Jan Behringer
Till van Treeck
Vincent Victor

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Family firms and their role in the fall of the labor share and the rise of corporate saving in Germany*

Jan Behringer
Macroeconomic Policy Institute (IMK)

Till van Treeck
University of Duisburg-Essen

Vincent Victor
University of Duisburg-Essen

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Abstract

This paper investigates the role of family firms in the fall of the labor share and rise in corporate saving in Germany from 1993 to 2019. Combining a new Family Ownership and Governance (FOG) database with financial data, we analyze 929 publicly listed firms. Our findings show that firm-level labor share declines are widespread in Germany, contrasting with findings from the U.S. that link this trend to a few fast-growing superstar firms. Family firms, particularly in manufacturing, experienced sharper decreases in the labor share and stronger increases in corporate saving compared to non-family firms. The level of family involvement in Germany's two-tier board system (management and supervisory board) further affects these outcomes. Despite paying lower wages, we find no evidence that family firms provide greater employment stability. Our results challenge global generalizations about the drivers of the labor share and corporate saving, while emphasizing the macroeconomic relevance of family firms, especially in Germany's corporate sector.

Keywords: Labor share, corporate saving, family firms

JEL Classifications: D22, D33, G32

*Jan Behringer, Macroeconomic Policy Institute (IMK), Georg-Glock-Straße 18, 40474 Düsseldorf, Germany. Email: Jan-Behringer@boeckler.de. Till van Treeck, Institute for Socio-Economics, University of Duisburg-Essen, Lotharstraße 65, 47057 Duisburg, Germany. Email: till.vantreeck@uni-due.de. Vincent Victor, PhD Student at the Institute for Socio-Economics, University of Duisburg-Essen, Lotharstraße 65, 47057 Duisburg, Germany. Email: vincent.victor@stud.uni-due.de. We would like to thank the Macroeconomic Policy Institute (IMK) for financial support.

1 Introduction

We analyze the role of family firms in the fall of the labor share and the rise of corporate saving in Germany. For this purpose, we use a newly developed database with detailed information about the role of controlling families in the ownership and corporate governance structures in publicly listed firms in Germany throughout the period 1993-2019. Our Family Ownership and Governance (FOG) database provides a comprehensive basis for analyzing the influence of families in listed firms in terms of control rights and in the two-tier board system (management board and supervisory board) that characterizes the German corporate sector. While we hope that the FOG database will be useful for a variety of research questions, in this paper we combine it with financial statement data to study trends in the labor share and corporate saving in Germany. This focus is motivated by the observation that over the period 1993-2019 the labor share fell and saving rose in broad segments of the publicly listed corporate sector in Germany (see Figure 1 a-b), and that these trends were much more pronounced among family firms than non-family firms (see Figure 2 a-b).

Recent literature has documented that corporate labor shares have fallen while corporate saving, i.e., corporate profits retained within firms, has increased as a share of corporate value added since the 1980s (Karabarbounis and Neiman, 2014; Chen et al., 2017). The existing literature so far has focused mostly on the global level and the U.S., but it has paid little attention to country-specific heterogeneity. According to Chen et al. (2017), both the fall in labor shares and the rise in corporate saving were pervasive across firms of different age and size and located in different countries and unlikely to be driven by structural change or idiosyncratic changes in the market power of particular firms or industries. Autor et al. (2020), by contrast, attribute the fall of the labor share in the U.S. to the emergence of a small number of "superstar firms". These firms are characterized by high productivity and low labor shares and managed, in a context of "winner takes most" markets, to expand their market shares considerably, resulting in a decline of the aggregate labor share. Kehrig and Vincent (2021) conclude that the decrease in the labor share in the U.S. manufacturing sector is better explained by the recurring phenomenon of "rising stars", i.e., establishments whose labor share fell (temporarily) as they grew in size.

Accounting for country-specific characteristics is, however, of great importance since corporate sectors operate under different institutional settings in different countries. In particular, the prevalence of family firms where a controlling family dominates the ownership structure, as opposed to firms with a dispersed ownership structure, is known to be higher in some countries than in others (La Porta et al., 1999; Faccio and Lang, 2002; Aminadav and Papaioannou, 2020). Moreover, there is some indication in previous literature that family firms pay lower wages (Sraer and

Thesmar, 2007) and hold more cash (Anderson et al., 2012) than non-family firms. In contrast to the U.S. corporate sector, featuring rapid structural change driven by relatively young and highly dynamic "superstars" or "rising stars", Germany's corporate sector has long been characterized by highly specialized, established firms especially in the export-oriented manufacturing sector. These firms typically pursue a more incremental innovation model and are often controlled by individual families, not uncommonly over several generations. While the degree of family control varies in terms of share ownership and involvement in corporate governance, the broad universe of family firms includes not only relatively small and highly specialized niche producers, often referred to as "hidden champions" (Simon, 2022), but also global players such as BMW (controlled by the Quandt family since the 1960s) or Merck (controlled by the Merck family since the 1820s).

In this paper, we combine financial statement data obtained from the *Worldscope* database with information on corporate ownership and governance including 929 non-financial, publicly listed firms in Germany over the period 1993-2019. To construct our own FOG database, we supplement information extracted from *Hoppenstedt Aktienführer*, an established and useful, albeit rather incomplete, reference work with information on German listed firms, with a wide range of manually collected information about shareholders, documented in the Online Appendix. We define family firms as those firms where a controlling family holds at least 25 percent of the voting rights, including through complex pyramid structures. Drawing on a variety of online sources, we categorize shareholders based on their characteristics, including their family connections, their relationship to the company founder and their level of involvement in the management and supervisory boards. This approach allows us not only to identify family-controlled firms but to delineate different subgroups of family firms based on their management structure, including founder-managed firms, firms managed by another family member and externally managed firms. We can thus document ownership and governance structures in the German corporate sector over a period of almost three decades, providing a level of granularity not available in the existing literature, which often focuses on specific points in time (e.g. Aminadav and Papaioannou, 2020).

Our main findings are as follows. We reject both the "superstar scenario" and the "rising star scenario" as explanations for the evolution of the labor share among public firms in Germany. Whereas previous work for the U.S. suggests that the fall in the aggregate labor share was due almost exclusively to a small fraction of fast-growing and eventually very large firms or establishments with very low labor shares, we find that the fall of the labor share was a more widespread phenomenon among public firms in Germany. Based on an analysis of the changing distributions of labor shares and value added as well as counterfactual exercises, we find that the fall of the aggregate labor share in our sample is not due to an increase in market share of firms with initially low labor share. Rather, our data are more compatible with a "constant market share scenario",

i.e., the fall in the aggregate labor share was driven by the drop in the individual labor shares of incumbent firms. In particular, the labor share fell especially strongly among family-controlled firms. While we do not attempt to identify the causal mechanisms behind these trends, one interesting finding is that the labor share fell particularly sharply in sectors where family businesses are most strongly represented, especially in manufacturing. Looking at individual firm-level trends, we also find that the rise in corporate profits as a share of value added, implied by a fall in the labor share, is mirrored almost one-by-one in increases in corporate saving as a share of value added, given that taxes, interest payments and profit payouts (dividends plus share buybacks) have remained roughly constant as shares of value added. In other words, the stronger rise of corporate saving in family firms as compared to non-family firms is due mainly to more pronounced falls in the labor share, rather than differences in profit retention or payout policies. We also find that higher profits did not systematically translate into higher investment spending so that corporate net lending (saving minus investment) increased more for firms with more strongly decreasing labor shares and more for family firms than non-family firms. These results are confirmed by regression analyses in which we control for a range of other firm characteristics in addition to our family ownership and governance variables. We find that family firms, as defined by conventional ownership thresholds, on average have lower labor shares, higher saving and higher net lending than non-family firms. We can also disentangle the effects of different levels of family involvement in corporate governance. Interestingly, labor shares are lower and corporate saving is higher for family firms where the controlling family is represented either on the management board only, or on the supervisory board only, or on both boards, than for family firms without family involvement in either corporate board. Moreover, labor shares are lower, and corporate saving is higher in those family firms where the founder is the CEO than in family firms led by another family member. Externally managed family firms still have lower labor shares and higher saving than non-family firms, but higher labor shares and lower saving than family firms where the CEO is the founder or another family member, controlling for other firm characteristics.

Overall, our results qualify the conclusions by Karabarbounis and Neiman (2014) and Chen et al. (2017), that the observed trends in the labor share and corporate saving are pervasive across countries, types of economic activities and sectors. Rather, our findings suggest that seemingly similar developments around the world are driven by different underlying mechanisms. In Germany, family ownership is a key factor accounting for the fall in the labor share and the rise in corporate saving, especially in the manufacturing sector.

An obvious question to ask is, why do family businesses manage to pay lower wages than non-family firms? In an environment of labor market deregulation and rising employment insecurity, the wage discount that employees are willing to accept for employment security likely increased.

Consistent with our findings, it has been argued that family firms enter into implicit contracts with their employees providing job security, which may lead employees to accept lower wages (Mueller and Philippon, 2011; Bassanini et al., 2013). This argument is supported by evidence which suggests that employment in family firms is indeed less sensitive to shocks (Lee, 2006; Sraer and Thesmar, 2007; Bjuggren, 2015). However, we do not find any straightforward evidence for more pronounced labor hoarding in family firms in the face of sales shocks in our sample. Consequently, employees' expectation of higher employment stability in return for lower wages may be illusory, although more research is necessary to explore this question.

From a macroeconomic perspective, a limitation of our study is that our dataset comprises only publicly listed firms. However, it is often emphasized that the backbone of the German corporate sector are private, family-run companies (the so-called *Mittelstand*), especially in the manufacturing sector, which range from very small to very large companies. If the different labor share and saving patterns documented in this paper extend to the entire corporate sector, this would strengthen the macroeconomic relevance of our findings. Previous literature suggests that the fall in the labor share and the rise in corporate saving, which resulted in a persistently positive net lending position of the corporate sector, have been closely related to the emergence of Germany's current account surplus since the early 2000s (IMF, 2017; Behringer and van Treeck, 2018, 2022). From a supply-side perspective, the prominent position of traditional family firms with incremental innovation models in the export-oriented manufacturing sector raises the question of the extent to which the German corporate sector is capable of rapid structural change and a reorientation towards the domestic economy, which could be warranted in view of current ecological, technological and geostrategic challenges.

The remainder of the paper is structured as follows. Section 2 provides a review of the related literature. Section 3 presents our dataset.[1] Section 4 examines the fall in the labor share, and Section 5 focuses on the rise in corporate saving. Section 6 offers some additional discussion and concludes. An extensive documentation of the procedures and sources used to construct the dataset is provided in an Online Appendix.[2]

2 Related literature

Our paper is related to three broad topics in the literature: family ownership and governance, the labor share, and corporate saving.

For a long time, a common perception was that (large) publicly listed firms typically exhibit

[1] The FOG database is available at `https://www.boeckler.de/pdf/imk_wp_fog_database.xlsx`.

[2] The Online Appendix is available at `https://www.boeckler.de/pdf/imk_wp_family_firms_online_appendix.pdf`.

dispersed ownership structures (Berle and Means, 1932). Yet, beginning with La Porta et al. (1999), numerous studies have shown that a sizable fraction even of large public firms actually are controlled by individual shareholders, including families. This finding has been confirmed for different countries, including Germany, and time periods (e.g. Faccio and Lang, 2002; Lins et al., 2013; Aminadav and Papaioannou, 2020). While the existing literature has primarily offered detailed documentation of ownership and governance structures in the German corporate sector for specific points in time, the ownership and governance database used in the present paper extends the documentation to a period of almost three decades.

A large body of literature has analyzed various aspects of firm performance in family firms. Although findings vary, there is some consensus that family firms do not perform worse than non-family firms in terms of profitability (Demsetz and Villalonga, 2001; Anderson and Reeb, 2003; Sraer and Thesmar, 2007) and firm value (Claessens et al., 2002; Villalonga and Amit, 2006). The literature also suggests that different ownership and control structures, and family ownership in particular, are highly relevant to a variety of strategic decisions such as investment (Chrisman and Patel, 2012; Anderson et al., 2012), acquisition and diversification strategies (Miller et al., 2009; Gomez-Mejia et al., 2010), downsizing (Block, 2010), employee and executive compensation (Gomez-Mejia et al., 2003; Mueller and Philippon, 2011; Bassanini et al., 2013), employment retention following shocks (Lee, 2006; Sraer and Thesmar, 2007), dividend distribution policy (Villalonga and Amit, 2006), and cash holdings (Anderson and Hamadi, 2016). Our paper is also related to the literature on family succession, which looks at differences in corporate behavior and performance between founder-managed, heir-managed, and externally managed family firms (Villalonga and Amit, 2006; Bennedsen et al., 2007; Sraer and Thesmar, 2007).

In recent years, a growing literature has discussed the evolution of corporate labor shares, although without considering the potential role of family control. Elsby et al. (2013) highlight the role of international trade and especially the relocation of manufacturing from advanced economies to China. Karabarbounis and Neiman (2014) argue that the decline of the relative cost of capital which induced firms to shift to more capital-intensive production resulted in the fall of aggregate labor shares. Similarly, Acemoglu and Restrepo (2018) emphasize the impact of technological change, which differentially affects labor and capital inputs. This view is supported by empirical studies that link developments in the labor share to technology, particularly automation (e.g. Dao et al., 2017). De Loecker et al. (2020) and Covarrubias et al. (2020) argue for diminishing competition as explanation for the rise in profit mark-ups and a corresponding decline in the labor share. While Karabarbounis and Neiman (2014) find that the global decline of corporate labor shares is driven by changes within, rather than between industries, Autor et al. (2020) emphasize the between-firm component in the evolution within industries. They argue that the decline in

aggregate labor shares can be explained by the rise of "superstars", where firms with initially low labor shares strongly grow in size. Kehrig and Vincent (2021) test the superstar hypothesis against two alternative scenarios: The "big player scenario", where initially large firms reduce their labor shares over time, and the "rising star scenario", where the labor share of initially small firms diminishes as they grow in size. Using establishment-level data for the U.S. manufacturing sector, they conclude that the rising star scenario best explains the data. Both the superstar and the rising star explanations have in common that they attribute the trajectory of aggregate labor shares to only a small group of firms. The existing literature hardly examines country-specific institutional factors. Empirical research using firm-level data, on the other hand, focuses predominantly on the U.S. We extend the literature in both respects by examining the corporate sector in Germany and emphasizing the role of family firms.

