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Losing your dictator: firms during political transition

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Abstract
We use new firm-level data from Chile to document resource misallocation in favor of politically connected firms during the transition from dictatorship to democracy. We find that firms with links to the Pinochet regime (1973–1990) were relatively unproductive and benefited from resource misallocation under dictatorship, and those distortions persisted into democracy. We show that, after learning that the dictatorship was going to end, firms in the dictator's network increased their productive capacity, experienced higher profits, and obtained more loans from the main state-owned bank. We test for different explanations and provide suggestive evidence consistent with connected firms aiming to shield their market position for the transition to democracy.

Keywords Transition · Distortions · Firms · Networks

JEL Classifcation D2 · G2 · G3 · M2 · N86

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1 Introduction

Political transitions are associated with significant economic changes (Acemoglu et al. 2019), but little is known about the persistence of resource misallocation across regimes and the role firms play during these times.[1] Distortions in the allocation of resources across firms are an important source of inefficiency (Hsieh and Klenow 2009) and links between firms and the state are at the heart of it.[2] Anticipation that said distortions will disappear if there is a regime change could lead politically connected firms to "prepare." If distortions exist and some firms successfully prepare, they are transferring inefficiencies across political regimes, possibly limiting the benefits of democratization and the market changes it creates. However, observing firms during transition and across political regimes has been difficult.

We collect new firm-level data from Chile to document resource misallocation in favor of politically connected firms during the transition from dictatorship to democracy.[3] We find that firms connected to the Pinochet dictatorship (1973–1990) were relatively unproductive and benefited from resource misallocation when compared to unconnected firms in the same industries, and these distortions seem to have persisted into democracy. We then show that after learning the dictatorship was going to end, firms in Pinochet's network increased their productive capacity, experienced higher profits, and obtained more loans from the main state-owned bank. In the effort to explain this observed firm behavior during the political transition, we test for different potential mechanisms—including the role of uncertainty and financial frictions—and provide suggestive evidence consistent with connected firms aiming to shield their market position for the future democracy.

Chile's transition to democracy provides an opportunity to measure and study the interactions between a dictatorship and firms. Vast amounts of (previously unexploited) information exist about firms operating during and after the dictatorship led by General Pinochet from 1973 to 1990. The existence of records of people who worked for Pinochet assures that these interactions are measurable. In addition, the timing of this transition provides an opportunity to measure firm behavior after a democratization announcement but before the new democratic government takes office, a period in which firms can reoptimize their decisions for the new environment. After fifteen years in power, General Pinochet called for a referendum in 1988, in which he would run to transform his autocratic regime into a democratic one for the next eight years. Contrary to everyone's expectations, Pinochet not only lost the referendum, but also acknowledged his defeat. This event, known as the "1988 plebiscite," marked the beginning of Chile's transition to democracy. Perhaps surprisingly, Treisman (2017) shows this type of democratization is common.[4] We take

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[1] On average, there were four transitions to democracy per year in the 25-year period from 1988 to 2013 (Figure A.1). A large literature studies the effects of political regimes on economic variables. See Acemoglu et al. (2019) for a recent discussion.

[2] A large body of work shows that firms benefit from having connections to the state (e.g. Fisman 2001; Khwaja and Mian 2005; Faccio et al. 2006; Jayachandran et al. 2006; Mobarak and Purbasari 2006; Claessens et al. 2008; Cingano and Pinotti 2013; Colonnelli and Prem 2017).

[3] We call "transition" the period when it was known the dictator was leaving but he was still in power, and "democracy" the period when the democratic government is in power. The former has been called a "lame duck" or "interim" period (Linz and Stepan 1996; Dell 2015).

[4] One third of democratizations since 1800 occurred because of deliberate decisions made by incumbents. Two thirds happened because incumbents attempted to consolidate their power but failed. According to data collected by Treisman (2017), the most common of these attempts has been calling for elections and losing.

advantage of this situation to study connected and unconnected firms under dictatorship, transition, and democracy.

Our econometric analysis uses data for 118 firms that were mandated to submit annual reports to a regulatory agency. By law, firms listed in the stock market—or those with more than five hundred shareholders—had to send reports describing their yearly business activities. We digitized these documents for all years between 1985 and 1994. We chose this period because since 1985 firms had to report the exact same activities. To be in our data, a firm needed to have reports in both the dictatorship and democracy. The reports allow us to observe assets and their subcategories, debt and its subcategories, profits, firm-bank relationships, and the identity of board members. To detect firms with links to the regime, we look for board members who worked for Pinochet before 1988, a process that results in the identification of firms with direct or indirect links to the regime, a novelty in our empirical approach. We refer to firms with direct or indirect links as connected or as being in the dictator's network of firms.

We study firm behavior using a differences-in-differences framework with three periods and three types of firms. Our strategy flexibly controls for the probability that firms had a link to Pinochet and for unobservable industry shocks by period. Because firms with connections to Pinochet were larger and more likely to have been privatized, a differences-in-differences strategy is subject to the threat of cross-sectional variables interacting with year shocks. To deal with this concern, we estimate the probability of firms having links to the dictatorship and include an interaction between this probability with period fixed effects. Then we follow Hornbeck and Naidu (2014) and show that after adding this control differences in observables between connected and unconnected firms are smaller and not statistically significant, and we cannot reject the existence of parallel trends across firms before the plebiscite. However, given the differences across firms in the dictatorship period, and the limited number of variables available in the reports for us to estimate the probability of having links in the best possible manner, the results should be interpreted as causal with caution.

The first part of our analysis shows that when financial investors learned that the dictatorship was going to come to an end—i.e. after the 1988 plebiscite—connected firms experienced a significant decrease in their stock market value. However, we also show that connected firms benefited from resource misallocation under dictatorship and these benefits persisted into democracy. To study changes in firm value we collected daily stock prices for firms in our data. We document that firms with direct *or* indirect links to Pinochet suffered a substantial decrease in their stock value in the days following the plebiscite. Although changes in stock prices of connected firms after political events have been documented before, the patterns for firms with *indirect* links are novel and suggest the existence of more complex political networks. To study resource misallocation we construct measures of productivity and the capital and output wedges proposed by Hsieh and Klenow (2009). Our results reveal that under dictatorship firms with direct and indirect connections were less productive and their capital was distorted when compared to unconnected firms. Using our empirical strategy we show that this resource misallocation persisted into democracy.

The second part shows that during the political transition, i.e. when it was known the dictatorship would end, firms with direct links to Pinochet increased their productive capacity—measured by changes in physical capital—by 0.40 standard deviations (σ) and enjoyed 0.20–0.30 σ higher profits, with no significant changes in the number of workers employed. Additionally, firms with direct links obtained substantially more loans from the main state-owned bank in this period, with some evidence of debt substitution from private banks. This result is consistent with anecdotal evidence pointing to the main state

bank as crucial for firms connected to Pinochet (Leon-Dermota 2003). Importantly, these results control for any effects the transition might have had across industries and are robust to a wide range of exercises, including: (i) a placebo that exploits the attempted murder of Pinochet during his dictatorship, and (ii) elections during democracy. However, the behavior of connected firms might still be explained by unobserved characteristics that were related to connections and unrelated to the variables included in the estimated probability of having links.

The last part of our paper attempts to explain the persistence of distortions using firm behavior during transition as a mechanism. We provide suggestive evidence that firms used their preferential relationship with state-owned banks to obtain credit and make investments to shield their market position for democracy. To arrive at this conclusion we test four different mechanisms that can potentially explain the higher investment, profits, and debt from the main state-owned bank. First, we propose a theoretical framework in which firms with different types of connections decide to invest in the presence of: (i) credit distortions, and (ii) the threat of entry under democracy. We test and confirm primary and auxiliary predictions from this model. Second, we use the Baker et al. (2016) text analysis framework to construct firm-level measures of uncertainty and find a limited role for economic uncertainty. Third, we find that a supply side explanation in which banks provide more credit to large firms (Beck et al. 2005) is inconsistent with the data. Finally, we show that strategic link formation and wealth extraction are also unlikely to be mechanisms behind our results. We conclude that the evidence is most consistent with strategic behavior of firms aiming to shield their market position for the democracy period. However, we are unable to test other mechanisms that could also be at play.

Several papers have shown that a threat of entry can induce incumbent firms to change their behavior (Goolsbee and Syverson 2008; Cookson 2018). However, the existence of a period for firms to adapt to the new environment is key. In a closely related study, Kochanova et al. (2018) show that the market share of firms connected to Suharto in Indonesia decreased in the post-Suharto era, a finding consistent with more competition from unconnected firms. The main difference with Chile's transition is that the fall of Suharto was more abrupt, leaving firms with less time to prepare for the next political period.

Our work is related to the literature studying resource misallocation under dictatorship and the legacies of non-democracies. Although empirical work documenting distortions associated with political connections is vast, only a few articles study resource misallocation in authoritarian regimes (e.g. Mobarak and Purbasari 2006). The empirical literature documenting short-term persistence of economic and political distortions across regimes is a relatively new area of research and has focused mostly on local politicians. For example, Martínez Bravo (2014) shows that appointed officials who remained in power after Indonesia's transition to democracy are associated with significant economic and political distortions. In the same context, Martínez Bravo et al. (2017) show that mayors who remained in power had worse governance outcomes, highlighting the costs associated with slow transitions. We contribute to this literature by examining the persistence of resource misallocation across firms.

