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Privatization and business groups: Evidence from the *Chicago Boys* in Chile[☆]

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ABSTRACT

Business groups are the predominant organizational structure in modern Chile. This article tests the long-standing hypothesis that the privatization reform implemented by the “Chicago Boys” during the Pinochet regime facilitated the creation of new groups and hence the renovation of the country’s elites. Using new data we find that firms sold during this privatization later became part of *new* business groups, process aided by an economic crisis that debilitated traditional elites. Moreover, some firms were bought by Pinochet’s allies and were later used as providers of capital within groups. We conclude that privatizations can empower outsiders to replace business elites.

1. Introduction

Business groups are the predominant organizational structure in modern Chile (Rojas, 2015).¹ Yet an empirical examination of how these groups became one of the most important actors in the country’s economy has been notably absent. This article tests the long-standing hypothesis that the privatization reform implemented by the “Chicago Boys” during the Pinochet regime (1973–1990) facilitated the creation of business groups and hence the renovation of economic elites. The idea that government policies might contribute to the formation of business groups has been suggested by academics in Chile (e.g. Lefort 2010) and elsewhere (e.g. Kandel et al. 2019; Morck and Nakamura 2007). Using newly collected firm-level data we find that firms sold during this privatization reform later became part of *new* business groups, a process seemingly aided by an economic crisis that debilitated traditional business elites.

The privatization process in Chile was implemented in the 1970s and 1980s by a group of economists known as the “Chicago Boys.” These economists worked as advisors of dictator Augusto Pinochet and argued that by selling state-owned firms the economy would be more productive. To the best of our knowledge this is the first paper to *empirically* document a relationship between this

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¹ A business group is defined as firms with a common controlling shareholder and they are prevalent across the world, affecting firm performance, internal capital markets, and contributing to the formation of corporate empires. Examples of papers studying the effects of business groups include Almeida et al. (2011); Bertrand et al. (2002); Johnson et al. (2000); Khanna and Palepu (2000); Morck et al. (2005), among many others.

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privatization and current business groups. In [Khanna and Yafeh \(2007\)](#) the authors also point out that government policies – such as a privatization reform – might explain the origins of groups in China, Japan, Malaysia, and Russia, among others. Relatedly [Morck and Nakamura \(2007\)](#) argue that privatization reforms can be historical circumstances that facilitate a “big push” coordinated by the private sector through business groups. However, most of this work consist of case studies and systematic evidence is lacking. Our primary contribution is to formally test if privatizations lead to the formation of business groups. In doing so, we highlight how government policies coupled with historical circumstances such as an economic crisis can contribute to the renovation of business elites.

The context of our study is the Pinochet dictatorship (1973–1990), after Salvador Allende (1970–1973) nationalized a large number of firms. At the time Chile was a developing country in the civil law tradition where business groups were young and steady: in 1970 little more than 20% of publicly traded firms were affiliated to a business group ([Salvaj and Couyoumdjian, 2016](#)), a number which was essentially the same in 1960. In 1990, however, group affiliation jumped to 70% of publicly traded firms. Our analysis reveals that Pinochet’s privatizations contributed to this rise. We show that *new* business groups were built around privatized firms, and particularly so when firms were sold after the 1982–1983 economic crisis, a period where traditional elites were financially debilitated. Moreover, some firms were bought by Pinochet’s allies, who placed them at the bottom of pyramids and used them as providers of capital within groups. We conclude that privatizations can empower outsiders to replace business elites.

The empirical analysis uses new data for 79 listed firms observed over five decades (1960–2005). We digitized this information from the archives of the regulatory agency in charge of collecting annual reports with firms’ activities. Besides balance sheets, income statements, and other information, we also uncovered business groups at different points in time. Additionally, we identified 50 firms that were privatized during the 1970s and 1980s, together with information about their buyers. Privatization reforms are often plagued by poor implementation ([Fisman and Wang, 2014](#)) and Chile is not different ([González et al., 2020](#)). To account for the implementation of this policy we classified firms into those sold to buyers that worked for Pinochet and other “politically unconnected” buyers. Our econometric strategy compares the evolution of business ownership between privatized and non-privatized firms within the same industry. The comparison group is composed by firms which operated during the same period of time but remained private throughout the period. These 29 control firms were also large companies which could have been privatized if Salvador Allende would have stayed in power.

We take insights from the historical context to offer a framework that guides our empirical analysis. There are traditional and new business agents who maximize their wealth and have the opportunity to buy state-owned firms in the context of a privatization. The government maximizes revenues and political support. Traditional business agents suffered a wealth shock due to an economic crisis and new business agents use this opportunity to acquire state-owned firms. This simple model predicts that firms will become part of *new* business groups, particularly so if firms were sold after a crisis. In addition, the model also predicts that business agents who are close to the government will use these firms as a source of capital. The mechanism is a substitution away from privileged access to bank loans when the dictatorship ends, as suggested in previous literature ([González and Prem, 2020](#); [Khwaja and Mian, 2005](#)).

Guided by the framework we organized results in two parts. The first part shows that firms privatized by the Pinochet regime were 32–37 percentage points more likely to become part of *new* business groups after the transition to democracy than non-privatized ones in the same industry. Importantly, group affiliation across privatized and non-privatized firms was similar before the Pinochet years, i.e. 1960 and 1970. Moreover, this tendency of privatized firms to become part of new business groups is larger for the subset of firms that were privatized *after* the 1982–1983 economic crisis – i.e. 40–43 versus 24–28 percentage points – providing suggestive evidence for the role played by the crisis in debilitating traditional business elites. This pattern reverses for *traditional* groups: firms that were privatized *before* the crisis were more likely to become part of old business groups. The former result is somewhat imprecisely estimated given the small sample, but the latter result is statistically significant and consistent with the negative impact of the crisis on traditional bank-based business groups ([Rojas, 2015](#); [Silva, 1996](#)).

The second part studies the role of firms within groups using four outcomes. We study pyramids with (i) an indicator for firms that were part of a pyramid and (ii) a variable that reveals the position of firms within pyramids.² We also study internal capital markets with (iii) a variable that detects which firms provided loans to other firms in the group and (iv) a similar variable for firms receiving loans from the group. In both cases we find evidence that is consistent with the framework: privatized firms are used as sources of capital, but only when bought by individuals who presumably lost privileged access to bank loans. In particular, we show that firms sold to “connected buyers” were twice more likely to be part of a pyramid, were placed at the bottom of these pyramids, and became providers of credit within the group.

All results are robust to a wide range of empirical exercises. Results are similar when we use three different matching estimators providing arguably better comparisons than ordinary least squares ([Crump et al., 2009](#); [Dehejia and Wahba, 2002](#)). Importantly, results are also similar when we use historical data to control for group affiliation in 1970, when we drop from the estimating sample the few firms which experienced takeovers, and when we include additional listed firms to increase the size of the comparison group. Finally, we reach the same conclusions when we employ a coefficient stability method that adjusts our estimates for the role of potentially relevant unobservable variables that could be driving the privatization decision and the outcomes we examine ([Altonji et al., 2005](#); [Oster, 2019](#)).

² Pyramids allow shareholders to control other firms indirectly ([Bertrand and Mullainathan, 2003](#)), their presence is common outside of the United States ([La Porta et al., 1999](#)), and they are associated to the expropriation of minority shareholders and tunneling ([Almeida and Wolfenzon, 2006](#); [Johnson et al., 2000](#); [Lin et al., 2011](#)).

Earlier work studying business groups in Chile has suggested the importance of the Chicago Boys privatization (Lefort, 2010). Moreover, most academics argue that existing business groups are young and their origins are probably related to the 1982–1983 economic crisis. For example, Rojas (2015, p. 62) says that “this second privatization round [after the crisis] brought new business groups to the scene. These groups did not involve families; rather, the executives of privatized firms built them and later expanded their operations to include other domestic industries and foreign markets.” Our work provides empirical evidence that supports these hypotheses. In doing so, we also complement earlier work studying the origins of political corporations (González et al., 2020). In contrast to that study, which concentrated on the political consequences of types of privatization within the set of privatized firms, we focus on privatized versus non-privatized firms, on the formation of business groups, and the renovation of business elites. We also use more firm-level data and new business group affiliation data over a 40-year period (1960–2005). Finally, we speak to a different literature that studies the contribution of government policies to the evolution of business groups and pyramidal ownership.

Scholars have studied business groups and pyramids since at least the beginning of the twentieth-century (Berle and Means, 1932). More recent work studies conditions that facilitate the formation of these organizational structures (Almeida and Wolfenzon, 2006). A key contribution is Kandel et al. (2019), who show the relation between the disappearance of groups in the U.S., government policies, and anti-big business sentiments. Theoretically a business group can appear as a consequence of market underdevelopment or market imperfections (Almeida and Wolfenzon, 2006; Leff, 1978), institutional voids (Khanna and Yafeh, 2007), economic circumstances combined with managerial capabilities (Guillén, 2000), or targeted policies (Morck and Nakamura, 2007; Schneider, 2010). In addition, pyramids can arise because of advantages derived from internal capital markets within groups (Bena and Ortiz-Molina, 2013) and portfolio diversification (Manikandan and Ramachandran, 2015).³

We contribute to this literature by studying the origins of business groups after a large privatization. Our results support descriptive evidence gathered by Khanna and Yafeh (2007) suggesting that government policies are behind the origins of groups in many countries. We also show that most privatized firms became part of new (instead of traditional) business groups. Hence, we argue that the privatization reform facilitated the renovation of elites and contributed to the formation of contemporaneous business groups, similar to processes that unfolded in Japan, Russia, and South Africa, among others (Khanna and Yafeh, 2007).

