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Mapping Corporate Ownership and Control Changes for Public and Private Companies

Finance Working Paper N° 1076/2025
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Keywords: Control change, Corporate control, Takeover, Family firm; COVID-19, Financial constraint

JEL Classifications: G30, G34

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July 2, 2025

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I Introduction

Corporate control has been a focal point in industry, regulatory, and academic discussions for almost a century (e.g., Berle and Means, 1968; Jensen and Ruback, 1983), with control changes representing pivotal moments in a company's lifecycle. While existing literature has significantly advanced our understanding of global corporate control (La Porta et al., 1999; Claessens et al., 2000b; Faccio and Lang, 2002; Anderson and Reeb, 2003; Masulis et al., 2011; Aminadav and Papaioannou, 2020; Fonseca et al., 2023), these analyses predominantly address listed firms.

Nearly four decades after the unfulfilled prediction of the eclipse of the public corporation (Jensen, 1989), trends indicate a substantial decline in the number of listed firms and a growing prominence of privately-owned firms (e.g., Doidge et al., 2017, 2018; Ewens and Farre-Mensa, 2020).[1] Despite considerable interest,[2] substantial gaps in our understanding of corporate control and its changes persist, particularly concerning privately-owned companies. This work aims to address this gap by providing a comprehensive map of corporate control, documenting the owners, the frequency of control changes, and the main determinants.

To this end, we propose an approach that identifies control changes based on the comparison of ultimate owners in subsequent years. It is important to note that a control change, while related, is not necessarily an acquisition of a majority stake. It is a broader concept that can include acquisitions of minority stakes, which still allow an investor to control the firm. Our method diverges from the conventional acquisition literature, which

[1] In the United States, the Wilshire 5000 index, encompassing every stock listed on the New York Stock Exchange, NASDAQ, and NYSE AMEX, peaked at 7,562 companies in July 1998. As of December 31, 2023, the index contained 3,403 components. The number of listings in the European Union decreased from 7,392 in 2010 to 6,538 in 2018 (https://ec.europa.eu/newsroom/fisma/items/734716/en)

[2] An extensive and expanding body of literature has examined various aspects of the market for corporate control, including merger negotiations (Aktas et al., 2010; Betton et al., 2009), wealth effects (Dessaint et al., 2024), methods of payment (Faccio and Masulis, 2005), impacts on corporate policies and innovation (Fresard et al., 2020; Bena and Li, 2014), characteristics of top executives involved (Malmendier and Tate, 2008; Yim, 2013; Jenter and Lewellen, 2015), and the role of institutional investors and hedge funds (Ferreira et al., 2010; Greenwood and Schor, 2009), among others. Research on acquisitions has similarly concentrated on listed firms, either as acquirers or targets, with relatively few studies examining privately-owned companies (e.g., Erel et al., 2015; Ortiz et al., 2023).

typically identifies control changes through deals reported by commercial M&A databases such as LSEG Workspace (formerly SDC) or Bureau Van Dijk's Zephyr.[3] Our approach offers the advantage of systematically tracking all control changes for every firm. Traditional M&A databases may overlook transactions involving small private firms, especially if only a block of shares is involved. Additionally, these databases record only the acquisition of the parent company when both parent and subsidiaries are acquired, hindering immediate tracking of control changes for affiliated firms. Additionaly, the ownership structure approach can capture genuine ownership changes, avoiding within-group transactions—a limitation of the traditional deal-based approach, which lacks reliable information about firms' ultimate owners. Moreover, our focus is on mapping control changes rather than determining the value effects of deals, which requires deal-level information provided exclusively by M&A databases.

To determine whether a control change occurs in a firm, we must first identify its owners. Indeed, the primary challenge of our analysis lies in identifying controlling shareholders. Systematically identifying the owners of hundreds of thousands of listed and privately-owned firms is daunting due to the complexity of ownership structures and data inconsistencies. The traditional approach in ownership literature for listed firms relies on control thresholds, typically 20% of voting rights, and measures shareholder control through the *weakest link* along control chains, i.e., the smallest amount of voting rights (La Porta et al., 1999; Claessens et al., 2000a; Faccio and Lang, 2002). However, ownership structure data are not readily available for private firms globally.

Europe provides an ideal setting for our study.[4] While privately-owned European firms are not subject to the same disclosure regime as listed firms, they must report shareholdings and financial data to local business registers.[5] This requirement allows us to access data on both listed and unlisted non-financial firms in these countries through historical databases available in Moody's DataHub. These databases include both public

[3]See Eckbo et al. (2025) for a comprehensive literature review on corporate takeovers.

[4]Our sample also includes firms from the European Union, Norway, Switzerland, and the United Kingdom. The United Kingdom, which left the European Union in 2016, is also part of the sample.

[5]Private firms are required to disclose their financial data following the implementation of the 2003 European Commission (EC) directive on financial reporting (Ortiz et al., 2023).

and private European firms, providing information on their ultimate owners (Kalemli-Ozcan et al., 2015). Previous versions of these data, formerly known as Bureau Van Dijk's Orbis and Amadeus databases, have been widely used to identify ultimate owners in prior research (Faccio et al., 2011; Lins et al., 2013).[6] In line with Franks et al. (2011) and Lins et al. (2013), we define ultimate ownership as control of at least 25% of voting rights in the firm. Our final sample consists of 375,634 non-financial European private and public firms from 2015 to 2022, corresponding to 2,025,931 firm-year observations for which we identify the controlling shareholder.

We develop a novel approach to determine corporate control changes. Our starting point is defining control change as different ultimate owners for the same firm in two consecutive years, as reported in the historical ownership files of the DataHub. By focusing on ultimate owners, we capture actual corporate control changes rather than ownership reshuffling within a business group. Control changes based on ultimate owners exclude intragroup transactions between firms under the same controlling owner, as the ultimate owner remains unchanged in these transactions. We identify 272,533 control changes (13.45%). However, relying solely on DataHub data would inflate the number of control changes due to reporting inconsistencies. We manually clean the ownership data to ensure consistency in the names of ultimate owners, reducing the frequency of control changes to 11.69%. Another problem with the data arises when ownership of a firm switches back and forth between two apparently unrelated owners. Since it is rare for a controlling shareholder to repurchase control shortly after selling it, we disregard a control change if the ultimate owner reappears within a three-year window. Thus, we assume the original owner remains in control, resulting in no control change.[7] Our methodology identifies 166,343 control changes in our sample (8.21%). Simply relying on DataHub ownership data would have increased the frequency of control changes by 64% compared to our

[6]The historical database available in Moody's DataHub was developed to link several vintages/disks of the Orbis data through firm identifiers to create firm-level longitudinal datasets for many countries (Gourinchas et al., 2024; Kalemli-Özcan et al., 2024).

[7]We describe our methodology in Section B.

identified changes.[8]

Overall, our evidence documents an active market for corporate control in Europe. The rate of corporate control changes has been relatively stable over the period studied, with a notable decrease in 2020 due to the COVID-19 pandemic. While there is some heterogeneity in the frequency of control changes across countries, our findings suggest that the corporate control market is well-developed throughout Europe. Consistent with Fonseca et al. (2023), domestic owners control the majority of our sample firms (64%). However, foreign ownership is significant, with more than one-third of the sample firms owned by foreign entities. Our descriptive analysis also underscores the importance of cross-border control changes. Specifically, 3.49% of control changes involve an acquirer from a different country. Additionally, we find that 9.5% of listed firms change controlling owners annually. For comparison, Bennett and Dam (2021) report that 5% of US publicly listed firms are acquired each year. Given that our unit of analysis is the individual firm and business groups are common in Europe (Masulis et al., 2011), a single acquisition of a parent company could trigger multiple control changes, including the parent and all its subsidiaries. To address concerns of overestimating the real rate of control change, we examine a sample of stand-alone companies, parent companies, and listed firms (580,204 firm-year observations). We find that the market for corporate control in Europe remains robust, with 5.43% of firms changing hands annually.

We investigate how the type of controlling shareholder influences the market for corporate control. It is well-documented that heterogeneity among controlling shareholders leads to variations in corporate policies and performance (Cronqvist and Fahlenbrach, 2008). Controlling shareholders differ in several dimensions, impacting corporate dynamics such as time horizons, control preferences, risk tolerance, and decision-making processes. We categorize controlling shareholders into four groups: families, financial owners, industrial companies, and the State.[9] Families and industrial companies are the

[8]The frequency of control changes is 7.81% if we exclude changes resulting in the firm becoming its own ultimate owner.

[9]Following the literature (Faccio and Lang, 2002), we use the label State to identify the controlling shareholder of firms owned by national and local governments.

predominant controlling shareholders, each representing over 40% of the observations. A notable portion of non-financial firms (approximately 10%) is owned by financial entities, including banks, insurance companies, and private equity funds. State-owned enterprises constitute about 5% of our sample. Aligned with the literature indicating that families prioritize retaining control of their firms (Sraer and Thesmar, 2007; Bauguess and Stegemoller, 2008; Caprio et al., 2011), we observe a lower rate of corporate control changes in family-owned firms (5.69%). Similarly, state-owned firms exhibit a low likelihood of ownership change (3.51%). Conversely, firms owned by industrial companies (9.89%) and financial firms (14.02%) experience higher frequencies of control changes. We also find that the type of owner changes in the majority of control changes. There is no evident preference for family owners to sell to other families. A significant proportion of firms owned by financial entities are sold to other financial firms, consistent with the increasing prevalence of secondary buyouts (Degeorge et al., 2016).

We confirm the univariate evidence discussed above with regression analyses, employing two sets of fixed effects. First, we use firm fixed effects and time fixed effects. Including both firm fixed effects and binary variables for controlling ownership types is typically challenging due to infrequent ownership changes (Sraer and Thesmar, 2007). However, our large datasets enable us to saturate the model with firm fixed effects, ruling out the possibility that the effect associated with ownership type is due to unobserved differences between firms. In this model, coefficients are identified by comparing the probability of a control change across different ownership types relative to industrial owners. In the second specification, we include $Industry \times Year$ and $Country \times Year$ fixed effects, controlling for time-varying industry and country differences. Here, coefficients are identified by comparing a firm's probability of changing control to that of peers in the same industry and country with industrial owners. Our results reveal that family-owned firms are significantly less likely to experience a change in corporate control. Keeping the firm constant (i.e., using firm fixed effects), family ownership reduces the likelihood of a control change by approximately 5.8%. The decrease is about 3.6% cross-sectionally ($Industry \times Year$ fixed effects). State ownership also decreases the likelihood of a con-

trol change. We find that financial owners are more likely to sell control of their firms compared to other owners in the same industry and country. Additionally, key factors in corporate control dynamics include firm age, liquidity, profitability, and financial distress. Relatively younger and more profitable firms, in terms of ROA, are more attractive targets. Firms with lower liquidity or higher leverage than industry peers are also more likely to experience ownership transitions, reflecting financial vulnerability.

We extend our analysis to investigate the impact of an exogenous shock, such as the COVID-19 pandemic, on control changes. COVID-19 has severely impacted economic activity and firm performance globally and in Europe (Carletti et al., 2020; Fahlenbrach et al., 2020; Ramelli and Wagner, 2020; Barrot et al., 2024). We employ Eurostat's Labor Force Survey data on work from home and the COVID-19 stringency index from the Oxford Coronavirus Government Response Tracker (OxCGRT) project to create a country-industry level variable that measures the intensity of exposure to the exogenous shock, following the approach of Barrot et al. (2024). Our results indicate that COVID-19 does not significantly alter the incentives of controlling shareholders.

We examine how financial constraints affect the propensity for a control change. Erel et al. (2015) show that acquisitions can help firms alleviate their financial constraints.[10] While we do not find that financially constrained firms are more likely to experience control changes, we document a tendency for family owners to be even more reluctant to sell control when the firm is financially constrained. This result is not entirely unexpected given families' attachment to control. This finding is also consistent with previous evidence from Lins et al. (2013), which shows that family firms take actions to increase the likelihood that the firms under their control, and their control benefits, survive crises.

As a final test for heterogeneous effects on the propensity for a control change, we examine whether owners' incentives to sell vary with the size and listing status of the firm. Using total assets as a proxy for firm size, we find that family owners' reluctance to sell decreases with size. However, this effect is observed only in the less saturated models

[10]We use measures applicable to privately-owned firms, such as the size-age index (SA Index) (Hadlock and Pierce, 2010), the SEB index (Schauer et al., 2019), the ASCL index (Mulier et al., 2016), and the firm's net financial position (debt minus cash).

with *industry* × *year* and *country* × *year* fixed effects. *Ceteris paribus*, family owners of smaller firms are more attached to control than those owning larger companies. Similarly, we find that families are more likely to sell a firm when it is listed on a regulated stock exchange. We also find that being listed generally increases the propensity for control changes across all types of owners. Finally, we investigate cross-border control changes and, again, find that family and state owners are the most reluctant to sell.

Our paper adds to the literature in different ways. First, we systematically map corporate control changes for the universe of privately-owned and publicly listed firms. By linking two well-developed strands of corporate finance literature—corporate ownership and acquisitions—we provide, to the best of our knowledge, the first empirical evidence on the frequency of control changes for a large population of private and listed firms, specifically the universe of European firms with total assets exceeding €10 million. We introduce a new methodology based on the historical ownership data from Moody's DataHub to identify these changes. Given the growing importance of private companies and the market for their corporate control, our findings offer novel insights that enhance the understanding of this market. By providing a comprehensive and dynamic analysis of ownership structures in both public and private European firms, our study advances the understanding of corporate control and its implications for governance, market stability, and economic resilience.

Second, an important byproduct of identifying control changes is determining the ownership of more than 375,000 non-financial firms over eight years in Europe. This dataset is one of the largest ownership datasets based on publicly available data. While the literature typically provides a snapshot of ownership structures at a specific point in time (Aminadav and Papaioannou, 2020), we track firms over a relatively long period. We meticulously clean the data to remove inconsistencies and errors. This dataset offers a novel dynamic view of corporate ownership in Europe, highlighting the significant role of financial firms as owners of non-financial companies. Financial owners are present in nearly one out of ten industrial companies, representing a substantial share of corporate Europe. This finding aligns with the increasing role of private equity ownership.

