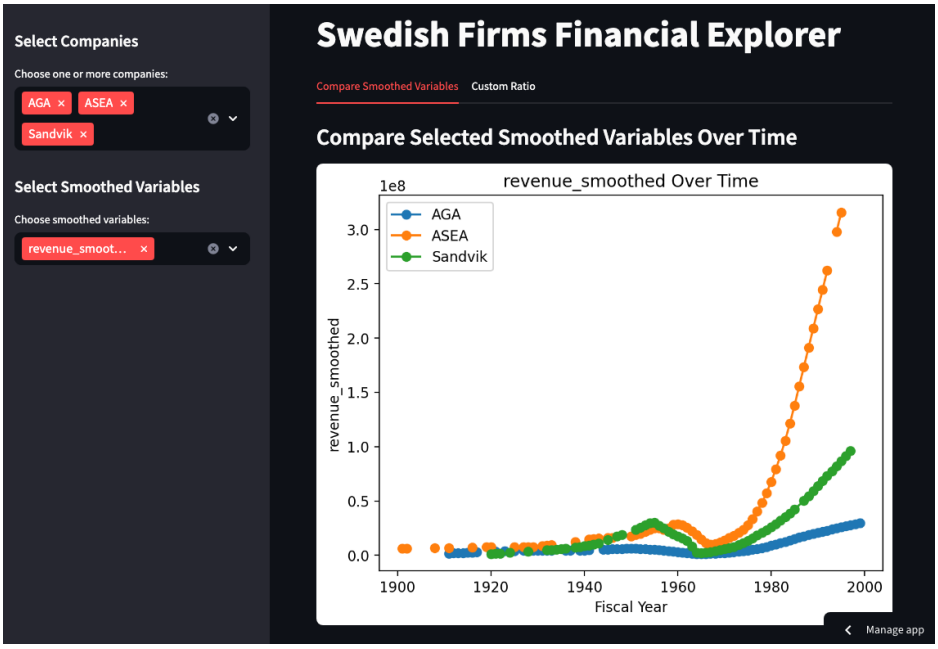
```
    long_term_liabilities: Optional[float] = Field(
        None, description="Long-term liabilities. (Swedish: Långfristiga skulder)"
    )
    shareholders_equity: Optional[float] = Field(
        None, description="Total shareholders' or owners' equity. (Swedish: Eget kapital)"
    )


class BoardMember(BaseModel):
    """
    Representation of a single board member.
    Typically listed below the Income Statement in older reports.
    """
    surname: str = Field(..., description="The surname of the board member.")
    first_name: Optional[str] = Field(None, description="The first name of the board member.
    initials: Optional[str] = Field(None, description="Initials of the board member.")
    position: Optional[str] = Field(None, description="The board position held by the member


class Auditor(BaseModel):
    """
    Representation of a single auditor.
    Typically listed after the board members.
    """
    surname: str = Field(..., description="The surname of the auditor.")
    first_name: Optional[str] = Field(None, description="The first name of the auditor.")
    initials: Optional[str] = Field(None, description="Initials of the auditor.")
    auditing_firm: Optional[str] = Field(None, description="The auditing firm, if specified.


class Employees(BaseModel):
    """
    Representation of the number of employees in a company.
    """
    n_employees: Optional[int] = Field(None, description="Total number of employees. (Swedis
    n_blue_collar_workers: Optional[int] = Field(None, description="Total number of blue col
    n_white_collar_workers: Optional[int] = Field(None, description="Total number of white c


class FinancialReport(BaseModel):
    """
    Comprehensive financial report model, including:
    - Income Statement (with Swedish term references)
    - Balance Sheet (with Swedish term references)
    - Employees (with Swedish term references)
```

```
    - Board members (often listed under the P&L statement)
    - Auditors (often follow after the board list)
    """
    company_name: str = Field(..., description="The name of the company.")
    fiscal_year: int = Field(..., description="Fiscal year of the report.")
    income_statement: IncomeStatement = Field(..., description="Income statement details.")
    balance_sheet: BalanceSheet = Field(..., description="Balance sheet details.")
    employees: Optional[Employees] = Field(None, description="Employee details.")
    board: Optional[List[BoardMember]] = Field(None, description="List of board members with
    auditors: Optional[List[Auditor]] = Field(None, description="List of auditors with detai
    additional_notes: Optional[str] = Field(None, description="Any extra commentary or notes
```

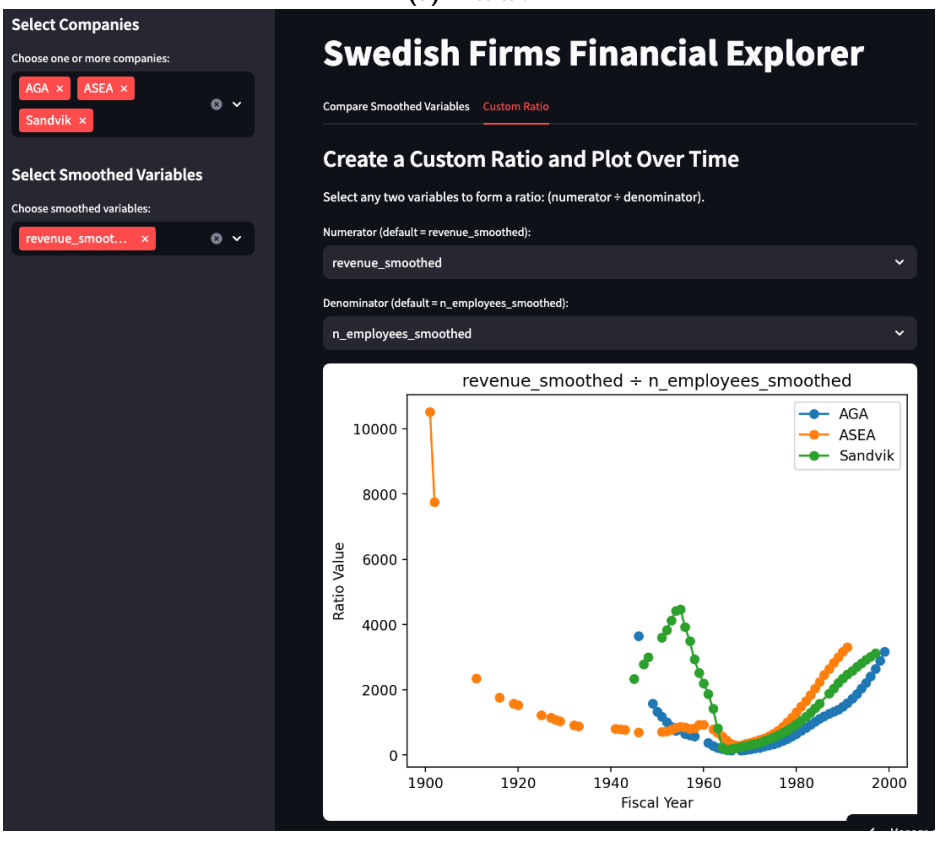
Data portal to examine company report data

I have created a Streamlit app to explore the company report data. The app allows users to select a set of companies, and view the extracted financial data. The second tab of the app allows users to calculate ratios of interest, such as revenue per employee, and view the development of these ratios across the selected companies and across time.

The app is available at the following link: https://swedish-annual-reports-archive-explorer.streamlit.app/.



(a) First tab



(b) Second tab

Figure 5: Screenshots of the Streamlit app interface. Source: Author's own work.

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