Finally, we also contribute to the literature that studies the usages and consequences of privatization reforms. Although the traditional literature focused mostly on changes in productivity after a privatization, recent research emphasizes potential unintended consequences.⁴ In a seminal paper, Fisman and Wang (2014) find that privatization had a positive effect on the performance of Chinese firms, except when privatizations were corrupt. Similarly, Black et al. (2000) argue that the massive Russian privatization program resulted in widespread expropriation through self-dealing by the new owners. Privatizations might also constitute an opportunity for business elites to invest in *de facto* economic power when foreseeing a democratization, thus helping to create “captured democracies” (Acemoglu and Robinson, 2008). Previous research emphasizes that privatization might be used as a policy to increase political support (Bel, 2010) or to create political corporations that are instrumental to gain or retain power (González et al., 2020). We contribute to this literature by showing that privatizations can help elites to persist over time (1970s privatization) but also to partially renovate them with new business agents when the reform is coupled with an economic crisis (1980s privatization).

2. Historical background

2.1. Business groups in historical perspective

Few companies operated under the same ownership in the nineteenth century (Aguirre, 2017; Kirsch, 1977). As argued by Garretón and Cisternas (1970), these were mostly families who controlled firms in different industries but did not necessarily operated as a coordinated group. The degree of corporate coordination changed with “modern” business groups in the twentieth century. Rojas (2015) puts it simple: “during the first half of the twentieth century, both family-owned and foreign companies acted as business groups, using individuals to coordinate decisions across several companies as a result of their involvement on multiple boards.”⁵ However, groups were far from widespread and only in the following decades they would become powerful. In the 1930s, both external and internal shocks played an important role in the creation of modern groups. Economically, Chile was one of the countries most negatively affected by the Great Depression in the early 1930s, leading the state to develop an economic policy of import substitution industrialization (Eichengreen and Irwin, 2010).

The industrialization process that unfolded after the 1929 worldwide crisis began its course under the government of Arturo Alessandri (1932–1938) and continued under the three consecutive governments of the Radical Party (1938–1952). The most important policy of the time was the creation of the Production Development Corporation in 1939 (Collier and Sater, 2004). Examples of important companies operating under the umbrella of this entity were the National Electricity Company, the Pacific Steel Company, the National Oil Company, and the National Sugar Industry, among others (details in Appendix A). In a matter of years the state became owner of multiple firms in different sectors and hence one of the most important (state-owned) “business groups” in

³ Case studies analyzing what factors might affect the evolution of groups are more common. Previous research emphasizes the importance of vertical versus horizontal group growth as a function of firms’ previous profitability (Almeida et al., 2011) and point to case studies of East Asian economies (Carney and Child, 2013), the Koç group in Turkey (Colpan and Jones, 2015), and British merchants (Jones, 2000), among others.

⁴ Prominent examples in the early literature include Barberis et al. (1996); D’Souza and Megginson (1999); La Porta and López-de-Silanes (1999) and Frydman et al. (1999), among others. See Megginson and Netter (2001) and Estrin et al. (2009) for surveys of this literature.

⁵ Examples include the copper broker Gibbs & Co. which held stakes in many companies, and the Croatian Pascual Barburizza who sat on the boards of 21 companies in 1920.

the country (Salvaj and Couyoumdjian, 2016). Following the industrialization policy, several studies reported an increasing concern about economic concentration and technological stagnation arising from the existence of business groups (Lagos, 1962; Zeitlin et al., 1974). Even the government showed its discontent by submitting a bill to Congress to amend the country's corporate law and reduce business groups' influence (Rojas, 2015, p. 55).

The increasing economic concentration and the rise of the left-wing in the 1960s facilitated the victory of the socialist coalition known as Popular Unity in 1970 (González, 2013). In November of that year Salvador Allende was elected president and the economy took an abrupt turn (Girardi and Bowles, 2018). Allende's economic plan became known as the *Vuskovic plan* – named after the Ministry Pedro Vuskovic – and one of its pillars was the nationalization of firms.⁶ The plan was to first buy the largest companies in the country and then take control of the remaining firms in the economy.⁷ To facilitate this nationalization program, president Allende invoked a 1932 law that allowed him to take control of a firm “whenever a strike or a breakdown would be against the public interest.” As a consequence of this policy, the importance of the public sector rose significantly and the development of modern business groups formed in previous decades suffered a large shock that contributed to their extinction (Larrain and Meller, 1991). While in 1965 state companies represented 14% of gross domestic product (GDP), by 1973 this percentage had almost tripled to 39% of GDP (Hachette, 2000) and the Production Development Corporation owned more than 500 firms.

The poor economic performance of Salvador Allende's government was at the root of increasing social tensions that led to a coup d'état. In 1973 inflation rose to 441% and the fiscal deficit of the central government reached 25% of GDP (Lüders, 1993). On September 11, 1973 Allende was removed from power by a military coup led by the Chilean armed forces and the police. Hundreds of firms that were in the process of nationalization were returned to their owners and the country experienced another radical turn now towards market-based economic policies (Huneus, 2006). The economic process that unfolded in previous decades continued its course and business groups began to flourish once again (Dahse, 1979).

2.2. Pinochet, privatization, and the Chicago Boys

The dictatorship that followed Allende's government lasted seventeen years. The leaders of the armed forces shared power in a military *junta* until 1974 when Augusto Pinochet, the leader of the army, took control. One of Pinochet's most important economic policies was a massive privatization reform implemented between 1974 and 1989, which aimed to undo Allende's nationalization program and privatize additional preexisting state-owned firms. Behind the design of this reform there was a group of economists mostly trained at the University of Chicago, and thus popularly known as the “Chicago Boys,” who believed in the efficiency of the market and the role of the private sector.⁸ Most of these economists were trained under the umbrella of an alliance between the economics department at the Catholic University of Chile and the economics department at the University of Chicago (Correa, 1986; Gallardo, 2011).

The objectives of the privatization reform were to reduce the state intervention in the economy and the fiscal deficit. However, the implementation of this reform was interrupted in 1982 and 1983 as Chile experienced a severe economic crisis with GDP falling 14%, one of the largest economic downturns since the Great Depression. Panel (a) in Fig. 1 plots the time series of GDP per capita using data from Díaz et al. (2016). By the end of 1983 the percentage of GDP represented by state owned firms had fallen to 24%, poverty rates increased from 30 to 55%, inflation doubled, and the unemployment rate rose to 30% of the labor force (Barandiarán and Hernández, 1999; Hachette, 2000). The government responded to the crisis by buying back several of previously privatized firms. As the downturn faded, a second wave of privatizations unfolded until the transition to democracy in 1990. Overall, the number of public firms decreased from a peak of 596 in 1973 to 45 in 1989 – which represented only 12.5% of GDP (Hachette, 2000) – and several traditional business groups disappeared.

Although the Pinochet regime understood the privatization process as a “diffusion of property to make Chile a country of owners” (Huneus, 2006, p. 314), the actual implementation of the reform was far from ideal. According to the most comprehensive report studying these privatizations, the process was characterized by a lack of information about the sales, a variety of unpredictable methods used in the transactions, and relatively low sale prices (Congress Report, 2004).⁹ The 1982–1983 crisis also affected the regime's sale strategy and the set of potential buyers of these firms. As we argue below, the existing business elite was shattered, providing the necessary space for a new business elite to emerge. Lefort (2010, p. 388) puts it succinctly: “the 1982 debt crisis meant that most bank-based conglomerates became bankrupt. [A]s some traditional business groups disappeared, others that were financially more robust emerged by acquiring controlling stakes from the government or the bankrupt groups.” All in all, the relative importance of external (e.g. crisis) versus internal (e.g. lack of information) factors driving the quality of the privatization process is a matter of debate. However, recent evidence shows that as a consequence of the poor implementation there were many individuals who worked for Pinochet that ended up buying many of these firms (González et al., 2020).

⁶ Other pillars of the plan were to increase expropriations of agricultural plots in the context of the agrarian reform, regulate prices in the economy, and increase the wages of workers.

⁷ At the same time, the government aimed at taking control of banks, which allowed them to offer credit to state-owned firms. Perhaps the most well known case within this program is the 1971 nationalization of copper, which created a confrontation between Allende and U.S. copper companies.

⁸ How this group of economists reached that level of influence has been an active area of research. Scholars have emphasized how the right-wing party and their associated technocrats took advantage of the military coup to advice the armed forces and suggest policies (Cavallo et al., 2011; Huneus, 2006; Spooner, 1999).

⁹ More details about the sales can be found in Marcel (1989) and Hachette and Lüders (1992).