Third, we contribute to the extensive literature on family firms and heterogeneity among large shareholders (Cronqvist and Fahlenbrach, 2008). We find that families are indeed attached to the control of their firms. Our analysis shows that the reluctance of family firms to relinquish control is shared only by governments. Financial owners are the most active sellers, indicating that their presence enhances the dynamism of the corporate control market.

Finally, our paper documents the significant role of foreign owners. Foreign ownership is widespread, which is unsurprising in a highly integrated area like the European Union, where countries share common regulations. Nonetheless, our results indicate a tendency for certain owners, such as families and the state, to exhibit biases against foreign buyers, reflecting signs of economic nationalism (Dinc and Erel, 2013).

The rest of the paper is organized as follows. Section II describes the data sources used and presents the methodology for identifying ultimate controlling shareholders. We also provide an illustration of the sample composition, descriptive statistics, and variables. Section III discusses the map of corporate control. In Section IV, we present the results of the different models. Section V summarizes our findings and concludes.

II Data and Methodology

A Data

The dataset includes firms from European Union (EU) countries, the United Kingdom, which left the EU in 2016, Norway, and Switzerland spanning from 2015 to 2021. Financial and ownership data are sourced from Moody's DataHub. We filter the dataset based on the legal form of entities, retaining only private limited companies, public limited companies, or foreign companies. We drop financial firms, public administration and defense firms, and extra-territorial firms because subject to different regulations. We include firms in the sample if they have total assets of at least €10 million for at least one year. We exclude firms categorized as "limited financial" (LF) in Moody's DataHub, having only information on total assets and sales. We also exclude firms whose legal

status is "bankruptcy", "dissolved", or "in liquidation" starting from the year following that status update.[11] Additionally, we remove observations related to firms whose country variable is inconsistent with their Bureau van Djik identifier.[12] Moreover, we drop firms with no information on their industry and on their ultimate owner.

We also apply the screening procedure of Gourinchas et al. (2024), who also utilizes the DataHub database, to the dataset obtained in the previous steps, filtering on total assets, operating revenues, number of employees, sales, age and remove observations with balance sheet inconsistencies. For accounting variables, we prioritize consolidated balance sheet accounts in our sample. If these are not available, we include unconsolidated accounts.[13] The decision to retain the highest consolidation level for each firm-year observation reflects our focus on what a potential new owner acquires by taking control of the firm. Because of this, we must consider its subsidiaries when they fall within the firm's consolidation perimeter. This approach differs from Kalemli-Ozcan et al. (2015), which employs uncosolidated data. However, differently from them, our goal is not to provide industry and national trends, for which using consolidated data could be problematic due to double counting. Table A1 in Appendix $A.1$ outlines the step-by-step procedure and the number of observations excluded at each step. The final dataset comprises 375,634 firms, accounting for 2,025,931 observations.

We supplement the dataset with information from various external sources. Data on

[11]DataHub provides a sub-classification for inactive companies: "Bankruptcy" refers to firms legally declared unable to pay their creditors, these firms are ultimately dissolved and cease to exist. "In liquidation" applies to companies whose assets are being sold, typically in cases of friendly or voluntary liquidation, not linked to credit issues. "Dissolved" denotes companies that no longer exist as a legal entity. Additionally, when the cause of dissolution is known, DataHub uses specific labels such as merger or take-over, demerger, bankruptcy, or liquidation. "Inactive" indicates no longer active companies for which the precise reason for inactivity is unknown. For our analysis, we consolidate these statuses into three categories: dissolved (including the labels dissolved, dissolved for demerger, and inactive companies), dissolved for merger or take-over, and bankruptcy (including the labels bankruptcy, in liquidation, dissolved for bankruptcy, and dissolved for liquidation).

[12]The first two letters of the identifier indicate the country of legal registration or headquarters.

[13]The consolidation code variable indicates the type of financial statements available for a company. C2 is associated to consolidated accounts, but both consolidated and unconsolidated accounts are available. C1 indicates only consolidated accounts are available. U2 is associated to unconsolidated accounts, but both consolidated and unconsolidated accounts are available. U1 refers to cases where only unconsolidated accounts are available. When firms have multiple filings in the same fiscal year, we prioritize annual reports over local filings due to their more comprehensive data.

firms' listing and delisting dates are obtained from Datastream. We collect information on deals involving European targets from the Orbis M&A database (formerly Zephyr). The gross fixed capital formation deflator is sourced from the European Central Bank (ECB) data repository. Data on government responses to the COVID-19 pandemic for European Union countries are collected from the Oxford COVID-19 Government Response Tracker (OxCGRT) (Hale et al., 2021) for the years 2020 and 2021.[14] Data on work from home are obtained from the Eurostat Labour Force Survey (EU-LFS).

B Identification of ultimate owners and control changes

Mapping corporate control changes in listed and unlisted firms begins with the identification of the ultimate shareholders. Although the market for corporate control is often associated with acquisitions, in this study we employ the broader concept of control change. We consistently refer to changes in control, which can occur through acquisitions, mergers, corporate restructuring, minority block purchases and other mechanisms. We propose a novel methodology, which enables us to determine who controls the firm and analyze changes in control. In this paragraph, we provide a step-by-step outline of the process used to trace ownership patterns.

Relying on ownership data from Moody's DataHub, we identify the controlling shareholder of each firm in our dataset. DataHub provides the global ultimate owner (GUO) at two thresholds of voting rights, 25% and 50%, for each year. The ultimate owner of a firm is either the entity directly controlling the firm at a defined cutoff or the entity having an indirect link exceeding the threshold (i.e., control chain). For both thresholds, two configurations are available: GUO and corporate GUO. Therefore, the database includes four variables that capture different levels and types of control: GUO25 and GUO50 (GUO), GUO25C and GUO50C (corporate GUO).

[14]While data are generally collected at the country level, regional-level data are used for Belgium, as available in the repository.

To identify controlling shareholders, we determine the ultimate owner by following a hierarchical procedure.[15] We begin by examining GUO25, which reflects an ultimate owner holding at least 25% of the firm's voting rights. If GUO25 is either unavailable or corresponds to the firm itself, we proceed to GUO50, representing ownership of at least 50%.[16] If neither of these variables yields a valid owner not corresponding to the firm itself, we apply the same logic to corporate owners, prioritizing GUO25C over GUO50C. This approach enables us to capture ownership structures at the most granular level, particularly when the ultimate owner is an individual. As indicated in Section *A*, if we do not have information on global ultimate owners at any level, as it the case for 126,929 entries, we exclude those observations from the sample. The resulting variable (*Ultimate Owner*) serves as the starting point for mapping corporate ownership and control. Using the sequence of controlling shareholders, we identify a change of control whenever we observe a different ultimate owner for the same firm in consecutive years. We label this initial measure of control changes *Moody's DataHub (MDH) Change*. We detect 272,553 control changes as shown in Table I, where we report the control changes.

[Please insert Table I about here]

The variable *Ultimate Owner* is not enough for an accurate analysis of control changes. In fact, corporate controls based on this variable would be artificially inflated due to data inconsistencies or reporting inaccuracies in the DataHub. To mitigate this risk, we conduct a detailed firm-entity-level ownership analysis that links global ultimate owners with famly, legal, or economic ties. Specifically, we employ textual analysis of GUO names to identify potential connections between shareholders, allowing us to detect continuity in control despite apparent changes in ownership.[17]

[15]This approach does not account for the presence of multiple blockholders, potentially omitting other relevant owners.

[16]For example, if firm A is identified as its GUO25 and B as its GUO50, B is the ultimate owner of firm A. However, if firm A is the only entity indicated as GUO, we consider A as the controlling entity.

[17]As an alternative methodology, we also attempted to match shareholders using a similarity score. However, defining a clear threshold to determine whether two names refer to the same entity proved challenging. For instance, false positives persist even imposing stringent cutoff levels. Moreover, while the similarity scores approach addresses problems related to formatting and typos, it performs poorly

We apply different rules to link controlling shareholders depending on the type of entity. To this end, we classify shareholders into four groups (as in Kalemli-Ozcan et al. (2015)): *Family* includes family, individual (category I in DataHub), or unnamed private shareholder (D); *Financial Owner* is an insurance firm (A), a bank (B), a mutual or pension fund, a nominee, a trust or trustee (E), a financial firm (F), a foundation or research institute (J), a private equity firm (P), a venture capital firm (V), or a hedge fund (Y); public authority (S) is categorized as *State Owner*; and *Industrial Owner* includes industrial firm (C) or employees, managers, or directors (M).

For State owners, we treat all shareholders representing the same national government as a single controlling entity. In other words, we rely on the ultimate owner country code. For industrial and financial owners, we combine the names of GUOs to identify the most frequent keywords at firm-entity level. We then refine this set of keywords by excluding common or generic terms (e.g., "limited", "holding", "international") that are useless to signal relatedness. Based on the keywords, we consolidate GUOs sharing at least one relevant word. Finally, we use GUO string names to match family owners too. These strings include first and last names of the individuals controlling the firm. However, they are often inconsistently formatted - e.g., switches between first and last names, titles or honorifics ("Dr.", "Miss", "Ing."). To address this issue, we identify common names between family GUOs controlling the same company. We consider blockholders sharing at least two keywords as a unique entity. It is unlikely that unrelated individuals with identical first and second given names have owned the same firm. Additionally, we perform an additional manual check to rule out false positives when observations share only one keyword.[18] We call this measure of control changes based on the name correction process *NCP Change*. In Table I, we find 236,825 control changes after these refinements.

when shareholders share the same last name but have different, often lengthy, first names. Limitations remain even after incorporating stopwords into the matching process.

[18]This additional check helps prevent the misclassification of individuals sharing just the first name, which does not imply any relationship. Also, it allows us to correct issues such as changes due to marital status or misspelled names. Additionally, when an identifier refers to multiple individuals, we classify the company as continuously controlled by the same family, provided that at least one overlapping individual remains involved.

This measure of control changes can still overestimate the actual number of transitions due to the ultimate owner switching back and forth between entities. Since it is not common for a former owner to repurchase control of a company within a short time span of the sale, such patterns may raise concerns. To address this issue, we further refine our measures of control changes. To facilitate the identification of control changes, we assign a letter to each ultimate owner of the firm. This allows us to work with patterns of letters that are comparable across firms.[19] After mapping owners into letters, we apply the following rules an ultimate owner appears multiple times: (1) we consider fixed the first and the last letters in the pattern; (2) a letter is preserved as long as it appears again within a maximum of four characters (three-year window), replacing letters in between; (3) in case of conflicts, e.g., multiple candidates within the four-characters window, we prioritize the most recent letter encountered in the sequence. To implement these rules, we need information on the ownership structure of the firm for at least a few years to identify a control change. To this end, we require at least three years of ownership data. Therefore, we use ownership data from 2013 to 2014 as a lookback period of the first sample years.[20]

Table II shows basic scenarios of ultimate ownership patterns that require adjustment to identify real changes in control, according to our rules. Examples 1 to 3 illustrate straightforward application of the second condition: (1) B is replaced by A since it reappears after two years; (2) both Cs become B, which reappears after three years; and (3) the sequence BBC is replaced by three As, because A reappears within the three-years window. The nested scenario in Example 4 requires a closer examination. In this case, multiple candidates qualify, as both A and C satisfy condition 2 (reappearing within four characters). Consequently, letter A prevails in the second year, replacing letter B. However, when letter C shows up, it must be preferred, as it is the most recent letter that reoccurs just after the three-years window.

[19] In our sample there are 6,928 unique patterns. For instance, assuming a four year time window, the ultimate owners of firm X are Mickey Mouse (A), Scrooge McDuck (B), Scrooge McDuck (B) and Minnie (C), while the ultimate owners of firm Y are Daisy Duck (A), Minnie (B), Donald Duck (C) and Daisy Duck (A).

[20] Firms entering from 2015 onward are not a concern since no prior ownership data should exist.

[Please insert Table II about here]

After applying the described transformations, we identify 159,373 changes of control in our sample. About 66% of the firms do not experience any ownership change. This evidence aligns with the existing literature on corporate control, as ownership structures tend to be relatively stable over time (La Porta et al., 1999).

A limitation of this approach is that it captures changes in control only for firms that continue operating as independent entities. To address this issue, we also consider firms that exit the sample when incorporated by the acquirer. First, we integrate our dataset with information on firms' legal status: among the inactive companies, those dissolved due to mergers or takeovers are classified as changes in control. Second, we also consider acquisition targets from Orbis M&A dataset that match our firm-year observations as ownership changes. These refinements increase the number of control changes to 166,354 real changes in control. The variable identifying these changes is labeled *Change*.

As a robustness check, we also construct the variable *Change2*. It ignores changes where the firm itself is indicated as its ultimate owner.[21] We also develop an alternative method to identify ownership changes, focusing on the persistence of control. Specifically, we consider a GUO as the real ultimate owner only if its control spans at least two consecutive years. This yields the variable *TargetP*, a stricter requirement that results in fewer ownership changes.

Table I summarizes the effects of our procedure on the number of changes in control. The adjustment processes clearly result in a reduction in the number of real changes identified. For instance, under the raw measure *MDH Change*, 13.45% of firms in our sample change owners annually, on average. This drops to 8.21% using *Change*. Control changes remain relatively stable over the years. However, focusing on the variables that incorporate the three-year pattern procedure (from Column 4 onwards), we observe a peak in control changes in 2017, which reflects changes occurring in 2018 due to the forward-looking nature of the variable. This is followed by a significant drop in 2019, corresponding

[21]For example, if firm A is the ultimate owner of firm A, and the following year B becomes the new ultimate owner, this change of control is not recorded.

to operations taking place in 2020. This reduction is likely attributable to the economic downturn caused by the COVID-19 pandemic. Control changes returned to pre-shock levels the following year, likely driven by increased consolidation or restructuring efforts in response to the crisis.[22]

Based on the organizational structure of a given firm, we build three dummy variables indicating if a firm is classified as a *Stand-alone company* (SAC), a *Parent company*, as a *Listed subsidiary* or as an *Unlisted subsidiary*. We consider a firm as a SAC if it is its own ultimate owner (i.e., its identifier matches the global ultimate owner reported by DataHub) and does not control any other firms in the sample. Conversely, if other firms are under its control, it is categorized as the holding of a group. Lastly, if a firm is neither a SAC nor an holding, it is classified as listed subsidiary if listed, as an unlisted subsidiary otherwise.