The trend towards higher corporate saving at the global level has been documented, and its macroeconomic implications have been discussed, based on national accounts data (e.g. IMF, 2006; André et al., 2007; IMF, 2017; Dao and Maggi, 2018; Behringer and van Treeck, 2022). Complementing national accounts data with a large international firm-level dataset, Chen et al. (2017) find that, with taxes and interest payments on debt remaining relatively stable over time as shares of value added, the rise in corporate saving essentially mirrors the decline in the labor share. Furthermore, they find that the increase in saving shows no particular concentration within specific types of countries, industries, or firms. These conclusions are supported by a general equilibrium model, where changes in the cost of capital, including declines in the real interest rate, the price of investment goods, corporate income taxes, and increases in markups, may explain the global rise in corporate saving, following a decrease in the labor share and "sticky" dividend payments.

Although it seems plausible that higher profit retention, as opposed to dividend payouts, is motivated by additional investment needs, the weak development of investment spending despite high corporate savings (Gruber and Kamin, 2016) raises skepticism about such explanations. However, the shift in investment towards intangible assets that cannot be used as collateral could prompt companies to make greater use of internal sources of financing (Falato et al., 2022). Similarly, Fan and Kalemli-Özcan (2015), who analyze Asian economies, associate saving with credit constraints at the firm level. Other studies emphasize a precautionary motive and argue that firms accumulate savings as a hedge against risks in times of heightened uncertainty (Bates et al., 2009; Armenter and Hnatkovska, 2017). Interestingly, and relevant to the topic of the present paper, Anderson and Hamadi (2016), using data on Belgian listed firms between 1991 and 2006, find a strong positive association between ownership concentration and cash holding. This may indicate a precautionary motive on the part of the controlling shareholders who highly value control.

3 Presentation of the dataset

We assemble a novel dataset containing annual information on family ownership and governance structures for a total of 1038 publicly listed firms in Germany for the period 1993-2019. After combining our FOG database with consolidated financial statement data, we are left with 929 firms, for which we have the financial information necessary for our empirical analysis of the labor share and corporate saving in family and non-family firms. The choice of the sample period resulted from the aim of creating a comprehensive dataset for the period since German reunification and from the fact that the data quality of both the ownership and management data and the financial data for earlier years is significantly poorer. While financial and real estate firms are excluded, our dataset comprises the vast majority of all other listed firms, offering a comprehensive coverage of the publicly listed non-financial corporate sector in Germany. To construct the FOG database, we start with information from *Hoppenstedt Aktienführer*, a useful, but somewhat fragmentary, historical compendium of public firms listed on German stock exchanges. Through extensive manual research, we fill a large number of gaps in the information provided by *Hoppenstedt Aktienführer*, and investigate potential family connections between individual shareholders, as well as the controlling families' involvement in the management and supervisory boards. Financial data and additional attributes are sourced from *Worldscope*, again complemented by extensive manual research to address data gaps.

In the remainder of this Section, we describe our methods used in constructing the FOG database and the financial data, before providing some descriptive statistics. For an illustration of our approach to identifying different types of family firms, see Appendix A. Additional details and a complete documentation of the sources of hand-collected information is provided in the Online Appendix.

3.1 Family ownership and governance (FOG) database

3.1.1 Defining family firms

There is no universally accepted definition of what constitutes a family firm. Various criteria are proposed in the literature, usually including ownership by families, managerial involvement, or a combination thereof.

Our baseline definition of family firms is based on control rights. We set the threshold for the cumulative family share at 25 percent.[3] Under German law, a 25 percent stake grants the share-

[3]La Porta et al. (1999), Sraer and Thesmar (2007), and Aminadav and Papaioannou (2020) use a 20 percent cutoff, while Franks et al. (2015) and Lins et al. (2013) opt for a 25 percent cutoff. In contrast, Anderson et al. (2012) and Chrisman and Patel (2012) classify family firms if the family's share exceeds a mere 5 percent. When determining a

holder the authority to veto significant decisions, thereby conferring disproportionate influence over the company. These decisions encompass critical matters such as company dissolution, secondary equity offerings, dismissal of supervisory board members, and alterations to the articles of incorporation.

Importantly, ownership and control structures can be complex, involving preference shares, pyramid structures, cross-holdings, or multiple control chains (Faccio and Lang, 2002; Aminadav and Papaioannou, 2020). This means that shareholders' control rights may exceed their cash flow rights. For example, if a natural person owns more than 25% but less than 100% of a non-listed company or a holding company that in turn owns x% of a listed company, we assume that this natural person controls x% of the listed company. To determine the cumulative family share, complex control chains need to be carefully traced to determine the ultimate owners (see Appendix A for an illustration). Moreover, we aggregate the voting rights of all family members. Note that, for our definition of family firms, we do not differentiate between founding and non-founding families, and therefore, in our identification of family owners, include families that either founded the company or acquired it later.

While board representation is not part of the baseline definition, we delineate additional subgroups of family firms, combining ownership and governance data (see Table 1). We thus take a more granular approach to defining family firms than is common in the literature, which seems appropriate in the context of Germany's two-tier corporate board system. The broadest group of family firms are those that qualify as family firms according to the ownership definition. Smaller subgroups are, firstly, family firms in which, additionally, at least one family member is represented on the management board; secondly, family firms in which at least one family member is represented on the supervisory board; and thirdly, family firms with family representation on both the management board and the supervisory board. Furthermore, we divide the family firms defined by the control rights cutoff into three further subgroups: firms which are led by their founder, firms which are led by another member of the controlling family, and those with an external CEO, a categorization similar to the one used by Sraer and Thesmar (2007).

3.1.2 Data sources and procedures

Hoppenstedt Aktienführer summarizes publicly available information about non-financial and financial public firms based in Germany, along with foreign firms cross-listed on German exchanges, dating back to 1935. Alternative sources of information on the shareholder and management structures of German firms have either been discontinued or lack the necessary information

precise threshold, the legal framework in particular must be taken into account, so that the appropriate threshold may vary from country to country.

to systematically map these structures over long periods of time.[4] While *Hoppenstedt Aktienführer* is the most suitable data source for our purposes, it brings with it a number of important challenges. Although the original manuals have been digitized and made available online, they are presented in a format that is unsuitable for immediate analysis. Moreover, and crucially, the dataset lacks information on the family relations between individual shareholders and managers, which requires substantial additional processing to identify controlling families.

From *Hoppenstedt Aktienführer*, we obtain the name and the percentage of shares held of each shareholder, as well as the names of all members of the management board (*Vorstand*) and the supervisory board (*Aufsichtsrat*), for each firm traded on German Stock exchanges in each year. To make sure that our FOG database can be readily combined with external data sources, we attributed a unique permanent identification number to each firm covered in *Hoppenstedt Aktienführer*.[5] After appropriately merging IDs, removing financial and real estate firms, cross-listed non-German firms, and consolidated subsidiaries of other firms in the sample, we are left with 1038 firms for which we have comprehensive ownership and governance information. One particular hurdle is the regular presentation of shareholders' ownership stakes in non-numeric form, which we convert manually. A codebook detailing the rules for converting non-numeric information into numeric values is included in the Online Appendix. To accurately reflect the distribution of control rights, we exclude preference shares and, in cases where this information is missing, include general partners of limited partnerships along with their ownership stakes, adjusting other shares accordingly as needed. Consequently, the dataset shows a complete breakdown of all voting shares per firm-year.

To identify controlling families, we first expand the data by categorizing shareholders into distinct groups, including individuals or families, holding companies, institutional investors, state entities, and widely held firms. This categorization is done meticulously by hand using various publicly available online resources such as company websites, financial reports, newspaper archives and financial information services such as *Bloomberg*. The next step is to check whether a shareholder is related to a family that holds shares in the company. The term "family" here includes persons who are related by direct descent or marriage, as well as corporations owned by family members. The assessment of family affiliation is based on the surnames of shareholders

[4]For example, the *Wer gehört zu wem* database published by *Commerzbank*, which was used in a number of older studies on the ownership structure of German firms (e.g. Faccio and Lang, 2002), only contains information up to 2010, while other popular databases such as *BvD Orbis* provide incomplete and largely unreliable information in this regard.

[5]The permanent ID numbers were obtained from consolidated financial statement data from *Worldscope*. This required extensive manual checks, as *Hoppenstedt Aktienführer* sometimes assigns different identifiers to the same firms in an unsystematic way when the name or company structure changes. For example, there are two separate entries for the automobile company that today operates as Mercedes Benz Group AG, namely Daimler AG before 1998 and DaimlerChrysler AG after 1998. After 2007, when the merger is dissolved and the name changes back to Daimler AG, the identifier, however, remains the same.

provided by *Hoppenstedt Aktienführer* and on information collected manually from various online sources (see Online Appendix). If the shareholder is not a natural person, we make substantial efforts to trace the control chain back to the ultimate owner. Specifically, we identify the controlling shareholder or owner for each firm, starting with the shareholders listed in *Hoppenstedt Aktienführer*, until we identify a natural person, if applicable. The classification of shareholders is then based on the identity of the ultimate owner. This identification process results in each shareholder being clearly attributable to a controlling family or not, which facilitates the calculation of the cumulative share of family members for each firm in each year (see Appendix A for an illustration).

In some cases, the information necessary to identify the ultimate owners is not available, as firms are controlled through obscure pyramid structures, e.g., involving offshore companies (Zucman, 2015). This may lead to an underestimation of family control in our database. The discrepancy is however likely to be small, as we find that less than 6 percent of firms are controlled by unidentified owners, a share considerably lower than in Aminadav and Papaioannou (2020) who report that 25.6 percent of firms in Germany are controlled by owners that could not be identified or Faccio and Lang (2002) who simply assume for 37.6 percent of German public firms that they are family firms because they are controlled by unlisted firms.

Through a comparison of shareholders' names with those of board members provided by *Hoppenstedt Aktienführer* and extensive additional checks based on online research, we also indicate whether the shareholder serves as the CEO or as a member of the management or supervisory board. This enables us to further classify firms based on the level of management involvement by the controlling family and their relationship to the firm's founder (see Table 1 and Appendix A for an illustration).

3.2 Financial data

We constructed our FOG database in such a way that it can readily be integrated with financial data from standard data providers. For our analysis of labor shares and corporate saving, we obtained consolidated financial statement data for the non-financial corporate sector from the *Worldscope* database via *LSEG Workspace*.

The financial data, denominated in euros, corresponds to the fiscal year of the companies; if their fiscal year differs from the calendar year, we interpret the data as reflecting their activity during the corresponding calendar year. We also record additional characteristics such as founding years and SIC codes. To compensate for missing values for variables that are essential to our analysis, we supplement the dataset with manually collected data. This primarily includes information on labor compensation, the number of employees, and founding years, which are generally

insufficiently recorded in *Worldscope*, but in some cases also dividends, interests, and capital expenditures. Labor compensation and other financial characteristics, as well as employment figures, come from firms' financial statements, while founding years come from various publicly available sources such as company websites or newspaper articles. For a few variables, including R&D expenditures, share buybacks, interest and dividend income, missing values are set to zero.

Given our focus on the labor and saving shares in gross value added, we aim at constructing variables that are as close as possible to the definitions of the national accounts. Here, gross value added (GVA) of the corporate sector is defined as output minus intermediate consumption. Deducting labor compensation and net taxes on production yields gross operating surplus (GOS). Further subtracting income taxes, interest expenses and dividends paid, net of interest and dividend income, yields gross saving. Gross saving, together with net capital transfers received, constitute the internal resources available to the corporate sector for investment financing. Investment spending in the national accounts primarily comprises gross fixed capital formation, which includes investment in both tangible and intangible fixed assets, as well as minor contributions from changes in inventories and acquisitions less disposals of valuables and non-produced assets. The difference between the internal funds available in a given year and investment expenditure represents net lending/borrowing and reflects the financial balance of the corporate sector.

However, replicating these flows at the firm level poses challenges due to important differences between the national accounts and firm-level accounting. Crucially, a number of variables central to our analysis, including gross value added, gross saving, and net lending/borrowing, are not standard accounting items and are therefore not available in *Worldscope*. Therefore, we rely on alternative items to construct the variables of interest, largely following the procedures used by Chen et al. (2017).

To begin with, we approximate gross value added as the sum of labor compensation and gross operating surplus:

$$GVA = Labor\,Compensation + GOS \tag{1}$$

where we define gross operating surplus as earnings before interest and taxes (EBITDA) plus R&D expenditures:[6]

$$GOS = EBITDA + R\&D \tag{2}$$

[6]Note that R&D is not categorized as investment in firm-level accounting and is therefore deducted from earnings. We add it back to better match the definition in the national accounts, where R&D is part of the investment flows subsumed under gross fixed capital formation.

In a next step, we define gross saving as gross operating surplus minus income taxes, interest expenses net of interest income, and payouts to shareholders:

$$Gross\,Saving = GOS - Income\,Taxes - Net\,Interests - Payouts \tag{3}$$

where we define payouts as dividends paid, net of dividend income, plus share buybacks:

$$Payouts = Net\,Dividends + Buybacks \tag{4}$$

We deviate from the national accounts in this respect by excluding buybacks from the measurement of gross saving and categorizing them as payouts instead. Share buybacks represent a flow comparable to dividends, and treating them differently would underestimate the true extent of the flow of payments to shareholders.[7] Next, we define investment expenditure at the firm level as the sum of capital expenditures and R&D expenditures, which is roughly equivalent to gross fixed capital formation in the national accounts:

$$Investment = Capital\,Expenditures + R\&D\,Expenditures \tag{5}$$

Since *Worldscope* does not provide information on investment grants and other capital transfers, we calculate the financial balance of the respective firm solely as gross saving minus investment:

$$Net\,Lending\,/\,Borrowing = Gross\,Saving - Investment \tag{6}$$

For the purposes of the analysis, we restrict the data to firm-year observations with available information for all variables required to calculate gross value added. We also exclude firm-year observations for which our calculations yield negative values for gross value added and for which labor compensation or the number of employees is zero. The final dataset encompasses 10,365 observations on 929 firms. The aggregate gross value added in our sample amounts to 645 billion euros in 2019. To see the macroeconomic relevance of this figure, note that the total gross value added of the German non-financial corporate sector amounted to 2,017 billion euros in the same year according to Eurostat.