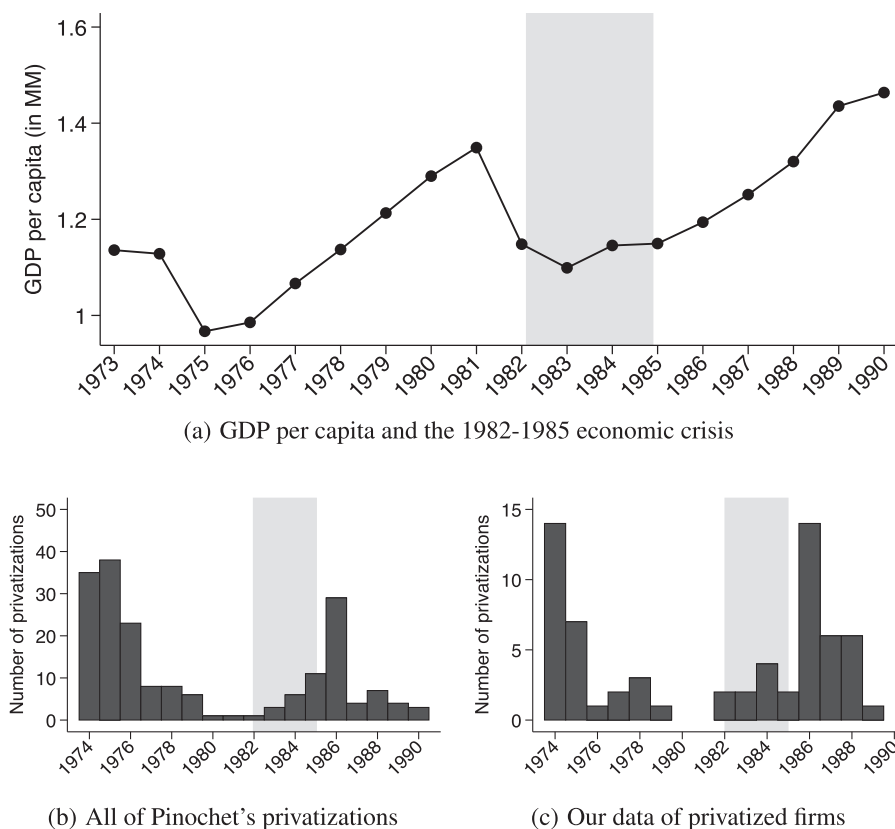


Fig. 1. Macroeconomic environment and privatizations by year *Notes:* Panel (a) plots the time series of GDP per capita in Chile during the Pinochet years. Panel (b) plots the number of privatizations per year in the same period. Panel (c) shows the distribution of privatizations per year in our dataset. All panels highlight in light gray the period in which the country experienced the economic crisis. *Sources:* GDP per capita data from Díaz et al. (2016), data on the number of privatizations by year from Congress Report (2004) and in sample is own construction using data from the Superintendencia de Valores y Seguros.

2.3. The transition to democracy

In October of 1988 Augusto Pinochet lost a referendum that intended to extend his presidency for eight more years. The election took place following the guidelines in the 1980 Constitution crafted by the same regime and allegedly approved by citizens in a controversial and fraudulent referendum (Fuentes, 2013). Pinochet's defeat at the polls in 1988 was unexpected because after fifteen years without free elections people actually organized to vote against Pinochet – despite potential fears of repression (Bautista et al., 2020) – and also because he acknowledge his defeat. Part of this result can be explained by the organization of opposition parties, pressure from within the Armed Forces, and by the pressure of countries that saw this election as important (Boas, 2015; González and Prem, 2018; 2020). As a consequence, presidential elections were held in 1989 and (as expected) a central left coalition won and took power in March 1990.

In the following decades of democracy, Pinochet's privatization process has been generally considered as successful by the international economic community (Galal et al., 1994). In Chile, however, some privatizations have generated significant controversy in the political and academic sphere. The heart of this controversy lies in investigations suggesting that several state-owned firms were sold underpriced to buyers who were socially connected with the dictatorship (Congress Report, 2004; Marcel, 1989; Mönckeberg, 2015).¹⁰ Perhaps the most well-known example corresponds to the sale of the Chemical and Mining Society of Chile (SQM), the largest Chilean non-metallic mining company, which was sold to Julio Ponce-Lerou, at the time Pinochet's son in law and previous manager of the Production Development Corporation. Besides Ponce-Lerou, several other firms were also sold to “connected buyers,” i.e. people who had worked with the Pinochet dictatorship in the years before the privatization. During the dictatorship and the transition periods, many of these connected buyers acted as board members in these firms. When democracy arrived, these firms

¹⁰ Marcel (1989) estimates that in the sale of the 12 largest public companies in 1986 and 1987 the underpricing ranged from 50% to 64% of total asset value of those firms, which corresponds to more than 4% of GDP in 1987 (Meller, 1993). Relatedly, González et al. (2020) provide the first firm-level estimates of the relationship between sale underpricing and the identity of buyers (connected vs. unconnected).

used a variety of strategies to retain their power using political networks, hiring politicians of the Pinochet regime, politicians of the newly-elected coalition in power, and engaging in campaign finance (Bucheli and Salvaj, 2014; González et al., 2020).

3. Conceptual framework

We use the historical background to provide a framework that guides the empirical analysis. We describe the players, the payoffs, and the economic environment. We then study the decision making process of players and discuss our main hypotheses.

3.1. Environment, business agents, and the government

Let there be $j \in J$ state-owned firms being sold by a government. We assume that the decision to sell these firms is exogenous and we think of it as the government following the advice of a team of economists.¹¹ The objective of the economic advisers is to increase the productivity of firms in the economy. The goal of the government is to maximize revenues from the privatization process $R \equiv \sum_{j \in J} p_j$ and to maximize political support to remain in power, as in Biais and Perotti (2002). We assume firms can help the government to stay in power by building support in the business world. The price p_j at which a state-owned firm j is sold is endogenous.

As potential buyers of these firms there are $i \in I$ business agents. Agents are characterized by two variables. First, some agents are part of existing business groups. We represent an agent's group affiliation by $b_i \in \{0, 1\}$. Second, some agents are connected to the government. We denote this link by $g_i \in \{0, 1\}$. Connected agents are better than unconnected ones at building political support for the government. The characteristics of agents $x_i \equiv (b_i, g_i)$ are exogenous. Importantly, we assume that business agents make decisions to maximize their total wealth A_i . Agents can potentially increase their initial wealth a_i by acquiring state-owned firms.

3.2. Privatization

Let us now turn to the privatization of firm j . If a business agent i decides to acquire a state-owned firm j , he or she obtains the following payoff:

$$\pi_{ij} = V_j(x_i) - (1 - \phi_i)p_j(x_i) - \phi_i p_j(x_i)(1 + r_i) \quad (1)$$

where $V_j(x_i)$ is the net present value of firm j when acquired by agent i , $\phi_i \in [0, 1]$ is the percentage of external funding used to buy the firm, and r_i is the interest rate.¹² As a consequence of this purchase, his new wealth level is $A_i = a_i + \pi_{ij}$. If an agent i decides not to buy a firm, he obtains the outside option w that without loss of generality we normalize to zero. When deciding to buy firm j in the privatization process, an agent i faces the following budget constraint:

$$p_j(x_i) \leq a_i + m(x_i) \quad (2)$$

where $m(x_i)$ is the amount of resources that agent i can obtain in the financial sector, which depends on his publicly known characteristics x_i .

In terms of the agents wealth and access to external funding we assume that $a_i = a(b_i, g_i)$ and $m_i = m(a_i)$. In particular, agents who are part of an existing business group ($b_i = 1$) were severely hit by an exogenous economic crisis and thus their initial wealth is $a_i = \underline{a}$. For simplicity, let all agents in groups be unconnected to the government ($g_i = 0$). This assumption is in line with the fact that before the crisis existing business groups were mostly bank-based, had high debt levels, and thus the currency devaluation hit them particularly hard (Rojas, 2015, p. 61). Let stand-alone and connected agents ($b_i = 0$ and $g_i = 1$) to have initial wealth $a_i = \underline{a}$, and stand-alone unconnected agents to have wealth $a_i = \bar{a} > \underline{a}$. Following the literature we let the banking sector to (i) lend more to agents with more wealth due to a collateral channel (e.g. Bernanke and Gertler 1989), and (ii) lend at a lower interest rate to connected agents (Khwaja and Mian, 2005). For simplicity let $m_i = \underline{m}$ if $a_i = \underline{a}$, and $m_i = \bar{m} > \underline{m}$ if $a_i = \bar{a}$.

The government perfectly observes agents' types before the privatization and maximizes the revenues $R \equiv \sum_{j \in J} p_j$ and its chances of remaining in power. The revenue maximization problem and the publicly known types imply that equation (2) is binding. Therefore the government is always more likely to sell state-owned firms to stand-alone business agents ($b_i = 0$) than group-affiliated agents ($b_i = 1$) because $\bar{a} + m_i(x_i) > \underline{a} + \underline{m} \forall i \in I$. In addition, the political objective of the government creates a trade-off in which they are willing to forgo revenue in exchange of political returns. Thus the government also sells (at least some) state-owned firms to connected agents despite the lower revenue obtained from this transaction.¹³

¹¹ Although this assumption is a clear limitation, it simplifies the analysis considerably. Empirically we argue that this decision is more likely to be exogenous after conditioning on a relevant set of observable variables.

¹² As described by Hachette and Lüders (1992), many firms were bought using external funding.

¹³ We take this insight from our related paper where we find that connected buyers indeed paid lower prices in the privatization process. See González et al. (2020) for details.

3.3. After privatization

As a result of the privatization process, business agents experience a change in their wealth. Stand-alone unconnected agents grow their wealth to $A_1 \equiv \bar{a} + \pi_{ij}$. Stand-alone connected agents, on the other hand, also experience an increase in their wealth but to a somewhat lower level $A_2 \equiv \underline{a} + \pi_{ij} < A_1$. After the transition to democracy, the banking sector evaluates unconnected agents similarly and hence their external sources of funding remain similar. However, as shown by [González and Prem \(2020\)](#) connected agents lost their political connections and thus their privileged access to the banking sector. As a result of this change, we hypothesize that stand-alone unconnected agents will use the newly acquired firm as a source of funding for their future investment projects that aim to increase their wealth.

This simple conceptual framework suggests two hypotheses that can be tested empirically with the firm-level data we constructed. First, stand-alone agents are more likely to buy state-owned firms than previously established business groups. This prediction is an implication of the negative effect that the economic crisis had on the existing business elite. The differential effect of the crisis is explained by the fact that business groups that survived the Allende years and the 1970s liberalization process were bank-based and thus severely affected by the devaluation in June 1982 ([Silva, 1996](#)). In contrast, other business agents specialized in exports and had low levels of debt ([Rojas, 2015](#), p. 62). As most firms in our data are part of a business group after the transition to democracy, this means that privatized firms are more likely to be a part of “new” business groups. Second, firms acquired by connected agents are more likely to be used as a source of funding than firms acquired by unconnected agents. This prediction is explained by the existence of a substitution effect from the banking sector to the existing capital within the business group after the transition to democracy.