We also consider the globalization of corporate control. To capture this phenomenon, we construct a dummy variable, *Foreign Owner*, which indicates whether the ultimate owner is located in a different country than the firm itself. Moreover, we define the variables *Cross-border* and *Extra Europe*, which indicate, respectively, whether the new ultimate owner is based in a different country from the target firm, and whether the new owner is located outside Europe. These variables allow us to distinguish between domestic changes in corporate control and those involving foreign ownership.

III The Map of Corporate Control

This section presents a comprehensive overview of corporate control dynamics within our sample. We begin by describing the sample composition, focusing on the time series of control changes identified by our variable *Change*. The analysis is conducted for the full dataset and further disaggregated into key subsamples: SACs, parent companies and listed subsidiaries, and listed firms. We then examine how control changes vary across

[22]The number of changes captured by the variable *ChangeP* in 2021, which reflects changes of control occurring in 2022, is negligible by definition. This is because, without data on 2023, the persistence of control requirement cannot be verified for these observations, even if a change of control did occur.

countries and industries, offering both geographical and sectoral insights. We conclude this descriptive map of control change dynamics by analyzing the type of shareholders involved in these operations. Using a transition matrix analysis, we trace who sells control and to whom. Finally, we extend this framework to explore control changes by firm type, identifying which structures are most likely to become targets of control changes and the organizational forms they adopt post-transition.

A Sample Composition

Using the procedures described in Section B, we trace the ultimate ownership of over 375,000 European firms between 2015 and 2021, covering both listed and unlisted firms. This mapping allows us to document and describe the evolution of the market for corporate control across time, countries, and industries.

Table III presents the time series (Panel A), geographical (Panel B), and sectoral (Panel C) distribution of control changes, in absolute and relative terms. To facilitate the comparison with the other subsamples, we report in the first block of the panel of Panel A, the time series of control changes for the full sample shown in Table I for the variable *Change*. Overall, Panel A shows a relatively stable market for corporate control in Europe. In the full sample, the average, 8.21% of firms change hands each year. This rate falls to 5.4% when we exclude unlisted subsidiaries, and rise to 9.5% considering the subsample of listed firms, which is a liquid segment and more active in terms of ownership transitions. Also, in the final two blocks of Panel A, we observe a notable drop in 2019 - reflecting control changes occurring in 2020 due to the forward-looking nature of the variable. This disruption likely reflects the economic uncertainty triggered by the COVID-19 pandemic. However, the control market activity recovered the following year, aligning with pre-crisis levels.

At the country level, Panel B reveals an interesting heterogeneity within Europe. As expected, Italy, United Kingdom, France, Spain, and Germany are the most represented countries in our panel. The highest frequency of changes in corporate control is in relatively small countries (Latvia, Malta, and Luxembourg) as well as in Ireland and the

United Kingdom. Conversely, firms in Greece, Hungary, Switzerland, Italy, and Austria exhibit greater stability in corporate control.[23] The same behavior is observed by SACs, parent companies and listed subsidiaries. While some cross-country variation exists, our findings suggest that the corporate control market is well-developed and active throughout Europe.

Finally, Panel C shows the breakdown of our sample in terms of industry, at NACE level 1. Five industries (manufacturing, `C`, trade, `G`, real estate activities, `L`, professional, scientific, and technical activities, `M`, and construction, `F`) represent more than 70% of the sample in terms of firm-year observations. Regarding changes in control, the most active industries are information and communication (`J`), and utilities, (`D`).

[Please insert Table III about here]

B Types of owners

Another important dimension of the market of corporate control concerns the type of controlling shareholder. Ownership types differ in key respects, including time horizons, control preferences, risk appetite, and strategic behavior, which can all shape corporate control dynamics.

As outlined in Section B, we categorize ultimate owners into four main groups: families, financial institutions, industrial companies, and the public authorities. Panel A of Table IV presents summary statistics of the sample by types of ultimate owners. The majority of our sample firms are either family-owned (43.3%) or controlled by industrial owners (40.6%). These figures are in line with previous findings for listed firms by Faccio and Lang (2002), who report that around 44% of Western European firms are family-owned businesses. Financial owners - including banks, insurance firms, and private equity funds - control around 11% of the sample, while state ownership is less common. Domestic owners continue to dominate the ownership structure of European firms. However, approximately one-third of firm-year observations correspond to foreign-controlled

[23]Differently from EU countries, private companies in Switzerland do not have the obligation to file annual reports to local chamber of commerce, so we have limited coverage.

firms, suggesting a significant level of international openness in the European corporate landscape.

Panel B provides the frequency of control changes by owner type. Families and public authorities are more reluctant to give up control, with rates of 5.7% and 3.5%, respectively. In contrast, firms owned by industrial and financial firms experience higher frequencies of control changes (9.89% and 14.02%). This pattern holds for cross-border deals and those involving non-European shareholders, where financial and industrial owners are more active participants.

The matrix presented in Panel C shows that most transitions involve a change in the type of controlling shareholder, highlighting that changes in control often involve not just new owners, but new categories of ownership.[24] Families do not exhibit a preference to transfer controls to other familes: the new owner is another family in less than 30% of the cases (29.06%). Family to industrial transitions represent 53.48% of the observations of family-owned companies. In contrast, the relatively high frequency of transitions between financial owners reflects the growing role of secondary buyouts in Europe, as documented by Degeorge et al. (2016). The most frequent trajectories of ownership change are between family and industrial owners, likely reflecting the dominance of these two groups in the sample. Transitions between financial and industrial ownership are also common, consistent with patterns observed in the broader M&A literature.

[Please insert Table IV about here]

C Types of firms

Owners exhibit different preferences across firm types - stand-alone companies, group holdings, listed and unlisted subsidiaries. Thus, exploring this dimension helps reveal key market dynamics, such as consolidation trends and the centralization of control within larger business groups.

[24]The "Dissolved" category includes firms that exit the panel due to merger or acquisitions. In most cases, we are unable to identify the bidder, since only a limited number of matched observations from the Orbis M&A database provide the acquirer's Bureau van Dijk identifier.

Table V replicates the analysis from Section B, focusing on the dynamics of corporate control across different types of firms. In Panel A, we can observe that most firms in the sample are part of a business group, with 74% classified as subsidiaries and 2.96% as parent companies. Stand-alone companies represent 23.01% of the sample. In terms of control dynamics (Panel B), listed subsidiaries are the most likely to change ownership, with a rate of 11.53%, whereas stand-alone companies exhibit the lowest frequency of control reallocation (4.96%). In the context of international transactions, subsidiaries emerge as the predominant targets of control changes. Panel C, which shows the transition matrix between firm types, highlights that unlisted subsidiaries usually remain in the same category over time. In contrast, stand-alone companies and parent companies are more likely to transition into subsidiaries, indicating a growing integration of firms into larger corporate groups.

[Please insert Table V about here]

IV Empirical Analyses

A Empirical Strategy

We aim to study how firms' characteristics, different types of ownership and possible financial distress affect the likelihood of a firm's change in control. We are also interested in understanding how an external shock such as the COVID-19 pandemic influences these dynamics. We implement a linear probability model (LPM) to examine the determinants of being acquired. Our main regression regression model is shown by Equation 1:

$$Change_{i,t+1} = \beta_{\mathbf{i,t}}^{\mathbf{T}} \mathbf{Ownership_{i,t}} + \gamma_{\mathbf{i,t}}^{\mathbf{T}} \mathbf{X_{i,t}} + \theta_i + \tau_t + \varepsilon_{i,t} \tag{1}$$

where $Change_{i,t+1}$ is our main dependent variable, taking value of 1 whenever the firm experiences a change in control, $\mathbf{Ownership_{i,t}}$ is the vector of ownership variables, which may include the family dummy alone, or also the financial-owner and state-owner dum-

mies.[25] $\mathbf{X_{i,t}}$ is the control vector term, including size, cash, tangible assets, ROA, leverage and age. We include firm (θ_i) and time (τ_t) fixed effects. The inclusion of firm fixed effects allows out to rule out the possibility that the effect associated with ownership type is due to unobserved differences between firms. In this model, coefficients are identified by comparing the probability of a control change across different ownership types relative to industrial owners. For all the models, we also present specification with a different level of saturation. In this second specification, we include $Industry \times Year$ and $Country \times Year$ fixed effects, controlling for time-varying industry and country differences. Here, coefficients are identified by comparing a firm's probability of changing control to that of peers in the same industry and country with industrial owners. We double cluster standard errors at firm and year level.

Variables referring to firms' financials included in the control vector $\mathbf{X_{i,t}}$ are defined as follows. *Total Assets* to account for firm size, the ratio of cash and cash equivalents to total assets (*Cash*) to measure liquidity, the ratio of tangible assets to total assets (*Tangible*) as a proxy for financial constraints (see, for example, Almeida and Campello, 2007), return on assets (EBITDA over total assets, *ROA*) to measure profitability, leverage (debt over total assets, *Leverage*), and firm age (*Age*). *Gross Investments* captures firm investments and is calculated following Erel et al. (2015) as the change in fixed assets from the previous year plus the depreciation and amortization of the current year, normalized by total assets. We winsorize financial data at the 0.5th and 99.5th percentiles. To control for distinct behavior of listed firms, we construct a dummy variable which takes value of 1 whenever the firm is listed. We define all variables in Appendix *D*.

We also investigate whether an external shock - the COVID-19 pandemic - can disrupt existing control structures. In the spirit of Barrot et al. (2024), we use the restricted labor force measure to capture the intensity of the exposure to such exogenous shock. Our *COVID-19* indicator allows us to assess the impact of the shock across countries and industries, and it is designed as follows:

[25] Industrial owners represent the baseline category in our models.

$$COVID\text{-}19_{s,c,t} = \frac{SI_{c,t}}{100} \times (1 - WFH_{s,c,t}) \tag{2}$$

where the Stringency index (SI) is a country-specific measure of lockdown intensity (Oxford Government Response Tracker)[26] and work-from-home (WFH) (EU-LFS) is the share of workers teleworking, at country-industry level.[27]

We then modify Equation 1 by interacting $\mathbf{Ownership_{i,t}}$ vector with the COVID-19 pandemic variable. This allows us to study how the shock caused by the pandemic altered family owners' incentives to sell the firm.

$$Change_{i,s,c,t+1} = \beta^{\mathbf{T}}_{\mathbf{i,t}}\mathbf{Ownership_{i,t}} \times COVID - 19_{s,c,t} + \gamma^{\mathbf{T}}_{\mathbf{i,t}}\mathbf{X_{i,t}} + \theta_i + \tau_t + \varepsilon_{i,t} \tag{3}$$

We extend our model to examine the role of internal financial difficulties using four different measures of financial constraints. Following Hadlock and Pierce (2010), we construct the size-assets (SA) index: firms in the top quartile of the SA index are categorized as financially constrained (captured by the dummy variable *SA Index*). Since the majority of our sample consists of unlisted firms, we include measures of financial constraints that are specifically suited to private companies. First, we follow Mulier et al. (2016) to construct the age-size-cash flow-leverage (ASCL) index. Firms that achieve the maximum ASCL index value (4) are categorized as financially constrained, as they are younger, smaller, less liquid, and more indebted compared to peers in the same industry

[26]The Stringency Index is based on nine metrics: school closures, workplace closures, cancellation of public events, restrictions on public gatherings, closures of public transport, stay-at-home requirements, public information campaigns, restrictions on internal movements, and international travel controls. The daily index is calculated as the mean score of those metrics, each taking a value between 0 and 100. We then compute the annual average using data from March 2020 to December 2022, aggregated by country-year.

[27]In the EU-LFS, respondents are asked whether they telework, with possible answers being "usually" (1), "sometimes" (2), or "never" (3). We adopt the stricter definition, by considering only those who mainly work from home (1) to construct the variable *WFH*. By integrating these data with the corresponding economic activity of the local unit for the respondent's main job - classified according to NACE sections - we are able to build, for each European country, an industry-level indicator of teleworking during the pandemic years. Note that data on teleworking for GB are only available up to 2019; therefore, we are unable to construct the index for those observations.

and country for the given year. This is captured by the dummy variable *ASCL*, which equals 1 for constrained firms and 0 otherwise. Second, we implement the methodology of Schauer et al. (2019), which is particularly appropriate for private firms but can also be applied to public firms. Their financial constraints index for private firms (FCP) incorporates size, interest coverage, profitability, and cash holdings. Firms in the top tercile of the FCP distribution within the same country and year are classified as financially constrained, captured by the variable *SEB*, which equals 1 for constrained firms and 0 otherwise. The last measure we consider as an indicator of financial difficulties is the firm's net financial position (debt-cash) over total assets. We define as financially constrained firms in the fourth quartile of the industry-country-year distribution of this ratio. The dummy variable *NFP* captures this measure. We interact these measures with $\mathbf{Ownership_{i,t}}$ and COVID-19.

We further modify our strategy by interacting $Large_{i,t}$, a dummy variable which takes the value of 1 whenever a firm's total assets are greater than 100 €million, with $\mathbf{Ownership_{i,t}}$ to explore different evidence as for larger firms.

B Summary statistics

Table VI presents the summary statistics for the variables related to firm characteristics, accounting data, financial constraints measures, and the *COVID-19* indicator.[28] The median firm is relatively small in size, with average total assets of €17.52 million. However, the size distribution is skewed, with a mean total assets size above €85 million. About 12% of the firms from the sample are classified as *Large*, having more than 100 €million as total assets, and only 1.8% are listed. European firms tend to be relatively old, consistent with the findings of Pagano et al. (1998), with an average age of almost 24 years. On average, cash accounts for slightly over 10% of total assets and tangible assets making up over 26%, a leverage ratio just below 23%, an ROA of 8.15%, and a gross investment to total assets ratio of 4%.

[28] As described in Section A, financial data corresponds to the highest level of consolidation for each firm-year observation. Although this approach aligns with our primary objective of capturing the entire financial position of target firms, it may imply some degree of double counting.