3.3 Descriptive statistics

Table 1 shows the prevalence of the different subgroups of family firms in our sample of 929 firms across different industries, using averages over the period 1993-2019. As the table shows, the

[7] In the national accounts, share buybacks are not deducted from gross operating surplus, but are a part of net lending, as they technically represent an acquisition of financial assets.

proportion of family businesses in most industries is around 40 percent, although there are some outliers ranging from 13 and 14 percent in, respectively, the utilities and transport industries, which generally consist of a few large enterprises, primarily non-family-controlled, to 51 and 57 percent in, respectively, construction and transportation equipment. Family ownership is persistently high in the manufacturing sector, the traditional backbone of the German economy.

Interestingly, while 42 percent of all firms qualify as family firms across all industries, 20 percent of all firms are family firms with family representation on the management board, and 16 percent are family firms with family representation on the supervisory board, but in only 4 percent of all firms there is a controlling family which is also represented on both the management board and the supervisory board. 9 percent of all firms are founder-led family firms, 10 percent are family firms where another family member is CEO, and 23 percent of all firms are family firms with an external CEO.

Table 2 shows key financial indicators for the firms in our sample, using averages over the period 1993-2019. The first seven rows show the unweighted mean of the different components of gross value added for all firms in our sample, non-family and family firms, as well as the three subgroups of family firms defined by their CEO. The remaining rows show unweighted averages of total assets, firm age, leverage ratio, R&D intensity, and stock price volatility. With assets of almost four billion euros and an average age of slightly more than 70 years, the companies are, on average, quite large and long-established. Regarding differences in total assets between firm types, family firms are, on average, somewhat smaller, due to the smaller size of firms led by their founder or other family members. Founder-led companies are also notably younger, which is not surprising given the generally advanced age of the companies in the sample. However, externally led companies exhibit an average size closer to non-family firms and are, on average, even a bit older than non-family firms. This suggests that while many large firms are also family-owned, operational management is typically outsourced to professional managers above a certain size.

Across all firms types, around three-quarters of gross value added is allocated to wages and salaries on average over the period 1993-2019. Smaller portions are used for interest payments, taxes, and distributions to shareholders. 15 percent remains within firms as gross saving. On average across all companies and years, investment exceeds gross saving, resulting in companies being, on average, net borrowers. Family firms exhibit higher savings than non-family firms: While their labor share is a bit more than 5 percentage points lower, family firms pay only slightly more in interests, taxes and payouts as a percentage of gross value added, so that saving as a percentage of gross value added is a bit more than 3 percentage points higher than for non-family firms.

Table 3 shows 10-year trends of labor compensation and corporate saving as a percent of

gross value added for the whole cross-section of firms and at the industry-level. As shown in Figure 1, the fall in the labor share and concomitant rise in corporate saving is exclusive to family firms. Non-family firms show not only a less pronounced labor share trend but also a negative saving share trend. Notably, when examining specific industries, it stands out that among non-family firms only manufacturing subsectors exhibit statistically significant trends aligned with the aggregate developments for both measures. In contrast, all other industries demonstrate opposing trends or lack significant trends altogether. Conversely, family firms show significant trends in the expected directions not only across manufacturing subsectors but also within other industries.

In the next two Sections, we use our dataset to investigate in greater depth the role of family ownership and governance in the evolution of the corporate labor share and corporate saving.

4 Why did the labor share fall?

4.1 The evolution of the labor share distribution

Figure 1 a) shows diverging trends in the labor shares at the aggregate and firm level: while the aggregate labor share of all publicly listed non-financial firms on average declined by 3.7 percentage points per decade (see Table 3), the median labor share fell far less. This implies that the fall in the labor share is not a uniform trend affecting the entire population of public non-financial firms, but that there was a reallocation of value added toward the left tail of the labor share distribution. As discussed by Kehrig and Vincent (2021) in the context of the U.S. manufacturing labor share, three scenarios potentially could account for such a pattern: in the "big player scenario", initially large firm reduce their labor share over time; in the "superstar scenario", firms with an initially low labor share grow; and in the "rising star scenario", initially small firms decrease their labor share as they grow. In the remainder of this Subsection, we assess the relevance of the three scenarios highlighted by Kehrig and Vincent (2021) while also looking separately at family and non-family firms.

An important difference between our firm-level data for Germany and the U.S. manufacturing establishment-level data used by Kehrig and Vincent (2021), which is already apparent from Figure 1 a), is that the fall in the labor share is a much more widespread phenomenon in our sample compared to the U.S. data. Kehrig and Vincent (2021) show that the median labor share of U.S. manufacturing establishments increased and was essentially flat at the 25th percentile of the labor share distribution over the period 1967-2012. Similarly, Autor et al. (2020) show that the median markup of U.S. manufacturing firms was flat during 1982-2012, while the aggregate markup fell strongly, and that the fall in the labor share was driven by the increasing concentration of value

added among a handful of firms in individual industries. In our data, the fall in the labor share is very similar at the 25th percentile of the labor share distribution and at the aggregate level, and even the median shows a clear, albeit less pronounced, downward trend. This shows that the fall in the labor share among public firms in Germany was not unique to only a few superstars.

In Figure 3, we divide the distribution of labor shares into 10 percentage point-wide bins, from 0 percent to 120 percent for the first and the final year of our sample period. For each labor share bin, we compute its share of total value added and number of establishments for all firms (panels a and b), family firms (panels c and d) and non-family firms (panels e and f). The black lines in the panels of Figure 3 display the distribution of firms in 1993 (left panels) and 2019 (right panels) along the labor share dimension. The bars in each panel show the distribution of value added against the labor share. As is apparent from panels a and b of Figure 3, the distribution of firms has become more left-skewed over time, with a larger mass in 2019 of low-labor-share firms relative to 1993. At the same time, we observe strong reallocation of value added toward the left tail of the labor share distribution. Whereas less than 10 percent of value added was produced in firms whose labor share fell short of 60 percent in 1993, firms with labor shares below 50 percent accounted for roughly half of total value added in 2019. Despite the apparent reallocation of value added toward the low labor share spectrum, panel b of Figure 3 shows that roughly one third of all firms in 2019 have labor shares in proximity (between 40 and 60 percent) of the aggregate labor share. This is in stark contrast to the superstar phenomenon observed in U.S. data. The differences in the evolution of the labor share distribution between family firms and non-family firms are striking. In 1993, the distribution of firms and of value added was very similar for both types of firms: most of value added was produced by firms in the middle of the labor share distribution (between 60 percent and 80 percent). But in 2019, more than three quarters of total value added by family firms was generated by firms with a labor share below 40 percent; for non-family firms, only about 40 percent of total value added was accounted for by firms whose labor share is lower than 40 percent. At the same time, the distribution of firms was somewhat more left-skewed for non-family firms in 2019.

Next, in Figure 4, we compute counterfactual labor shares to examine the relative importance of changes in market shares (reallocation of value added) and changes in firm-level labor shares. In the "constant labor share scenario", we compare the actual labor share to a counterfactual in which we keep the firm's labor share equal to its initial value while allowing its market share to evolve over time, as is the case in the data. For this exercise, we focus on a strongly balanced panel between 1993 and 2019 since the initial market share and labor share changes of firms entering or exiting are not well defined. Despite its more limited coverage, the aggregate labor share trend in this strongly balanced sample looks very similar to the one in the full sample, as is apparent

from Figure 4. This suggests that most of the reallocation we documented earlier is occurring among long-lived incumbent firms, rather than being driven by entry and exit. The more closely the counterfactual labor share, which is determined assuming constant constant labor shares at the firm level, tracks the actual labor share, the more this could be taken as evidence that the aggregate labor share is driven by superstar firms which grew strongly in size over the sample period. We compute the counterfactual aggregate labor share based on the assumption on constant firm-level labor shares, λ_t^{CLS}, as follows:

$$\lambda_t^{CLS} = \sum_i \lambda_{i,1993}\omega_{it} \tag{7}$$

where $\lambda_{i,1993}$ denotes the labor share of firm i in 1993 and $\omega_{i,t}$ the share of firm i in aggregate gross value added in year t. As can be seen in Figure 4 a), the constant labor share scenario does not generate any noticeable drop in the labor share over the sample period, compared to a decrease of more than 10 percentage points in the actual labor share in the balanced sample. This result indicates that there were no major shifts in the market shares of incumbent firms with low labor shares which could explain the aggregate labor share development. We can thus firmly reject the superstar hypothesis for our sample.

In the "constant market share scenario", shown in Figure 4 b), we keep each firm's market share constant while allowing its labor share to change as in the data. The counterfactual aggregate labor share based on the assumption of constant firm-level market shares, λ_t^{CMS}, is computed as follows:

$$\lambda_t^{CMS} = \sum_i \lambda_{it}\omega_{i,1993} \tag{8}$$

Figure 4 b) shows that the constant market share scenario produces a counterfactual aggregate labor share series that tracks the aggregate labor share observed in the actual data extremely closely. The comovement of the actual and the counterfactual labor shares indicates that even if market shares had not changed at all, the evolution of the aggregate labor share would have been very similar, driven by changes in individual labor shares of incumbent firms. Kehrig and Vincent (2021) refer to this latter counterfactual exercise as the "big player scenario". It is clear that large firms drive the evolution of the aggregate labor share under this scenario, simply because of their large share in total value added.[8] However, as shown in Figures 1 a) and 3, the fall in firm-level labor shares in our sample is not unique to just a few big players, but it is a more pervasive

[8] Of the ten largest firms in terms of gross value added in 2019, eight are already in our sample in 1993. These eight firms alone (Volkswagen, Mercedes, Siemens, BMW, Bayer, SAP, Fresenius, and BASF) accounted for 40 percent of gross value added in our sample in 1993 and 50 percent in 2019.

phenomenon among German public non-financial firms.

4.2 Wages and productivity

A defining feature of the superstar phenomenon in the U.S. is that superstar firms have low labor shares because they are highly productive (rather than pay below-average wages at average productivity) (Autor et al., 2020; Kehrig and Vincent, 2021). Because our discussion so far suggests that a key factor in accounting for the fall in the labor share in Germany are differences between family firms and non-family firms, we take a closer look at the relative contributions of wages and productivity to the observed labor share trends. Ideally, we would compare hourly wages and hourly labor productivity across different firm types. However, *Worldscope* only provides firm-level information about employment, not about hours worked. This is an important caveat for the discussion that follows.

Figure 5 shows that family firms in the aggregate had similar labor productivity as non-family firms, but paid lower wages throughout the entire sample period. In Table 4, we show results of firm-level regressions of wages per employee and gross value added per employee (labor productivity) on a family firm dummy as well as industry and time fixed effects (columns 1 and 3). In columns 2 and 4 of Table 4, we also control for a measure of capital intensity (assets over employment) and a measure of technological advancement (R&D expenditures over sales), both of which should be positively related with productivity and wages. Interestingly, family firms pay lower wages per employee, but do not have lower labor productivity, even when controlling for capital intensity and R&D expenditures. According to our regressions, family firms on average pay 8.2 percent lower wages per employee than non-family firms, and 6.6 percent lower wages per employee at given capital intensity and R&D expenditures, whereas there are no significant differences of productivity across firm types. This result once again contrasts with the superstar phenomenon observed in the U.S.

4.3 The labor share and different forms of family control

We also use our dataset for a series of regression analyses to examine the implications of various degrees of family involvement in ownership and governance for the labor share, while controlling for other firm characteristics. In the next Section, we use the same regression analysis framework to look at the relationship between family control and the uses of gross value added including corporate saving. The estimation equations have the following general form:

$$y_{it} = \alpha + \beta F_{it} + \gamma X_{it} + \varepsilon_{it} \tag{9}$$

where y_{it} is the dependent variable of firm i at time t (i.e. the labor share in this Section, and different components of gross value added in Section 5).[9] F_{it} is our family firm variable, which can be broken down into different dummy variables representing different forms of family control depending on the degree of family involvement in ownership and governance. Since family control shows little variation over time, we cannot identify firm fixed effects with this estimation. X_{it} is a set of control variables. These variables include the log of total assets and the log of years since foundation to account for possible effects of firm size and age. Further control variables are the leverage ratio, R&D intensity, and stock price volatility. These variables are standard controls used in the literature that analyzes various aspects of firm behavior and performance (e.g. Anderson and Reeb, 2003; Sraer and Thesmar, 2007; Lins et al., 2013; Fan and Kalemli-Özcan, 2015; Dao and Maggi, 2018). All estimations include industry and year fixed effects.[10] Standard errors are clustered at the firm level.

The results from OLS regressions are presented in Tables 5-7. In this Section, we discuss the results of three regressions where the labor share is the dependent variable, shown in the first column of Tables 5-7. In Table 5, we regress firm-level labor shares on a family firm dummy, where family firm is defined solely by ownership (the family share exceeding 25 percent of control rights), in addition to the control variables.[11] We find that the labor share on average is 9.6 percentage points lower in family firms than in non-family firms. In Table 6, we differentiate between four types of family firms: in firms where the controlling family is present only in the management board, the labor share is estimated to be 12.6 percentage points lower than in non-family firms; in firms where the controlling family is present only in the supervisory board, the labor share is 8.3 percentage points lower; in family firms without family representation on either board, the labor share is estimated to be still 5.6 percentage points lower than in non-family firms; when the controlling family is present in the supervisory board in addition to being represented on the management board, this does not have an additional effect on the labor share according to our estimations. Finally, in Table 7, we look at the implications of different CEO types of family firms for the labor share. We find the strongest effect for founder-led family firms, where the labor share is estimated to be 14.7 percentage points lower than in non-family firms, controlling for other firm characteristics. In family firms which are led by a family member other than the firm's founder the labor share is 11.5 percentage points lower than in non-family firms, while in family firms managed by an external CEO, the difference is 6.9 percentage points, controlling for other firm characteristics.