This paper also contributes to the empirical literature studying the economic effects of political transitions. Estimates of the effect of democracy on economic growth go back to at least the beginning of the 1990s and have been the focus of contentious debates. Acemoglu et al. (2019) provide the most recent empirical analysis and show significant positive

effects of democratizations on economic growth in the long run.[5] Our results suggest that the short-run effects of democratizations may be at least partially explained by a transfer of distortions from the previous regime. In this sense, we interpret the persistence of distortions as a potential constraint on the effects of democratizations. Finally, our results also speak to a theoretical literature studying the persistence of economic power across political regimes (e.g. Acemoglu 2008; Acemoglu and Robinson 2008).

2 Chile's transition to democracy

The dictatorship led by General Pinochet began after a coup d'état against democratically-elected socialist Salvador Allende on September 1973. Following the coup, Pinochet was part of a military *junta* that ruled the country until June 1974. After consolidating his power in the *junta*, Pinochet ruled the country for the next 17 years. We can divide the Pinochet dictatorship in three periods: installation and repression (1973–1975), implementation of radical economic policies (1976–1982), and implementation of pragmatic policies (1983–1989). Our analysis focuses on the period 1985–1994. Figure 1 presents a timeline of events and Figure A.2 presents macroeconomic indicators for this period. Throughout the text we will refer to the period from September 1973 to October 1988 as dictatorship, the period between October 1988 and March 1990 as transition—because it was known Pinochet would leave—and the period from March 1990 onwards as democracy.

2.1 Firms and the Pinochet regime

We now briefly discuss the history of the relations between firms and the Pinochet regime. Although empirical work studying the practices of firms during this period is limited, historical work documenting the relationship between firms and the regime is abundant. Relying on this research we argue that firm/state relations in the 1980s (our period of study) had their origins in: (1) the preexisting links between advisors to the regime and the business world, and (2) the privatization program implemented in the 1970s and 1980s.

After the 1973 coup, the right-wing coalition saw an opportunity to implement their economic program and persuaded the regime to follow market-based policies and to change the institutional framework (Cavallo et al. 2011). The regime was advised by two groups of individuals. The former group was composed by technocrats trained as economists at the University of Chicago—popularly known as the "Chicago Boys"—who had developed an economic program for the right-wing candidate in the 1970 presidential election. The majority of these economists studied business at leading universities in Chile and had close connections to the business world (Silva 1996). The latter group of advisors was in charge of designing and implementing the legal framework that was to be used by the regime (Huneeus 2000). The majority of these advisors were formally or informally associated with the right-wing coalition and also had close links to the business world.

In addition to the links between advisors and the business world, individuals who worked for the regime acquired control of firms in the context of a privatization program, probably one of Pinochet's most controversial policies (González et al. 2020). Individuals

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[5] See also Barro (1996), Tavares and Wacziarg (2001), Rodrik and Wacziarg (2005), Persson and Tabellini (2006), Papaioannou and Siourounis (2008), Murtin and Wacziarg (2014) among many others.

close to Pinochet started working as board members for firms that were privatized by the regime. Perhaps the most famous case is Pinochet's former son-in-law, Julio Ponce Lerou, who worked for the regime and became a board member of the Chemical and Mining Society of Chile during its privatization process. Ponce Lerou represents one of the links between firms and the regime in our empirical analysis.[6]

2.2 Democratization by election

Pinochet called for elections in 1988 in which he would run as the only candidate; this Yes/No election known as the "1988 plebiscite" took place on October 5*th*. Pinochet's goal was to validate his regime internationally and become president of Chile for the period 1988–1996. However, he did not accomplish his goal. In an election in which more than 90% of the voting-age population registered to vote, 56% voted against Pinochet. Then, in December of 1989, a presidential election with candidates from all parties took place, an election in which Pinochet could not run. As expected, the opposition won, and the new democratically elected president Patricio Aylwin took office in March of 1990. Between the plebiscite and the arrival of the new government, seventeen months transpired in which firms could prepare for the new economic environment. According to Treisman (2017), Chile's democratization by election is a relatively common type of transition.

Pinochet's defeat at the plebiscite was unexpected for several reasons. First, there was no legal institution in charge of regulating the election. Second, previous surveys did not give a clear prediction (Cauce 1988). Third, most people believed that Pinochet was not going to acknowledge a negative result.[7] And fourth, on election day, most preliminary results showed that Pinochet was winning, and the opposition's victory was only recognized on the next day at around 2 a.m. (Méndez et al. 1988). In addition to this historical evidence, Sect. 5.1 provides empirical evidence for the unexpectedness of the plebiscite's outcome by analyzing stock market returns for firms with and without links to Pinochet.

2.3 The credit market

Three state-owned banks operated during our period of analysis: the Bank of the State, the Central Bank, and the Production Development Corporation. The Bank of the State granted 85 percent of loans from state-owned banks in 1986 (84.7%) and 1987 (84.8%). Executives at these banks were directly appointed by Pinochet and were in charge of the review and approval of loan petitions (Law No. 2079, enacted in 1978).

The President of the Bank of the State during the transition period was Alvaro Bardón, the former President of the Central Bank (1977–1981), Undersecretary of Finance (1982), and a member of the Chicago Boys. Bardón was appointed president one month after the plebiscite (November 7, 1988) and remained in this position until the last week of the

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[6] Importantly, not all privatized firms were linked to Pinochet and not all firms linked to Pinochet were privatized. Thus, we can account for the effect of privatizations and differentiate it from the effect of links to Pinochet.

[7] According to declassified documents posted by the U.S. National Security Archive, Pinochet stated, "I'm not leaving power, no matter what." Different political forces (including the navy) pushed him finally to accept the result (Huneeus 2006).
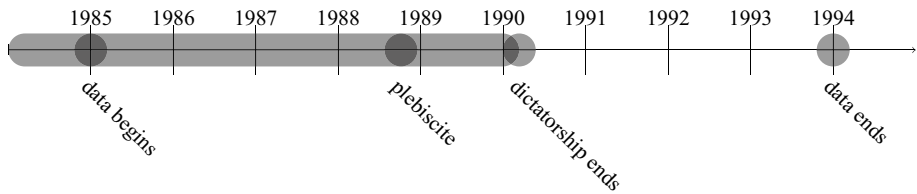
Fig. 1 Timeline and network of firms. *Notes*: We use three periods in our analysis. We call "dictatorship" the period from September 1973 to October 1988 (for data restrictions we only use 4 years of data, from 1985 to 1988). We call "transition" the period between October 1988 and March 1990 (1.5 years of data), when it was known Pinochet would leave. Finally, the "democracy" period begins in March 1990 and we collected data until 1994 (5 years of data). Overall, our firm-level data go from 1985 to 1994, quarterly in the case of balance sheets data and annually for report data

regime. In contrast, the other two banks had the same leader in the months surrounding the plebiscite.

Bardón's appointment was the focus of controversy due to the bank's financial operations during the transition. The controversy lies in the privatization of *El Mercurio* and *La Tercera* (the two largest newspapers), both bankrupted by the time of the transition. These newspapers were bailed out after the 1982 financial crisis and, as a consequence, were heavily indebted to the Bank of the State. These debts meant that the opposition party could have owned a significant part of the written media after taking office in 1990. To prevent this scenario, Bardón used debt swaps to transfer the ownership of the newspapers to firms with links to Pinochet. These financial operations were implemented between November 1989 and March 1990 and, because of significant underpricing, cost the Bank of the State approximately 26 million USD (Leon-Dermota 2003).[8]

This "newspapers case" exemplifies how the Pinochet regime used state-owned banks to gain an advantage during the political transition. Leon-Dermota (2003, p. 143) puts it succinctly: "The connection between *El Mercurio* and the military regime facilitated access to credit that was used to invest and gain an advantage over competitors."

3 Data construction

3.1 Sample selection

We constructed a panel dataset of firms that were required to report firm-level information to the *Superintendencia de Valores y Seguros*, a regulatory agency in Chile equivalent to the Securities and Exchange Commission in the U.S. The universe of companies that report data are firms listed in the stock market or firms with more than five hundred shareholders. Firms report information in two ways, balance sheets and annual reports. Balance sheets have been digitized by the agency and contain quarterly information on earnings, physical capital, debt, and equity. Annual reports are kept in physical files at the agency and contained more firm-level information. Since 1985 the information reported was standardized,