4. Data construction

We collected data for publicly traded firms operating in the period 1970–2005. These firms were mandated to submit annual reports to the *Superintendencia de Valores y Seguros*, a regulatory agency equivalent to the Securities and Exchange commission in the United States. The information that firms had to submit included balance sheets, income statements, and ownership information.¹⁴ We collected these reports directly from the archives of the regulatory agency, digitized thousands of reports we found, and transformed all monetary variables to 1998 Chilean pesos using the price index of the Central Bank. The number of firms reporting to the agency varies from year to year, but there were roughly two-hundred firms in 1985.

4.1. Privatized firms and control group

From the hundreds of firms that reported to the agency, we identified fifty companies that were privatized by the Pinochet regime in the 1973–1988 period and for which there is detailed firm-level data annually. We detected these firms by matching the names of all listed firms with the list of the names of the approximately four-hundred firms privatized by the dictatorship. The latter list can be found in a report produced by the Chilean Congress after the return to democracy ([Congress Report, 2004](#)). In addition to these privatized firms, we also selected a set of firms that operated during the same period of time, in the same industries, but remained private throughout the period. More precisely, we included firms with reports before and after the last year of privatization in its industry.¹⁵ We use these firms as a comparison group. As we argue in the next section, it is likely that these companies would have been nationalized by Salvador Allende in the absence of the 1973 coup. Hence, they could have been privatized by the Pinochet regime, but the coup prevented this from being the case.

All in all, our final sample is composed by 79 firms: 50 firms privatized by the dictatorship and 29 firms that remained private throughout the period. The number of firms in the latter group is relatively small because many firms submit reports for only a few years and some have missing reports. The focus on firms that remain private and submit reports throughout the period guarantees that these are large and important firms. Examples of these firms include well-known mining and electricity companies. Panel (b) in [Fig. 1](#) shows the number of privatizations by year during the dictatorship. The first and second waves of privatizations are clearly visible. Panel (c) in [Fig. 1](#) shows a similar distribution of privatizations in our sample.¹⁶

Finally, building on recent evidence showing that privatization reforms can be implemented in different ways ([Fisman and Wang, 2014](#)), we use data to classify each privatization in one of two categories: (i) firms sold to buyers who were “connected” to the Pinochet dictatorship, and (ii) firms sold to “unconnected” buyers. Following [González et al. \(2020\)](#) we say a buyer was connected if he worked for Pinochet before buying the firm. Operationally we take all buyers and find the intersection with all secretaries of state and all high-ranked militaries in the period 1973–1990, restricting attention to the period before each corresponding sale. We find that 27% of firms in our data (21 out of 79) were sold to connected buyers and 37% (29 out of 79) to unconnected buyers. The majority of connected buyers were bureaucrats and a few were members of Pinochet’s family.

¹⁴ Since 1985 the agency required all firms to submit the exact same information. In earlier years the submission process was not standardized and hence the number of variables we observe is more limited.

¹⁵ For example, let the privatization years of three firms in industry j be 1979, 1986, and 1987. Then, the control group is composed by non-privatized firms with reports before 1987 and after 1990, the year of democratization.

¹⁶ As a robustness exercise we expanded the sample of firms in the control group by relaxing the “throughout the period” requirement, increasing the number of control firms to 112. We find similar results.

Table 1
Publicly traded firms and group affiliation in 1960 and 1970.

	All publicly traded firms in:				Group member firms in:	
	1960		1970		1960	1970
	Number of firms	Percentage of firms (%)	Number of firms	Percentage of firms (%)	Percentage of group members (%)	Percentage of group members (%)
Industry :	(1)	(2)	(3)	(4)	(5)	(6)
Accommodation and food services	1	0.5	1	0.5	0	0
Agriculture, forestry and fishing	21	11.4	23	10.6	28.6	34.8
Construction	5	2.7	8	3.7	20	12.5
Electricity and gas	2	1.1	5	2.3	0	0
Financial and insurance activities	15	8.1	15	6.9	53.3	46.7
Information and communication	2	1.1	2	0.9	0	0
Manufacturing	89	48.1	107	49.3	19.1	23.4
Mining and quarrying	29	15.7	21	9.7	20.7	9.5
Real estate activities	4	2.2	11	5.1	25	9.1
Transportation and storage	5	2.7	4	1.8	60	75.0
Wholesale and retail trade	12	6.5	20	9.2	0	5.0
Total	185	100	217	100	22.7	22.1

Notes: This table presents the distribution of all publicly traded firms in 1960 and 1970 across industries (columns 1–4) and of the subsample of these firms that were affiliated to a business group in those years (columns 5–6). Sources: The list of publicly traded firms comes from records of the [Santiago Stock Exchange \(1960, 1970\)](#) and business group affiliation data come from [Lagos \(1962\)](#), [Movimiento de Acción Popular \(1972\)](#), and [Aguirre \(2017\)](#). More details in [Section 4](#).

4.2. Business group affiliation before and after the Pinochet regime

We detect business groups using official ownership information from the regulatory agency. This information is easily accessible after 1990 and for the period before that year we proceed as follows. The Santiago Stock Exchange produced a report with the names of all publicly traded firms in the early 1970s ([Santiago Stock Exchange, 1970](#)) and information about the ownership of firms at that time can be found in a book titled “The book of the 91 [firms]” (own translation, [Movimiento de Acción Popular 1972](#)), constructed under the socialist government of Salvador Allende with the goal of studying economic concentration ([Salvaj and Couyoumdjian, 2016](#)). Using these data we follow the literature and define a business group as two or more listed firms under the same controlling shareholder ([Buchuk et al., 2014](#)). Therefore, for each firm in our data we observe their group affiliation status in 1970 and from 1990 onwards.

The scattered historical information suggests that business group affiliation was constant in the decade before the arrival of the Pinochet regime. In an effort to understand business groups before the Salvador Allende government, we were able to construct the group affiliation status of listed firms in the year 1960. More precisely, we gathered and harmonized business ownership information from the [Santiago Stock Exchange \(1960\)](#), [Lagos \(1962\)](#), and [Aguirre \(2017\)](#). The list of publicly traded firms comes from [Santiago Stock Exchange \(1960\)](#), and firms’ group affiliation comes from [Lagos \(1962\)](#) and [Aguirre \(2017\)](#). [Table 1](#) presents the results from this analysis, which reveals that less than a quarter of firms belonged to a business group in 1960. Given that this number is similar in 1970, these numbers suggest that business group affiliation was relatively constant before the Salvador Allende years.

Business groups can also be characterized by their layers. When firm A controls firm B and C directly, we say the group has one layer. In contrast, when firm A controls firm B, and firm B controls firm C, we say there are two layers because firm A controls firm C through firm B. In 1990 we observe 48 firms as part of a business group, the average group had two layers, and five groups consisted of only two listed firms (but potentially more non-listed firms).

Because our main focus is in the democracy period, we also classified the set of existing business groups in 1990 in two categories. In the first category are those groups that existed before the Pinochet regime, which we call *old* or *traditional* business groups. In the second category are those that did not exist before the privatization process, which we call *new* business groups. To classify business groups as new or old we make use of “The book of the 91 [firms]” mentioned in [Section 4](#). In particular, we take the set of business groups in 1990, find the intersection with the set of business groups in 1970, and call those “old business groups.” The remaining are “new business groups.” The outcomes are two, an indicator for firms that belonged to a new business group in 1990, and an indicator for firms that belonged to traditional business groups in the same year, mutually exclusive categories by definition.

4.3. The role of firms within groups: Pyramids and internal capital markets

We measure the role of firms within groups using four variables, two related to pyramidal structures and two related to internal capital markets. The first outcome is the difference between voting and cash-flow rights, which we call wedge $\omega_i \in [0, 1]$. To calculate voting and cash-flow rights we use all stakes that the controlling shareholder has in each company. The second outcome is an indicator for firms that were part of a pyramid ($\tau_i = \{0, 1\}$). Pyramids can represent a solution for firms to ease financial constraints ([Khanna and Palepu, 2000](#)), but can also be related to inefficiencies ([Bertrand et al., 2002](#); [Johnson et al., 2000](#); [Larrain et al., 2019](#)). We follow the literature and say a pyramid exists if the group has more than one layer, which can only occur if some firm in the group has a

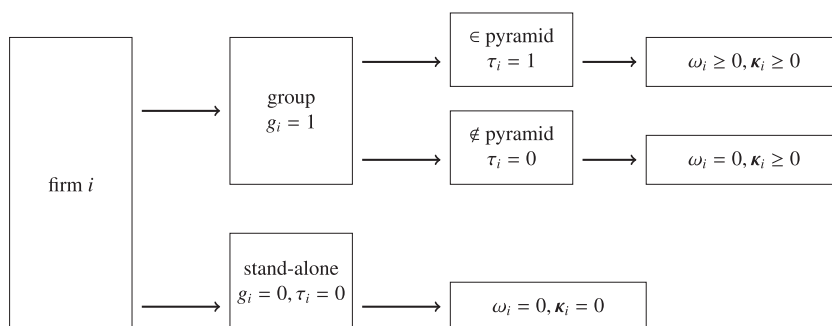


Fig. 2. The role of firms within groups *Notes:* This figure presents how we measure the role of firms within groups. We detect whether a firm belongs to a group using firm ownership data. A stand-alone firm ($g_i = 0$) has the same voting and cash-flow rights ($\omega_i = 0$), and it is not a provider nor receiver of capital within the group ($\kappa_i = [\underline{\kappa}_i, \bar{\kappa}_i] = [0, 0]$). If a firm is part of a group ($g_i = 0$) then the group can potentially be organized as a pyramid. We say firm i is part of a pyramid ($\tau_i = 1$) if voting and cash-flow rights differ for *some* firm in the group, regardless of whether cash-flow and voting rights differ for the firm itself ($\omega_i \geq 0$). If $\omega_j = 0$ for all firms j in the group, then the group is not organized as a pyramid. A firm within a group can always be provider or receiver of capital within the group ($\kappa \geq 0$) regardless of the potential pyramidal structure.

positive wedge. In 1990 we observe 27 firms as part of a pyramid and these pyramids had 2.4 layers on average. The position of the firm within the pyramid is then revealed by the firm's own wedge: firms at the bottom have a $\omega_i > 0$.¹⁷

The third outcome detects firms that were *Providers* of credit by measuring the percentage of years in the period 1991–2005 that the firm provided intra-group *net* loans larger than 5% of their assets, $\underline{\kappa}_i \in [0, 1]$. Similarly, the fourth outcome detects firms that were *Receivers* of intra-group *net* loans smaller than -5% of their assets in the same period $\bar{\kappa}_i \in [0, 1]$. Buchuk et al. (2014) measure the functioning of internal capital markets in the same way. A total of 55 (40) firms were providers (receivers) at least one year during this period. Scholars have found internal capital markets to be crucial for the performance of firms around the world in the 1990s and 2000s, particularly during the Asian and Euro crises (Almeida et al., 2015; Buchuk et al., 2020; Gopalan et al., 2007; Santioni et al., 2020).