[9] We winsorize all dependent variables at the top and bottom 1 percent.

[10] We use SIC codes from Worldscope to group companies into twelve industries, five of which are manufacturing subsectors. Table 3 and Table A.5 in the Online Appendix provide an overview of the industry classification.

[11] The results are robust to using the ownership share of the controlling family instead of the family firm dummy.

5 How were rising profits used?

In this Section, we analyze how the fall of the labor share was translated into a rise of corporate saving as a share of gross value added. At the aggregate level, we documented a trend where labor compensation has been reduced primarily in favor of gross saving, especially among family firms (Table 3). This observation prompts the question of whether this relationship holds at the individual firm level, i.e., whether individual firms experiencing a drop in their labor share correspondingly increased their saving as a share of gross value added. If the connection between decreasing labor and increasing saving share persists at the firm-level, a larger (smaller) trend increase in gross operating surplus on average should be associated primarily with a larger (smaller) trend increase in gross saving rather than payouts, interests, or taxes.

5.1 Firms' profit and saving trends

As a first step, we plot the percentage points trend per 10 years in firm gross operating surplus against the trends in the four categories that constitute it, similar to Chen et al. (2017) in their analysis of global corporate saving. The results are shown in Figure 6, where the size of each circle corresponds to the firm's average gross value added. Black circles represent family firms, grey circles non-family firms. In producing Figure 6, we restrict the sub-sample of family firms to only those firms that can be identified as family firms. Strikingly, only the trend in gross saving exhibits a strong positive association with the trend in gross operating surplus, implying that firms reducing their labor share over the sample period tend to direct additional gross operating surplus into gross saving rather than other potential uses. In Figure 7, we repeat the same exercise to see how trends in gross saving are related to investment and net lending: firms can either use their saving to fund investment expenditures, or to acquire financial assets or reduce liabilities. As is apparent from Figure 7, firm-level trends in gross saving correlate positively with trends in net lending, while there is no discernible association with trends in investment.

In Figures 6 and 7, there is no noticeable difference in the trend relationships between family firms and non-family firms. We can see some concentration of family firms in the top-right segments of Figures 6 and 7, implying that many (incuding large) family firms experienced both a fall in the labor share and a rise in corporate saving and net lending. However, the more pronounced rise in corporate saving (and net lending) among family firms seems to be due primarily to stronger drops in the labor share, as opposed to differences in the propensity to retain profits.

5.2 Uses of value added and different forms of family control

To take a closer look at the differences between different types of family firms and non-family firms in terms of uses of value added, we now turn to the regression results for Equation 9, shown in Tables 5-7. As noted previously, we control for industry and time fixed effects, firm size (assets) and age. We also take into account the effect of R&D intensity due to its potential influence on productivity and saving and investment decisions. The leverage ratio is included to control for debt in the capital structure. Higher saving may be an adaptation to higher firm specific risk, for which stock return volatility is used as a proxy.

The results of the regression analyses for our baseline definition of family firms, based on control rights, are shown in Table 5: family firms use a significantly lower share of gross value added for labor compensation which is primarily offset by a higher share of saving. With more than 9 percentage points lower labor compensation (column 1) and over 7 percentage points higher saving (column 5), the magnitude of the differences is substantial. Interestingly, we also find that family firms have significantly higher payouts (column 4). The overall development of payouts by family firms shown in previous sections is primarily driven by large family firms, which exhibit exceptionally low payout ratios. We do not find a significant effect of family control on investment (column 6), but an effect on net lending (column 7) of a similar magnitude as the one on gross saving, indicating that family firms, despite having significantly higher internal means of finance available through saving, do not have higher relative investment expenditures. Instead, family firms have higher net lending, all else equal.

In Tables 6 and 7, we show the results for regressions in which different subgroups of family firms according to family involvement in management are used as right-hand side variables. The results essentially confirm the main finding from Figure 6 and Table 5: the more or less pronounced negative deviations in the labor share in the various types of family firms compared to non-family firms are almost entirely reflected in corresponding positive deviations in corporate saving (and, though somewhat less clearly, net lending) as a percentage of value added.

6 Discussion and conclusion

By emphasizing the role of family-controlled firms as a distinctive feature of the German corporate landscape, this paper complements the existing literature that has tended to overlook country-specific heterogeneity in trends of corporate labor shares and corporate saving. Our results leave a number of open questions and point to several important avenues for future research, which we briefly discuss in the remainder of this Section.

First, the question remains as to why family businesses manage to pay lower wages. Have workers become increasingly willing to accept lower wages in exchange for the higher employment security that family firms may be able to credibly commit to, as suggested by the literature on implicit employment contracts (Mueller and Philippon, 2011; Bassanini et al., 2013)? Some previous literature suggests that employment in family firms is indeed less sensitive to sales shocks (Lee, 2006; Sraer and Thesmar, 2007; Bjuggren, 2015).

While an exhaustive treatment of this question is beyond the scope of this paper, we do not find evidence that employment in family firms is more insulated from sales shocks. Figure 8 plots the standard deviations in the log of sales against the standard deviations in the log of employment for family and non-family firms separately. Although there is a clear positive correlation between the standard deviations, indicating that changes in sales are passed through to employees by adjusting employment numbers, family firms and non-family firms do not appear to react differently to fluctuations in sales. In Appendix B, we present a simple regression analysis, where employment is regressed on sales, an interaction term between sales and different family firm dummies, and a number of control variables. The results suggest that the response of family firms to sales shocks does not differ from that of non-family firms. Hence, if employees were indeed willing to trade lower wages for perceived job security in family firms, this trade-off ultimately may have been based on a false assumption. Yet, Nollenberger (2024) presents new evidence for a sample of listed and unlisted firms that family firms in Germany reduced employment levels less than non-family firms, controlling for changes in sales and other firm characteristics, during the recent Covid and energy price crises. Clearly, more research is needed to investigate the relationship between wages and employment stability further.

A second and related question that requires more research is, why do family firms in particular retain such a large proportion of their profits rather than distribute them to shareholders? We concluded previously that family firms do not differ from non-family firms in terms of payout policies, but that their higher saving results predominantly from lower wages relative to productivity. Controlling families may be more risk averse (Anderson et al., 2012) and have a higher preference for internal financing than other shareholders, as they seek to retain control of their business and pass it on to future generations. In the German context, a preference to accumulate funds inside firms may be amplified by inheritance taxation which strongly favors wealth tied up in companies (Bach, 2015). If the workers of family firms to some extent share these objectives and value the financial independence and perceived crisis resilience of their employers, this may go some way in explaining why they accept lower wages at given productivity levels.

Third, one may ask what are the broader distributional implications of our findings? While the rise in retained profits is not accounted for in conventional measures of personal income dis-

tribution (which include only household income), in theory they should be captured by measures of personal wealth distribution (as shareholders are the ultimate owners of corporations). Yet, retained profits increase shareholders' wealth only to the extent that they are reflected in firms' stock market value. Hence, standard measures of both income and wealth inequality likely are downward biased as a result of disproportionately high saving by firms with concentrated ownership structures.

Fourth, from a macroeconomic perspective, the importance of family firms for Germany's broader "growth model" warrants further discussion. For one thing, the high saving rate and positive net lending position of the German corporate sector have likely contributed to Germany's persistent current account surplus and structural dependence on exports as a growth driver (IMF, 2017; Behringer and van Treeck, 2018). At the same time, the large share of manufacturing in Germany's value added and the associated high degree of specialization require a focus by corporations not on the domestic market, but on exports in order to achieve the necessary market size. While the incremental innovation model of "coordinated market economies" such as Germany has long been recognized in the literature on "varieties of capitalism" as an alternative to the more radical innovation model in "liberal market economies" like the U.S., the role of family firms in Germany's innovation and growth model so far has been underappreciated in the comparative political economy literature (Behringer and van Treeck, 2019).

In order to better understand how the discussion of innovation and growth models is linked to the development of the labor share, a digression on the "rising star" phenomenon in the U.S., highlighted by Kehrig and Vincent (2021), may be useful. The rising star interpretation in fact describes a recurring cycle of radical product innovation: New firms develop new products that meet the tastes of consumers. This translates into unusually high demand, high price-setting power, and hence exceptionally high labor productivity. This, in conjunction with incomplete wage adjustments, results in a low labor share. Temporarily high profit shares eventually decline as the competition adjusts to structural change and the rising stars' price-setting power falls. In addition, the rising stars must gradually pay higher wages and expand employment. This leads to a rise in the labor share of these former rising stars. Then new rising stars come along, develop better and altogether different products, and the cycle begins again for these new rising stars while the old rising stars' labor shares have already risen again and their market shares have fallen due to the success of the new rising stars. The phenomenon of rising stars explains why most of today's best-known U.S. companies, such as Apple, Google, Microsoft, and Amazon, were completely unknown two to three decades ago.

The situation is very different in Germany, where the corporate landscape is still dominated by the same incumbents as in the early 1990s, especially in the automotive, chemical, and phar-

maceutical industries. As noted earlier, these long-established firms may be global players like Volkswagen, BMW, Bayer, or Siemens, but many of them are small and medium-sized, highly specialized "hidden champions". Unlike in the U.S., the fall in the labor share in Germany since the early 1990s was not driven by the emergence of new superstar firms benefiting from domestic consumers' demand for radically new products. Rather, an important reason for the exceptionally strong productivity growth and the decline in the labor share in manufacturing was that the established German manufacturing companies somewhat coincidentally were in a position to supply exactly the right products that late industrializing countries in Eastern Europe and China demanded when the "iron curtain" fell in 1991 and when China opened up and joined the WTO in the early 2000s. And as the analysis in this paper has shown, family firms in particular were able to keep their labor costs low during the boom in foreign demand. However, with a view to the current ecological, technological and geostrategic challenges, it remains to be seen to what extent the dominance of individual families in the ownership structures of firms impairs the ability of the corporate sector to implement radical structural change. Due to the greater risk aversion and the often decades-long anchoring of family firms in certain product segments, family-owned firms could be even more inclined than others to cling to established business models, including through political lobbying.

Finally, the relevance of our analysis is limited by the fact that our dataset comprises only publicly listed firms. However, it is often emphasized that the backbone of the German corporate sector are private, family-run companies (the *Mittelstand*), especially in the manufacturing sector, which range from very small to very large companies. One might hypothesize that the different labor share and saving patterns documented in this paper are even more pronounced when the analysis is extended to the entire corporate sector. While this poses new challenges in terms of data availability, future research could extend an analysis like the one developed in this paper to the non-listed corporate sector.

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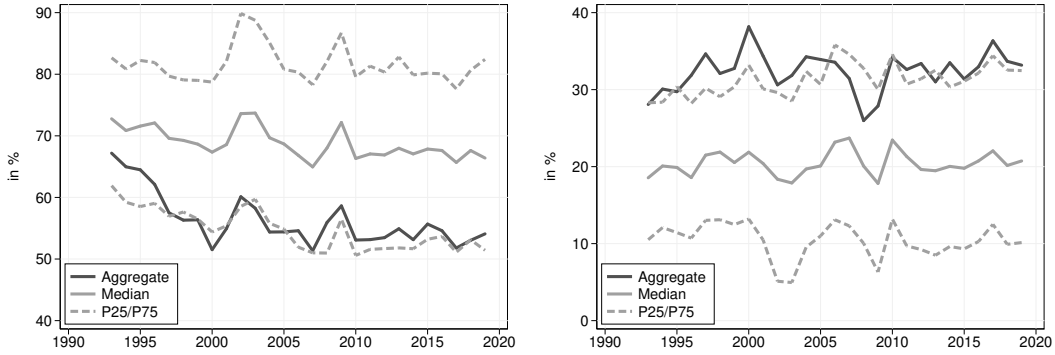
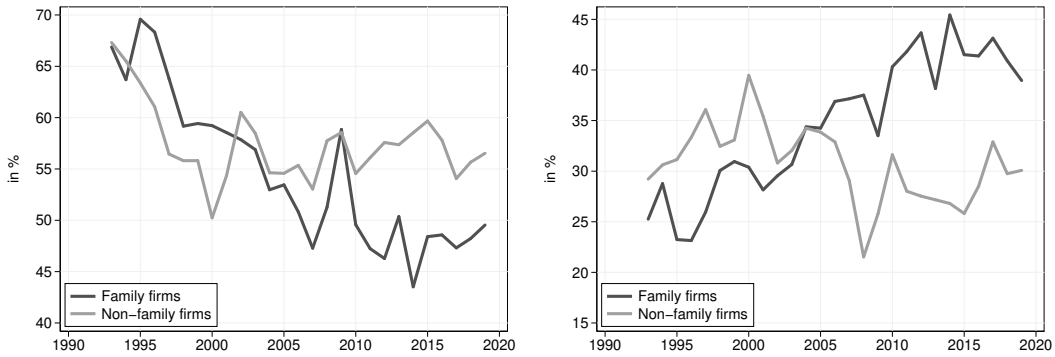


(a) Distribution of labor shares (b) Distribution of saving shares

Notes: The figure shows the aggregate labor share (left panel) and saving share (right panel) against the year-by-year quantiles of the labor and saving share distributions, respectively. Black lines reflect the aggregate labor and saving shares, solid gray lines reflect the median, and dashed gray lines reflect the first and third quartile.

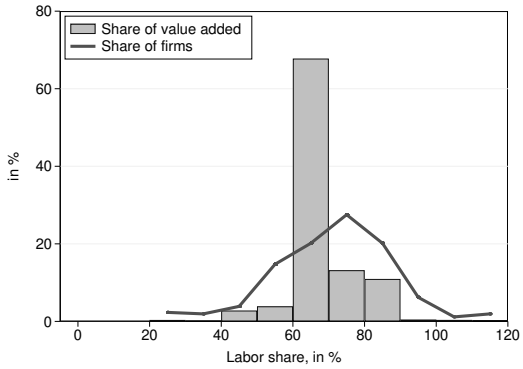
Figure 1: Distribution of labor and saving shares



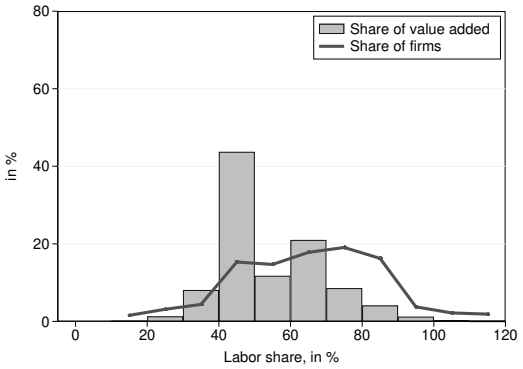
(a) Labor shares (b) Saving shares

Notes: The figure shows the aggregate labor share (left panel) and saving share (right panel) for family and non-family firms.