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[8] Price Waterhouse was in charge of estimating this value. Bardón and his team were investigated for state fraud in 1991. In a controversial ruling, the Supreme Court decided to exonerate them. Leon-Dermota (2003) argues that this exoneration is an example of Pinochet's power in the new democratic era.
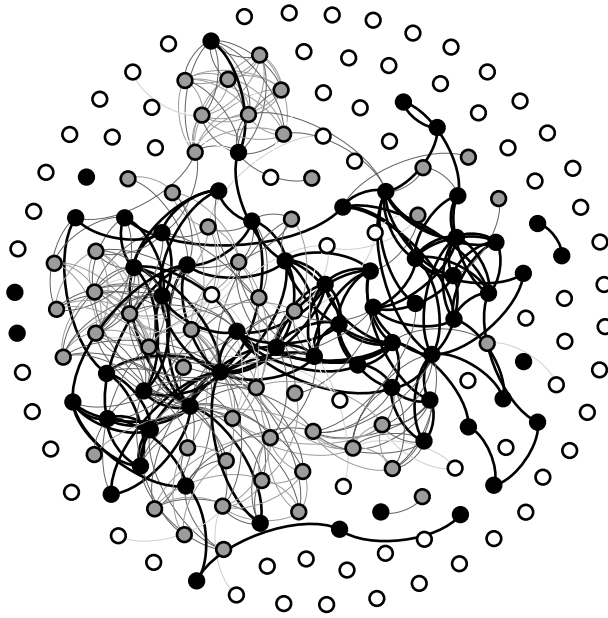
Notes: This figure presents the network of firms listed in the Chilean stock market in 1987. We classify these firms into three groups. Each circle represents a firm. Firms denoted by black dots had a direct link to the Pinochet regime (first degree link), firms denoted by gray dots had no links to the regime but had a link to firms with a link (second degree link), and firms denoted by white dots did not have links to the regime or linked firms. We define a link "—" between firms using board linkages. The average firm is linked to 4.7 other firms by board linkages. The average number of links between any two firms that can be connected is 3.3, the maximum distance between any two firms is 9, the global clustering coefficient is 0.48, and the fraction of firms in the giant network is 0.44. This network of firms shows some features of "small world," low diameter, and high clustering discussed by Jackson and Rogers (2005). The network is our own construction based on data provided by Chile's stock market regulatory agency

so we observe the same variables for all firms. From these reports, we collected outstanding borrowing from banks, bond and equity issuance, number of workers, year of foundation, and information about exports. We converted all variables to 1998 Chilean pesos using the consumer price index of the Central Bank of Chile. Table 1 presents a summary of the data.

The selection of firms in our final sample results from three steps. First, we use the universe of balance sheets and firms' unique identifiers to construct an unbalanced panel of approximately 180 firms observed between 1985 and 1994. We chose those so we could compare across the three periods. Second, because we needed to digitize annual reports, we decided to work with a balanced panel, which decreased our sample to 118 firms. Third, in several trips to the agency we collected all reports we could find in their archives. Unfortunately, some reports were lost, and we could only construct an *unbalanced* panel of firm-level variables due to this. Therefore, from balance sheets, our sample consists of a balanced panel of 118 firms and when studying outcomes from the reports our sample consists of an unbalanced panel of approximately 99 firms.

Table 1 Definition of variables and data sources

	Definition (1)	Source (2)
Sample		
Universe of firms	All Firms listed in Chile's stock market or with more than five hundred shareholders	SVS
Sample of firms	Firms with balance sheet information or annual reports under dictatorship and democracy	SVS
Variables		
Direct link to Pinochet	1987 board member worked for Pinochet	See Appendix B
Indirect link to Pinochet	1987 board member works in another board where a board member worked for Pinochet	See Appendix B
Stock prices	Daily stock prices	Newspaper *El Mercurio*
Abnormal returns	Daily stock returns different from business as usual. Defined by Campbell et al. (1997)	Stock prices
Physical capital	The sum of land, machinery, and buildings in monetary units	Balance sheets
Profits	Earnings before interest, taxes, and depreciation	Balance sheets
Investment	Log change in physical capital between periods	Physical capital
Workers	Number of blue- and white-collar workers in the firm	Annual reports
Revenues	Sales, measured in monetary units	Balance sheets
Productivity	Revenue productivity, defined by Olley and Pakes (1996)	Revenues, capital, and workers
Capital misallocation	A measure of distortion defined by Hsieh and Klenow (2009), equation (17) in page 1415	Revenues, capital, and workers
Output misallocation	A measure of distortion defined by Hsieh and Klenow (2009), equation (18) in page 1415	Revenues, capital, and workers
Debt with state-owned banks	Outstanding debt with *Banco del Estado*	Annual reports
Debt with other banks	Outstanding debt with all private banks	Annual reports
Age in 1987	1987 minus the year of establishment	Annual reports
Exporter	Indicator that takes the value of one for firms declaring they export products	Annual reports
Privatized by Pinochet	List of firms privatized by Pinochet	Congress' report
Industries	Own classification reading description of activities and using two-digit industries	Annual reports and United Nations (2008)
Business groups	Firms under the same controller belong to the same group. Controllers own more than 50% of the firm	Circular N. 766 (SVS)
Uncertainty measures	Baker et al. (2016) text analysis applied to letters for shareholders	Annual reports

This table presents definitions and sources for all variables mentioned in the paper. Balance sheets and annual reports for each firm-year come from the Superintendencia de Valores y Seguros (SVS). More details in Sect. 3

3.2 Construction of variables and the network of firms

Outcome variables We use firm-level outcome variables from balance sheets and annual reports. From balance sheets, we use investment in physical capital and profits. We define investment in physical capital similarly to Banerjee and Duflo (2014): logarithmic change in land, machinery, and buildings. Profits are defined as earnings before interest, taxes, and depreciation. From annual reports, we use the total number of workers, productivity, outstanding debt to private and state banks separately, and two misallocation measures. We calculate productivity as "revenue productivity" using the Olley and Pakes (1996) procedure, although results are robust to using a simpler Solow residual. Outstanding debt with private and state banks is measured in billions of Chilean pesos, and we use it to construct indicators for having debt with public and private banks separately. To handle outliers, we winsorized all variables at 2.5 percent of the empirical distribution. The last outcome variables from annual reports are two misallocation measures, capital and output wedges, which we constructed using the Hsieh and Klenow (2009) method, specifically their equations (17) and (18).

Auxiliary variables In addition, we constructed an indicator for exporting firms, an indicator for firms privatized by Pinochet, and existing business groups in 1987. The regime privatized 40 firms in our sample, and 32 firms were part of nine different business groups. We identified privatized firms using data from a commission in charge of investigating privatizations and business groups using the official document *Circular N. 766* produced by the stock market regulatory agency. To classify firms into industries we use the two-digit definition of United Nations (2008). Finally, to study mechanisms we followed Baker et al. (2016) and constructed firm-by-year measures of uncertainty using text analysis of letters written for the shareholders, available in annual reports (more details in Sect. 7.2).

Network of firms We constructed the network of firms with links to Pinochet using the names of board members in 1987, digitized by the regulatory agency. In particular, we performed a Google search for all board members from the universe of firms with balance sheets. We considered all firms instead of our balanced panel of 118 firms to avoid missing indirect links to Pinochet. Board information was complete for all firms. We classified a board member as linked to the regime if he worked for Pinochet before 1987 or was a member of Pinochet's close family. We found that approximately 10 percent of board positions were connected. We say a firm had a link to the regime if at least one board member worked for Pinochet.[9] Besides *direct* (first degree) links, we say a firm had an *indirect* (second degree) link to the regime if none of its directors worked for Pinochet but at least one worked for a firm with a link to him. Several papers have shown that these "interlocking directors" affect firm outcomes through an information mechanism (e.g., Fracassi 2017). Overall, in our sample of 118 firms we found that 43 firms had a *direct* link to Pinochet, 33 firms had an *indirect* link, and 42 were unconnected. Figure 1 presents this network of firms graphically.[10]

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[9] Others have classified political connections similarly (e.g., Fisman 2001, Bertrand et al. 2007, Acemoglu et al. 2016). We present details about links in Appendix B. Measurement error is unlikely to be relevant because firms had on average 10 board members and most connected firms had multiple connections. Hence, to code a connected firm as unconnected we would have to miss several connections simultaneously.

[10] The distinction between direct and indirect links is novel but it does *not* drive our results. Unfortunately, our relative small sample prevents us from studying 3rd degree connections and beyond. Table A.1 presents an example of a firm with a direct link and Table A.2 presents the number of firms per link type and industry.

3.3 Descriptive statistics

Table 2 presents descriptive statistics in the dictatorship period by type of link. For completion Table A.3 presents descriptive statistics for the transition and democracy periods. We present the average and the standard deviation of all variables from balance sheets (118 firms) and annual reports (99 firms) in the period 1985–1987. To calculate statistical differences across firms, we estimate a cross-sectional regression using an outcome as dependent variable and indicators for direct and indirect links in the right-hand side. We present coefficients and standard errors for differences in the last two columns in this table.

Overall, firms linked to the dictatorship were larger and older, and were more likely to have been exporters, privatized by the regime, and part of a business group. These firms were also less productive and accrued more debt from banks. Differences between firms with direct and indirect links are similar but smaller. In addition, the two misallocation wedges reveal that connected firms benefited from cheaper access to credit and higher subsidies. These differences tend to be larger for firms with direct links and are similar when we use within-industry comparisons (unreported). In sum, Table 2 reveals the absence of quasi-random variation of connections across firms and therefore we develop an empirical strategy that controls for the probability of having links.