[Please insert Table VI about here]

C Results

In this section, we present the results of our regression analysis, which complements the univariate evidence discussed in Section III. While the primary aim of the paper is descriptive, this empirical validation offers additional support for our findings. We begin by discussing the baseline specifications, which rely on firm and time fixed effects to isolate the effect of ownership structure on control changes. Next, we explore how financial constraints and exposure to the COVID-19 shock shape these dynamics. Finally, we assess the heterogeneous effects of firm size and the role of cross-border dynamics in corporate control.

C.1 Baseline Models

Table VII presents the results when employing Equation 1 using family ownership as the main independent variable (Columns 1 and 2) and the entire ownership vector (family, financial, or State owner). In the latter specification, we compare firm's probability to change control to those of peers with industrial owners. The first and the third column of this table present results when applying firm- and year-fixed effects. The large dimension of our database allows us to apply firm-fixed effects. As expected, firms owned by families are 5.8% less likely to change control. This finding aligns with existing evidence (e.g., Bauguess and Stegemoller (2008); Caprio et al. (2011)), confirming that family control reduces the probability of an ownership change. *Ceteris paribus*, firms with more liquidity, more tangible assets, exhibiting higher profitability and listed are more likely to experience a change of control. The presence of a foreign owner makes a change of control more unlikely. When also considering financial and State owners, results on family owner remains valid. The presence of a State owner significantly lowers the probability of a control change with respect to all peers in general, and industrial

owner in particular (-9.5%). Financial and industrial (the baseline in this model) owners have a comparable effect.

Even-numbered columns employ industry-by-year and country-by-year fixed effects, allowing us to focus on the cross-sectional variation within industries and countries. We are able to confirm results shown on the type of ownership as for family-owned and state-owned firms, even though magnitudes of coefficients decrease, respectively, below 4% and to 6.7%. Differently from before, results show that financial owners are more prone to lose control with respect to industrial owners in the same industry and country. We also observe that firms holding relatively less cash compared to the industry-country average are more likely to experience a control change. This contrasts with the estimates of Models 1 and 3, which show a positive effect of cash holdings. The negative coefficients of the cross-sectional models suggest that these firms may be in the process of strengthening their liquidity position, but they are still far from the industry average. This interpretation is further supported by the finding on firm's debt position, which indicates that firms with high leverage are more likely to be acquired. In this specification, foreign ownership is associated with a higher likelihood of control changes, as foreign owners are generally less tied to firms located in other countries. However, in the model with firm-fixed effects, this relationship is reversed. Firms with more tangible assets are less attractive for potential buyers compared to their peers. Since asset tangibility is known as an inverse measure of financial constraint (Almeida and Campello, 2007), this result suggests that stronger firms in terms of financial position are less likely to experience a change of control with respect to industry peers. The firm capital expenditures are negatively correlated with the probability of a control change, although the effect is significant only at 10% level. We interpret this result as evidence that firms committed to make investments are less likely to be sold. Finally, also in this model the variable *Listed* exhibit a positive and significant coefficient, likely capturing a size effect.

[Please insert Table VII about here]

Table VIII presents the baseline analysis across different groups of firms, to ensure

that our results are not driven by specific subsamples. We run Equation 1 on the sample comprising parent holdings, SACs and listed subsidiaries (Columns 1 and 2), unlisted subsidiaries (Columns 3 and 4), all listed firms (Columns 5 and 6), and all unlisted firms (Columns 7 and 8). Results are consistent across all groups, and confirm the ones of the full sample. When focusing on cross-sectional variation within industries and countries, as in the baseline specification, we observe lower magnitudes for the *Family* coefficient, but the results remain consistent.

[Please insert Table VIII about here]

C.2 COVID-19 and Financial Constraints

We extend our analysis by investigating whether and how the outbreak of COVID-19 pandemic impacts the likelihood of control change in firms. The pandemic significantly disrupted both economic activity and firm performance (Carletti et al., 2020; Fahlenbrach et al., 2020; Ramelli and Wagner, 2020; Barrot et al., 2024). This could have an impact in the market of corporate control, with some owners losing control of their firms due to the crisis.

Table IX show the results of the models when employing Equation 3, confirming the findings of the baseline regression for all the covariates. When focusing on the specification with firm-fixed effects, we observe that families have been even more reluctant in losing control of parent holdings, SACs and listed subsidiaries, while we do not detect any other impact on other groups. State-owned firms exhibit the same result, while financial-owned firms exhibit a slight decrease in the probability of control change where COVID-19 pandemic hit more. This last result is mainly driven by evidence on unlisted firms. When shifting the attention on cross-sectional variation within industries and countries, interestingly, we notice that state-owned listed firms experience an higher degree of probability of change in control when the pandemic hit.

[Please insert Table IX about here]

We further analyze if financially constrained firms exhibit a different likelihood in changing corporate controls, and if this effect is different during the COVID-19 pandemic. Table X presents the results including the measures of financial constraints. While confirming signs of non-interacted independent variables, we observe notable patterns among financially constrained firms. We observe a tendency of family owners to be even more reluctant to give up control when the firm is financially constrained across almost all specifications, supporting previous literature on families' attachment to control and it is consistent with the findings of Lins et al. (2013). When analyzing state-owned firms, we see that the presence of financial distress is playing a role whenever dealing with industry- and country-fixed effects, suggesting that distressed state-owned firms are not attractive in the market. Overall, these findings complements those of Erel et al. (2015), who find that relieving target firms' financial constraints is a key motivation for deals. However, their analysis is conditional on firm acquisitions, whereas we consider the entire population of firms.

We do not find that the COVID-19 pandemic increases the likelihood of control change for financially constrained family firms. Indeed, we do not find consistent results across different measures of financial constraints: just in two specifications out of four, financially constrained firms owned by financial institutions during the COVID-19 pandemic experienced a significantly lower probability of control change. This result, even if not robust, may suggest limited market appeal for these firms in that peculiar period. Interestingly, as for state-owned firms, where COVID-19 pandemic hit more severely, we find evidence that this shock might have changed the owner behavior in this complicated setting by making more likely a change of control for these firms.

[Please insert Table X about here]

C.3 Additional Analyses

We further modify Equation 3 by also interacting our main independent variables and the COVID-19 variable with the variable *Large*, to inspect whether larger firms (those with

more than €100 million of total assets) exhibit different behaviors from smaller ones. We show the results of this specification in Table XI. Larger family-owned firms are more likely to change control during the analyzed period when focusing on the cross-sectional variation within industries and countries rather than smaller ones, suggesting that family owners' reluctance to sell decreases with size.

[Please insert Table XI about here]

We are also interested in investigating more closely the impact of economic nationalism (Dinc and Erel, 2013) on corporate control. In order to do so, we modify our dependent variable to isolate changes of control where the new ultimate owner is a foreigner, and when the owner is extra-European. To do so, we construct two other dummy variables, namely *Cross-border* and *Extra Europe*, and we employ them in Equations 1 and 3, to inspect for different behaviors for change of controls with foreign controllers. Table XII shows the results of this specification. Results confirm once again the unwillingness to sell control of families and States. When focusing on cross-sectional variations, we observe that financial-owned firms are once again more likely to experience a change of control. Collectively, the results of Table XII suggest that the effects of home-bias and nationalism tend to be concentrated in certain types of owners.

[Please insert Table XII about here]

V Conclusions

In this paper, we propose a systematic approach to identify corporate control changes across 375,634 non-financial European public and private firms over the period 2015-2022. This method relies on ultimate ownership information provided by Moody's DataHub. Given the scarcity of ownership data for private firms and the complexity of ownership structures, tracing controlling shareholders for the entire universe of firms presents significant challenges. A primary obstacle lies in data inconsistencies. To address this,

we implement an extensive data cleaning and refinement process, including entity name corrections and a conservative filter to manage short-term ownership shifts.

Our methodology reveals that approximately 8% of companies in our sample experience a change in control each year. This result also offers a valuable benchmark: relying solely on DataHub ownership data would have overstated the frequency of control changes by 64% (13.45%). Overall, our findings highlight the existence of an active market for corporate control in Europe. The rate of control changes remained relatively stable throughout the analyzed period, with a decline in 2020, likely attributable to the economic disruptions caused by the COVID-19 pandemic.

Examining how different types of controlling shareholders influence the dynamics of the corporate control market, we find a lower incidence of control changes among family-owned firms and state-owned firms. To reinforce our descriptive analysis, we conduct regression analyses that confirm key univariate patterns. Family-owned firms are significantly less likely to experience changes in corporate control, with the likelihood reduced between 5.8% and 3.6%. State ownership similarly reduces the probability of a control change, while financial owners are comparatively more inclined to sell control. The COVID-19 pandemic does not seem to significantly alter controlling shareholders' behavior. Instead, financially constrained firms increase the reluctance to sell when family-owned. This reluctance weakens as firm size increases and when firms are publicly listed. Finally, we observe that cross-border control changes are less common among family and state owners, suggesting preferences for economic nationalism.

Our main contribution of our paper is to systematically map changes in corporate control across the universe of European privately held and publicly listed, particuraly relvant in light of the growing importance of private companies and the evolving market for their control, that are still largely unexplored in the literature. In addition, tracing the ownership evolution of over 375,000 firms across eight years, we construct one of the largest ownership datasets based entirely on publicly available data. Whereas much of the existing literature offers static snapshots of ownership, our dataset captures the dynamic nature of corporate control over time.

We acknowledge certain limitations inherent in our methodology. Accurately capturing the full dynamics of corporate control remains challenging due to the intrinsic opacity of ownership structures. Intermediaries such as trusts, holding companies, and nominee entities can obscure the identification of ultimate controllers. Although manual verification represents the ideal approach for establishing clarity, it is often infeasible given the lack of publicly available information and the extensive scale of our sample. Despite these challenges, we have applied rigorous measures to mitigate potential biases and enhance the dataset's reliability. We believe that our dataset not only bolsters the robustness of our analysis but also serves as a valuable foundation for future empirical research on corporate ownership and governance.

References

Aktas, Nihat, Eric de Bodt, and Richard Roll, "Negotiations under the Threat of an Auction," *Journal of Financial Economics*, 2010, *98* (2), 241–255.

Almeida, Heitor and Murillo Campello, "Financial constraints, asset tangibility, and corporate investment," *The Review of Financial Studies*, 2007, *20* (5), 1429–1460.

Aminadav, Gur and Elias Papaioannou, "Corporate Control around the World," *The Journal of Finance*, 2020, *75* (3), 1191–1246.

Anderson, Ronald C. and David M. Reeb, "Founding-Family Ownership and Firm Performance: Evidence from the S&P 500," *The Journal of Finance*, 2003, *58* (3), 1301–1328.

Barrot, Jean-Noël, Maxime Bonelli, Basile Grassi, and Julien Sauvagnat, "Causal effects of closing businesses in a pandemic," *Journal of Financial Economics*, 2024, *154*, 103794.

Bauguess, Scott and Mike Stegemoller, "Protective governance choices and the value of acquisition activity," *Journal of Corporate Finance*, 2008, *14* (5), 550–566.

Bena, Jan and Kai Li, "Corporate Innovations and Mergers and Acquisitions," *Journal of Finance*, 2014, *69* (5), 1923–1960.

Bennett, Benjamin and Robert A. Dam, "Merger Activity, Stock Prices, and Measuring Gains from M&A," *Working paper*, 2021, p. 0.

Berle, Adolf A. and Gardiner C. Means, *The Modern Corporation and Private Property* A Harvest Book, HB 152, Harcourt, Brace & World, 1968.

Betton, Sandra, B. Espen Eckbo, and Karin S. Thorburn, "Merger Negotiations and the Toehold Puzzle," *Journal of Financial Economics*, 2009, *91* (2), 158–178.

Caprio, Lorenzo, Ettore Croci, and Alfonso Del Giudice, "Ownership Structure, Family Control, and Acquisition Decisions," *Journal of Corporate Finance*, 2011, *17* (5), 1636–1657.

Carletti, Elena, Tommaso Oliviero, Marco Pagano, Loriana Pelizzon, and Marti G Subrahmanyam, "The COVID-19 Shock and Equity Shortfall: Firm-Level Evidence from Italy," *The Review of Corporate Finance Studies*, 08 2020, *9* (3), 534–568.

Claessens, Stijn, Djankov Simeon, and Lang Larry H.P, "The separation of ownership and control in East Asian Corporations," *Journal of Financial Economics*, 2000, *58* (1), 81–112.

_ , **Simeon Djankov, and Larry H.P Lang**, "The separation of ownership and control in East Asian Corporations," *Journal of Financial Economics*, 2000, *58* (1), 81–112. Special Issue on International Corporate Governance.

Cronqvist, Henrik and Rüdiger Fahlenbrach, "Large Shareholders and Corporate Policies," *The Review of Financial Studies*, 10 2008, *22* (10), 3941–3976.

Degeorge, Francois, Jens Martin, and Ludovic Phalippou, "On secondary buyouts," *Journal of Financial Economics*, 2016, *120* (1), 124–145.

Dessaint, Olivier, B. Espen Eckbo, and Andrey Golubov, "Bidder-Specific Synergies and the Evolution of Acquirer Returns," *Management Science*, 2024. Forthcoming.

Dinc, Serdar I. and Isil Erel, "Economic Nationalism in Mergers and Acquisitions," *The Journal of Finance*, 2013, *68* (6), 2471–2514.

Doidge, Craig, G. Andrew Karolyi, and René M. Stulz, "The U.S. listing gap," *Journal of Financial Economics*, 2017, *123* (3), 464–487.

_ , **Kathleen M. Kahle, G. Andrew Karolyi, and René M. Stulz**, "Eclipse of the Public Corporation or Eclipse of the Public Markets?," *Journal of Applied Corporate Finance*, 2018, *30* (1), 8–16.

Eckbo, B. Espen, Andrey Malenko, and Karin S. Thorburn, "Corporate Takeovers: Theory and Evidence," *FEB-RN Research Paper No. 41/2025, European Corporate Governance Institute – Finance Working Paper No. 1030/2025*, January 2025. Available at SSRN.

Erel, Isil, Yeejin Jang, and Michael S Weisbach, "Do acquisitions relieve target firms' financial constraints?," *The journal of finance*, 2015, *70* (1), 289–328.