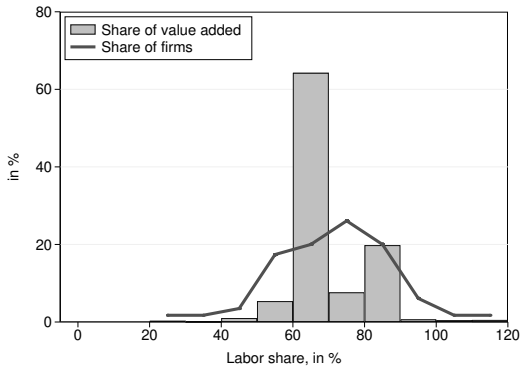
Figure 2: Labor and saving shares, family and non-family firms



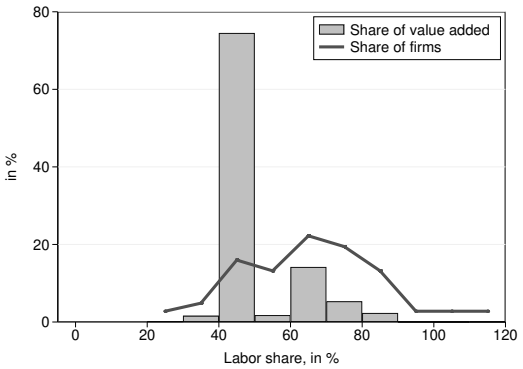
(a) All firms, 1993



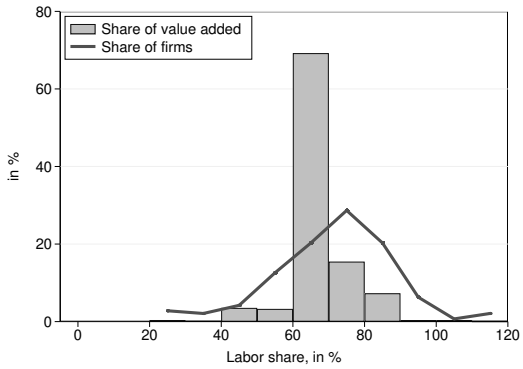
(b) All firms, 2019



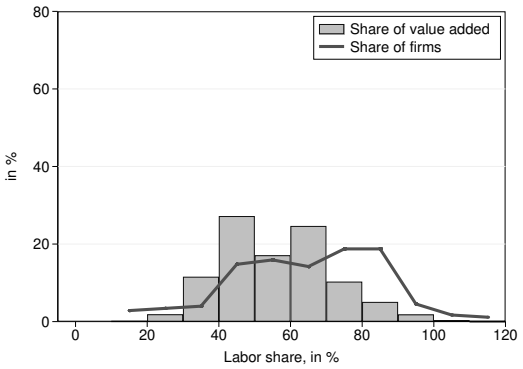
(c) Family firms, 1993



(d) Family firms, 2019



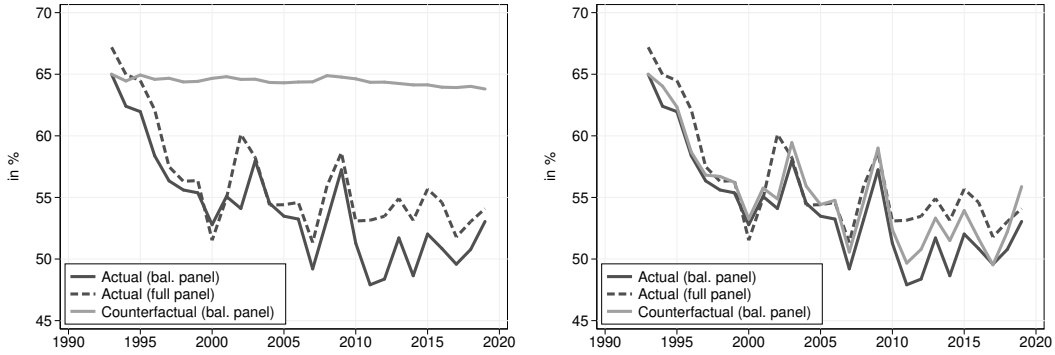
(e) Non-family firms, 1993



(f) Non-family firms, 2019

Notes: The figure shows the distributions of firms and valued added in 1993 (left panels) and 2019 (right panels) along the labor share dimension for all firms (top row), family firms (middle row) and non-family firms (bottom row). The black lines reflect the distribution of firms, while the distribution of valued added is represented by the gray bars.

Figure 3: Distributions of labor shares and value added



(a) Constant labor share scenario

(b) Constant market share scenario

Notes: The figure shows the actual aggregate labor share against the counterfactual labor shares in the constant labor share scenario (left panel) and the constant market share scenario (right panel). Black lines reflect actual labor shares for a strongly balanced panel (solid) and the full panel (dashed), and grey lines reflect counterfactual labor shares.

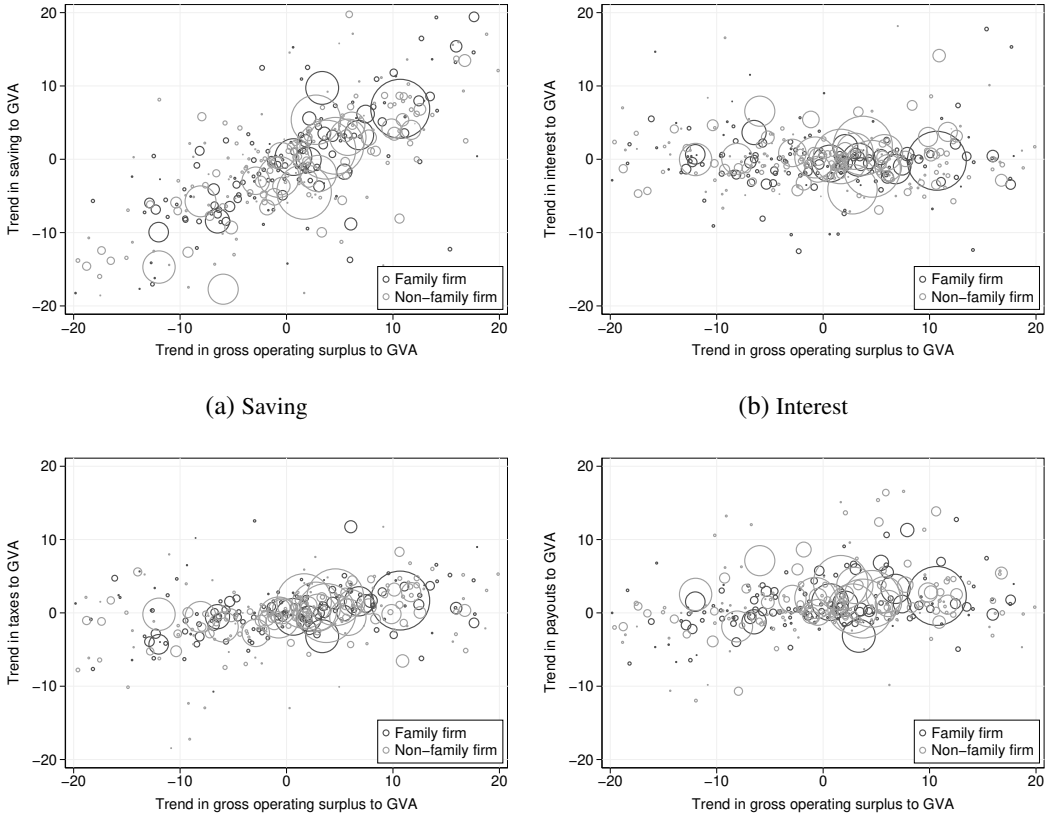
Figure 4: The evolution of the labor share under different scenarios

(a) Wages per worker

(b) Value added per worker

Notes: The figure shows aggregate wages per worker (left panel) and value added per worker (right panel) for family and non-family firms.

Figure 5: Wages and labor productivity



(a) Saving

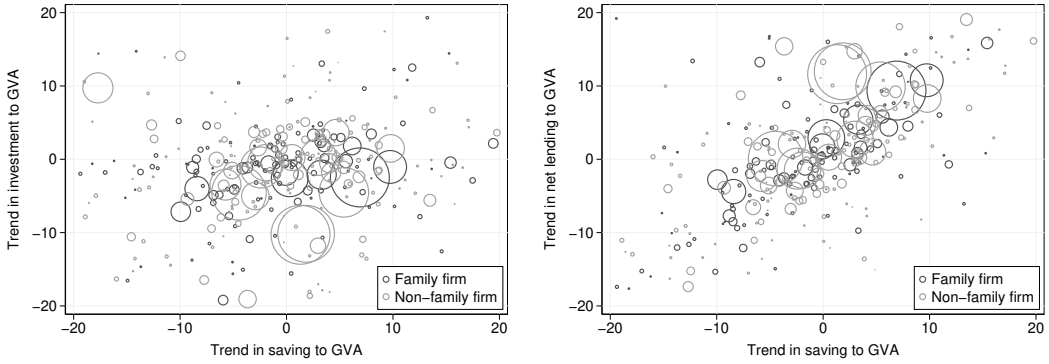
(b) Interest

(c) Taxes

(d) Payouts

Notes: The figure shows scatterplots of firm-level trends (in percentage points per 10 years) in gross operating surplus to gross value added against trends in the components that constitute gross operating surplus (i.e. saving, interest, taxes, payouts) for family and non-family firms. Trends are estimated for firms with at least 10 years of data. The classification of family and non-family firms is based on the status that occurred most frequently during the observation period. The size of the hollow circles corresponds to a firm's average gross valued added over the sample period.

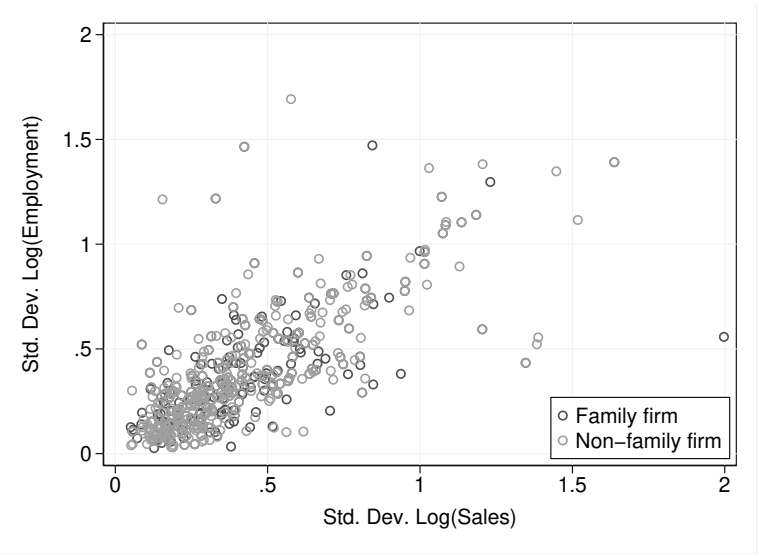
Figure 6: Uses of operating surplus: saving, interest, taxes, payouts



(a) Investment (b) Net lending

Notes: The figure shows scatterplots of firm-level trends in saving to gross value added against trends in investment (left panel) and net lending (right panel) for family and non-family firms. Trends are estimated for firms with at least 10 years of data. The classification of family and non-family firms is based on the status that occurred most frequently during the observation period. The size of the hollow circles corresponds to a firm's average gross valued added over the sample period.

Figure 7: Uses of saving: investment and net lending



Notes: The figure plots the standard deviation of the log of sales against the standard deviation of the log of employment for family and non-family firms. Standard deviations are calculated for firms with at least 10 years of data. The classification of family and non-family firms is based on the status that occurred most frequently during the observation period.

Figure 8: Sales and employment instability

Table 1: Presence of family firms

Industry	Family firm (1)	Family firm, with family on: MB (2)	SB (3)	MB and SB (4)	Family firm, managed by: Founder (5)	Member (6)	External CEO (7)
Total	0.42	0.20	0.16	0.04	0.09	0.10	0.23
Agriculture and mining	0.32	0.21	0.19	0.13	0.12	0.08	0.12
Construction	0.51	0.21	0.26	0.00	0.07	0.14	0.30
Information and communications	0.44	0.28	0.13	0.04	0.23	0.05	0.17
Total manufacturing	0.45	0.19	0.21	0.05	0.06	0.12	0.27
Chemical and pharmaceutical	0.48	0.20	0.22	0.04	0.07	0.12	0.29
Electronics	0.43	0.19	0.17	0.03	0.10	0.10	0.24
Transportation equipment	0.57	0.11	0.38	0.01	0.06	0.05	0.46
Rubber, plastic, glass, metal	0.41	0.15	0.25	0.07	0.02	0.10	0.29
Other manufacturing	0.46	0.22	0.18	0.06	0.06	0.15	0.25
Services	0.38	0.22	0.08	0.02	0.11	0.11	0.16
Transportation	0.14	0.05	0.01	0.00	0.05	0.00	0.08
Utilities	0.13	0.06	0.06	0.00	0.05	0.01	0.07
Wholesale/Retail trade	0.47	0.20	0.10	0.04	0.09	0.10	0.28

Notes: The table presents the share of different groups of family firms by industry. Column 1 shows the share of family firms, columns 2-4 show the share of family firms with family representation on the management board (MB), the supervisory board (SB), or both boards, and columns 5-7 show the share of family firms defined by their CEO.