4 Empirical strategy

Because firms were not randomly linked to the regime, we estimate a differences-in-differences model that controls for the probability of having a connection to Pinochet. In addition, to control for potential changes in expectations, economic and political stability, and movements in commodity prices that might affect firms, we include fixed effects by industry over time. The estimation distinguishes between three periods and three firm types. The baseline regression is:

$$Y_{ijkt} = \beta_T(P_i \cdot T_t) + \gamma_T(p_i \cdot T_t) + \psi_{kt} + \xi_i + \varepsilon_{ijkt} \tag{1}$$

where Y_{ijkt} is the outcome of firm i—part of business group j and operating in industry k—in period t. The indicators P_i and p_i are indicators for firms with (respectively) direct or indirect links in 1987, which are mutually exclusive categories. The vector T_t contains two sets of time indicators, one set for the transition regime and one for the democratic regime, with dictatorship as the omitted category. The vectors of parameters $\beta_T = (\beta_{tran} \ \beta_{dem})$ and $\gamma_T = (\gamma_{tran} \ \gamma_{dem})$ contain the coefficients of interest, with β_{tran} and γ_{tran} capturing differences during the political transition. The vector ψ_{kt} captures industry unobservable shocks in the transition and democracy periods separately, and ξ_i represent firm fixed effects.[11] Finally, ε_{ijkt} is an error term clustered at the business group level.[12]

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[11] One might worry that firms in the energy sector anticipated increased demand after the plebiscite and decided to increase their productive capacity accordingly. Including industry-period fixed effects addresses this type of concern.

[12] Any firm that is not part of a business group is assumed to be a business group on its own. There are 104 clusters in our dataset.

Table 2 Differences in observables across types of firms under dictatorship

	Firms without links	Firms with direct links to Pinochet	Firms with indirect links to Pinochet	Difference with unconnected firms	
	(1)	(2)	(3)	(2)–(1)	(3)–(1)
Panel A: Balance sheets					
Investment in physical capital	0.00	− 0.00	0.01	− 0.00	0.00
	(0.05)	(0.05)	(0.06)	(0.01)	(0.01)
Profits	− 0.32	0.40	− 0.11	0.70***	0.20**
	(0.24)	(1.49)	(0.53)	(0.18)	(0.08)
Logarithm of assets	14.52	17.55	16.82	3.00***	2.27***
	(2.10)	(1.87)	(1.37)	(0.43)	(0.41)
Panel B: Annual reports					
Log workers	4.38	6.28	5.66	1.98***	1.26***
	(1.99)	(1.65)	(1.37)	(0.50)	(0.47)
Productivity	− 0.47	− 1.53	− 1.08	− 1.05**	− 0.55
	(1.69)	(1.92)	(1.54)	(0.46)	(0.42)
Capital misallocation	− 0.31	− 0.71	− 0.70	− 0.43*	− 0.41
	(1.11)	(0.53)	(0.70)	(0.23)	(0.26)
Output misallocation	0.88	0.76	0.87	− 0.10	− 0.02
	(0.14)	(0.81)	(0.49)	(0.14)	(0.11)
Debt with state-owned banks	4	17	18	13*	14*
	(17)	(48)	(45)	(8)	(8)
Debt with other banks	17	86	59	67***	41**
	(46)	(118)	(91)	(19)	(16)
Panel C: Time invariant					
Age in 1987	39	53	49	14**	10
	(27)	(30)	(29)	(6)	(7)
Exporter	0.22	0.35	0.51	0.15	0.33***
	(0.42)	(0.48)	(0.50)	(0.10)	(0.11)
Privatized by Pinochet	0.11	0.56	0.33	0.44***	0.21**
	(0.31)	(0.50)	(0.47)	(0.09)	(0.10)
Part of a business group	0.02	0.21	0.39	0.19***	0.37***
	(0.15)	(0.41)	(0.49)	(0.07)	(0.09)

Average of main variables in the period 1985–1987. Data for 118 firms in panels A and C, 99 firms in the first four rows of panel B, and 113 firms in the last two rows of panel B. Debt is measured in billions of Chilean pesos. Standard deviation is in parentheses in columns 1–3, and standard error is in parentheses in the last three columns. Significance level: $*** p < 0.01$, $** p < 0.05$, $* p < 0.1$. More details in Sect. 3

4.1 Controlling for the probability of having links to the regime

Our empirical strategy controls for the probability of being connected to the regime (Dehejia and Wahba 2002). This control is important because, as we will show, it leads to balance in observables and we cannot statistically reject the existence of parallel trends across groups of firms before the announcement of the transition to democracy. We proceed in two steps. In the first step, we estimate the probabilities of a firm having a link using a

rich set of observable variables measured during the dictatorship period. In particular, we estimate:

$$\Pr(L_i^D = 1) = \Phi(x_i' \pi_D) \qquad (2)$$

$$\Pr(L_i^I = 1) = \Phi(x_i' \pi_I) \qquad (3)$$

where L_i^D and L_i^I are indicators for firms with direct and indirect links, x_i is a vector of variables in the dictatorship period, and (π_D, π_I) is a vector of parameters we estimate. We estimate Eq. (2) omitting firms with indirect links and Eq. (3) omitting firms with direct links. In our main specification the vector x_i includes the logarithm of assets, an indicator for firms privatized by Pinochet, an indicator for firms that were part of a business group, an indicator for exporting firms, leverage, firm age in 1987, productivity, and the two misallocation wedges. When we study differences in productivity and misallocation under dictatorship, however, we omit the latter three variables. Table 3 presents marginal effects for the two probit estimations.

In the second step of the empirical strategy, we use the probit estimates to construct the predicted probabilities of being linked to the regime, i.e. $\widehat{L}_i^D$ and $\widehat{L}_i^I$. Then we define $\widehat{L}_i$ as the average of these probabilities and include it in the baseline regression interacted with time indicators for the transition and the democracy periods as control variables:

$$Y_{ijkt} = \beta_T(P_i \cdot T_t) + \gamma_T(p_i \cdot T_t) + \delta_T(\widehat{L}_i \cdot T_t) + \psi_{kt} + \xi_i + \varepsilon_{ijkt} \qquad (4)$$

where all variables are defined as in Eq. (1), and we now include a control that captures how the probability of firms being connected affects firm-level outcomes in the transition and democracy periods. We use Eq. (4) as our main specification but we also present estimates of Eq. (1) as a benchmark. Therefore, our identification assumption is that, after controlling for the probability of a firm having links to the regime and in the absence of the transition, firms with and without links would have evolved similarly in the period 1989–1994. We now present evidence that suggests the identification assumption is likely to hold, and thus our empirical strategy is a valid approach. In addition, when analyzing the robustness of results we also allow for small deviations from the parallel trends assumption and calculate bounds for our estimates.

4.2 Validity of the empirical strategy

Observable differences across connected and unconnected firms in Table 2 disappear after we control for the probability of having links. Moreover, we present statistical evidence for the existence of parallel trends between firms with and without links before the transition to democracy. Taken together, we argue that these empirical patterns constitute evidence supporting our empirical strategy.

We begin by showing that firms with and without links appear to be similar. To test for balance in outcomes before the transition to democracy, we compare averages of our main variables across connected and unconnected firms using the following regression:

$$\overline{Y}_{i,DICT} = \alpha + \beta P_i + \gamma \widehat{L}_i + \epsilon_i \qquad (5)$$

Table 3 Predicting direct and indirect links to the Pinochet regime

Dependent variable	Direct link to Pinochet	Indirect link to Pinochet
	(1)	(2)
Logarithm of assets	0.23***	0.16***
	(0.06)	(0.05)
Indicator privatized by Pinochet	0.21	− 0.07
	(0.15)	(0.17)
Indicator part of a business group	0.23	0.62***
	(0.22)	(0.14)
Leverage	0.16**	0.29*
	(0.07)	(0.17)
Indicator exporter	− 0.42**	0.15
	(0.16)	(0.17)
Age in 1987	0.00	0.00
	(0.00)	(0.00)
Productivity	− 0.08	− 0.01
	(0.07)	(0.05)
Capital misallocation	− 0.07	− 0.47**
	(0.09)	(0.19)
Output misallocation	− 0.96	− 0.69**
	(0.88)	(0.30)
Firms	82	73

We report marginal effects from two cross-sectional probit regressions using indicators for firms with direct and indirect links as dependent variables. Marginal effects are evaluated at the sample means for continuous predictors and, in the case of indicators, represent changes in the dependent variable after a change from 0 to 1 in the corresponding indicator. Column 1 (2) omits firms with indirect (direct) links. We measure right-hand-side variables as averages in the period 1985–1987 (the baseline dictatorship period). Standard errors are in parentheses. Significance level: $***\, p < 0.01, **\, p < 0.05, *\, p < 0.1$

where β tests for differences in outcomes under dictatorship, i.e. if firms are similar then $\hat{\beta} \approx 0$. We estimate Eq. (5) for firms with direct and indirect links separately. In a similar way, we follow Hornbeck and Naidu (2014) and test for the existence of parallel trends across types of firms during the dictatorship period using the following regression:

$$Y_{i,1987} - Y_{i,1986} = \alpha + \beta P_i + \gamma \hat{L}_i + \epsilon_i \tag{6}$$

where β tests for differential trends across connected and unconnected groups before the transition. We estimate Eq. (6) again separately for firms with direct and indirect links. If they exhibit parallel trends, then $\hat{\beta} \approx 0$. This strategy to test for pre-trends is particularly useful when there are only a few periods available before the treatment.