Ewens, Michael and Joan Farre-Mensa, "The Deregulation of the Private Equity Markets and the Decline in IPOs," *The Review of Financial Studies*, December 2020, *33* (12), 5463–5509.

Faccio, Mara and Larry H. P. Lang, "The ultimate ownership of Western European corporations," *Journal of Financial Economics*, 2002, *65* (3), 365–395.

_ **and Ronald W. Masulis**, "The Choice of Payment Method in European Mergers and Acquisitions," *Journal of Finance*, 2005, *60* (3), 1345–1388.

_ , **Maria-Teresa Marchica, and Roberto Mura**, "Large Shareholder Diversification and Corporate Risk-Taking," *The Review of Financial Studies*, 2011, *24* (11), 3601–3641.

Fahlenbrach, Rüdiger, Kevin Rageth, and René M Stulz, "How Valuable Is Financial Flexibility when Revenue Stops? Evidence from the COVID-19 Crisis," *The Review of Financial Studies*, 12 2020, *34* (11), 5474–5521.

Ferreira, Miguel A, Massimo Massa, and Pedro Matos, "Shareholders at the Gate? Institutional Investors and Cross-Border Mergers and Acquisitions," *The Review of Financial Studies*, February 2010, *23* (2), 601–644.

Fonseca, Luís, Katerina Nikalexi, and Elias Papaioannou, "The globalization of corporate control," *Journal of International Economics*, 2023, *146*, 103754.

Franks, Julian, Colin Mayer, Paolo Volpin, and Hannes F. Wagner, "The Life Cycle of Family Ownership: International Evidence," *The Review of Financial Studies*, 2011, *25* (6), 1675–1712.

Fresard, Laurent, Gerard Hoberg, and Gordon Phillips, "Innovation Activities and Integration through Vertical Acquisitions," *Review of Financial Studies*, 2020, *33* (7), 2937–2976.

Gourinchas, Pierre-Olivier, Şebnem Kalemli-Özcan, Veronika Penciakova, and Nick Sander, "SME failures under large liquidity shocks: an application to the COVID-19 crisis," *Journal of the European Economic Association*, 2024, p. jvae041.

Greenwood, Robin and Michael Schor, "Investor Activism and Takeovers," *Journal of Financial Economics*, June 2009, *92* (3), 362–375.

Hadlock, Charles J and Joshua R Pierce, "New evidence on measuring financial constraints: Moving beyond the KZ index," *The review of financial studies*, 2010, *23* (5), 1909–1940.

Hale, Thomas, Noam Angrist, Rafael Goldszmidt, Beatriz Kira, Anna Petherick, Toby Phillips, Samuel Webster, Emily Cameron-Blake, Laura Hallas, Saptarshi Majumdar et al., "A global panel database of pandemic policies (Oxford COVID-19 Government Response Tracker)," *Nature human behaviour*, 2021, *5* (4), 529–538.

Jensen, Michael C., "Eclipse of the Public Corporation," *Harvard Business Review*, 1989, *Sept.-Oct*, 0.

_ **and Richard S. Ruback**, "The market for corporate control: The scientific evidence," *Journal of Financial Economics*, 1983, *11* (1), 5–50.

Jenter, Dirk and Katharina Lewellen, "CEO Preferences and Acquisitions," *The Journal of Finance*, 2015, *70* (6), 2813–2852.

Kalemli-Ozcan, Sebnem, Bent Sorensen, Carolina Villegas-Sanchez, Vadym Volosovych, and Sevcan Yesiltas, "How to construct nationally representative firm level data from the Orbis global database: New facts and aggregate implications," Technical Report, National Bureau of Economic Research 2015.

La Porta, Rafael, Florencio Lopez-De-Silanes, and Andrei Shleifer, "Corporate Ownership Around the World," *The Journal of Finance*, 1999, *54* (2), 471–517.

Lins, Karl, Paolo Volpin, and Hannes Wagner, "Does Family Control Matter? International Evidence from the 2008–2009 Financial Crisis," *The Review of Financial Studies*, 2013, *26* (10), 2583–2619.

Malmendier, Ulrike and Geoffrey Tate, "Who makes acquisitions? CEO overconfidence and the market's reaction," *Journal of Financial Economics*, 2008, *89* (1), 20–43.

Masulis, Ronald W., Peter Kien Pham, and Jason Zein, "Family Business Groups around the World: Financing Advantages, Control Motivations, and Organizational Choices," *The Review of Financial Studies*, 07 2011, *24* (11), 3556–3600.

Mulier, Klaas, Koen Schoors, and Bruno Merlevede, "Investment-cash flow sensitivity and financial constraints: Evidence from unquoted European SMEs," *Journal of Banking & Finance*, 2016, *73*, 182–197.

Ortiz, Marcelo, Caspar David Peter, Francisco Urzúa I, and Paolo F. Volpin, "Mandatory Financial Disclosure and M&A Activity," *The Review of Financial Studies*, 2023, *36* (12), 4788–4823.

Pagano, Marco, Fabio Panetta, and Luigi Zingales, "Why Do Companies Go Public? An Empirical Analysis," *The Journal of Finance*, 1998, *53* (1), 27–64.

Ramelli, Stefano and Alexander F Wagner, "Feverish Stock Price Reactions to COVID-19*," *The Review of Corporate Finance Studies*, 07 2020, *9* (3), 622–655.

Schauer, Catharina, Ralf Elsas, and Nikolas Breitkopf, "A new measure of financial constraints applicable to private and public firms," *Journal of Banking & Finance*, 2019, *101*, 270–295.

Sraer, David and David Thesmar, "Performance and Behavior of Family Firms: Evidence from the French Stock Market," *Journal of the European Economic Association*, 06 2007, *5* (4), 709–751.

Yim, Soojin, "The acquisitiveness of youth: CEO age and acquisition behavior," *Journal of Financial Economics*, 2013, *108* (1), 250–273.

Şebnem Kalemli-Özcan, Bent E. Sørensen, Carolina Villegas-Sanchez, Vadym Volosovych, and Sevcan Yeşiltaş, "How to Construct Nationally Representative Firm-Level Data from the Orbis Global Database: New Facts on SMEs and Aggregate Implications for Industry Concentration," *American Economic Journal: Macroeconomics*, April 2024, *16* (2), 353–74.

VI Tables

Table I

Change of control measures

This table illustrates the percentage number of identified change of controls, at t+1, according to the original dataset by Moody's DataHub (*MDH Change*), when applying names correction process (NCP) (*NCP Change*), when applying the 3-years pattern rule (3yPR) (*Pattern Change*), when applying NPC, 3yPR, and considering firms dissolved or merged into the acquirer after the control change (*Change*), when applying NPC, 3yPR, control changes of dissolved/merged firms and not considering a change of control whenever the firm itself becomes its ultimate owner (*Change2*), and when applying NCP, a 2-years pattern procedure to check the persistence of control change, and control changes of dissolved/merged firms (*ChangeP*).

Panel A): Number of change of control by year

year	MDH Change	NCP Change	Pattern Change	Change	Change2	ChangeP
2015	37,806	33,313	22,773	23,544	22,568	21,917
2016	37,384	32,854	22,589	23,503	22,520	22,254
2017	41,444	36,120	24,771	25,841	24,452	24,651
2018	39,407	34,337	23,028	24,128	22,941	23,327
2019	39,836	34,448	19,875	20,843	19,769	19,547
2020	44,047	38,080	24,449	25,500	24,157	26,124
2021	32,609	27,673	21,888	22,995	21,787	1,107
Total	272,533	236,825	159,373	166,354	158,194	138,927

Panel B): Change of control (%) by year

year	MDH Change	NCP Change	Pattern Change	Change	Change2	ChangeP
2015	0.1341	0.1181	0.0808	0.0835	0.0800	0.0777
2016	0.1319	0.1159	0.0797	0.0829	0.0795	0.0785
2017	0.1429	0.1246	0.0854	0.0891	0.0843	0.0850
2018	0.1348	0.1174	0.0787	0.0825	0.0785	0.0798
2019	0.1358	0.1174	0.0677	0.0710	0.0674	0.0666
2020	0.1496	0.1293	0.0830	0.0866	0.0820	0.0887
2021	0.1124	0.0953	0.0754	0.0792	0.0751	0.0038
Total	0.1345	0.1169	0.0787	0.0821	0.0781	0.0686

Table II

Identification of ultimate owners

This table presents examples of ultimate ownership patterns that require adjustment to identify real changes in control, according to our definition. Cases 1–3 illustrate rule (1), where a letter is preserved if it reappears within a maximum span of four characters. Case 4 demonstrates rule (2), which favors the most recent letter when it shows up again later in the sequence.

	Original pattern	**Problem description**	**Rule applied**	**Final pattern**
1	A**ABA**A	two-characters window	1	AA**A**AA
2	A**BCCB**	three-characters window	1	AB**BB**B
3	**ABBCA**D	four-characters window	1	A**AAA**AD
4	**ABCDAC**	multiple candidates	2	A**A**C**CC**C

Table III

Sample composition

This table illustrates the distribution of observations and number of change in corporate control by year (Panel A), country (Panel B), and industry (Panel C) for the entire sample (first three columns) and for the subsample composed only by SACs, group holdings and listed subsidiaries (columns four to six), and for listed firms (columns 7 to 9). Industries are defined at NACE Level 1: A - Agriculture, forestry and fishing; B - Mining and quarrying; C - Manufacturing; D - Electricity, gas, steam and air conditioning supply; E - Water supply; sewerage; waste management and remediation activities; F - Construction; G - Wholesale and retail trade; repair of motor vehicles and motorcycles; H - Transporting and storage; I - Accommodation and food service activities; J - Information and communication; L - Real estate activities; M - Professional, scientific and technical activities; N - Administrative and support service activities; P - Education; Q - Human health and social work activities; R - Arts, entertainment and recreation; S - Other services activities.

Panel A): Distribution of observations and number of change in corporate control by year

	Total Sample			SACs, Group Holdings & Listed Subsidiaries			Listed Firms		
	N of observations	Change (t+1)	% Change (t+1)	N of observations	Change (t+1)	% Change (t+1)	N of observations	Change (t+1)	% Change (t+1)
2015	282,002	23,544	0.0835	78,857	4,053	0.0514	5,312	562	0.1058
2016	283,376	23,503	0.0829	78,137	3,937	0.0504	5,312	518	0.0975
2017	289,999	25,841	0.0891	79,301	5,184	0.0654	5,340	474	0.0888
2018	292,423	24,128	0.0825	78,694	4,351	0.0553	5,324	479	0.0900
2019	293,391	20,843	0.0710	77,419	3,672	0.0474	5,230	439	0.0839
2020	294,500	25,500	0.0866	78,129	4,688	0.0600	5,200	514	0.0988
2021	290,240	22,995	0.0792	75,164	3,722	0.0495	5,318	534	0.1004
Total	2,025,931	166,354	0.0821	545,701	29,607	0.0543	37,036	3,520	0.0950

Table III - continued

Panel B): Distribution of observations and number of change in corporate control by country

	Total Sample			SACs, Group Holdings & Listed Subsidiaries			Listed Firms		
	N of observations	Change	% Change	N of observations	Change	% Change	N of observations	Change	% Change
Austria	30,766	1,624	0.0528	7,647	264	0.0345	408	32	0.0784
Belgium	63,066	5,090	0.0807	9,968	606	0.0608	875	69	0.0789
Bulgaria	20,930	1,590	0.0760	6,693	361	0.0539	127	11	0.0866
Croatia	13,150	997	0.0758	5,752	319	0.0555	832	93	0.1118
Cyprus	2,882	219	0.0760	1,478	87	0.0589	386	31	0.0803
Czech Republic	8,885	692	0.0779	2,080	119	0.0572	76	10	0.1316
Denmark	22,408	1,673	0.0747	4,201	270	0.0643	712	44	0.0618
Estonia	5,417	391	0.0722	931	50	0.0537	112	14	0.1250
Finland	36,594	2,788	0.0762	8,744	616	0.0704	911	76	0.0834
France	249,248	24,182	0.0970	55,057	4,569	0.0830	4,160	419	0.1007
Germany	141,817	8,252	0.0582	40,880	1,554	0.0380	3,517	279	0.0793
Greece	20,011	694	0.0347	8,329	164	0.0197	1,044	121	0.1159
Hungary	20,316	963	0.0474	9,891	244	0.0247	168	22	0.1310
Ireland	36,564	4,239	0.1159	4,307	357	0.0829	425	39	0.0918
Italy	372,961	22,797	0.0611	143,031	5,188	0.0363	1,901	178	0.0936
Latvia	2,903	356	0.1226	961	86	0.0895	82	8	0.0976
Lithuania	8,087	619	0.0765	2,770	164	0.0592	204	17	0.0833
Luxembourg	5,339	535	0.1002	1,249	101	0.0809	335	42	0.1254
Malta	3,123	364	0.1166	710	66	0.0930	151	16	0.1060
Netherlands	4,056	347	0.0856	1,173	94	0.0801	713	61	0.0856
Norway	88,129	9,596	0.1089	18,169	1,409	0.0775	1,107	143	0.1292
Poland	84,024	7,555	0.0899	24,534	1,690	0.0689	2,911	334	0.1147
Portugal	57,528	4,456	0.0775	9,650	454	0.0470	289	18	0.0623
Romania	23,668	1,421	0.0600	9,201	341	0.0371	1,378	74	0.0537
Slovakia	15,739	1,227	0.0780	6,052	387	0.0639	66	2	0.0303
Slovenia	8,012	655	0.0818	3,212	170	0.0529	195	20	0.1026
Spain	237,473	17,778	0.0749	73,075	3,336	0.0457	1,358	134	0.0987
Sweden	108,535	10,481	0.0966	21,505	1,326	0.0617	3,522	366	0.1039
Switzerland	3,060	177	0.0578	1,872	137	0.0732	1,240	109	0.0879
United Kingdom	331,240	34,596	0.1044	62,579	5,078	0.0811	7,831	738	0.0942
Total	2,025,931	166,354	0.0821	545,701	29,607	0.0543	37,036	3,520	0.0950

Table III - continued

Panel C): Distribution of observations and number of changes in corporate control by industry