Table 2: Characteristics of firms

	All firms (1)	Non-family firms (2)	Family firms (3)	Family firm, managed by: Founder (4)	Member (5)	External CEO (6)
Salary in % of GVA	73.31	75.46	70.35	69.73	68.80	71.26
Interest in % of GVA	3.05	2.90	3.27	3.46	3.50	3.09
Taxes in % of GVA	4.09	3.70	4.63	5.38	4.99	4.16
Payouts in % of GVA	4.08	3.91	4.31	5.04	4.67	3.85
Saving in % of GVA	14.99	13.66	16.84	15.24	17.76	17.10
Investment in % of GVA	22.19	22.73	21.45	25.37	18.54	21.10
Assets (bn. euro)	3.94	4.98	2.50	0.26	0.36	4.33
Age (years)	71.09	74.28	66.71	22.28	75.51	81.06
Debt/Assets	20.21	19.09	21.75	19.51	23.96	21.72
R&D/Sales	2.42	2.39	2.46	3.16	1.33	2.66
Stock price vol.	4.96	5.14	4.70	5.48	3.56	4.88
Employment	11849.64	15164.65	7264.65	1182.66	2272.57	11844.91
Sales (bn. euro)	3.06	3.87	1.94	0.24	0.42	3.28

Notes: The table presents summary statistics for the different components of value added and other key variables for all firms (column 1), non-family and family firms (columns 2 and 3), as well as the three groups of family firms defined by their CEO (columns 4-6).

Table 3: Trends in labor and saving shares

	All firms		Family firms		Non-family firms	
Industry	Salary (1)	Saving (2)	Salary (3)	Saving (4)	Salary (5)	Saving (6)
Total	-3.690***	0.665	-8.252***	7.613***	-1.819	-2.209**
	(0.084)	(0.054)	(0.086)	(0.076)	(0.099)	(0.075)
Agriculture and mining	-1.058	-2.624	-9.411***	11.210***	2.012	-8.730*
	(0.244)	(0.193)	(0.079)	(0.098)	(0.338)	(0.376)
Construction	-2.781	-0.367	-10.271***	5.322***	-1.763	-1.379
	(0.163)	(0.135)	(0.163)	(0.131)	(0.211)	(0.193)
Information and communications	-3.276	-2.259	0.745	-4.955***	-3.565*	-2.083
	(0.163)	(0.125)	(0.117)	(0.103)	(0.171)	(0.132)
Total manufacturing	-6.261***	3.922***	-8.632***	8.126***	-4.888***	0.872
	(0.085)	(0.063)	(0.133)	(0.110)	(0.085)	(0.070)
Chemical and pharmaceutical	-5.004***	2.146***	-7.028***	6.809***	-4.711***	0.976*
	(0.080)	(0.045)	(0.089)	(0.071)	(0.083)	(0.047)
Electronics	-9.773***	7.336***	-9.344***	7.963***	-9.773***	6.788***
	(0.123)	(0.099)	(0.163)	(0.191)	(0.132)	(0.112)
Transportation equipment	-6.143***	3.700***	-6.269***	5.764**	-5.203***	0.488
	(0.086)	(0.096)	(0.168)	(0.170)	(0.113)	(0.132)
Rubber, plastic, glass, metal	-6.583***	3.895***	-11.621***	8.959***	-2.461*	-1.571
	(0.107)	(0.073)	(0.115)	(0.097)	(0.105)	(0.089)
Other manufacturing	-3.433***	1.733*	-3.256***	2.690***	-3.547**	1.336
	(0.089)	(0.078)	(0.057)	(0.058)	(0.126)	(0.110)
Services	2.232**	-2.567**	-7.578***	4.469***	-1.098	0.586
	(0.067)	(0.072)	(0.122)	(0.115)	(0.097)	(0.109)
Transportation	1.420	-3.056**	1.420	-0.981	1.534	-3.092**
	(0.123)	(0.103)	(0.650)	(0.525)	(0.125)	(0.104)
Utilities	0.533	-7.720	-11.205*	2.913	0.764	-7.872
	(0.425)	(0.434)	(0.430)	(0.450)	(0.438)	(0.444)
Wholesale/Retail trade	2.449**	-4.455***	3.025*	-3.854***	0.758	-3.829***
	(0.066)	(0.070)	(0.123)	(0.088)	(0.105)	(0.067)

Notes: The table presents trends (in percentage points per 10 years) in labor and saving shares, at the aggregate and industry level. Columns 1 and 2 show trends for all firms, columns 3 and 4 show trends for family firms and columns 5 and 6 show trends for non-family firms. Robust standard errors are in parentheses. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively.

Table 4: Wages and productivity

	Log(Salary/Empl.)		Log(GVA/Empl.)	
	(1)	(2)	(3)	(4)
Family firm	-0.082***	-0.066***	-0.007	0.022
	(0.025)	(0.021)	(0.032)	(0.021)
Log(Assets/Empl.)		0.248***		0.510***
		(0.021)		(0.017)
R&D/Sales		0.008***		0.001
		(0.001)		(0.003)
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	10256	10239	10256	10239
Adj. R-squared	0.135	0.299	0.174	0.523

Notes: The table presents the results of OLS regressions. Dependent variables are the log of wages per worker (columns 1 and 2) and the log of value added per worker (columns 3 and 4). Family firm is a dummy variable indicating family ownership. Other explanatory variables (columns 2 and 4) are Log(Assets/Employment) (log of total assets over total employment) and R&D/Sales (R&D intensity). All regressions include industry fixed effects and year fixed effects. Standard errors are clustered at the firm level. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively.

Table 5: Components of value added and the role of family firms

	Salary	Interest	Taxes	Payouts	Saving	Investment	Net lending
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Family firm	-9.613***	-0.287	1.420***	0.989***	7.264***	-0.414	8.379***
	(1.583)	(0.228)	(0.255)	(0.326)	(1.540)	(1.122)	(2.268)
Log(Assets)	-5.199***	-0.179***	0.433***	0.420***	4.548***	0.024	4.987***
	(0.580)	(0.067)	(0.072)	(0.090)	(0.572)	(0.308)	(0.765)
Log(Age)	0.259	-0.356**	-0.449***	-0.285*	0.787	-3.516***	5.545***
	(0.955)	(0.147)	(0.157)	(0.172)	(0.917)	(0.795)	(1.441)
Debt/Assets	0.134**	0.227***	-0.063***	-0.056***	-0.239***	0.202***	-0.471***
	(0.054)	(0.010)	(0.007)	(0.009)	(0.054)	(0.035)	(0.078)
R&D/Sales	0.571**	-0.024	-0.121***	-0.052*	-0.305	2.371***	-2.837***
	(0.286)	(0.022)	(0.023)	(0.030)	(0.311)	(0.229)	(0.532)
Stock price vol.	0.079	-0.005	0.028**	0.052***	-0.172**	0.227***	-0.432***
	(0.087)	(0.008)	(0.013)	(0.015)	(0.084)	(0.068)	(0.124)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10148	10148	10148	10148	10148	10148	10148
Adj. R-squared	0.118	0.378	0.084	0.098	0.078	0.274	0.118

Notes: The table presents the results of OLS regressions. Dependent variables are the different components of value added, in percent of value added. Family firm is a dummy variable indicating family ownership. Other explanatory variables are Log(Assets) (log of book value of total assets), Log(Age) (log of firm age measured in years plus one), Debt/Assets (leverage ratio), R&D/Sales (R&D intensity), Stock price volatility (standard deviation of a firm's stock price). All regressions include industry fixed effects and year fixed effects. Standard errors are clustered at the firm level. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively.

Table 6: Components of value added and the role of board representation of family firms

	Salary (1)	Interest (2)	Taxes (3)	Payouts (4)	Saving (5)	Investment (6)	Net lending (7)
Family in MB	-12.578***	-0.408	2.123***	1.862***	9.022***	-0.019	10.103***
	(2.204)	(0.354)	(0.407)	(0.499)	(2.104)	(1.818)	(3.104)
Family in SB	-8.346***	-0.136	0.975***	0.725	6.499***	-2.984**	10.010***
	(2.083)	(0.311)	(0.350)	(0.523)	(1.946)	(1.295)	(2.855)
Family in MB and SB	-12.266***	-0.056	1.601***	0.879	9.048***	2.362	7.663*
	(2.696)	(0.616)	(0.515)	(0.690)	(2.545)	(2.530)	(4.271)
Family neither in MB nor SB	-5.631***	-0.376	0.825**	0.039	4.836**	0.952	4.143
	(1.952)	(0.269)	(0.360)	(0.356)	(1.985)	(1.648)	(3.143)
Log(Assets)	-5.275***	-0.182***	0.451***	0.439***	4.594***	0.059	5.006***
	(0.581)	(0.068)	(0.073)	(0.090)	(0.573)	(0.314)	(0.766)
Log(Age)	-0.008	-0.363**	-0.392**	-0.210	0.946	-3.520***	5.739***
	(0.965)	(0.148)	(0.158)	(0.174)	(0.929)	(0.810)	(1.453)
Debt/Assets	0.137**	0.227***	-0.063***	-0.057***	-0.240***	0.200***	-0.472***
	(0.054)	(0.010)	(0.007)	(0.009)	(0.054)	(0.035)	(0.078)
R&D/Sales	0.552*	-0.024	-0.118***	-0.048	-0.294	2.373***	-2.826***
	(0.283)	(0.022)	(0.023)	(0.030)	(0.310)	(0.227)	(0.527)
Stock price vol.	0.082	-0.005	0.028**	0.050***	-0.173**	0.231***	-0.438***
	(0.087)	(0.008)	(0.012)	(0.015)	(0.085)	(0.068)	(0.124)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10148	10148	10148	10148	10148	10148	10148
R-squared	0.124	0.380	0.091	0.106	0.083	0.278	0.122
Adj. R-squared	0.120	0.378	0.087	0.102	0.078	0.275	0.118

Notes: The table presents the results of OLS regressions. Dependent variables are the different components of value added, in percent of value added. Family in MB, Family in SB, Family in MB and SB, and Family neither in MB nor SB are dummy variables indicating that the controlling family is represented either on the management board only, on the supervisory board only, on both boards, or on neither board. The other explanatory variables are consistent with Table 5. All regressions include industry fixed effects and year fixed effects. Standard errors are clustered at the firm level. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively.

Table 7: Components of value added and the role of different CEO types of family firms

	Salary	Interest	Taxes	Payouts	Saving	Investment	Net lending
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Founder CEO	-14.704***	0.194	2.399***	1.559***	10.158***	1.731	9.375**
	(3.010)	(0.559)	(0.560)	(0.598)	(2.821)	(2.190)	(4.554)
Member CEO	-11.487***	-0.661**	1.925***	1.762***	8.536***	-0.757	10.316***
	(2.325)	(0.332)	(0.449)	(0.608)	(2.219)	(2.126)	(2.905)
External CEO	-6.864***	-0.319	0.832***	0.448	5.616***	-1.104	7.193***
	(1.688)	(0.234)	(0.274)	(0.361)	(1.643)	(1.169)	(2.504)
Log(Assets)	-5.288***	-0.179***	0.452***	0.438***	4.602***	0.046	5.026***
	(0.580)	(0.067)	(0.072)	(0.090)	(0.573)	(0.313)	(0.766)
Log(Age)	-0.158	-0.314**	-0.370**	-0.241	1.023	-3.335***	5.619***
	(0.990)	(0.149)	(0.162)	(0.182)	(0.949)	(0.789)	(1.473)
Debt/Assets	0.136**	0.227***	-0.063***	-0.057***	-0.240***	0.202***	-0.473***
	(0.054)	(0.010)	(0.007)	(0.009)	(0.054)	(0.034)	(0.078)
R&D/Sales	0.556**	-0.024	-0.118***	-0.049	-0.296	2.373***	-2.829***
	(0.283)	(0.022)	(0.023)	(0.030)	(0.310)	(0.231)	(0.531)
Stock price vol.	0.083	-0.006	0.028**	0.052***	-0.174**	0.224***	-0.431***
	(0.087)	(0.008)	(0.012)	(0.015)	(0.085)	(0.068)	(0.124)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10148	10148	10148	10148	10148	10148	10148
Adj. R-squared	0.121	0.378	0.088	0.101	0.079	0.274	0.118

Notes: The table presents the results of OLS regressions. Dependent variables are the different components of value added, in percent of value added. Founder CEO, Member CEO, and External CEO are dummy variables indicating that a family firm is managed either by its founder, another family member, or an external CEO. The other explanatory variables are consistent with Table 5. All regressions include industry fixed effects and year fixed effects. Standard errors are clustered at the firm level. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively.

A Illustration of the FOG database

The identification of ownership and governance structures is illustrated below using the examples of two firms with different degrees of family involvement: Continental, a large automotive supplier which employed more than 240,000 persons in more than 50 countries worldwide and recorded sales of more than 44 billion Euros in 2019; and Greiffenberger, a small domestic producer of metal bandsaw blades and precision strip steel located in Bavaria with 310 employees and sales of 49 million Euros in 2019.

To be able to read the tables in this Appendix, a number of variable definitions are required. Hoppenstedt provides information on the first level of ownership, i.e., the direct shareholders of the company. For each shareholder two main pieces of information are provided: the name of the shareholder (sh_name) and the percentage of shares held (sh_share). For some shareholders additional information of various kinds is available through Hoppenstedt, for others we need to rely on external sources. We add six additional variables, which we define as follows: shareholder type, sh_type (1: individual/family, 2: family holding/foundation, 3: institutional investor, 4: firm in same/related sector, 5: miscellaneous, 6: state (domestic), 7: state (foreign), 8: employees, 9: treasury shares); family affiliation, sh_fam (1: yes, 0: no); relation to the founder, sh_found (1: founder, 2: relative of founder, 0: no relation); CEO, sh_ceo (1: yes, 0: no), member of management board; sh_mgmt (1: yes, 0: no); member of the supervisory board, sh_board (1: yes, 0: no). These variables are coded manually, based on different sources of information. See the Online Appendix for a more detailed description of definitions and sources.

A.1 Continental (2016)

Figure A.1 shows the ownership and governance structure of Continental AG in 2016. The company has been controlled by the Schaeffler family since 2009, through a chain of holding companies, ultimately owning 46% of shares in 2016. While Continental had many different shareholders in past years (see Online Appendix), the only other large shareholder in recent years was BlackRock (3.15% in 2016), with the remaining shares in free float. In addition to their ownership stake, two members of the Schaeffler family are represented in the company's supervisory board.