Table 4 shows that the empirical strategy delivers balance and parallel trends in key outcome variables before the transition to democracy. The upper panel studies outcomes from balance sheets and the lower panel outcomes from annual reports. We do not observe statistically significant differences in levels (columns 1 and 2) or changes (columns 3 and 4). There are also only a few economically meaningful differences and we observe no

Table 4 Balance in observables and parallel trends

	Difference with unconnected firms		Parallel trends with unconnected firms	
	Direct	Indirect	Direct	Indirect
	(1)	(2)	(3)	(4)
Balance sheets				
Investment in physical capital	− 0.00	0.01	0.00	0.00
	(0.01)	(0.00)	(0.01)	(0.01)
Profits	0.40	− 0.05	0.02	− 0.00
	(0.27)	(0.07)	(0.09)	(0.04)
Logarithm of assets	0.88	− 0.07	− 0.01	− 0.01
	(0.64)	(0.35)	(0.01)	(0.01)
Annual reports				
Logarithm of workers	0.88	− 0.31	0.07	0.01
	(0.72)	(0.39)	(0.08)	(0.07)
Productivity	− 0.01	− 0.12	− 0.04	− 0.09
	(0.64)	(0.43)	(0.13)	(0.10)
Capital misallocation	0.04	− 0.23	0.02	0.04
	(0.22)	(0.17)	(0.02)	(0.02)
Output misallocation	− 0.01	0.02	0.00	− 0.01
	(0.06)	(0.04)	(0.01)	(0.01)
Debt with state owned banks	6	− 4	− 2	5∗
	(7)	(7)	(6)	(3)
Debt with other banks	14	− 4	− 2	24∗
	(22)	(19)	(23)	(14)

This table presents the balance in observables and parallel trends between connected and unconnected firms after controlling for the probability of having links to Pinochet. Columns 1 and 2 present differences in means between connected and unconnected firms in the *level* of key outcome variables before the transition. Columns 3 and 4 present differences between connected and unconnected firms in the *changes* of key outcomes variables. Significance level: ∗∗∗ $p < 0.01$, ∗∗ $p < 0.05$, ∗ $p < 0.1$. More details in Sect. 4

clear patterns in the sign of these estimated coefficients. However, we acknowledge that we cannot completely rule out the presence of unobservable firm-level variables related to connections and interacting with the announcement of the transition. Therefore we also perform a battery of robustness checks to evaluate potential violations of the assumption behind our empirical strategy.

5 Democratization and persistent distortions

This section presents two pieces of evidence that motivate our analysis of firms during the political transition. First, we collect daily stock prices for our sample of firms to show that movements in the stock market reveal that Chile's democratization by election was largely unexpected. Second, we show that there is a robust negative relationship among political connections, productivity, and misallocation measures—which we call "distortions"—under dictatorship and that these distortions persisted after democratization.

5.1 An unexpected democratization

The stock market reflects the knowledge of financial investors about current and future events and therefore it can provide valuable information about the contemporaneous perception of events. To estimate the effect of the 1988 plebiscite on the stock market we combine our network analysis with daily stock market prices we hand-collected from the contemporary newspaper *El Mercurio*, publicly available at Chile's National Library.[13] To account for unobserved variables affecting stock returns across firms we utilize "abnormal returns," i.e. the difference between actual returns and expected (business as usual) returns (Campbell et al. 1997). We measure abnormal returns by restricting attention to firms that were traded for at least four months before October 1988, reducing our data to 80 firms.

We present results graphically. Figure 2 reveals a significant drop in abnormal returns of firms linked to the Pinochet regime. This drop corresponds to a decrease of three standard deviations and is similar for firms with direct (first degree) and indirect (second degree) links. We confirmed that this drop in stock returns was unique to the plebiscite by studying abnormal returns around other important political events (Figure A.3). We interpret these patterns in the stock market as evidence that the outcome of the plebiscite was unexpected and as validation of our identification of the network of firms.[14] These findings serve as motivation to study firms during this political transition.

5.2 Persistent distortions

We begin by showing that politically connected firms were associated with significant economic distortions under dictatorship. We then show that these distortions persisted after democratization. To examine the relationship between political connections and firm-level distortions under dictatorship, we estimate the following regression:

$$Y_{ikt} = \beta P_i + \gamma p_i + \delta \widehat{L}_i + \psi_k + \lambda_t + \epsilon_{ikt} \tag{7}$$

where Y_{ikt} is one of three dependent variables: productivity, capital misallocation, or output misallocation in firm i in year t, with $t = 1985, 1986, 1987$. Note that we include industry fixed effects in order to compare firms operating in the same industry. Finally, when

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estimating Eq. (7) we exclude the dependent variable in the calculation of the probability $\widehat{L}_i$ to avoid over-controlling.

If political connections were associated with increased distortions under dictatorship, then $\beta < 0$ for all three dependent variables. Table 5-A presents estimation results and shows that firms with links to the regime indeed had more distortions than other firms in the same industry. In particular, these firms had significantly lower productivity and had more misallocated capital, with smaller and statistically non-significant differences in output misallocation. Estimates in columns 1-4 are economically large, as can be seen from the averages of outcome variables in Table 2. Coefficients are almost always larger for firms with direct links and decrease when we control for the probability of firms being connected to Pinochet. Overall, this panel supports the hypothesis that political connections and distortions were associated under dictatorship.

Did firm-level distortions change under democracy? To answer this question we estimate Eqs. (1) and (4). Table 5-B presents estimation results and shows that the negative association among productivity, capital allocation, and political connections seems to have persisted into democracy. Besides a few statistically significant differences after 1988, we observe changes that are economically smaller than in Panel A. Point estimates suggest that under democracy the productivity of firms with direct links improved by 7% (0.07/0.95, see column 2) and their misallocation measures deteriorated by 26 and 33% (0.06/0.23 and 0.11/0.33, see columns 4 and 6). However, these coefficients are insignificant at conventional levels and have wide confidence intervals, preventing us from rejecting economically relevant changes, particularly in the case of productivity. Moreover, recent work emphasizes that estimating resource misallocation can be subject to some measurement problems.[15] Therefore, we interpret this table as suggestive evidence of persistent misallocation distortions among firms with links to the regime, with weaker evidence of persistence in productivity among these firms. In addition, our analysis only captures differences across firms and the causal effect of the democratization on resource misallocation in the economy as a whole is still unclear.

6 Firms during political transition

Can firm behavior explain the persistence of distortions? This section studies firm inputs, profits, and the credit market during the political transition. Overall, we find that: (i) firms linked to the regime increased their productive capacity and enjoyed higher profits during the political transition; (ii) firms linked to the regime obtained more loans from state-owned banks during the political transition, with suggestive evidence of some debt substitution from private banks; and (iii) firms linked to the regime had better market outcomes under democracy. Section 7 tests for explanations for these findings.

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[15] On the one hand dispersion in revenue productivity within industry could be explained by overhead costs, adjustment costs, or an increase in competition under financial constraints (Bartelsman et al. 2013; Asker et al. 2014; Galle 2019). On the other hand measured misallocation could be partially explained by measurement error (Bils et al. 2018) and model misspecification (Albagli et al. 2019).

Table 5 The persistence of distortions across political regimes

| | Productivity (Olley and Pakes 1996) | | Misallocation measures (Hsieh and Klenow 2009) | | | |
| | | | Capital | | Output | |
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Distortions under dictatorship						
Direct link	− 1.22***	− 0.95***	− 0.49***	− 0.25**	− 0.15	− 0.34*
	(0.29)	(0.35)	(0.15)	(0.12)	(0.11)	(0.19)
Indirect link	− 0.79***	− 0.53*	− 0.48***	− 0.27**	− 0.01	− 0.19*
	(0.25)	(0.31)	(0.15)	(0.12)	(0.06)	(0.10)
Firms	99	99	91	91	88	88
Observations	231	231	243	241	234	232
Year fixed effects	x	x	x	x	x	x
Industry fixed effects	x	x	x	x	x	x
Probability of links		x		x		x
Panel B						
Change in distortions after dictatorship						
Direct link × Transition	− 0.11	− 0.16	0.12	0.10	0.04	0.01
	(0.19)	(0.16)	(0.17)	(0.10)	(0.09)	(0.05)
Direct link × Democracy	0.11	0.07	− 0.13	− 0.07	0.03	− 0.05
	(0.38)	(0.34)	(0.14)	(0.12)	(0.21)	(0.13)
Indirect link × Transition	− 0.21*	− 0.26*	− 0.14	− 0.14	− 0.05	− 0.08
	(0.12)	(0.15)	(0.13)	(0.11)	(0.03)	(0.06)
Indirect link × Democracy	− 0.01	− 0.06	− 0.27*	− 0.23**	0.08	0.00
	(0.23)	(0.31)	(0.13)	(0.11)	(0.09)	(0.12)
Firms	99	99	91	91	90	90
Observations	792	792	774	774	732	732
Firm fixed effects	x	x	x	x	x	x
Year fixed effects	x	x	x	x	x	x
Industry fixed effects × Transition	x	x	x	x	x	x
Industry fixed effects × Democracy	x	x	x	x	x	x
Probability of links × Transition		x		x		x
Probability of links × Democracy		x		x		x

Panel A uses firm-year observations under dictatorship (3 years, 1985–1987) and presents estimates of cross-sectional regressions using two specifications and three dependent variables. Panel B uses the same sample of firm-year observations from Panel A and expands the analysis to study *changes* under transition (1988–1989) and democracy (1990–1994). We estimate the "Probability of links" using the probit specifications from Table 3. Robust standard errors are clustered at the business group level and are reported in parentheses (88 clusters). Significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