	Total Sample			SACs, Group Holdings & Listed Subsidiaries			Listed Firms		
	N of observations	Change	% Change	N of observations	Change	% Change	N of observations	Change	% Change
A	31,575	2,054	0.0651	11,400	547	0.0480	482	63	0.1307
B	15,579	1,385	0.0889	3,553	254	0.0715	1,286	128	0.0995
C	433,626	33,768	0.0779	130,110	6,799	0.0523	14,331	1,187	0.0828
D	68,067	7,339	0.1078	8,106	573	0.0707	1,093	100	0.0915
E	30,335	2,007	0.0662	8,650	321	0.0371	268	20	0.0746
F	176,703	11,953	0.0676	58,044	2,463	0.0424	1,225	109	0.0890
G	357,705	25,763	0.0720	103,910	4,926	0.0474	3,339	316	0.0946
H	88,788	7,024	0.0791	19,842	1,110	0.0559	1,262	128	0.1014
I	57,459	4,819	0.0839	15,278	716	0.0469	831	95	0.1143
J	98,021	12,200	0.1245	22,011	2,381	0.1082	4,547	492	0.1082
L	274,475	21,278	0.0775	67,415	2,839	0.0421	2,474	233	0.0942
M	193,547	16,689	0.0862	55,414	3,686	0.0665	2,406	262	0.1089
N	118,373	11,969	0.1011	23,447	1,619	0.0690	1,145	123	0.1074
P	7,739	826	0.1067	1,790	135	0.0754	74	8	0.1081
Q	38,969	3,964	0.1017	8,254	596	0.0722	581	65	0.1119
R	20,523	1,917	0.0934	4,902	361	0.0736	708	77	0.1088
S	14,447	1,399	0.0968	3,575	281	0.0786	984	114	0.1159
Total	2,025,931	166,354	0.0821	545,701	29,607	0.0543	37,036	3,520	0.0950

Table IV

Type of ultimate owner

This table shows the distribution of ultimate owner type, at 25% level. Panel A provides the descriptive statistics for the variables, namely the four capturing the type of ultimate owner, and a dummy variable to capture the presence of an owner of a different country from the one of the given firm (*Foreign Owner*). Panel B illustrates the frequency of different types of owner, whenever a change of control occurs. Ultimate owners are grouped into four categories. The ultimate owner is categorized as *Family* if the ultimate owner is a family, an individual (`I` in DataHub), or an unnamed private shareholder (`D`); *Financial Owner* if the owner is an insurance firm (`A`), a bank (`B`), a mutual or pension fund, a nominee, a trust or trustee (`E`), a financial firm (`F`), a foundation or research institute (`J`), a private equity firm (`P`), a venture capital firm (`V`), or a hedge fund (`Y`); *State Owner* equals 1 when the ultimate owner is categorized as a public authority (`S`); and *Industrial Owner* takes a value of 1 if the owner is an industrial firm (`C`) or employees, managers, or directors (`M`). We show this data for all changes of control (Change), for those occurring cross-country (cross-border, meaning that the new owner is of a different country than the one of the firm), and for those when the new owner belongs to a country outside of Europe (Non Europe). Panel C shows the transition matrix of ultimate owner type whenever a change of control happens, for the variable Change. If the firm is no more in the sample the subsequent year, it is defined as dissolved.

Panel A): Descriptive statistics of ultimate owner

	Mean	Median	Standard Deviation	N of observations
Family	0.4328	0.0000	0.4955	2,025,933
Financial Owner	0.1112	0.0000	0.3144	2,025,933
State Owner	0.0503	0.0000	0.2187	2,025,933
Industrial Owner	0.4056	0.0000	0.4910	2,025,933
Foreign Owner	0.3568	0.0000	0.4791	2,025,933

Panel B): Distribution of ultimate owner when a change of control occurs

		Change		Cross-border		Non Europe	
Type of owner	N of observations	N	%	N	%	N	%
Family	876,779	49,929	0.0569	19,523	0.0223	7,480	0.0085
Financial	225,339	31,597	0.1402	17,925	0.0795	6,826	0.0303
Industrial	821,809	81,244	0.0989	43,771	0.0533	18,039	0.0220
State	102,004	3,584	0.0351	1,611	0.0158	475	0.0047
Total	2,025,931	166,354	0.0821	82,830	0.0409	32,820	0.0162

Panel C): Type of ultimate owner transition matrix when a change of control occurs

	Dissolved (merger or take-over)	Family	Financial Owner	Industrial Owner	State Owner	**Total**
Family	2,116	13,847	7,777	25,661	528	**49,929**
Financial	835	7,871	6,934	14,958	999	**31,597**
Industrial	2,680	25,481	15,520	35,070	2,493	**81,244**
State	397	445	561	2,181	0	**3,584**
Total	**6,028**	**47,644**	**30,792**	**77,870**	**4,020**	**166,354**

Table V

Type of firms' group

This table shows the distribution of firms' group type. We consider a firm as a SAC if it is its own ultimate owner (i.e., its identifier matches the global ultimate owner reported by DataHub) and does not control any other firms in the sample. Conversely, if other firms are under its control, it is categorized as the holding of a group (*Parent Company*). Lastly, if a firm is neither a SAC nor an holding, it is classified as listed subsidiary if listed, as a unlisted subsidiary otherwise. Panel A provides the descriptive statistics for the variables. Panel B illustrates the frequency of those variables, whenever a change of control occurs. We show this data for all changes of control (Change), for those occurring cross-country (cross-border, meaning that the new owner is of a different country than the one of the firm), and for those when the new owner belongs to a country outside of Europe (Non Europe). Panel C shows the transition matrix of firms' group type whenever a change of control happens, for the variable Change. If the firm is no more in the sample the subsequent year, it is defined as dissolved.

Panel A): Descriptive statistics of type of firms' group

	Mean	Median	Standard Deviation	N of observations
Subsidiary	0.7306	1.0000	0.4436	2,025,933
Subsidiary Listed	0.0096	0.0000	0.0975	2,025,933
SAC	0.2301	0.0000	0.4209	2,025,933
Parent Company	0.0296	0.0000	0.1695	2,025,933

Panel B): Distribution of type of firms' group when a change of control occurs

		Change		Cross-border		Non Europe	
Type of firms' group	N of observations	N	%	N	%	N	%
Subsidiary	1,480,230	136,747	0.0924	73,217	0.0495	28,875	0.0195
Subsidiary Listed	19,433	2,241	0.1153	982	0.0505	413	0.0213
SAC	466,260	23,149	0.0496	7,007	0.0150	2,841	0.0061
Parent Company	60,008	4,217	0.0703	1,624	0.0271	691	0.0115
Total	2,025,931	166,354	0.0821	82,830	0.0409	32,820	0.0162

Panel C): Type of firms' group transition matrix when a change of control occurs

	Dissolved (merger or take-over)	Subsidiary	Subsidiary Listed	SAC	Parent Company	**Total**
Subsidiary	6,101	118,700	72	9,555	2,319	**136,747**
Subsidiary Listed	71	130	1393	280	367	**2,241**
SAC	580	14,367	335	7724	143	**23,149**
Parent Company	229	3,438	451	99	0	**4,217**
Total	**6,981**	**136,635**	**2,251**	**17,658**	**2,829**	**166,354**

Table VI

Summary Statistics

This table illustrates the summary statistics of our sample. The sample period covers the years from 2015 to 2021. Variable definition is provided in Table A2, in Appendix D.

	Mean	Median	Standard Deviation	N of observations
Total Assets	85.8137	17.5169	328.2072	2,025,931
Cash	0.1094	0.0463	0.1535	1,908,838
Tangible	0.2685	0.1377	0.3035	1,983,718
ROA	0.0815	0.0680	0.1318	1,861,059
Leverage Ratio	0.2277	0.1201	0.2828	1,871,877
Age	23.9565	20.0000	20.2220	2,025,598
Gross Investments	0.0401	0.0198	0.1603	1,740,728
Listed	0.0183	0.0000	0.1340	2,025,931
Large Firm	0.1210	0.0000	0.3261	2,025,933
Financial constraints measures				
SA Index	0.2500	0.0000	0.4330	2,025,931
ASCL	0.0663	0.0000	0.2488	960,324
SEB	0.3333	0.0000	0.4714	1,531,232
FC NFP	0.2493	0.0000	0.4326	1,772,477
COVID-19	0.1304	0.0000	0.2308	1,910,008

Table VII

Baseline regression

This table presents the estimated coefficients from the linear probability model presented in Equation 1. The dependent variable is *Change*, i.e. the binary variable capturing change in control in the following year. The definitions of the variables are provided in Table A2 (Appendix). The sample period spans from 2015 to 2021. Standard errors are double-clustered at the firm and year level (in parenthesis).

	(1)	(2)	(3)	(4)
VARIABLES	Change (t+1)	Change (t+1)	Change (t+1)	Change (t+1)
Family	-0.058***	-0.039***	-0.058***	-0.036***
	(0.014)	(0.004)	(0.015)	(0.004)
Financial Owner			0.003	0.040***
			(0.010)	(0.003)
State Owner			-0.095**	-0.067***
			(0.030)	(0.005)
Total Assets (ln)	-0.002	-0.001	-0.002	-0.000
	(0.002)	(0.001)	(0.002)	(0.001)
Cash	0.023***	-0.028***	0.023***	-0.024***
	(0.004)	(0.003)	(0.004)	(0.003)
Tangible	0.005*	-0.022***	0.005*	-0.017***
	(0.003)	(0.002)	(0.002)	(0.002)
ROA	0.016**	0.020***	0.016**	0.013**
	(0.006)	(0.005)	(0.006)	(0.005)
Leverage Ratio	-0.004	0.020***	-0.004	0.017***
	(0.003)	(0.002)	(0.003)	(0.002)
Age (ln)	-0.006	-0.012***	-0.005	-0.011***
	(0.004)	(0.001)	(0.004)	(0.001)
Gross Investments	-0.006	-0.005*	-0.006	-0.005*
	(0.004)	(0.002)	(0.004)	(0.002)
Listed	0.032**	0.014***	0.032**	0.011***
	(0.011)	(0.002)	(0.011)	(0.002)
Foreign Owner	-0.059***	0.028***	-0.054***	0.027***
	(0.013)	(0.002)	(0.012)	(0.002)
Observations	1,524,170	1,553,368	1,524,170	1,553,368
R-squared	0.260	0.023	0.261	0.027
Firm FE	YES	NO	YES	NO
Year FE	YES	NO	YES	NO
Industry × Year FE	NO	YES	NO	YES
Country × Year FE	NO	YES	NO	YES

*p<.10; **p<.05; ***p<.01

Table VIII

Sub-sample analysis

This table presents the estimated coefficients from the linear probability model presented in Equation 1 when taking into account group holdings, SACs, and listed subsidiaries (columns 1 and 2), unlisted subsidiaries (columns 3 and 4), listed firms (columns 5 and 6), and unlisted firms (columns 7 and 8). The dependent variable is *Change*, i.e. the binary variable capturing change in control in the following year. The definitions of the variables are provided in Table A2 (Appendix). The sample period spans from 2015 to 2021. Standard errors are double-clustered at the firm and year level (in parenthesis).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Change (t+1)	Change (t+1)	Change (t+1)	Change (t+1)	Change (t+1)	Change (t+1)	Change (t+1)	Change (t+1)
Family	-0.084**	-0.028***	-0.054***	-0.038***	-0.064**	-0.013**	-0.059***	-0.036***
	(0.030)	(0.004)	(0.010)	(0.004)	(0.020)	(0.005)	(0.015)	(0.004)
Financial Owner	-0.009	0.028***	0.006	0.039***	0.031	0.061***	0.002	0.039***
	(0.014)	(0.004)	(0.010)	(0.003)	(0.025)	(0.006)	(0.009)	(0.003)
State Owner	-0.058**	-0.054***	-0.105**	-0.069***	-0.030	-0.062***	-0.098**	-0.067***
	(0.022)	(0.004)	(0.033)	(0.006)	(0.043)	(0.008)	(0.030)	(0.005)
Total Assets (ln)	0.003	0.001**	-0.002	-0.001	-0.017*	-0.007***	-0.002	0.000
	(0.004)	(0.000)	(0.001)	(0.001)	(0.007)	(0.001)	(0.002)	(0.001)
Cash	-0.001	-0.013***	0.027***	-0.030***	-0.003	-0.018	0.023***	-0.024***
	(0.005)	(0.003)	(0.004)	(0.004)	(0.020)	(0.012)	(0.004)	(0.003)
Tangible	-0.015**	-0.017***	0.012**	-0.018***	0.006	0.000	0.005*	-0.017***
	(0.005)	(0.002)	(0.003)	(0.002)	(0.027)	(0.011)	(0.002)	(0.002)
ROA	0.002	0.017***	0.015*	0.011	-0.013	-0.025**	0.016**	0.015**
	(0.007)	(0.004)	(0.007)	(0.006)	(0.026)	(0.008)	(0.006)	(0.005)
Leverage Ratio	-0.005	0.013***	-0.003	0.018***	0.013	0.030**	-0.005	0.017***
	(0.003)	(0.002)	(0.004)	(0.002)	(0.015)	(0.009)	(0.003)	(0.002)
Age (ln)	0.030**	-0.011***	0.000	-0.010***	-0.032	-0.012***	-0.004	-0.011***
	(0.009)	(0.001)	(0.003)	(0.001)	(0.019)	(0.002)	(0.004)	(0.001)
Gross Investments	-0.009*	-0.007*	-0.005	-0.003	-0.021	-0.028	-0.005	-0.004*
	(0.005)	(0.003)	(0.003)	(0.002)	(0.014)	(0.018)	(0.004)	(0.002)
Listed	-0.037*	0.019***						
	(0.018)	(0.003)						
Foreign Owner	-0.030*	0.016***	-0.037***	0.025***	-0.014	0.048***	-0.055***	0.027***
	(0.015)	(0.002)	(0.010)	(0.002)	(0.016)	(0.004)	(0.012)	(0.002)
Observations	437,724	456,128	1,068,508	1,097,237	32,959	33,568	1,490,446	1,519,782
R-squared	0.288	0.026	0.274	0.025	0.258	0.044	0.262	0.028
Sample	No unlisted subs	No unlisted subs	Unlisted subs	Unlisted subs	Listed firms	Listed firms	Unlisted firms	Unlisted firms
Firm FE	YES	NO	YES	NO	YES	NO	YES	NO
Year FE	YES	NO	YES	NO	YES	NO	YES	NO
Industry × Year FE	NO	YES	NO	YES	NO	YES	NO	YES
Country × Year FE	NO	YES	NO	YES	NO	YES	NO	YES