The data used to track this structure is detailed in Tables A.1-A.5. Table A.1 shows the first shareholder of Continental AG included in Hoppenstedt for 2016. The first column contains the different variables used to categorize the shareholder. The second column shows the value assigned to the variable, the third column explains the categorization, and the last column contains the respective source. The name of the shareholder, Schaeffler Verwaltung Zwei GmbH, and the corresponding ownership stake of 35.99% are indicated in Hoppenstedt. Additional information

from Hoppenstedt reveals that Schaeffler Verwaltung Zwei GmbH is 100% owned by the Schaeffler Verwaltungs GmbH, which in turn is 100% owned by the Schaeffler Holding GmbH & Co. KG. Information from Wikipedia reveals that this again a holding company owned by the Schaeffler family (80% Georg F.W. Schaeffler and 20% Maria-Elisabeth Schaeffler-Thumann). Accordingly, we identify the shareholder type as a family holding (sh_type = 2). The variable sh_fam indicates whether the shareholder can be assigned to the family that holds the largest stake in the company (if applicable). Since Schaeffler Verwaltung Zwei GmbH is a family holding which is also the largest shareholder, we set sh_fam = 1. Since this shareholder is not a natural person, the other variables (sh_found, sh_ceo, sh_mgmt, sh_board) are assigned the value 0.

The second shareholder (Table A.2) included in the Hoppenstedt data is Schaeffler Verwaltungs GmbH, holding 10.01%. Note that this is the same as the owner of shareholder 1. It is owned by Schaeffler Holding GmbH & Co. KG and can therefore also be attributed to the Schaeffler family. The third shareholder (Table A.3) is BlackRock Inc. with a 3.15 % stake, which is categorized as institutional investor.

Comparing the list of members of the management and supervisory board with the names of the shareholders yields no direct match since all shareholders are corporate entities. However, Maria-Elisabeth Schaeffler-Thumann and Georg F.W. Schaeffler are included in the list of supervisory board members. To reflect the link between the shareholders and the board representation of the ultimate owners in the dataset, we add these two individuals as shareholders (Tables A.4-A.5). We assign 0 shares since all shares which are (indirectly) owned by these individuals are already captured by shareholders 1 and 2. Online research shows that the founder of Continental was not connected to the Schaeffler family, therefore we assign a 0 for the variable sh_found in both cases. Both shareholders are not members of the management board (sh_ceo = 0; sh_mgmt = 0), but since they are recorded as members of the supervisory board, we assign the value 1 to the variable sh_board.

Table A.6 summarizes the ownership and governance structure of Continental for the year 2016 and shows how they relate to the different definitions of family firms used in this paper (see Table 1 above). Since the shares of shareholder 1 (35.99%) and shareholder 2 (10.01 %) can be attributed to the Schaeffler family, the family share of Continental AG in 2016 is 46%. Since the share exceeds 25%, it is a family firm according to our baseline ownership definition. More specifically, it is a family firm where the controlling family is also represented on the supervisory board. Moreover, Continental is an externally managed family firm. The other definitions do not apply to Continental for the year 2016.

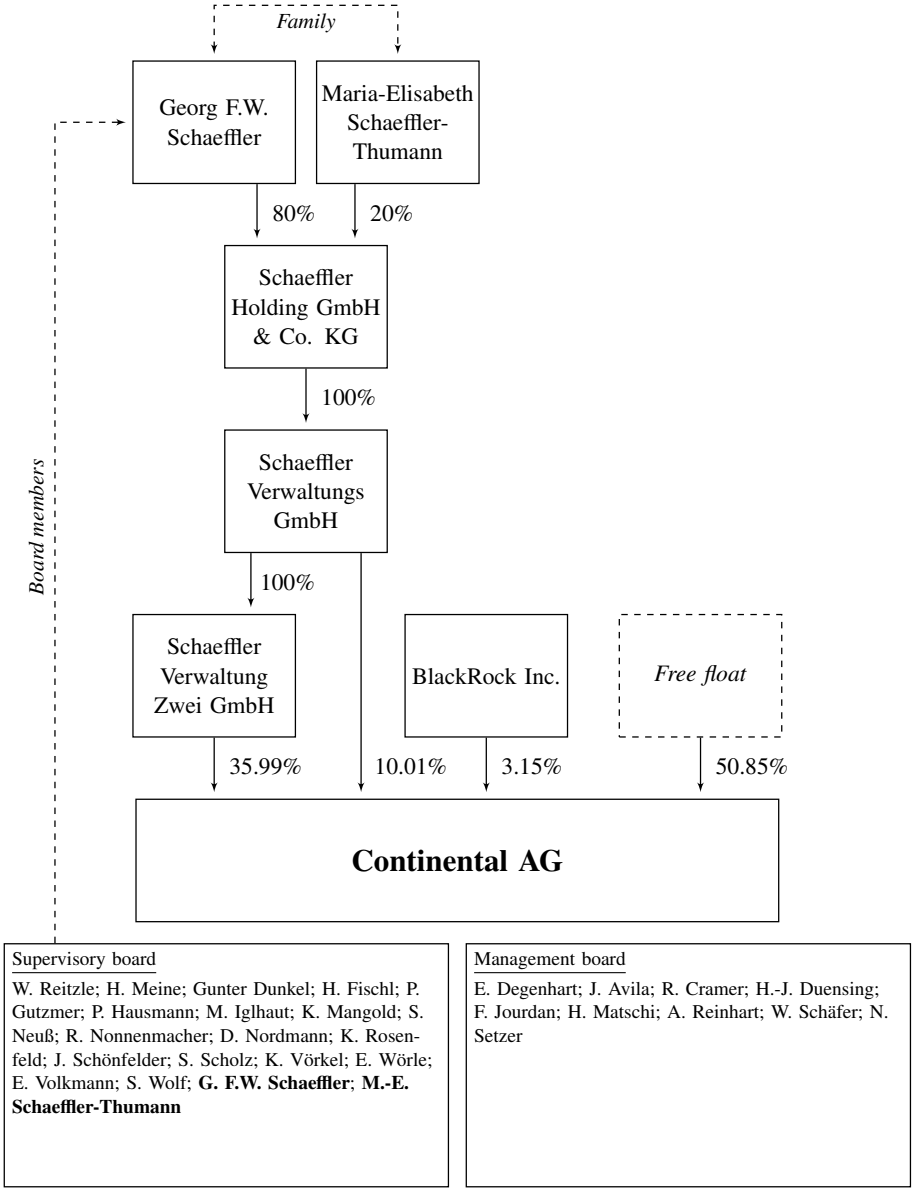


Figure A.1: Ownership and governance structure, Continental AG, 2016

Table A.1: Shareholder 1, Continental AG, 2016

Variable	Coding	Explanation	Source
sh_name1	Schaeffler Verwaltung Zwei GmbH		*Hoppenstedt: Included in shareholder data*
sh_share1	0.3599		*Hoppenstedt: Included in shareholder data*
sh_type1	2	*Owned by Schaeffler Verwaltungs GmbH which in turn is owned by Schaeffler Holding GmbH & Co. KG which is exclusively owned by members of the Schaeffler family.*	*Hoppenstedt: Anteilseigner: Schaeffler Verwaltungs GmbH, Herzogenaurach, 100%; Anteilseigner: Schaeffler Holding GmbH & Co. KG, Herzogenaurach, 100%*
			External source: „Schaeffler-Gruppe [...] Maria-Elisabeth Schaeffler 20% der Unternehmensanteile und ihr Sohn Georg F. W. Schaeffler 80%“ https://de.wikipedia.org/wiki/Maria-Elisabeth_Schaeffler
sh_fam1	1	*Schaeffler family is the shareholder with the (cumulative) largest (indirect) share.*	
sh_found1	0	*Not a natural person*	
sh_ceo1	0	*Not a natural person*	
sh_mgmt1	0	*Not a natural person*	
sh_board1	0	*Not a natural person*	

Table A.2: Shareholder 2, Continental AG, 2016

Variable	Coding	Explanation	Source
sh_name2	Schaeffler Verwaltungs GmbH		*Hoppenstedt: Included in shareholder data*
sh_share2	0.1001		*Hoppenstedt: Included in shareholder data*
sh_type2	2	*Owned by Schaeffler Holding GmbH & Co. KG which is exclusively owned by members of the Schaeffler family.*	*Hoppenstedt: Anteilseigner: Schaeffler Holding GmbH & Co. KG, Herzogenaurach, 100%*
			External source: „Schaeffler-Gruppe [...] Maria-Elisabeth Schaeffler 20% der Unternehmensanteile und ihr Sohn Georg F. W. Schaeffler 80%“ https://de.wikipedia.org/wiki/Maria-Elisabeth_Schaeffler
sh_fam2	1	*Schaeffler family is the shareholder with the (cumulative) largest (indirect) share.*	
sh_found2	0	*Not a natural person*	
sh_ceo2	0	*Not a natural person*	
sh_mgmt2	0	*Not a natural person*	
sh_board2	0	*Not a natural person*	

Table A.3: Shareholder 3, Continental AG, 2016

Variable	Coding	Explanation	Source
sh_name3	BlackRock Inc.		*Hoppenstedt: Included in shareholder data*
sh_share3	0.0315		*Hoppenstedt: Included in shareholder data*
sh_type3	3	*Institutional investor / asset manager on behalf of its clients*	*External source: "BlackRock is one of the world's leading providers of investment, advisory and risk management solutions. We are a fiduciary to our clients." https://www.blackrock.com/corporate*
sh_fam3	0	*Not associated with Schaeffler family*	
sh_found3	0	*Not a natural person*	
sh_ceo3	0	*Not a natural person*	
sh_mgmt3	0	*Not a natural person*	
sh_board3	0	*Not a natural person*	

Table A.4: Shareholder 4, Continental AG, 2016

Variable	Coding	Explanation	Source
sh_name4	Maria-Elisabeth Schaeffler-Thumann	*Added as shareholder because part of the board and holds shares indirectly*	*Hoppenstedt: Name included in supervisory board data*
sh_share4	0	*No shares held directly; included in shareholders 1 and 2.*	*Hoppenstedt: Not included in shareholder data*
sh_type4	1	*Natural Person*	
sh_fam4	1	*Member of Schaeffler family which is the largest (cumulative) shareholder.*	*External source: "Georg Friedrich Wilhelm Schaeffler [...] is a German billionaire businessman and owner of 80% of the holding company [...] His mother, Maria-Elisabeth Schaeffler, owns the other 20%. Both inherited their fortune from Schaeffler's father, Georg Schaeffler, who died in 1996." https://de.wikipedia.org/wiki/Georg_F._W._Schaeffler*
sh_found4	0	*Schaeffler family not associated with founder*	*External source: „Keimzelle der heutigen Continental AG war die Konkursmasse des kleinen gummiverarbeitenden Unternehmens Neue Hannoversche Gummi-Warenfabrik, die 1869 vom Bankier Moritz Magnus [...] erworben wurde." https://de.wikipedia.org/wiki/Continental_AG*
sh_ceo4	0	*Not a member of management board*	*Hoppenstedt: Management board data*
sh_mgmt4	0	*Not a member of management board*	*Hoppenstedt: Management board data*
sh_board4	1	*Member of supervisory board*	*Hoppenstedt: Supervisory board data*

Table A.5: Shareholder 5, Continental AG, 2016

Variable	Coding	Explanation	Source
sh_name5	Georg F.W. Schaeffler	*Added as shareholder because part of the board and holds shares indirectly*	*Hoppenstedt: Name included in supervisory board data*
sh_share5	0	*No shares held directly; included in shareholders 1 and 2.*	*Hoppenstedt: Not included in shareholder data*
sh_type5	1	*Natural Person*	
sh_fam5	1	*Member of Schaeffler family which is the largest (cumulative) shareholder.*	*External source: "Georg Friedrich Wilhelm Schaeffler [...] is a German billionaire businessman and owner of 80% of the holding company [...] His mother, Maria-Elisabeth Schaeffler, owns the other 20%. Both inherited their fortune from Schaeffler's father, Georg Schaeffler, who died in 1996." https://de.wikipedia.org/wiki/Georg_F._W._Schaeffler*
sh_found5	0	*Schaeffler family not associated with founder*	*External source: „Keimzelle der heutigen Continental AG war die Konkursmasse des kleinen gummiverarbeitenden Unternehmens Neue Hannoversche Gummi-Warenfabrik, die 1869 vom Bankier Moritz Magnus [...] erworben wurde." https://de.wikipedia.org/wiki/Continental_AG*
sh_ceo5	0	*Not a member of management board*	*Hoppenstedt: Management board data*
sh_mgmt5	0	*Not a member of management board*	*Hoppenstedt: Management board data*
sh_board5	1	*Member of supervisory board*	*Hoppenstedt: Supervisory board data*

Table A.6: Family firm definitions, Continental AG, 2016

Definition		Continental AG, 2016
Family share	*Cumulative controlling share held by members of the family*	46%
Ownership	*Family shareholders hold more than 25%*	Yes
Ownership & management board	*More than 25% and at least one family member in management board*	No
Ownership & supervisory board	*More than 25% and at least one family member in supervisory board*	Yes
Ownership & management & supervisory board	*More than 25% and family members in both boards*	No
Ownership & founder CEO	*More than 25% and CEO is the founder*	No
Ownership & other family member CEO	*More than 25% and CEO is another family member*	No
Ownership & external CEO	*More than 25% and CEO is not a family member*	Yes

A.2 Greiffenberger (2013)

Figure A.2 shows the ownership and management structure of Greiffenberger AG in 2013. The company is controlled by the Greiffenberger family through their family holding. One family member, Stefan Greiffenberger, acted as CEO and sole member of the management board of the company in 2013, while another, Heinz Greiffenberger, was member of the supervisory board (in 2016, Heinz Greiffenberger retired from the supervisory board, and Stefan Greiffenberger joined the supervisory board while leaving the management board and being replaced by an external CEO). With a stake of 58.87%, the first shareholder of Greiffenberger AG included in Hoppenstedt for 2013 is Greiffenberger Holding GmbH (Table A.7), which can be identified as a holding company, in which Heinz Greiffenberger holds 41.2% and Stefan Greiffenberger holds 29.4%. Accordingly, the shareholder is categorized as associated with the controlling family.