6.1 Firm inputs, profits, and the credit market

Columns 1-6 in Table 6 present estimates of Eqs. (1) and (4) to show how investment in physical capital, profits, and the number of workers changed after the plebiscite among firms with direct links to the regime. Coefficients indicate that firms with direct links to Pinochet
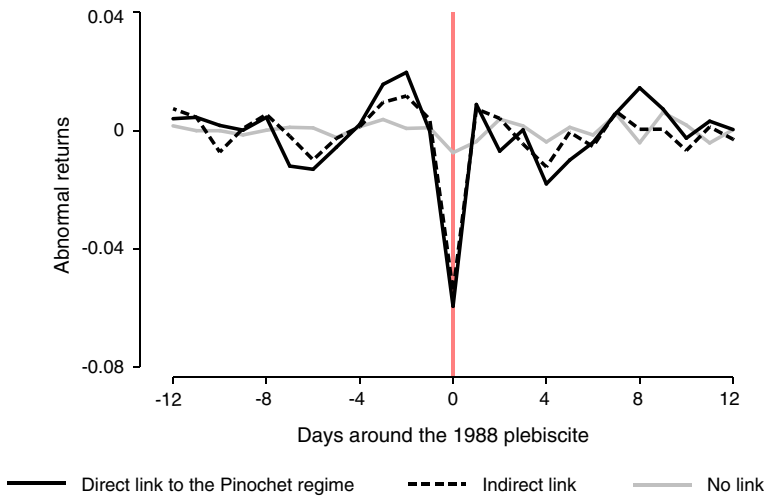
Fig. 2 The stock market. *Notes:* The stock prices data were collected from the contemporary newspaper "El Mercurio," accessed through Chile's National Library. The vertical red line denotes the date of the plebiscite (October 5, 1988)

increased their investments and enjoyed higher profits during the political transition, with little change in the number of workers. In terms of magnitudes, the standard deviations (σ) under dictatorship imply that investment in physical capital increased by 0.40σ and profits increased by 0.25σ, while the change in the number of workers is smaller than 0.05σ.

The coefficients for firms with indirect links are smaller during the political transition. Estimates of the regression that controls for the probability of having links deliver similar although somewhat smaller estimates. Columns with even numbers are our preferred specification because we are comparing firms within industry-period and with similar probabilities of being connected. Regarding the democracy coefficients, we believe it is difficult to interpret these because firm responses during the political transition could have easily persisted to the democratic period. Results are similar if we use only the dictatorship and transition periods.

We now present results for the credit market using a modified version of Eq. (4). In particular, we estimate the following regression equation:

$$
\begin{aligned}
Y_{ihjkt} = {}& \beta_T (P_i \cdot D_h \cdot T_t) + \gamma_T (p_i \cdot D_h \cdot T_t) + \delta_T (\widehat{L}_i \cdot T_t) \\
& + \omega_{1T}(P_i \cdot T_t) + \omega_{2T}(p_i \cdot T_t) + \tau_T(D_h \cdot T_t) + \phi_{ih} + \phi_t + \psi_{kT} + \varepsilon_{ihjkt}
\end{aligned}
\tag{8}
$$

where Y_{ihjkt} is a debt outcome for firm i with type of bank h (i.e. private or state) in period t, with j and k denoting industries and business groups respectively. The indicator D_h takes the value of one for state banks and ϕ_{ih} is a full set of firm-bank fixed effects. All remaining variables are defined as before, with the probability of links $\widehat{L}_i$ again estimated using the specification from Table 3 which includes all firm-level variables at baseline. Standard errors are again clustered by business group.

The main coefficients of interest are β_T and γ_T, which capture the change in a debt outcome from the state bank among connected firms during the transition and democracy periods. Table 7 presents estimates of Eq. (8). Columns 1 and 2 present estimates

Table 6 Firms during Chile's transition to democracy

	Balance sheets				Annual reports	
	Investment		Profits		Workers	
	(1)	(2)	(3)	(4)	(5)	(6)
Direct link × Transition	0.02**	0.02*	0.29***	0.24**	0.01	0.07
	(0.01)	(0.01)	(0.09)	(0.10)	(0.12)	(0.09)
Direct link × Democracy	0.02***	0.01	0.20	0.14	−0.06	−0.02
	(0.01)	(0.01)	(0.13)	(0.13)	(0.11)	(0.11)
Indirect link × Transition	0.01	0.01	0.06	0.01	−0.02	0.03
	(0.01)	(0.01)	(0.05)	(0.08)	(0.08)	(0.08)
Indirect link × Democracy	0.02**	0.01	0.17*	0.11	0.04	0.08
	(0.01)	(0.01)	(0.10)	(0.13)	(0.11)	(0.11)
Firms	118	118	118	118	99	99
Observations	4694	4694	4694	4692	794	794
Firm fixed effects	x	x	x	x	x	x
Time fixed effects	x	x	x	x	x	x
Industry fixed efects × Transition	x	x	x	x	x	x
Industry fixed efects × Democracy	x	x	x	x	x	x
Probability of links × Transition		x		x		x
Probability of links × Democracy		x		x		x

Columns 1–4 use quarterly data (balance sheets), and columns 5–6 use annual data (reports), both for the period 1985–1994. The "transition" period corresponds to the time between the plebiscite (October 1988) and the arrival of the new democratic government (March 1990). We estimate the "Probability of links" using the probit specifications from Table 3. Robust standard errors are clustered at the business group level and are reported in parentheses. There are 104 clusters in columns 1–4 and 88 clusters in columns 5–6. Significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. More details in Sect. 6

of linear probability models and show that the probability of having a positive amount of debt is larger for connected firms. More precisely, the probability of having some debt with a state-owned bank increases by 18 percentage points for firms with direct links during transition. Columns 3 and 4 show that debt over assets also increased significantly after the plebiscite. Remarkably, coefficients are always positive but smaller in magnitude for firms with indirect links (p-values of 0.23 and 0.07, respectively).[16] We can also reject that connected firms borrowed similarly from state and private banks during the transition period (p-values of <0.01, <0.01, 0.02, and 0.03 in columns 1-4), which suggests results are unlikely to be driven by less productive firms investing to become more competitive.

To examine a potential substitution of debt let us briefly discuss estimates using the total amount of debt as the dependent variable and coefficients ω_{1T} and ω_{2T}, which capture the change in debt from private banks (the omitted category) among connected firms by period. The sum of coefficients $\beta_T + \omega_{1T}$ (or $\gamma_T + \omega_{2T}$) measures the change in *total* debt

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[16] The average firm had debt with five banks under dictatorship and this number did not change for linked firms after the plebiscite.

Table 7 The credit market during political transition

	Indicator forpositive debt		Debt over assets	
	(1)	(2)	(3)	(4)
Direct link × Transition × State bank	0.18**	0.18**	0.09**	0.09**
	(0.08)	(0.08)	(0.04)	(0.04)
Direct link × Democracy × State bank	0.22**	0.22**	0.07*	0.07*
	(0.10)	(0.10)	(0.04)	(0.04)
Indirect link × Transition × State bank	0.09	0.09	0.07*	0.07*
	(0.07)	(0.07)	(0.04)	(0.04)
Indirect link × Democracy × State bank	0.14	0.14	0.06	0.06
	(0.09)	(0.09)	(0.05)	(0.05)
Direct link × Transition	−0.19**	−0.21**	−0.08**	−0.09**
	(0.07)	(0.08)	(0.04)	(0.04)
Direct link × Democracy	−0.19**	−0.24**	−0.05	−0.08
	(0.09)	(0.11)	(0.04)	(0.05)
Indirect link × Transition	−0.02	−0.04	−0.07*	−0.08*
	(0.08)	(0.09)	(0.04)	(0.05)
Indirect link × Democracy	−0.11	−0.16**	−0.06	−0.08
	(0.07)	(0.08)	(0.05)	(0.06)
Transition × State bank	−0.06	−0.06	−0.02	−0.02
	(0.04)	(0.04)	(0.03)	(0.03)
Democracy × State bank	−0.08**	−0.08**	−0.02	−0.02
	(0.04)	(0.04)	(0.03)	(0.03)
Mean of dependent variable	0.38	0.38	0.06	0.06
Firms	113	113	113	113
Observations	2073	2073	2073	2073
Firm-bank and year fixed effects	x	x	x	x
Industry fixed effects × Transition	x	x	x	x
Industry fixed effects × Democracy	x	x	x	x
Probability of links × Transition		x		x
Probability of links × Democracy		x		x

These regressions use the annual dataset of firms in the period 1985–1994. The unit of observation is a firm-bank-year triad. We estimate the "Probability of links" using the probit specifications from Table 3. Robust standard errors are clustered at the business group level and are reported in parentheses. The number of clusters is 99. Significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. More details in Sect. 6

Dependent variable is total debt with banks, measured from annual reports

among firms with direct (or indirect) connections when compared to unconnected ones in the same industry-period. The sum is important because it provides suggestive evidence of a potential debt substitution from one type of bank to the other.[17] When examining

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[17] For example, if $\beta_{tran} > 0$ and $\beta_{tran} + \omega_{1,tran} > 0$, then connected firms were increasing their total debt using state banks. In contrast, if $\beta_{tran} > 0$ and $\beta_{tran} + \omega_{1,tran} = 0$, then firms with direct links might have been substituting debt from private banks to the state bank. We emphasize that this analysis needs to be interpreted with caution because the use of monetary units in the dependent variable, an in a panel data setting, might entail cross-section and time-series heteroskedasticity with potentially finite support.

these sums of coefficients a more nuanced interpretation emerges. First, $\widehat{\omega}_{1,tran}$ is negative, which means that the debt of connected firms with private banks decreased during the transition period. Second, the sum of coefficients $\widehat{\beta}_{tran} + \widehat{\omega}_{1,tran}$ is 15.53 (p-value<0.05). Therefore, the estimates suggest that 56% of the increase in debt from state banks during the transition period among firms with direct connections is an increase in *total* debt ($15.53/27.83 = 0.56$). The remaining 44% of the increase in debt during transition might have been debt substitution from private banks. A similar pattern appears among first with indirect connections. Although we are unable to precisely show if and which loans are being substituted, this result is consistent with anecdotal evidence highlighting how the state bank used debt swaps during this period (Leon-Dermota 2003).[18]

6.2 Robustness checks

We now show that results in Sect. 6.1 are robust to specification and estimation decisions. Columns 2-7 in Table 8 replace the probability of having links by specific firm-level variables. All these controls are measured under dictatorship and we allow their coefficients to change in the transition and democracy periods separately. Results are similar when we add an indicator for big firms—above the median of the firm size distribution—an indicator for firms privatized by the dictatorship, an indicator for firms participating in a business group, an indicator for exporting firms, and the productivity and misallocation wedges. Moreover, Column 8 includes all of these control variables together and results are again similar.