*p<.10; **p<.05; ***p<.01

Table IX

COVID-19 analysis

This table presents the estimated coefficients from the linear probability model presented in Equation 3, when dealing with the entire sample (columns 1 and 2), unlisted subsidiaries (columns 3 and 4), listed firms (columns 5 and 6), and unlisted firms (columns 7 and 8). The dependent variable is *Change*, i.e. the binary variable capturing change in control in the following year. The definitions of the variables are provided in Table A2 (Appendix). The sample period spans from 2015 to 2021. Standard errors are double-clustered at the firm and year level (in parenthesis).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Change (t+1)	Change (t+1)	Change (t+1)	Change (t+1)	Change (t+1)	Change (t+1)	Change (t+1)	Change (t+1)
Family	-0.064***	-0.038***	-0.086**	-0.030***	-0.071**	-0.015**	-0.065***	-0.039***
	(0.016)	(0.004)	(0.033)	(0.005)	(0.022)	(0.005)	(0.016)	(0.004)
Financial Owner	0.008	0.041***	-0.012	0.031***	0.022	0.064***	0.007	0.040***
	(0.010)	(0.004)	(0.013)	(0.003)	(0.027)	(0.008)	(0.010)	(0.004)
State Owner	-0.095**	-0.070***	-0.061**	-0.058***	-0.046	-0.071***	-0.097**	-0.070***
	(0.029)	(0.007)	(0.024)	(0.005)	(0.053)	(0.006)	(0.029)	(0.007)
Family × COVID-19	-0.001	0.013	-0.036***	0.009	-0.006	0.013	-0.001	0.014
	(0.005)	(0.021)	(0.006)	(0.015)	(0.022)	(0.026)	(0.005)	(0.021)
Financial Owner × COVID-19	-0.024*	-0.006	-0.019	-0.025	-0.052	-0.032	-0.023*	-0.005
	(0.012)	(0.008)	(0.017)	(0.015)	(0.032)	(0.016)	(0.012)	(0.008)
State Owner × COVID-19	0.003	0.020	-0.053***	0.010	0.012	0.053**	0.004	0.020
	(0.012)	(0.022)	(0.005)	(0.018)	(0.023)	(0.020)	(0.012)	(0.022)
Observations	1,445,719	1,475,457	416,556	434,485	30,100	30,698	1,414,894	1,444,735
R-squared	0.265	0.027	0.291	0.026	0.265	0.046	0.266	0.028
Sample	Full Sample	Full Sample	No unlisted subs	No unlisted subs	Listed firms	Listed firms	Unlisted firms	Unlisted firms
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	NO	YES	NO	YES	NO	YES	NO
Year FE	YES	NO	YES	NO	YES	NO	YES	NO
Industry × Year FE	NO	YES	NO	YES	NO	YES	NO	YES
Country × Year FE	NO	YES	NO	YES	NO	YES	NO	YES

*p<.10; **p<.05; ***p<.01

Table X

Financially constrained firms

This table presents the estimated coefficients from the linear probability model presented in Equation **??**, including the interaction with financial constraint measures (*FC*). We employ four different measures of financial constraints: *SA Index* (Models 1 and 2), *SEB* (Models 3 and 4), *ASCL* (Models 5 and 6), and *DEBT_CASH*. The definitions of the variables are provided in Table A2 (Appendix). The sample period spans from 2015 to 2021. Standard errors are double-clustered at the firm and year level (in parenthesis).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Change (t+1)	Change (t+1)	Change (t+1)	Change (t+1)	Change (t+1)	Change (t+1)	Change (t+1)	Change (t+1)
Family	-0.064***	-0.034***	-0.064***	-0.034***	-0.075**	-0.035***	-0.063***	-0.034***
	(0.016)	(0.004)	(0.016)	(0.004)	(0.022)	(0.005)	(0.015)	(0.004)
Financial Owner	0.004	0.043***	0.004	0.042***	-0.003	0.039***	0.004	0.042***
	(0.009)	(0.003)	(0.010)	(0.003)	(0.009)	(0.002)	(0.009)	(0.003)
State Owner	-0.092**	-0.066***	-0.099**	-0.067***	-0.095**	-0.065***	-0.093**	-0.065***
	(0.029)	(0.006)	(0.030)	(0.006)	(0.033)	(0.006)	(0.029)	(0.006)
FC	0.002	0.004	0.005*	0.008***	0.009*	0.009**	0.004*	0.005**
	(0.004)	(0.002)	(0.002)	(0.002)	(0.004)	(0.003)	(0.002)	(0.002)
Family × FC	-0.004	-0.013***	-0.010***	-0.010**	-0.010	-0.017***	-0.007***	-0.014***
	(0.005)	(0.003)	(0.002)	(0.003)	(0.005)	(0.004)	(0.002)	(0.003)
Financial Owner × FC	0.004	-0.011**	0.002	-0.008*	0.002	-0.004	0.005	-0.002
	(0.005)	(0.004)	(0.004)	(0.004)	(0.009)	(0.007)	(0.006)	(0.003)
State Owner × FC	-0.014	-0.012**	0.001	-0.003	-0.006	-0.013**	-0.006	-0.013**
	(0.010)	(0.003)	(0.004)	(0.002)	(0.009)	(0.004)	(0.005)	(0.004)
FC × COVID-19	0.000	-0.002	-0.012	-0.014	0.002	-0.010	-0.006	-0.008
	(0.016)	(0.014)	(0.012)	(0.013)	(0.011)	(0.016)	(0.014)	(0.012)
Family × FC × COVID-19	-0.004	0.009	0.005	0.017	-0.006	0.015	0.007	0.015
	(0.012)	(0.018)	(0.013)	(0.022)	(0.010)	(0.022)	(0.013)	(0.020)
Financial Owner × FC × COVID-19	-0.013	-0.011	-0.006	0.010	-0.039	-0.044**	-0.040*	-0.030*
	(0.015)	(0.012)	(0.013)	(0.011)	(0.023)	(0.016)	(0.017)	(0.013)
State Owner × FC × COVID-19	0.023	0.044***	0.029	0.039*	0.021	0.047**	0.012	0.031
	(0.016)	(0.010)	(0.021)	(0.019)	(0.026)	(0.012)	(0.023)	(0.020)
Observations	1,445,719	1,475,457	1,350,982	1,381,670	832,927	858,340	1,445,719	1,475,457
R-squared	0.265	0.027	0.268	0.028	0.293	0.029	0.265	0.027
FC Measure	SA Index	SA Index	SEB	SEB	ASCL	ASCL	NFP	NFP
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	NO	YES	NO	YES	NO	YES	NO
Year FE	YES	NO	YES	NO	YES	NO	YES	NO
Industry × Year FE	NO	YES	NO	YES	NO	YES	NO	YES
Country × Year FE	NO	YES	NO	YES	NO	YES	NO	YES

*p<.10; **p<.05; ***p<.01

Table XI

Firm size analysis

This table presents the estimated coefficients from the linear probability model presented in Equation 1 and interacting ownership dummies with a dummy variable capturing if a firm is large (*Large*) or not, when taking into account group holdings, SACs, and listed subsidiaries (columns 1 and 2) and unlisted subsidiaries (columns 3 and 4). The dependent variable is *Change*, i.e. the binary variable capturing change in control in the following year. The definitions of the variables are provided in Table A2 (Appendix). The sample period spans from 2015 to 2021. Standard errors are double-clustered at the firm and year level (in parenthesis).

VARIABLES	(1) Change (t+1)	(2) Change (t+1)	(3) Change (t+1)	(4) Change (t+1)
Family	-0.066***	-0.041***	-0.087**	-0.031***
	(0.016)	(0.004)	(0.034)	(0.006)
Financial Owner	0.008	0.040***	-0.010	0.031***
	(0.010)	(0.004)	(0.011)	(0.003)
State Owner	-0.095**	-0.070***	-0.036	-0.056***
	(0.029)	(0.007)	(0.022)	(0.007)
Large Firm	-0.007	-0.014***	-0.000	-0.008*
	(0.005)	(0.003)	(0.007)	(0.004)
Family × Large Firm	0.012	0.026***	0.007	0.014**
	(0.009)	(0.003)	(0.015)	(0.005)
Financial Owner × Large Firm	-0.001	0.005	-0.005	-0.001
	(0.008)	(0.002)	(0.040)	(0.007)
State Owner × Large Firm	0.003	0.005	-0.055*	-0.005
	(0.011)	(0.004)	(0.025)	(0.009)
Family × COVID-19	-0.003	0.015	-0.037***	0.011
	(0.005)	(0.020)	(0.008)	(0.014)
Financial Owner × COVID-19	-0.024*	-0.006	-0.013	-0.024
	(0.012)	(0.007)	(0.021)	(0.020)
State Owner × COVID-19	0.006	0.022	-0.056***	0.008
	(0.012)	(0.020)	(0.006)	(0.018)
Large Firm × COVID-19	-0.003	0.011	-0.015	0.017
	(0.015)	(0.009)	(0.011)	(0.011)
Family × Large Firm × COVID-19	0.014	-0.013	0.009	-0.023
	(0.022)	(0.013)	(0.036)	(0.026)
Financial Owner × Large Firm × COVID-19	0.001	0.000	-0.023	-0.006
	(0.009)	(0.004)	(0.030)	(0.032)
State Owner × Large Firm × COVID-19	-0.007	-0.011	0.027	0.002
	(0.019)	(0.013)	(0.025)	(0.021)
Observations	1,445,719	1,475,457	416,556	434,485
R-squared	0.265	0.028	0.291	0.026
Sample	Full Sample	Full Sample	No unlisted subs	No unlisted subs
Controls	YES	YES	YES	YES
Firm FE	YES	NO	YES	NO
Year FE	YES	NO	YES	NO
Industry × Year FE	NO	YES	NO	YES
Country × Year FE	NO	YES	NO	YES

*p<.10; **p<.05; ***p<.01

Table XII

Cross-border and extra-Europe change of control

This table presents the estimated coefficients from the linear probability model presented in Equation 1 when having as dependent variables a dummy variable capturing cross-country acquisitions (*Cross-border Acquisition*) (columns 1–4) and extra European Economic Area acquisitions (*Extra EEA acq*). The definitions of the variables are provided in Table A2 (Appendix). The sample period spans from 2015 to 2021. Standard errors are double-clustered at the firm and year level (in parenthesis).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Cross-border	Cross-border	Cross-border	Cross-border	Non Europe	Non Europe	Non Europe	Non Europe
Family	-0.016***	-0.019***	-0.016***	-0.020***	-0.015***	-0.009***	-0.014***	-0.009***
	(0.003)	(0.001)	(0.004)	(0.001)	(0.003)	(0.000)	(0.003)	(0.000)
Financial Owner	0.002	0.022***	0.003	0.020***	0.001	0.006***	0.002	0.005***
	(0.006)	(0.001)	(0.006)	(0.001)	(0.004)	(0.001)	(0.004)	(0.001)
State Owner	-0.073*	-0.044***	-0.066*	-0.044***	0.014**	-0.016***	0.015**	-0.018***
	(0.033)	(0.004)	(0.032)	(0.005)	(0.005)	(0.001)	(0.005)	(0.001)
Family × COVID-19			-0.004	0.006			-0.004	0.005
			(0.003)	(0.011)			(0.002)	(0.003)
Financial Owner × COVID-19			-0.005	0.013*			0.002	0.004
			(0.007)	(0.006)			(0.008)	(0.007)
State Owner × COVID-19			-0.014	0.004			0.001	0.012**
			(0.008)	(0.013)			(0.002)	(0.003)
Observations	1,524,170	1,553,368	1,445,719	1,475,457	1,524,170	1,553,368	1,445,719	1,475,457
R-squared	0.290	0.034	0.298	0.034	0.257	0.017	0.266	0.016
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	NO	YES	NO	YES	NO	YES	NO
Year FE	YES	NO	YES	NO	YES	NO	YES	NO
Industry × Year FE	NO	YES	NO	YES	NO	YES	NO	YES
Country × Year FE	NO	YES	NO	YES	NO	YES	NO	YES

*p<.10; **p<.05; ***p<.01

Appendix

A Dataset construction

Table A1
Dataset filtering

This table shows the step-by-step procedure we implement to filter our database, the number of observation dropped for each step and the final number of the observation and unique firms in the sample.

Description	**Dropped observations**	**Number of firms**	**Number of observations**
Public limited companies, private limited companies, foreign companies. Total assets at least one year above €10 million. No financial, public administration, defense, and extra-territorial firms.	–	592,835	4,682,099
Country variable inconsistency	15,076	589,897	4,667,023
Missing total assets, operating revenues, and number of employees	12,185	589,845	4,654,838
Negative total assets, operating revenues, employees, and tangible fixed assets	39,961	584,771	4,614,877
Observations with missing, zero, or negative values for sales and total assets	1,394,771	455,082	3,220,106
No NACE code	53,283	441,248	3,166,823
Balance sheet inconsistencies	173,158	424,058	2,993,665
Negative age	2,944	423,760	2,990,721
No data on ultimate owner	126,929	402,201	2,863,792
Drop 2013, 2014, 2022	837,861	383,197	2,310,273
Final database	–	**375,634**	**2,025,931**

B Links between ultimate owners

In this section of the Appendix, we presents illustrative cases of ultimate owner linkages identified within owner types - State, industrial, financial and family owners. Panel A shows examples of state ownership, where shareholders representing the same national government are not treated as a single controlling entity. Panel B and Panel C report cases of industrial and financial owners, respectively, that appear to be related. Panel D provides examples of potential family ties, identified using GUO string names to match family-related owners. Many cases are easily identifiable, such as instances where the same firm lists multiple ultimate owners with identical names but different identifiers (A), or where owners share a common last name (B). However, the analysis also required meticulous manual verification to rule out false positive. For instance, when individuals share only a first name (e.g., Savigny Jean Loup and Mosca Jean Louis, where the textual analysis would detect the common keyword "JEAN". However, sharing a fisrt or second name does not imply any actual connection between the individuals). There are also cases that are more difficult to detect that require close attention, including name alterations due to marital status (C) (we manually verified personal information using publicly available online sources, where both the full current name and the birth name are often reported), misspellings (D), and ownership involving multiple shareholders (E).