The second shareholder (Table A.8) is an institutional investor called Baden-Württembergische Versorgungsanstalt für Ärzte controlled by a German state entity and is not associated with the Greiffenberger family. In 2013, Stefan Greiffenberger acted as sole director and Heinz Greiffenberger was a member of the supervisory board. We thus added these two individuals as shareholders (Tables A.9-A.10). We assign 0 shares since all shares which are (indirectly) owned by shareholders 3 and 4 are already listed under shareholder 1. Online research reveals that Heinz Greiffenberger is the company's founder, while Stefan Greiffenberger is his son. The family is represented in the management board through Stefan Greiffenberger who is also the CEO, and the family is also present in the supervisory board through Heinz Greiffenberger.

The information described above is summarized in Table A.11. Since family members hold the overwhelming majority of shares in the holding company Greiffenberger Holding GmbH, we attribute the entire stake of the holding company in Greiffenberger AG to the family. The family share accordingly amounts to 58.87%. Since the share exceeds 25%, Greiffenberger AG is a family firm according to our baseline ownership definition. More precisely, it is a family firm where the controlling family is represented on both the management board and the supervisory board. Moreover, it is a family firm led by a family member as CEO.

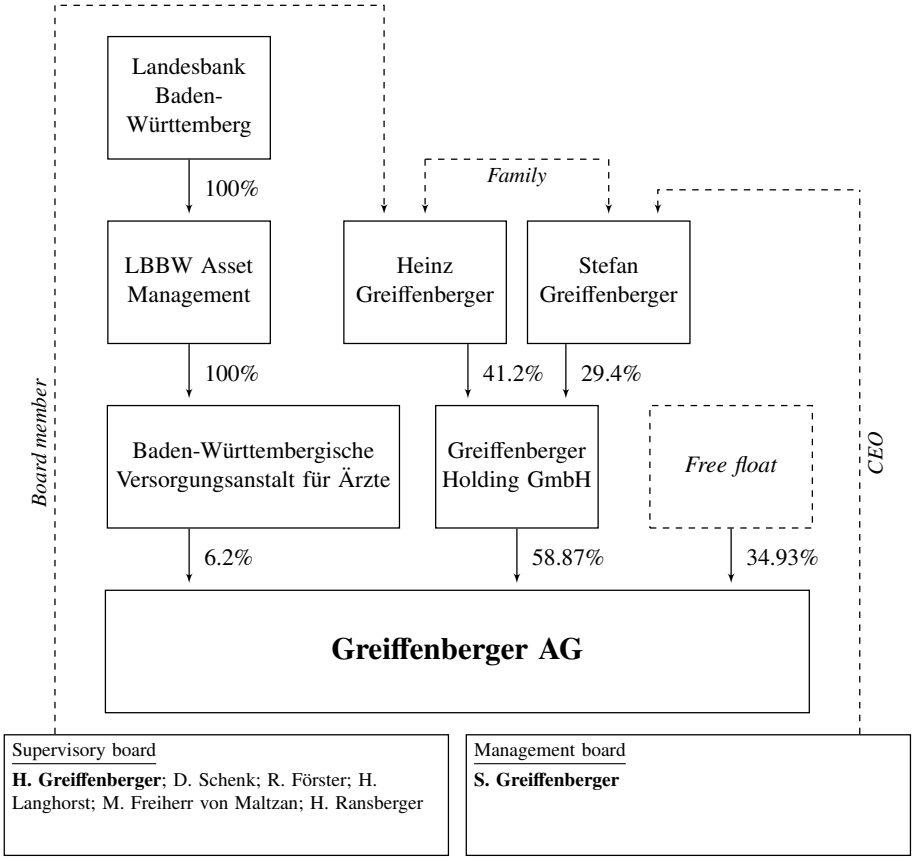


Figure A.2: Ownership and governance structure, Greiffenberger AG, 2013

Table A.7: Shareholder 1, Greiffenberger AG, 2013

Variable	Coding	Explanation	Source
sh_name1	Greiffenberger Holding GmbH		*Hoppenstedt: Included in shareholder data*
sh_share1	0.5887		*Hoppenstedt: Included in shareholder data*
sh_type1	2	*Holding company*	*External source: „Gegenstand des Unternehmens ist die Verwaltung eigenen Vermögens und das Halten von Beteiligungen an anderen Gesellschaften.“ https://www.northdata.de/Greiffenberger+Holding+ GmbH,+Thurnau/Amtsgericht+Bayreuth+HRB+3604*
sh_fam1	1	*Owned by Greiffenberger family which is the shareholder with the (cumulative) largest (indirect) share.*	*External source: „Herr Heinz Greiffenberger hält 41,2 % der Anteile an der Greiffenberger Holding GmbH, während der alleinvorstand der Greiffenberger AG, Herr Stefan Greiffenberger, 29,4 % der Anteile an der Greiffenberger Holding Gmbh hält.“ https://greiffenberger.de/wp-content/uploads/2021/12/Greiffenberger_GB_2013.pdf*
sh_found1	0	*Not a natural person*	
sh_ceo1	0	*Not a natural person*	
sh_mgmt	0	*Not a natural person*	
sh_board1	0	*Not a natural person*	

Table A.8: Shareholder 2, Greiffenberger AG, 2013

Variable	Coding	Explanation	Source
sh_name2	Baden-Württembergische Versorgungsanstalt für Ärzte		*Hoppenstedt: Included in shareholder data*
sh_share2	0.062		*Hoppenstedt: Included in shareholder data*
sh_type2	6	*Institutional investor but controlled by state entity*	*Hoppenstedt: Anteilseigner: LBBW Asset Management Investmentgesellschaft mbH, Stuttgart, 100%; Anteilseigner: Landesbank Baden-Württemberg, Stuttgart, 100%*
			External source: "Landesbank Baden-Württemberg [...] is a universal bank and the Landesbank for some Federal States of Germany [...] it is Germany's biggest state-backed landesbank lender." https://en.wikipedia.org/wiki/Landesbank_Baden-W%C3%BCrttemberg
sh_fam2	0	*Not associated with Greiffenberger family*	
sh_found2	0	*Not a natural person*	
sh_ceo2	0	*Not a natural person*	
sh_mgmt2	0	*Not a natural person*	
sh_board2	0	*Not a natural person*	

Table A.9: Shareholder 3, Greiffenberger AG, 2013

Variable	Coding	Explanation	Source
sh_name3	Heinz Greiffenberger	*Added as shareholder because part of the board and holds shares indirectly*	*Hoppenstedt: Name included in supervisory board data*
sh_share3	0	*No shares held directly; indirect share included in shareholder 1.*	*Hoppenstedt: Not included in shareholder data*
sh_type3	1	*Natural Person*	
sh_fam3	1	*Member of Greiffenberger family which is the largest (cumulative) shareholder.*	*External source: „Firmengründer Heinz Greiffenberger“ https://www.kurier.de/inhalt.stefan-greiffenberger-packt-aus.5bad6f68-e0ec-420b-bccc-7e3723346f41.html*
sh_found3	1	*Founder of the company*	*External source: „Firmengründer Heinz Greiffenberger“ https://www.kurier.de/inhalt.stefan-greiffenberger-packt-aus.5bad6f68-e0ec-420b-bccc-7e3723346f41.html*
sh_ceo3	0	*Not a member of management board*	*Hoppenstedt: Management board data*
sh_mgmt3	0	*Not a member of management board*	*Hoppenstedt: Management board data*
sh_board3	1	*Member of supervisory board*	*Hoppenstedt: Supervisory board data*

Table A.10: Shareholder 4, Greiffenberger AG, 2013

Variable	Coding	Explanation	Source
sh_name4	Stefan Greiffenberger	*Added as shareholder because part of the board and holds shares indirectly*	*Hoppenstedt: Name included in management board data*
sh_share1	0	*No shares held directly; indirect share included in shareholder 1.*	*Hoppenstedt: Not included in shareholder data*
sh_type4	1	*Natural Person*	
sh_fam4	1	*Member of Greiffenberger family which is the largest (cumulative) shareholder.*	*External source: „Stefan Greiffenberger [...] Sohn des Firmengründers Heinz Greiffenberger“ https://www.kurier.de/inhalt.stefan-greiffenberger-packt-aus.5bad6f68-e0ec-420b-bccc-7e3723346f41.html*
sh_found4	2	*Relative of founder Heinz Greiffenberger*	*External source: „Stefan Greiffenberger [...] Sohn des Firmengründers Heinz Greiffenberger“ https://www.kurier.de/inhalt.stefan-greiffenberger-packt-aus.5bad6f68-e0ec-420b-bccc-7e3723346f41.html*
sh_ceo4	1	*CEO („Vorstandsvorsitzender“)*	*Hoppenstedt: Management board data*
sh_mgmt4	1	*Member of management board*	*Hoppenstedt: Management board data*
sh_board4	0	*Not a member of supervisory board*	*Hoppenstedt: Supervisory board data*

Table A.11: Family firm definitions, Greiffenberger AG, 2013

Definition		Greiffenberger AG, 2013
Family share	*Cumulative controlling share held by members of the family*	58.87%
Ownership	*Family shareholders hold more than 25%*	Yes
Ownership & management board	*More than 25% and at least one family member in management board*	Yes
Ownership & supervisory board	*More than 25% and at least one family member in supervisory board*	Yes
Ownership & management & supervisory board	*More than 25% and family members in both boards*	Yes
Ownership & founder CEO	*More than 25% and CEO is the founder*	No
Ownership & other family member CEO	*More than 25% and CEO is another family member*	Yes
Ownership & external CEO	*More than 25% and CEO is not a family member*	No

B Employment and sales shocks

We ask whether labor hoarding may be more pronounced in family firms than in non-family firms in the face of sales shocks. In this Appendix, we present a simple regression analysis to estimate the sensitivity of firm employment to sales shocks. Specifically, we test whether this sensitivity varies between family and non-family firms. The baseline specification of our employment regression is:

$$\log e_{it} = \beta_1 \log s_{it} + \beta_2 \log s_{it} F_{it} + \beta_3 \log s_{it} \log age_{it} + \alpha_i + \delta_t + \varepsilon_{it} \tag{10}$$

where e_{it} is employment and s_{it} is sales of firm i in year t, F_{it} is a family firm dummy variable, age_{it} is the firm's age, α_i is a firm fixed effect and δ_t is a year fixed effect to control for aggregate shocks. The coefficient β_1 measures the sensitivity of employment to sales shocks in non-family firms, and β_2 measures the difference in that sensitivity between family and non-family firms. In a variant of this specification, we also include interaction terms between year fixed effects and the family firm dummy variable or the firm's age, to allow for the fact that firms may vary in their response to aggregate shocks.

Table B.1 shows the regression results. While columns (1) and (2) show the results of estimations using our baseline definition of family firms, columns (3) and (4) show estimations including dummies for family representation in the management and supervisory boards. Lastly, columns (5) and (6) shows results for the three subgroups of family firms led by the CEO, a family member or an external CEO. The specifications in columns (2), (4), and (6) include interaction terms between year fixed effects and the respective family firm dummy or the firm's age. Across all models, we find a similar, highly significant, employment reaction to sales shocks, indicating that firms in our sample tend to align their workforce numbers with sales fluctuations. However, the estimated effect of family firms is negligible and lacks significance across all specifications, suggesting that the response of family firms to sales shocks does not differ from that of non-family firms.

Table B.1: Employment and sales shocks

	Log(Employment)					
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Sales)	0.620***	0.620***	0.620***	0.618***	0.625***	0.625***
	(0.049)	(0.090)	(0.049)	(0.085)	(0.049)	(0.089)
Log(Sales) × Family firm	0.000	-0.012				
	(0.003)	(0.017)				
Log(Sales) × Family in MB			-0.001	-0.015		
			(0.004)	(0.023)		
Log(Sales) × Family in SB			-0.002	-0.023		
			(0.003)	(0.037)		
Log(Sales) × Family in MB and SB			0.002	-0.070*		
			(0.005)	(0.042)		
Log(Sales) × Family neither in MB nor SB			0.002	0.013		
			(0.003)	(0.014)		
Log(Sales) × Founder CEO					-0.008*	-0.041
					(0.004)	(0.028)
Log(Sales) × Member CEO					0.004	-0.019
					(0.004)	(0.029)
Log(Sales) × External CEO					0.001	-0.005
					(0.003)	(0.020)
Log(Sales) × Log(Age)	0.024***	0.025	0.024***	0.027	0.023***	0.024
	(0.007)	(0.027)	(0.007)	(0.025)	(0.007)	(0.027)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year FE × Family firm	No	Yes	No	No	No	No
Year FE × Family in MB	No	No	No	Yes	No	No
Year FE × Family in SB	No	No	No	Yes	No	No
Year FE × Family in MB and SB	No	No	No	Yes	No	No
Year FE × Family neither in MB nor SB	No	No	No	Yes	No	No
Year FE × Founder CEO	No	No	No	No	No	Yes
Year FE × Member CEO	No	No	No	No	No	Yes
Year FE × External CEO	No	No	No	No	No	Yes
Year FE × Log(Age)	No	Yes	No	Yes	No	Yes
Observations	10167	10167	10167	10167	10167	10167
Adj. R-squared	0.589	0.595	0.589	0.597	0.590	0.596

Notes: The table presents the results of OLS regressions. Dependent variable is the log of total employment. Family firm is a dummy variable indicating family ownership. Family in MB, Family in SB, Family in MB and SB, and Family neither in MB nor SB are dummy variables indicating that the controlling family is represented either on the management board only, on the supervisory board only, on both boards, or on neither board. Founder CEO, Member CEO, and External CEO are dummy variables indicating that a family firm is managed either by its founder, another family member, or an external CEO. All regressions include firm fixed effects and year fixed effects. Standard errors are clustered at the firm level. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively.

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ifso institute for socio-economics

Institute for Socio-Economics
University of Duisburg-Essen

Lotharstr. 65
47057 Duisburg
Germany

uni-due.de/soziooekonomie
wp.ifso@uni-due.de