Fig. 2 presents a graphical summary of these four outcomes. We detect whether a firm belongs to a group using ownership data. A stand-alone firm ($g_i = 0$) has the same voting and cash-flow rights ($\omega_i = 0$), and it is not a provider nor receiver of capital, $\kappa_i \equiv [\underline{\kappa}_i, \bar{\kappa}_i] = [0, 0]$. If a firm is part of a business group ($g_i = 0$) then the group can potentially be organized as a pyramid. We say firm i is part of a pyramid ($\tau_i = 1$) if voting and cash-flow rights differ for *some* firm in the group, regardless of whether cash-flow and voting rights differ for the firm itself ($\omega_i \geq 0$). If $\omega_j = 0$ for all firms j in the group, then we say the group is *not* organized as a pyramid. A firm i within a group could be a provider or a receiver of capital within the group ($\kappa_i \geq 0$) regardless of the existence of a pyramidal structure.

5. Empirical framework

This section describes firms before privatization and, informed by this descriptive evidence, it then presents our empirical strategy to estimate the contribution of the privatization process to the formation of business groups and the role of firms within these groups.

5.1. Descriptive statistics

We begin by describing business groups in 1960 and 1970. Table 1 shows that 22% of firms were part of a business group. The transportation industry and financial firms show the highest percentage of business groups affiliation, with 75% and 50% of firms being part of a group respectively. This table also shows that almost 50% of publicly traded firms were part of the manufacturing industry, representing 37% of market capitalization. Other important industries were “Agriculture, forestry, and fishing” with 24% of market capitalization and “Financial services” with 11%. In 1960 we also observe that 22% of firms were affiliated to a group. Moreover, the distribution of group affiliation is similar across industries in 1960 and 1970.

Given the importance of unobserved industry characteristics in explaining business ownership structures and the intensity of the privatization reform, our empirical analysis will only compare firms within industries. Moreover, our empirical strategy also exploits the 1982–1983 economic crisis as a shock to existing business groups, a crisis which affected mostly between-industry (instead of within industry) allocational efficiency (Oberfield, 2013). We classify firms into industries using Standard Industry Classification (four-digit SIC) codes. Table 2 presents the number of firms in our sample across industries. Column 1 shows that firms in our data operate

¹⁷ “[I]n a pyramid an ultimate owner uses indirect ownership to maintain control over a large number of companies” (Bertrand and Mul-lainathan, 2003, p. 478), a common strategy outside of the U.S. (La Porta et al., 1999). Pyramids are controversial in Chile as some individuals involved in Pinochet’s privatizations were legally charged of using complex ownership structures to extract financial benefits (SVS, 2014). Figure A.2 presents as an example the Chemical and Mining Society of Chile (SQM), nowadays the world’s biggest lithium producer (The Economist, 2017) and controlled by a pyramid formed by listed and non-listed firms.

Table 2
Distribution of firms in our sample by industry.

Industry:	All firms in our data (1)	Privatized firms		Firms <i>not</i> sold (comparison group) (4)
		Firms sold to connected buyers (2)	Firms sold to unconnected buyer (3)	
Accommodation and food services	1	0	0	1
Agriculture, forestry and fishing	9	2	1	6
Construction	1	0	1	0
Electricity and gas	13	5	7	1
Health	1	0	0	1
Information and communication	4	1	3	0
Manufacturing	34	9	11	14
Mining and quarrying	7	3	2	2
Real state activity	2	0	0	2
Transportation and storage	5	1	3	1
Wholesale and retail trade	2	0	1	1
Number of firms:	79	21	29	29

Notes: This table shows the distribution of firms in our data by industry. Columns 2–3 constitute the main group of interest (privatized firms) and column 4 characterizes the set of firms in the control group. Firms in the control group operated during the same period of time but remained private throughout these years. We classify all of these firms into industries using Standard Industry Classification (four-digit SIC) codes. *Sources:* Own construction based on data from the *Superintendencia de Valores y Seguros* and standard-industry classification codes. More details in [Section 4](#).

Table 3
Summary statistics.

	Mean (1)	Standard deviation (2)	90th pctile (3)	10th pctile (4)	Number of firms (5)
A. Outcomes after dictatorship					
Owned by business group in 1990	0.61	0.49	1	0	79
Owned by <i>new</i> business group in 1990	0.15	0.36	1	0	79
Owned by <i>old</i> business group in 1990	0.46	0.50	1	0	79
Part of a pyramid in 1991–2005	0.57	0.50	1	0	79
Wedge cash-voting rights in 1991–2005	0.51	0.50	1	0	79
<i>Provider</i> within group in 1991–2005	0.28	0.29	0.73	0	79
<i>Receiver</i> within group in 1991–2005	0.12	0.17	0.33	0	79
B. Pre-privatization					
Logarithm of total assets	20.26	6.05	30.19	15.26	79
Logarithm of sales	18.88	6.94	29.11	13.61	79
Return over equity	0.15	0.19	0.39	-0.03	79
Leverage	0.43	0.26	0.83	0.08	79
Year of foundation	1940	31	1981	1902	79
Privatization year	1982	5	1988	1974	50
Owned by business group in 1960	0.30	0.47	1	0	27
Owned by business group in 1970	0.36	0.49	1	0	36

Notes: This table presents cross-sectional summary statistics for the 79 firms in our sample. Panel A describes the outcome variables and panel B presents firm-level characteristics in the pre-privatization period. *Sources:* Own construction using data from the *Superintendencia de Valores y Seguros* and business group affiliation data from *Lagos (1962)*, *Movimiento de Acción Popular (1972)*, and *Aguirre (2017)*.

in a diverse set of industries. Manufacturing is the most important one with 34 firms. Columns 2–4 split firms by privatization status. The distribution of privatizations is fairly balanced across industries: 26% of manufacturing firms were sold to connected buyers, 32% were sold to unconnected buyers, and 41% were not privatized.

Table 3 presents summary statistics for firms in our sample, before (panel B) and after (panel A) the dictatorship period. Panel A shows that after the return to democracy in 1990 a total of 57% and 61% of firms were part of a pyramid and a business group respectively (45 and 48 out of 79 firms). The lower panel shows that 36% of firms belonged to a business group in 1970. Fig. 3 presents the evolution of business ownership. The statization process in the early 1970s can be clearly observed as an increase in state owned firms in 1974. The second wave of privatizations that started in 1983 gradually returned all these firms to private hands by the end of 1990.

Table 4 presents differences between firms by privatization status. Columns 1 and 4 show averages for privatized and non-privatized firms. Column 5 presents the statistical difference between these groups, with and without adjustment for small sample inference (Robinson and Robinson, 2001). Although privatized firms were larger than non-privatized, the two groups were similar in terms of their profitability, leverage, age, and business ownership in 1970 and 1983. Columns 2 and 3 compare firms that were privatized but that differed in their buyer connectedness. Column 6 present the corresponding statistical difference. Firms sold to connected buyers were smaller than those sold to unconnected buyers, but were similar in terms of their profitability, leverage, age, and ownership structure before privatization. Finally, in the appendix we present suggestive evidence that is consistent with the role of connections: (i) connected buyers seem to have benefited from underpricing, as revealed by privatization prices and book values; (ii) connected buyers were more likely to acquire firms after the 1982 economic crisis, when traditional business groups were economically debilitated (Tables A.2–A.3).

Overall, the main difference between types of firms was their size. Therefore, our econometric strategy will control for the logarithm of assets and sales, as well as by firm leverage and return over equity, all of these measured before the privatization process began.

5.2. Econometric strategy

Our primary goal is to estimate the contribution of privatization to the formation of business groups, and the role of privatized firms within groups. To fix ideas, let us begin discussing the workhorse regression specification we use to relate these variables:

$$Y_{ij} = \beta \text{Privatization}_i + \gamma' x_i + \eta_j + \epsilon_{ij} \quad (3)$$

where Y_{ij} is an outcome of interest for firm i , which operates in industry j . We use three sets of dependent variables. First, an indicator that takes the value of one for firms that were part of a business group. The second set is composed by two variables that measure pyramidal ownership: an indicator for firms that were part of a pyramid, and an indicator for positive differences between cash and voting rights. And in the third set we have two variables that measure the involvement of firms within business groups: a variable measuring which firms provided intra-group loans, and a similar variable for firms receiving loans within groups. We measure business group affiliation in 1990 to capture how firms fare immediately after the dictatorship period, and how firms operate within groups as an average in 15 years of democracy (1991–2005) to capture fundamentals of group dynamics instead of idiosyncratic variation.