Results are also similar when we collapse the data to three periods—dictatorship, transition, and democracy—to deal with potentially serially correlated outcomes (Bertrand et al. 2004, see column 1 in Table 8), when we use a Solow residual to estimate productivity (Table A.6), and when we measure links to the regime in 1986 instead of 1987 (see column 8 in Table 8). In addition, column 9 controls for the effect of substituting links from the old to the new regime and results are again similar.[19] Two additional exercises using the propensity score also support previous results. First, we estimate regression (4) but follow Crump et al. (2009) and restrict attention to firms with overlap in the propensity score distribution, and coefficients are again similar (see column 11). Second, column 12 includes indicators for quartiles of the propensity score distribution interacted with period fixed effects and the results are robust. Finally, we use the synthetic control approach proposed by Abadie and Gardeazabal (2003) and find similar results (Table A.7).

We also performed two falsification exercises to corroborate the importance of the plebiscite. The first, presented in Table 9-A, restricts attention to the period 1985–1988 and examines outcomes before and after the third quarter of 1986, when a group of politically motivated individuals attempted to murder Pinochet, a well-known event at the time that can be interpreted as a potential end of the Pinochet regime. The second exercise, presented in Table 9-B, restricts attention to the period 1990–1997 and examines the time before and after the 1993 presidential election in columns 1-2. Due to data constraints, we repeat this exercise before and after the 1992 local elections for outcomes in columns 3-5. These elections serve as checks for the effect of elections that did not lead to a political

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[18] To understand additional sources of funding we also explored changes in stocks and bond issuances. However, we did not find any significant differences explained by links to the regime (Table A.5)

[19] To measure these links we used the methodology in Appendix B but replaced the word "Pinochet" with the word "Concertacion." We identified seven firms that substituted links between 1988 and 1992.

Table 8 Robustness checks

	Three periods	Control variables × Period indicators							Network links		Propensity score	
		Big firms	Privatized	Business group	Exporter	Productivity	Misal-location wedges	All	Substituted links	Links 1986	Truncated	Non-linear
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Investment												
Direct × Transition	0.02*	0.02**	0.02**	0.02**	0.02**	0.02**	0.02**	0.02**	0.02*	0.02**	0.02**	0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Indirect × Transition	0.01	0.02	0.01	0.01	0.02*	0.01	0.01	0.02*	0.01	0.01	0.02**	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Profits												
Direct × Transition	0.35**	0.21**	0.22**	0.32***	0.27***	0.28***	0.27***	0.20**	0.23**	0.21*	0.19	0.18**
	(0.15)	(0.09)	(0.10)	(0.10)	(0.10)	(0.09)	(0.09)	(0.10)	(0.11)	(0.11)	(0.13)	(0.09)
Indirect × Transition	0.06	−0.00	0.03	0.12*	0.04	0.06	0.05	0.04	0.02	−0.03	0.10*	−0.02
	(0.11)	(0.05)	(0.05)	(0.07)	(0.05)	(0.05)	(0.05)	(0.07)	(0.08)	(0.07)	(0.05)	(0.06)
Workers												
Direct × Transition	0.05	−0.00	0.01	0.03	0.01	0.03	−0.01	0.02	0.11	0.21**	−0.05	0.08
	(0.09)	(0.12)	(0.12)	(0.13)	(0.12)	(0.12)	(0.12)	(0.13)	(0.08)	(0.09)	(0.16)	(0.12)
Indirect × Transition	−0.02	−0.03	−0.03	0.00	−0.03	−0.02	−0.04	−0.01	0.02	0.15	0.06	0.03
	(0.07)	(0.08)	(0.09)	(0.10)	(0.08)	(0.08)	(0.08)	(0.10)	(0.08)	(0.13)	(0.10)	(0.10)
Credit market												
Direct × Transition × State bank	0.08**	0.11**	0.09**	0.11***	0.09**	0.09**	0.09**	0.14***	0.09**	0.09**	0.07*	0.09**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Indirect × Transition × State bank	0.07*	0.10**	0.08*	0.12**	0.07	0.08*	0.08*	0.14***	0.07*	0.04	0.06	0.07*
	(0.04)	(0.05)	(0.04)	(0.05)	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
Firm and time fixed effects	x	x	x	x	x	x	x	x	x	x	x	x

Table 8 (continued)

	Control variables × Period indicators								Network links		Propensity score	
	Three periods	Big firms	Privatized	Business group	Exporter	Productivity	Misallocation wedges	All	Substituted links	Links 1986	Truncated	Non-linear
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Industry fixed effects × Transition	×	×	×	×	×	×	×	×	×	×	×	×
Industry fixed effects × Democracy	×	×	×	×	×	×	×	×	×	×	×	×
Probability of links × Transition	×								×	×	×	×
Probability of links × Democracy	×								×	×	×	×

We estimate the "Probability of links" using the probit specifications from Table 3. Column 8 includes "All" controls from columns 2–7. Robust standard errors are clustered at the business group level and are reported in parentheses. Significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Details in Sect. 6

Table 9 The importance of the plebiscite

	Investment	Profits	Productivity	Workers	Debt
	(1)	(2)	(3)	(4)	(5)
A—Placebo under dictatorship (1985–1987)					
Direct link × After attempted murder of Pinochet	0.01	0.08	− 0.28*	0.09	7
	(0.01)	(0.10)	(0.15)	(0.11)	(10)
Indirect link × After attempted murder of Pinochet	0.02**	− 0.00	− 0.05	0.04	15
	(0.01)	(0.10)	(0.14)	(0.07)	(14)
Firms	118	118	89	89	109
Observations	1518	1400	310	310	829
Firm fixed effects	x	x	x	x	x
Time fixed effects	x	x	x	x	x
Industry fixed effects × Transition	x	x	x	x	x
Industry fixed effects × Democracy	x	x	x	x	x
Probability of links × Transition	x	x	x	x	x
Probability of links × Democracy	x	x	x	x	x
B—Placebo under democracy (1990–1994)					
Direct link × After local/presidential elections	0.01	0.21*	− 0.21	0.08	− 3
	(0.01)	(0.12)	(0.37)	(0.10)	(12)
Indirect link × After local/presidential elections	0.01	0.19	0.52	0.11	− 9
	(0.01)	(0.14)	(0.34)	(0.10)	(9)
Firms	118	118	92	92	109
Observations	2232	2348	411	411	1,034
Firm fixed effects	x	x	x	x	x
Time fixed effects	x	x	x	x	x
Industry fixed effects × Transition	x	x	x	x	x
Industry fixed effects × Democracy	x	x	x	x	x
Probability of links × Transition	x	x	x	x	x
Probability of links × Democracy	x	x	x	x	x

In panel A we create a placebo exercise by splitting the dictatorship period (1985–1987) in two, before and after the third quarter of 1986, a time when a group of individuals attempted to murder Pinochet. In panel B, we create another placebo by splitting the democracy period (1990–1994) in two, before and after the 1993 presidential elections in columns 1–2, and before and after 1992 local elections in columns 4–5. We estimate the "Probability of links" using the probit specifications from Table 3. Robust standard errors are clustered at the business group level and are reported in parentheses (104 clusters). Significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. More details in Sect. 6

transition. In both cases we observe smaller and statistically insignificant point estimates. We interpret these results as further evidence for the importance of the plebiscite, an election which initiated a political transition.

Finally, Figures A.4 and A.5 present year-by-year coefficients from a flexible estimation of Eqs. (4) and (8) and reveal some noise with perhaps some visual evidence of differential trends across firms before the plebiscite. Although this could constitute a threat, further statistical analysis reveals that these patterns are unlikely to be a concern. First, the test in Table 4 does *not* reject the existence of similar trends across firms. Moreover, when we test for the joint significance of coefficients during the dictatorship period we cannot reject

that these are zero while the coefficients after it *are* different from zero. Second, we followed Muralidharan and Prakash (2017) and estimated a differential linear trend among connected firms to construct bounds for the profits and credit market results, cases in which the trend could affect our results. This is a conservative exercise because the trend for profits is not statistically significant. Our calculations indicate that the estimated increase in profits during the transition period for firms with direct connections decreases by 25% and the increase in debt with the state-owned bank among the same firms decreases by 45%. Although smaller, our estimates remain economically large and statistically significant at conventional levels (see Table A.8 for details).