Panel A): Ultimate owners links: **State owners**

Firm	**Ultimate owner ID**	**Ultimate owner name**
NAPAPIIRIN VESI	FI19782831	ROVANIEMEN KAUPUNKI
	FI01924184	ROVANIEMEN KAUPUNKI
LEONARDO	IT80415740580	MINISTERO DEL TESORO IGED
	IT*J00S1150	REPUBBLICA ITALIANA
ALSTOM	CA377940908L	QUEBEC PROVINCE
	CA263359388L	CANADA
NTT	JP*J00S4260	GOVERNMENT OF JAPAN
	JP8000012050001	MINISTRY OF FINANCE

Panel B): Ultimate owners links: **Industrial owners**

Firm	**Ultimate owner ID**	**Ultimate owner name**
BRUSSELS SOUTH CHARLEROI AIRPORT	LULB116635	MARCHI GIOVANNI S.A.
	IT00469210264	MARCHI GIOVANNI & C. S.P.A.
OTELINOX SA	KR1101110002975	SAMSUNG C&T CORPORATION
	KR1101110015762	SAMSUNG C&T CORPORATION
	DE6290134421	SAMSUNG C&T DEUTSCHLAND
TOYOTA MANUFACTURING SWEDEN	JP3180301014273	TOYOTA INDUSTRIES CORPORATION
	JP1180301018771	TOYOTA MOTOR CORPORATION
ISG IRELAND LIMITED	US*D00438190	CATHEXIS HOLDINGS II, LLC
	US*B000114341	CATHEXIS HOLDINGS II, LP
	USLEI921615	CATHEXIS HOLDINGS LP

Panel C): Ultimate owners links: **Financial owners**

	Firm	**Ultimate owner ID**	**Ultimate owner name**
	ESKIGEL S.R.L.	LULB177023	RIVIERA MIDCO SA
		LULB177014	RIVIERA TOPCO S.R.L.
	SKF CZ	SE5592931587	WALLENBERG INVESTMENTS AB
		SE5565984894	WALLENBERG FOUNDATIONS AB
	DAVID LINLEY & CO LTD	VG*B000045528	WEAR INVESTMENTS LTD
		YY*B000120315	WEAR INVESTM AB
	NOVARES PORTUGAL S.A.	FRECB0012696037	EQUISTONE V FPCI
		FRECB0013334208	EQUISTONE VI FPCI

Panel D): Ultimate owners links: **Family owners**

	Firm	**Ultimate owner ID**	**Ultimate owner name**
A	SCIC S.R.L.	ITPPFRNRNZ32E29I068F	FORNARI RENZO
		ITPPFRNRNZ32E29G337E	FORNARI RENZO
A	SOLARIS DEUTSHLAND GMBH	DE*110024024008	KRZYSZTOF OLSZEWSKI
		PL*Z00321358	MR KRZYSZTOF OLSZEWSKI
A	OPTIMA LOGISTICS GROUP S.A.	WW*110158746187	ALEKSANDRA MAGDALENA RYBINSKA
		PL*110158902390	ALEKSANDRA RYBINSKA
B	THERMOCOMPACT	FR*110354327879	MME BAVAREL DESPATURE MARIE
		WW*4000000165528	M. PAUL GEORGES DESPATURE ET SES ENFANTS
C	WARSEMANN AUTOMOBILES BRACIEUX	FR*110330519430	LAURENCE WARSEMANN
		WW*110337141933	MME DELETANG LAURENCE
D	ALU-SOMMER GMBH	DE*110306884423	WEISS, SUSANNE
		AT*776207967	WEIß, SUSANNE
D	REAL VALLADOLID CLUB	ES*110189452354	NAZARIO DA LIMA RONALDO LUIS
		WW*110193234721	NAZARIO DE LIMA RONALDO LUIS
D	TECHNOBIZ SUPPORT LTD	WW*110185528511	SERGEY ALEKSEY
		WW*110312355205	SERGEY ALEXEI
E	ALLEN'S CARAVANS LTD (ESTATES)	WW*110325998618	DAVID STUART D. LODDER & SHEILA PATRICIA ALLEN
		WW*1519609889	DAVID STUART LODDER JOINT SHAREHOLDER
		WW*215410262	SHEILA PATRICIA ALLEN JOINT SHAREHOLDER
		GB*110166520064	MR MARK WILLIAM ALLEN

C Ownership patterns

C.1 Identification approach: three-years pattern rule

To provide a clearer understanding of the implementation of the three-years pattern rule, we draw on specific cases from our sample. As described in Section B, when an ultimate owner appears multiple times, we apply the 3yPR: (1) a letter is preserved as long as it appears again within a maximum of four characters (three-years window), replacing letters in between; (2) in case of conflicts, e.g., multiple candidates within the four-characters window, we prioritize the most recent letter encountered in the sequence. The following tables report: the year of the observation; the ultimate owner (represented by a letter); the variable *MDH Change*, that is equals to 1 whenver we observe a change in the *Ultimate Owner* at $t + 1$; the variable *Change*, resulting from the application of the 3yPC pattern rules; and the *New ultimate owner*, indicating the letter corresponding to the ultimate owner identified after the 3yPR.

Ex. 1 In this example, we observe two control changes using the MDH metric, while no ownership alterations are detected under the 3yPR method. This occurs because letter A replaces both Bs in 2019 and 2020, as it reappears within the three-year window.

Year	Ultimate owner	MDH Change	Change	New ultimate owner
2013	A	0	0	A
2014	A	0	0	A
2015	A	0	0	A
2016	A	0	0	A
2017	A	0	0	A
2018	A	1	0	A
2019	B	0	0	A
2020	B	1	0	A
2021	A	0	0	A
2022	A	0	0	A

Ex. 2 In this example, we observe three control changes using the MDH metric. Differently from Ex. 1, here B is the most recent owner in the sequence, replacing both As in 2020 and 2021. Therefore, when applying the 3yPR method, only one control change is identified, occurring in 2017.

Year	Ultimate owner	MDH Change	Change	New ultimate owner
2013	A	0	0	A
2014	A	0	0	A
2015	A	0	0	A
2016	A	0	0	A
2017	A	1	1	A
2018	B	0	0	B
2019	B	1	0	B
2020	A	0	0	B
2021	A	1	0	B
2022	B	0	0	B

Ex. 3 In this example, letter A reappears in 2019, satisfying condition (1) of the 3yPC method. However, it only replaces letter B, which does not reappear later in the sequence. From 2018 onwards, letter C takes precedence over A, as it is the ultimate owner in 2020 (condition 2). As a result, only two control changes are identified using the 3yPR method, whereas the MDH metric records five changes.

Year	Ultimate owner	MDH Change	Change	New ultimate owner
2015	A	0	0	A
2016	A	1	0	A
2017	B	1	1	A
2018	C	1	0	C
2019	A	1	0	C
2020	C	1	1	C
2021	D	0	0	D
2022	D	0	0	D

Ex.4 This example is similar to Ex. 3. Letter B replaces only letter C in 2016. Then, according to rule (2), letter D dominates all ultimate owners from 2017 to 2022, as it is the most recent letter satisfying condition (1). The 3yPR method thus deflates the number of control changes from eight (under the MDH metric) to just two.

Year	Ultimate owner	MDH Change	Change	New ultimate owner
2013	A	1	1	A
2014	B	0	0	B
2015	B	1	0	B
2016	C	1	1	B
2017	D	1	0	D
2018	B	1	0	D
2019	D	1	0	D
2020	B	1	0	D
2021	E	1	0	D
2022	D	0	0	D

C.2 Identification approach: persistence of control

In this section of the Appendix we present examples from our sample to illustrate the implementation of the alternative approach we emply to identify control changes: the persistence of control method (PCM). In particular, we consider a GUO as the real ultimate owner only if its control spans at least two consecutive years. The following tables report: the year of the observation; the ultimate owner (represented by a letter); the variable *MDH Change*, that is equals to 1 whenver we observe a change in the *Ultimate Owner* at $t + 1$; the variable *ChangeP*, resulting from the application of the persistence of control identification approach; and the *New ultimate owner*, indicating the letter corresponding to the ultimate owner identified after the PCM.

Ex. 1 In this example, the control change identified by the MDH approach in 2015 (from A to B) no longer satisfies the requirements of the PCM. As a result, only two control changes are ultimately identified.

Year	Ultimate owner	MDH Change	ChangeP	New ultimate owner
2013	A	0	0	A
2014	A	0	0	A
2015	A	1	0	A
2016	B	1	1	A
2017	C	0	0	C
2018	C	0	0	C
2019	C	1	0	C
2020	A	1	1	C
2021	D	0	0	D
2022	D	0	0	D

Ex. 2 In this example, only B and G satisfy the conditions of the PCM; consequently, all changes in ultimate ownership between 2016 and 2018 are disregarded.

Year	Ultimate owner	MDH Change	ChangeP	New ultimate owner
2013	A	1	1	A
2014	B	0	0	B
2015	B	1	0	B
2016	C	1	0	B
2017	D	1	0	B
2018	E	1	0	B
2019	F	1	1	B
2020	G	0	0	G
2021	G	0	0	G
2022	G	0	0	G

Ex. 3 In this example, B is the only ultimate owner that controls the company for at least two consecutive years, thereby dominating over A, C, D, and E in the last four years of the sequence.

Year	Ultimate owner	MDH Change	ChangeP	New ultimate owner
2013	A	1	1	A
2014	B	0	0	B
2015	B	0	0	B
2016	B	1	0	B
2017	A	0	0	B
2018	C	1	0	B
2019	D	1	0	B
2020	E	0	0	B

D Variables Definition

Table A2
Variable Definition (1)

Variable	Definition	Source
Age	Difference between the year of observation and the year of incorporation of the firm	Moody's DataHub
ASCL	Dummy variable equal to 1 if the ASCL indicator (Mulier et al., 2016) equals 4, 0 otherwise	Moody's DataHub
Cash	Ratio of cash and cash equivalents over total assets	Moody's DataHub
Change	Dummy variable equal to 1 whenever the firm experiences a change in control in the following year applying both the NCP and the pattern procedure, 0 otherwise	Own calculation
ChangeP	Dummy variable equal to 1 whenever the firm experiences a persistent change in control in the following year (i.e., the new ultimate owner must control the firm for at least two years), 0 otherwise	Own calculation
COVID-19	Continuous variable proxing for the intensity of the pandemic shock across countries and industries. $$COVID\text{-}19_{s,c,t} = \frac{SI_{c,t}}{100} \times (1 - WFH_{s,c,t})$$	OxCGRT, EU-LFS
Cross-border Change	Dummy variable equal to 1 when the new ultimate owner is based in a different country with respect to the target firm, 0 otherwise	Moody's DataHub
Family	Dummy variable equal to 1 if the ultimate owner is a family, an individual, or an unnamed private shareholder (D), 0 otherwise	Moody's DataHub
Financial Owner	Dummy variable equal to 1 if the owner is an insurance firm (A), a bank (B), a mutual or pension fund, a nominee, a trust or trustee (E), a financial firm (F), a foundation or research institute (J), a private equity firm (P), a venture capital firm (V), or a hedge fund (Y), 0 otherwise	Moody's DataHub
Foreign Owner	Dummy variable equal 1 whenever the ultimate owner of the firm belongs to a different country than the firm itself	Moody's DataHub
Gross Investments	Change in fixed assets from the previous year plus the depreciation and amortization of the current year, normalized by total assets	Moody's DataHub

Variable Definition (2)

Variable	Definition	Source
Industrial Owner	Dummy which takes a value of 1 if the owner is an industrial firm (C) or employees, managers, or directors (M), 0 otherwise	Moody's DataHub
Large	Dummy variable which takes value of 1 if total assets are larger than € 100 million, 0 otherwise	
Leverage Ratio	Total debt over total assets	Moody's DataHub
Listed	Indicator variable taking value of 1 whenever the firm is listed in the given year	Moody's DataHub, Datastream
MDH Change	Dummy variable which takes value of 1 when there is a change in the ultimate owner identified by DataHub in $t+1$, 0 otherwise	Moody's DataHub
NFP	Dummy variable equal to 1 if the firm is in the fourth quartile of the industry-country-year distribution of the Net Financial Position (NFP), that consider firm's net debt (debt-cash) over total assets 0 otherwise	Moody's DataHub
NPC Change	Dummy variable which takes value of 1 when there is a change in the ultimate owner in $t+1$ after applying the Name Correction Process (NCP) that links related ultimate owners, 0 otherwise	Own calculation
Parent company	Dummy variable which takes value of 1 if it is its own ultimate owner and it is also the ultimate owner of other firms within the sample, 0 otherwise	Moody's DataHub
ROA	Return on assets, obtained as EBITDA over total assets	Moody's DataHub
SA Index	Dummy variable which equals 1 if the firm is in the top quartile of the Size-Asset index (Hadlock and Pierce, 2010), 0 if not	Moody's DataHub
SAC	Dummy variable with a value of 1 if the firm itself is its own ultimate owner and does not control any other firm in the sample, 0 otherwise	Moody's DataHub
SEB	Indicator variable equaling 1 whenever the firm FCP index (Schauer et al., 2019) is in the top tercile of the distribution of the same country and year firm FCP index distribution	Moody's DataHub
State Owner	Dummy variable equal to 1 when the ultimate owner is categorized as a public authority (S), 0 otherwise	Moody's DataHub
SI	Measure of lockdown intensity at country level taking a value between 0 and 100. We compute the annual average using data from March 2020 to December 2022, aggregated by country-year	OxCGRT
Subsidiary Unlisted	Firms which cannot be categorized as SAC or Group Holding, not listed	Moody's DataHub
Subsidiary Listed	Firms which cannot be categorized as SAC or Group Holding, and listed	Moody's DataHub
Tangible	Ratio of tangible assets over total assets	Moody's DataHub
Total Assets	Expressed in € million, represents firm size	Moody's DataHub
WFH	Share of workers who work-from-home at country-industry level	EU-LFS

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