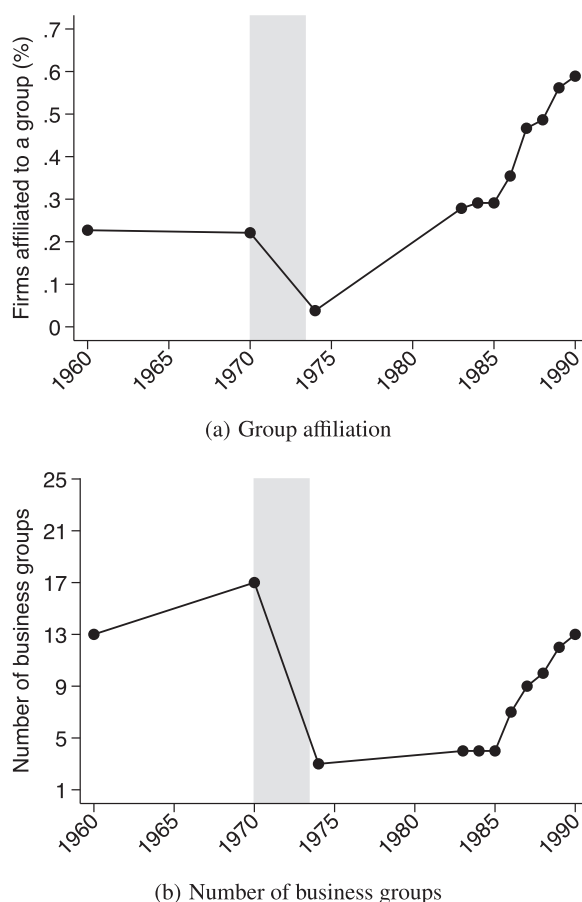


Fig. 3. Business groups over time *Notes:* This figure shows the evolution of business groups in the period 1960–1990. We highlight the Salvador Allende years (1970–1973) in light gray. The Pinochet years are between 1973 and 1990. *Sources:* Own construction using data from administrative records in the *Santiago Stock Exchange* (1960, 1970), and archival work by Lagos (1962), *Movimiento de Acción Popular* (1972), and Aguirre (2017). We provide more details about these data in [Section 4](#).

It is important to highlight the characteristics of non-privatized firms, the control group that acts as a counterfactual for privatized firms in our empirical strategy. As discussed in [Section 4.1](#), these firms are also relatively large companies that report annually to the regulatory agency but were not part of the privatization process implemented by Pinochet. Importantly, these firms could have been privatized by the Pinochet dictatorship if Salvador Allende stayed in power, i.e. in the absence of a coup. Allende’s economic plan revealed that his goal was to transform all large businesses into state property (*Popular Unity*, 1969, p. 19–20).¹⁸ However, the timing in which firms were chosen to be nationalized or privatized was far from random, thus it is important to account for differences across firms. In any case, it is useful to think about non-privatized firms as companies that could have been privatized if Salvador Allende spent more years in power.

The main variable of interest in [equation \(3\)](#) is *Privatization_i*, an indicator that takes the value of one if firm *i* was privatized during the Pinochet dictatorship (1973–1990) and zero otherwise. [Equation \(3\)](#) also includes a vector x_i with pre-determined firm-level variables that could have been related to the privatization process and have the potential to affect our outcomes in the short- and long-run, i.e. the logarithm of assets, the logarithm of sales, the firm’s leverage, and its return over equity. In the case of privatized firms, we compute each of these variables as a three-year average before the year of privatization. We do this to decrease the role of annual anomalies unrelated to firm’s fundamental characteristics. In the case of non-privatized (control) firms this benchmark year is absent and so we use three-year averages before the maximum year of privatization in the firm’s industry, but results are robust to other definitions. To capture differences in the evolution of business ownership and profitability that are related to industry-level

¹⁸ The economic plan reveals that the following companies and industries were to be state property (or part of the “Social Property Area”): (1) the mining industry, (2) the financial industry, (3) exporting firms, (4) large companies and distribution monopolies, (5) industrial monopolies, (6) all companies that contribute to the social and economic development of the country. The plan was approved in December of 1969 by all political parties that were part of the Popular Unity coalition. Own translation from *Popular Unity* (1969).

Table 4
Pre-privatization differences across firms.

	Privatized firms			Not privatized	Difference	
	All	Sold to connected buyer	Sold to unconnected buyer		(1)–(4)	(2)–(3)
	(1)	(2)	(3)	(4)		
Log assets	22.52 (6.58)	20.81 (5.09)	23.76 (7.31)	16.35 (1.18)	6.17*** (0.96) [0.00]	-2.95* (1.75) [0.23]
Log sales	21.33 (7.32)	18.99 (6.71)	23.02 (7.38)	14.65 (3.34)	6.68*** (1.21) [0.00]	-4.04** (2.00) [0.11]
Return over equity	0.17 (0.19)	0.13 (0.21)	0.19 (0.17)	0.12 (0.19)	0.04 (0.04) [0.33]	-0.06 (0.06) [0.13]
Leverage	0.41 (0.24)	0.42 (0.26)	0.41 (0.23)	0.45 (0.31)	-0.04 (0.07) [0.98]	0.01 (0.07) [0.99]
Year of foundation	1937 (33)	1944 (27)	1932 (37)	1945 (26)	-8 (7) [0.29]	12 (9) [0.22]
Bus. group in 1960	0.29 (0.46)	0.44 (0.53)	0.20 (0.41)	0.33 (0.58)	-0.04 (0.30) [0.73]	0.24 (0.20) [0.09]
Bus. group in 1970	0.38 (0.50)	0.50 (0.53)	0.31 (0.48)	0.30 (0.48)	0.08 (0.18) [0.88]	0.19 (0.20) [0.34]
Firms	50	21	29	29		

Notes: This table presents the average and standard deviation of pre-privatization variables for different subsets of firms in columns 1–4. Firms “Not privatized” constitute the control group and are firms which operated during the same period of time but remained private throughout these years. The last two columns present univariate regressions results to determine the statistical significance of the differences between columns 1 and 4, and 2 and 3 respectively. In these columns we present robust standard errors in parenthesis and *p*-values correcting for small sample inference in square brackets. Significance level: *** *p* < .01, ** *p* < .05, * *p* < .1. Sources: Own construction using data from the *Superintendencia de Valores y Seguros* and business group affiliation data from Lagos (1962), *Movimiento de Acción Popular* (1972), and Aguirre (2017).

differences, equation (3) also includes a full set of industry fixed effects η_j . Finally, ϵ_{ij} is an error term with a mean of zero and robust to heteroskedasticity.

We begin by estimating equation (3) using ordinary least squares. The coefficient of interest is $\hat{\beta}$ and captures the differential evolution of privatized firms. The comparison are other (non-privatized) firms in the same industry after adjusting for the effect of pre-privatization characteristics x_i . The main threat to interpret $\hat{\beta}$ as the causal effect of privatization are potential omitted variables that explain both why a firm was privatized and the outcomes under study. For these omitted variables to be a threat they need to be firm-specific (instead of industry-specific) and unrelated to observables, otherwise their effects are captured by x_i and η_j . To assess this possibility we complement the analysis with three matching estimates that aim to produce improved comparisons, we use additional control variables, different regression specifications, and finally we employ the method proposed by Altonji et al. (2005) and extended by Oster (2019) to gauge the potential effects of unobservables.

In addition to equation (3) we also present estimates from a regression specification that allows different types of privatizations to have potentially different effects on business ownership and internal capital markets. This decision is motivated by a recent empirical literature that shows privatizations can be implemented in different manners, with some firms sold to buyers who are socially close to the seller or at reduced prices (Fisman and Wang, 2014; González et al., 2020). Because firms might have been sold at different prices precisely because the buyer was close to the government, we use the identity of the buyer as the main source of heterogeneity. In particular, we augment equation (3) with an interaction term and estimate the following regression equation using ordinary least squares:

$$Y_{ij} = \phi_1 \text{Privatization}_i + \phi_2 (\text{Privatization}_i \times \text{Connected}_i) + \gamma' x_i + \eta_j + \epsilon_{ij} \tag{4}$$

where all variables are defined as in equation (3) and Connected_i is an indicator that takes the value of one if firm *i* was sold to a connected buyer. When using this specification the coefficients of interest are ϕ_1 and ϕ_2 . The former measures the effect of “unconnected” privatizations on the outcomes of interest, and the latter measures the differential effect for “connected” privatizations. If we estimate that $\hat{\phi}_2 \approx 0$, then both types of privatizations had similar effects.

6. Main results

The first part of this section shows that privatized firms are more likely to belong to new business groups after the transition to democracy, particularly those sold after the 1982 crisis. The second part shows that firms bought by connected buyers were more

Table 5
Privatization and business groups.

Dependent variable: Indicator firm belongs to (new or old) business group in 1990						
	Any group		New group		Old group	
	(1)	(2)	(3)	(4)	(5)	(6)
Firm privatized by Pinochet	0.47*** (0.16) [0.00]	0.38* (0.19) [0.06]	0.37*** (0.13) [0.00]	0.32** (0.16) [0.03]	0.09 (0.18) [0.60]	0.06 (0.19) [0.77]
Firm sold to connected buyer		0.14 (0.14) [0.36]		0.08 (0.14) [0.47]		0.06 (0.16) [0.74]
Firms	79	79	79	79	79	79
Industry fixed effects	X	X	X	X	X	X
Pre-privatization controls	X	X	X	X	X	X
Avg. dep. variable (non-privatized)	0.41	0.41	0.00	0.00	0.41	0.41

Notes: In this table each observation is a firm and coefficients correspond to cross-sectional estimates of the linear probability models in equations (3) and (4). All privatizations occurred in the period 1973–1989. Firms in the control group operated during the same period of time but remained private throughout these years. Robust standard errors in parenthesis and *p*-values correcting for small sample inference in square brackets. Significance level: *** $p < .01$, ** $p < .05$, * $p < .1$. More details in Section 6.1.

likely to be placed at the bottom of pyramids and used as a source of capital within groups. We end this section by showing that these results are robust to the use of a variety of alternative estimation strategies.