7 An exploration of mechanisms

This section provides an exploration of mechanisms that can potentially explain our findings. We first discuss a simple model that can rationalize our results and then study salient alternative explanations. We argue that the collection of findings is most consistent with firms linked to the dictatorship making strategic investments to shield their market position after political transition. Alternative explanations find little support in the data. However, we cannot rule out all potential mechanisms and results in this section should be interpreted as suggestive.

7.1 Strategic investments

Our findings are theoretically consistent with entry deterrence models predicting increased investment when there is a threat of competition (Dixit 1980). In our context, the increase in competition comes from the potential increase in firm entry that democracy brings (Acemoglu 2008).[20] This model predicts that firms exploit their (now transitory) privileged relationship with state-owned banks during the political transition to increase their productive capacity and deter entry under democracy. This model has the ability to explain the increased investment, higher profits, and increase in loans from state-owned banks during transition. The model is also consistent with empirical evidence of an increase in the compensation of connected board members during the transition period (González and Prem 2018).

We present a formal theoretical model with the former predictions in Appendix A. The model has three time periods (dictatorship, transition, and democracy) and three types of firms (direct links, indirect links, and no links). To solve the model we obtain best response functions for all firm-period pairs using an exogenous democratization announcement to study the transition period. Importantly, this model not only has the ability to predict the previously mentioned results, but also rationalizes the observed differences between firms with direct and indirect links. This model is also useful because we can use it to derive auxiliary predictions. We now discuss evidence for three additional predictions of the model.

In our model investing in physical capital is an effective way to reduce firm entry.[21] If our findings are the consequence of strategic decisions, then we should expect higher investment during the political transition in industries with higher entry costs. This is

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[20] Reassuringly, we observe an increase in firm entry after democratization in Chile. See Figure A.6.

[21] However, investments might also take place to capture local institutions or to improve efficiency in production and we cannot distinguish between these. In addition, note that in the model the ability of connected firms to invest comes from preferential access to credit, but empirically we cannot precisely pin down the sources of funding.

because of the higher marginal return for investment in these industries. To test for this, we follow Lambson and Jensen (1998) and construct a proxy for entry (sunk) costs by industry using data on property, plants, and equipment in the period 1985–1987. We divide industries into those with more and less entry costs and use this variable to augment Eq. (1) with a triple difference. Table A.9 shows that investment among firms with links is indeed higher in more capital-intensive industries during the political transition, evidence that supports the first auxiliary prediction.

A second auxiliary prediction we can test is the relationship between the number of firms with links in an industry and firm entry into the same industry under democracy. To do this, we estimate industry-level regressions using the logarithm of number of firms as the dependent variable and the share of firms with links as an explanatory variable, controlling for industry fixed effects and time trends. We use this econometric strategy both in our data of listed firms and in a different dataset of firms we constructed using the Chilean annual manufacturing census, which also serves as an out-of-sample test. Table A.10 provides some suggestive evidence that industries with more linked firms during the political transition indeed had lower firm entry under democracy. However, given the limited number of industries in our data, these results need to be interpreted with caution.

A final prediction we can test is the following. If firms increasing their capacity during the political transition obtained an advantage over those that did not, we should expect the former to have higher profits during democracy. Indeed, we find that there is a positive and statistically significant relationship between capacity responses in transition and profits under democracy, and the effect is large when compared to investments in a different period. In particular, a one standard deviation increase in a firm's capacity response to the plebiscite is associated with an increase of 0.2 standard deviations in profits, which is larger than the increase of 0.1 standard deviations to investments found in a different period (namely the third quarter of 1986 in our estimation). See Figure A.7 for details. Although suggestive, we believe that taken together these additional results provide some evidence for strategic behavior of firms with links to the regime aiming to improve their market position under democracy. In the remainder of this section we address the plausibility of alternative mechanisms.

7.2 Alternative explanations

Economic policy uncertainty Are the results driven by political and economic uncertainty? Several authors have shown that uncertainty affects investment and profits (e.g., Julio and Yook 2012) and it is sensible to think the periods before and after the plebiscite were times of uncertainty. Empirical evidence, however, suggest this is probably not relevant in explaining our results. As our analysis includes time fixed effects, we are accounting for changes in macroeconomic variables that affect all firms. Hence, uncertainty can only explain our results if it affects firms with links differently after the plebiscite. We follow Baker et al. (2016) and construct a firm-by-year measures of uncertainty using text analysis of reports and estimate the following equation:

$$\text{Uncertainty}_{it} = \beta(P_i \cdot T_t) + \gamma(p_i \cdot T_t) + \psi_{kt} + \lambda_t + \xi_i + \varepsilon_{ijkt} \qquad (9)$$

where all variables are defined as in Sect. 4 but we focus on the period 1986-1989. The outcome variable *Uncertainty$_{it}$* is a measure of uncertainty for firm i in year t which we construct directly from annual reports. In particular, we employ a section of the reports with a letter written for the shareholders. We read the letters for all firms in this period

and construct four indicator variables. The first variable takes the value of one if the report mentions uncertainty and risk explicitly in the letter. The second and third indicate whether the firm had positive or negative beliefs about the evolution of the industry or the country. The fourth measures if policy was mentioned in the letter. Only 11% of firm-year observations mentioned uncertainty and risk, 22% (3%) had positive (negative) beliefs about the industry or country, and 6% mentioned economic policy.

Table A.11 presents estimates of Eq. (9). The first column shows that, if anything, connected firms perceived uncertainty to be higher than unconnected firms did. As higher uncertainty is *negatively* associated with investment (Julio and Yook 2012), these results suggest that uncertainty is unlikely to be a mechanism behind the observed firm behavior during the political transition. Columns 2 and 3 also show that connected firms were slightly more optimistic about the evolution of their industry and the country, although coefficients are not statistically significant at conventional levels. Column 4 shows that connected firms also mention economic policy more than unconnected firms, but the difference is not statistically significant. In sum, we find some suggestive (but weak) evidence that connected firms' positive beliefs about the future could explain some of their greater investment during the political transition.[22]

Supply-side explanation Another alternative explanation comes from the supply side. A large body of research suggests that banks' valuation of assets creates credit misallocation in the form of more funds being available for larger firms (e.g., Beck et al. 2005). Because connected firms are larger, receive more credit, invest more, and have higher profits, differential bank behavior is a potential mechanism. To test for the role of banks we use a version of Eq. (4) that includes one of three cross-sectional variables: firm size—an indicator for firms above the median of the firm size distribution in 1986—which captures the fact that larger firms are more likely to get credit; leverage, which we use to control for the fact that firms with higher leverage are less likely to obtain credit; and the financial constraints index proposed by Kaplan and Zingales (1997), a linear combination of cash flow, leverage, liquidity, Tobin's Q, and dividend payments. Overall, when we control for any of these three variables interacted with the transition and democracy indicators, our findings remain unchanged (Table A.12).[23]

8 Conclusion

To improve our understanding of the economic effects of democratizations, we studied resource misallocation and the behavior of firms during political transition. Our empirical analysis focused on Chile's transition to democracy, which offered a unique opportunity to measure the network of firms with links to the dictatorship and other important firm-level variables. We showed that firms connected to the Pinochet regime were relative unproductive and benefited from resource misallocation under dictatorship. These economic distortions persisted into democracy, and we provide suggestive evidence consistent with firms

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[22] We also read the Sunday edition of the main newspaper in the country and found similar evidence of positive expectations about the future and limited changes in the policy platform around the plebiscite (newspaper editions from July 30 of 1988 until December 30 of 1988).

[23] Appendix C discusses two additional explanations that are inconsistent with the data. Namely, the potential targeting of firms to game the transition and the use of firms to extract rents before the dictatorship is over.

attempting to shield their market position for the new democratic era, highlighting the role of firm responses during political transition.

The reader might worry that Chile's transition to democracy differs from other transitions and our findings have limited external validity. However, roughly half of democratizations occur in a similar fashion (Treisman 2017). Hence, we believe our findings are informative about the role of firms in other transitions around the world. Possible sources of differential effects in other countries are the role of information and the probability of a reversal. If firms in a dictator's network have more accurate information about the future than other firms—the most likely case in our view—the kind of firm behavior we have documented could be magnified. Conversely, if the new regime is fragile and a reversal probable, firms may be less likely to respond during transition. In this sense, careful regulation of the credit and investment market during a democratization seems like a potentially effective policy to avoid the persistence of distortions.

Although this paper studied firms, we emphasize that other agents could also react to a democratic transition. For example, individuals non-democratically appointed to local governments might decide to allocate resources to win elections under democracy. Landowners could make an effort to depress mobility from rural to urban sectors of the economy to preserve their economic power. In addition, there could be other areas affected by firms under democracy. We believe the political arena is particularly important not only in the Chilean case, but potentially other settings as well. If the economic power that persists across regimes translates into political power under democracy, the old political regime could still exert influence and create political distortions. Recent corruption scandals in Chile suggest this is indeed the case as several firms have been accused of (illegally) financing electoral campaigns.

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