6.1. Privatized firms and business groups

Table 5 presents estimates of equations (3) and (4) using three different measures of business groups as dependent variables. In particular, the outcomes are indicators that are equal to one if the firm was affiliated to a business group (columns 1 and 2), a new business group (columns 3 and 4), or an old business group (columns 5 and 6). Therefore, all coefficients correspond to estimates from linear probability models. If a firm is part of an *old* business group, we argue that this firm was bought by an existing business group at the time of the privatization. In contrast, if a firm is part of a *new* business group, we argue it was bought by an agent unrelated to previous groups. These dependent variables are always measured in 1990, the first year of democracy after the Pinochet dictatorship.

Column 1 in Table 5 shows that firms privatized by Pinochet were 47 percentage points more likely to be part of a business group in the year 1990. Column 2 in the same panel allows for heterogeneous effects by buyer connectedness and reveals that this increase in business group affiliation is similar across firms sold to connected and unconnected individuals. For a better understanding of the magnitude of this estimate consider that 41% of non-privatized firms (12 out of 29) belonged to a business group during this period. Therefore, the privatization process doubled the probability that a firm was part of a business group, an economically large effect.

It is important to understand whether firms became part of traditional or new business groups. If most state-owned firms were being bought by *traditional* business groups then the sale of state-owned firms was a way to regain or consolidate the economic power of existing business elites. In contrast, if firms were bought by *new* business groups then these reforms provided an opportunity for the creation of new economic elites. Which business groups are more prone to buy firms during privatization, or if new business groups form around the purchase of state-owned firms, are to the best of our knowledge open empirical questions.¹⁹

Columns 3 and 4 in Table 5 reveal that most firms privatized by Pinochet that ended being part of a business group were part of groups that did *not* exist before the dictatorship. Columns 5 and 6 confirm this result, old business groups were not buying state-owned firms more than non-privatized firms. Recall that the comparison group are other non-privatized firms in the same industry. For reference, none of these control firms in our estimating sample were part of new business groups and 41% of them were or became part of old groups. Then the fact that 37% of firms privatized by Pinochet became part of new business groups is economically meaningful. We again find little heterogeneity by the type of privatization process as measured by buyer connectedness.²⁰ Overall, results in Table 5 support the hypothesis that privatizations contributed to the formation of *new* business groups.

Why were privatized firms contributing to the formation of new business groups? Why were traditional business groups not buying these firms? If buying is a dominant strategy, then old business groups might have faced some restriction to buy. This is a

¹⁹ A similar process to renovate business elites seemed to have occurred in Japan, with new *zaibatsus* like Toyota and Nissan forming to replace traditional groups (Hadley, 1970). Descriptive evidence from post-Apartheid South Africa, Malaysia, and Russia also fit into this narrative (Khanna and Yafeh, 2007).

²⁰ In the appendix we show that the results remain unchanged in terms of statistical significance if we consider a longer time horizon and measure the dependent variables in the period 1991–2005 instead of 1990 (see Table A.5). The results are also robust to define business groups as three or more (instead of two or more) listed firms controlled by the same shareholder (Table A.6). In both cases the magnitude of coefficients also remains similar.

Table 6
Privatization, economic crisis, and business groups.

Dependent variable: Indicator firm belongs to (new or old) business group in 1990						
	Any group		New group		Old group	
	(1)	(2)	(3)	(4)	(5)	(6)
Privatized <i>after</i> the economic crisis	0.45*** (0.17)	0.37* (0.19)	0.40*** (0.13)	0.43*** (0.14)	0.05 (0.18)	-0.06 (0.19)
Privatized <i>before</i> the economic crisis	0.56*** (0.19)	0.61*** (0.14)	0.24 (0.22)	0.28 (0.17)	0.32 (0.28)	0.34 (0.22)
Firms	79	79	79	79	79	79
R-squared	0.360	0.377	0.328	0.331	0.233	0.267
Industry fixed effects	X	X	X	X	X	X
Pre-privatization controls	X	X	X	X	X	X
Difference before and after (<i>p</i> -value)	0.54	0.12	0.38	0.37	0.24	0.03
Avg. dep. variable (non-privatized)	0.41	0.41	0	0	0.41	0.41

Notes: In this table each observation is a firm and coefficients correspond to cross-sectional estimates of an augmented version of the linear probability model in equation (3). All privatizations occurred in the period 1973–1989. Firms in the control group operated during the same period of time but remained private throughout these years. We split the privatization years in those after and before the economic crisis in the 1980s. The period *after* the economic crisis corresponds to the years after 1984 (1985) in odd (even) columns. The period before the economic crisis are the years before 1984 (1985) in odd (even) columns. Robust standard errors in parenthesis. Significance level: *** $p < .01$, ** $p < .05$, * $p < .1$. More details in Section 6.1.

hard question to answer empirically but in our conceptual framework we suggest that the 1982 economic crisis might have acted as a financial restriction for traditional business groups. Some evidence for this mechanism can be found in the fact that most firms that became part of new business groups were bought after the 1982 crisis, a time in which financial restrictions might have been binding for traditional business groups (Rojas, 2015; Silva, 1996). In this sense, the evidence suggests that the interaction between an economic crisis and a privatization reform might at least partially facilitate the renovation of business elites.²¹

Table 6 presents some suggestive patterns for the role played by the 1982 crisis. In this table we repeat the estimation of equation (3), but separate the privatization indicator in two, one for firms privatized before the crisis and one for firms privatized afterwards. To determine which year represents the period after the crisis is difficult, so we take the patterns in panel (a) in Fig. 1 and use two definitions: the period after 1984 (odd columns) and the years after 1985 (even columns). The structure of the table mimics the previous one for completeness, but columns 3–6 present the patterns that we argue are consistent with the role of the crisis. These columns show that when firms were privatized *after* the crisis, the probability of a firm becoming part of a *new* business group increased more than when firms were privatized before the crisis (40–43 vs. 24–28 percentage points), although given the small sample the difference is not statistically significant at conventional levels. Remarkably, we observe the reversed pattern when we look at traditional business groups: firms sold before the crisis were 34 percentage points more likely to become part of an old business groups, and the difference is statistically significant at conventional levels in column 6 (p -value 0.03). Overall, we interpret this evidence with caution given the small sample but as indicative of the role played by the crisis.

Importantly, after the transition to democracy in 1990 we observe that traditional and new business groups differed in the way they were organized and operated. To characterize them we use records from the regulatory agency for all firms in the new and old groups in our data. When compared to new groups, we observe that the old ones operated in more industries (3.2 versus 2.2), had simpler structure (measured by the number of layers, 2.3 versus 3.4), and were composed significantly more by family firms (82 versus 20%, as defined by Donelli et al. 2013). Of course, some of these differences might be the consequence of the privatization reform, and some might reflect inherent differences in their comparative (or competitive) advantage.

6.2. Privatized firms, pyramids, and capital within groups

In Section 3 we argue that firms acquired by agents linked to the government might end up being used as a source of funding. The mechanism behind this argument is a substitution from preferential access to the banking sector to sources of capital within the group. This section tests this hypothesis using three variables that measure how firms operate within groups: pyramidal ownership, separation between cash and voting rights, and capital markets within groups. Because our focus is now on the functioning of business groups during the democracy period, we measure these variables in the fifteen-year period 1991–2005. This measurement strategy allows us to observe the behavior of groups over an extended period of time.

Columns 1 and 2 in Table 7 repeat the previous estimations using as dependent variable the indicator for firms that were part of a pyramid. To facilitate the interpretation of these linear probability estimates consider that 38% of non-privatized firms were part

²¹ We acknowledge there could be additional mechanisms at play. For example, traditional groups might simply have a comparative advantage that perhaps was unlikely to be a good match for privatized firms.

Table 7
Privatization, pyramids, and internal capital markets.

Dependent variable:	Pyramid		Wedge		Providers		Receivers	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Firm privatized by Pinochet	0.29* (0.18) [0.07]	0.04 (0.19) [0.84]	0.16 (0.19) [0.36]	-0.09 (0.20) [0.65]	0.09 (0.10) [0.35]	-0.03 (0.12) [0.76]	-0.05 (0.06) [0.38]	-0.04 (0.07) [0.54]
Firm sold to connected buyer		0.39*** (0.13) [0.01]		0.38** (0.15) [0.02]		0.20** (0.09) [0.03]		-0.02 (0.05) [0.76]
Firms	79	79	79	79	79	79	79	79
Industry fixed effects	X	X	X	X	X	X	X	X
Pre-privatization controls	X	X	X	X	X	X	X	X
Avg. dep. variable (non-privatized)	0.38	0.38	0.41	0.41	0.27	0.27	0.13	0.13

Notes: In this table each observation is a firm and coefficients correspond to cross-sectional estimates of the linear probability models in equations (3) and (4). All privatizations occurred in the period 1973–1989. Firms in the control group operated during the same period of time but remained private throughout these years. Robust standard errors in parenthesis and *p*-values correcting for small sample inference in square brackets. Significance level: *** $p < .01$, ** $p < .05$, * $p < .1$. More details in Section 6.2.

of a pyramid in the 1991–2005 period. Column 1 shows that for privatized firms this percentage increases by 29 percentage points, an economically large effect that is also statistically significant. In contrast to the business group results, column 2 reveals that most of this effect is explained by the set of firms sold to buyers who worked for the Pinochet dictatorship before privatization. Columns 3 and 4 use the indicator for positive differences between cash and voting rights (wedge) as dependent variable. We find that in privatized firms there was more likely to be a wedge between ownership and control, but only among those sold to connected buyers, suggesting these firms were placed at the bottom of the pyramid. Wedges and pyramids potentially allow the largest shareholder to control a firm despite having low cash flow rights, and has been linked in the literature to lower valuations (Claessens et al., 2002).

Next we study the role of newly privatized firms within their business group. To measure their role we use the *Providers* and *Receivers* variables, i.e. indicators for firms who provide or receive capital to or from other firms in the group (see Section 4.3). Estimates of equation (3) in columns 5 and 7 show that experiencing a privatization is *not* associated with a differential role within the group. Privatized firms are on average equally likely to be providers or receivers of capital within business groups after the transition to democracy. However, estimates of equation (4) in column 6 reveal that the subset of firms sold to connected buyers were significantly more likely to become providers of capital within their business group. Almost 50% of firms sold to connected buyers transformed into providers of credit in their business group, a result that is statistically significant (p -value < 0.05). In contrast, columns 7 and 8 show that privatized firms were *not* more likely to become receivers within their group, with an economically small coefficient.²²

6.3. Robustness of results

This section shows that previous results are robust to specification decisions and estimation methods. Main results are presented in Table 8 and for brevity we leave the remaining exercises for the appendix (see Tables A.8–A.11). We begin by showing that results are similar when we use three different matching exercises to minimize concerns about potential unobservables driving our results. Then for a subsample of firms we are able to show that results are robust to controlling for group affiliation in 1970, before the statization and privatization processes. We also report results dropping firms with takeovers, using a different definition of connected buyers, and extending the sample to include additional firm-level controls. Finally, we use the Altonji et al. (2005) approach and report estimated coefficients that account for potential effect of unobservables using the method proposed by Oster (2019).

The reader might worry about the role of potential omitted variables correlated with privatizations and business ownership. Two sets of exercises suggest that this is unlikely to be a concern. First, we use three matching estimators with the goal of making better comparisons across firms and results are similar. These matching estimators use the probability of a privatization, estimated using pre-privatizations variables and industry effects. Column 1 follows Crump et al. (2009) and truncate the propensity score distribution, eliminating a few firms without close comparisons. In addition, column 2 uses this propensity score as an additional control, and column 3 chooses the comparison firms with the k -nearest neighbors approach (with $k = 1$). In all of these cases we observe similar results than before.

Second, we follow the Altonji et al. (2005) approach and use the statistical power of observable variables that could be correlated with unobservables to adjust our estimates in order to account for the effect of potentially omitted variables. This approach was recently formalized by Oster (2019) and we use her method to adjust the estimated coefficients. In our context, this method could

²² Note that when measuring these four outcomes – pyramid, wedge, provider, receiver – we are assigning a value of zero to stand-alone firms. Table A.7 shows that results are similar when we condition the estimation to the subset of firms that were part of a business group after the return to democracy.

Table 8
Robustness of main results.

New business group	Truncate matching (1)	Matching control (2)	Matching <i>k</i> -neighbor (3)	Control group (4)	Drops takeovers (5)	Coefficient stability (6)	Journalistic investig. (7)	Extended sample (8)
Firm privatized by Pinochet	0.50*** (0.16)	0.41*** (0.14)	0.24*** (0.08)	0.22 (0.17)	0.35** (0.13)	0.80	0.37*** (0.13)	0.19* (0.11)
Pyramid								
Firm privatized by Pinochet	-0.03 (0.25)	0.01 (0.20)	0.24* (0.13)	0.08 (0.41)	0.08 (0.23)	-0.23	0.26 (0.18)	-0.12 (0.13)
Firm sold to connected buyer	0.39* (0.21)	0.36** (0.15)	0.43** (0.17)	0.56** (0.25)	0.49*** (0.17)	0.39	0.25** (0.10)	0.48*** (0.12)
Wedge								
Firm privatized by Pinochet	-0.27 (0.24)	-0.10 (0.21)	0.08 (0.13)	-0.16 (0.41)	-0.06 (0.22)	-0.38	0.14 (0.19)	-0.29** (0.14)
Firm sold to connected buyer	0.57*** (0.20)	0.37** (0.15)	0.43** (0.17)	0.62** (0.22)	0.53*** (0.17)	0.50	0.13 (0.19)	0.45** (0.14)
Providers								
Firm privatized by Pinochet	-0.01 (0.17)	-0.04 (0.12)	-0.08 (0.11)	-0.09 (0.23)	0.04 (0.14)	0.09	0.03 (0.10)	-0.02 (0.09)
Firm sold to connected buyer	0.10 (0.16)	0.19** (0.09)	0.23*** (0.09)	0.16 (0.16)	0.08 (0.11)	0.22	0.45*** (0.09)	0.19** (0.09)
Firms	49	79	79	36	68	79	79	112
Industry fixed effects	X	X	X	X	X	X	X	X
Pre-privatization controls	X	X	X	X	X	X	X	X

Notes: In this table each observation is a firm and estimates come from a different estimation strategy. All privatizations occurred in the period 1973–1989. Firms in the control group operated during the same period of time but remained private throughout these years. Columns 1–3 offer three different matching estimators. Column 4 includes an additional control for group affiliation in 1970 (subsample with available information). Column 5 drops from the estimation the few firms with takeovers. Column 6 implements the coefficient stability method proposed by Altonji et al. (2005) and extended by Oster (2019). Column 7 uses a different definition of “connected buyers.” Finally, column 8 includes more firms in the control group by relaxing the data requirements. See Section 6.3 for details. Robust standard errors in parentheses. Significance level: *** $p < .01$, ** $p < .05$, * $p < .1$.

be interpreted as a selection model in which the privatization decision depends on both observables and unobservables that are correlated with the observables. Reassuringly, column 6 shows that the adjusted coefficients remain similar to previous estimates.

The results are also similar when we control for group affiliation before the beginning of the Pinochet dictatorship and when we drop firms with takeovers. For the former exercise we had to match firms in our data with the set of firms with business group affiliation data in 1970 (see Section 5.1). We were able to find 36 out of the 79 firms.²³ Operationally we include as an additional control an indicator variable that is equal to one for firms affiliated to a business group in 1970. Column 4 shows that most results remain unchanged, although the smaller sample decreases the statistical power of the analysis. Results are also similar if we drop from estimation the few firms with takeovers during the 1990–2005 period (column 5). Although the relatively small sample reduces the statistical significance of the estimates, results taken as a whole point in a similar direction than before. Similarly, the appendix shows that results are similar if we control for pre-privatization differences in a flexible way by including indicators for quartiles for the firm size distribution as measured by assets (Tables A.12–A.14).

Finally, the results are similar if we use an alternative definition for connected buyers and if we use an extended sample of firms. As an alternative definition of connected buyers we consider the names of eight firms mentioned in two well known investigations studying Pinochet's privatization process (Marcel, 1989; Mönckeberg, 2015). Importantly, these firms are part of our sample as connected privatizations. Column 7 shows that all results are similar if we use this alternative definition. Column 8 uses an extended sample in which we include additional firms in the control group. To expand this group we relaxed the restriction that a firm needs to be observed three years before the last privatization year in its industry. For this exercise we use not-privatized firms with information for at least one year before the return to democracy in 1990 (see Section 4 for details). As “pre-privatization” controls we use the average over the first three years (or fewer years depending on the information available in the reports). The estimated coefficients are again similar.

7. Conclusion

We used new firm-level data to show how the privatization process implemented by a group of economists known as the “Chicago Boys” during the 1973–1990 dictatorship led by Augusto Pinochet contributed to the formation of new business groups in modern democratic Chile. To the best of our knowledge this is the first paper to empirically show how a privatization reform might contribute to the formation of *new* business groups, arguably fostering the replacement of elites. In addition, we also show that when firms were sold to connected buyers some of these firms began to act as providers of credit within their groups and pyramids were built on top of them. We argue that the context and which privatizations took place – i.e. after an economic crisis – and the way in which these were implemented can explain most of these results.

The history of privatizations in Chile provides at least two valuable lessons. First, as suggested by Schneider (2010), policies can create important changes in the structure of organizations and these changes can persist over time. In this sense our analysis complements that of Kandel et al. (2019) who show that government policies can contribute to the *disappearance* of business groups. Besides expanding their work to an empirical analysis of the *appearance* of groups, we also note that policies can foster a replacement of elites, create corporate empires, and contribute to the concentration of economic power in the hands of few entrepreneurs, which might or might not be of interest for a country depending on the economic context, the development process, and the potential benefits of a “big push” (Morck and Nakamura, 2007).

Second, the impact of privatizations on the formation of business groups and pyramidal ownership structures calls for a reassessment of the costs and benefits of these reforms. When selling state-owned firms it is important to evaluate the intended policy impacts taking into account “general equilibrium” effects caused by the formation of new organizational structures in the economy. For example, privatizations might have the objective of increasing economic performance and productivity more generally, but the creation of groups can increase the concentration in an industry and potentially increase market power, increase prices, and even lower wages (Jarosch et al., 2019). Because of this, potential restrictions to the identity of buyers are perhaps of interest for governments when implementing these reforms.

The study of the unintended impacts of privatizations and government policies on organizations is a promising area of future research as there are many open questions. Can government policies unintentionally increase market power? To what extent can these policies affect the structure of organizations? What are their long-run impacts on productivity and economic performance? What are the impacts on consumers? Can the temporary creation of business groups help economies by creating a “big push”? If business groups benefitted as a whole after buying or forming around state-owned firms is yet another important question. How long will these firms remain in their respective groups and what factors will affect the survival rate of different business groups, remain open questions.

Supplementary material

Supplementary material associated with this article can be found, in the online version, at [10.1016/j.eeh.2020.101355](https://doi.org/10.1016/j.eeh.2020.101355)

²³ The remaining firms were not listed and hence were not mandated to report their ownership. Then we are unable to observe if these firms were part of some business group before 1973.

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