Uncertainty from dictatorship to democracy: Evidence from business communications*

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On the eve of a democratization by election, one of the most common forms of transition, dictators can use uncertainty about the future to win political support. We study the evolution of uncertainty from dictatorship to democracy in Chile using text analysis of business communications. We construct new measures of firm-level uncertainty and compare them to perceptions of international experts. We find that uncertainty changes little around the election triggering the transition and decreases markedly after the return to democracy. The exploitation of a misperceived high uncertainty epitomizes the type of errors dictators make before elections that threaten their power.

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1 Introduction

How democracy emerges from dictatorship is a fundamental question to understand the democratic revolution of the past centuries. Scholars have traditionally viewed democratizations as the outcome of a conflict between groups (O'Donnell and Schmitter, 1986; Huntington, 1991; Acemoglu and Robinson, 2006). However, recent research documents that elections triggering democratizations are one of the most common forms of transition out of dictatorship. Why do dictators hold elections threatening their political power? Misperceptions and errors when calculating their chances to win have been put forward as key (Treisman, 2020). An example is the dictator's beliefs about the future policy platform of the opposition. Given that uncertain economic policies are strongly associated with worse economic performance (Baker et al., 2016), the dictator's expectation of winning the election might be inflated by a perception of high uncertainty. However, uncertainty about future policies might be perceived differently among businesspeople. How do business elites perceive economic policy uncertainty around a democratization by election?

We study the evolution of business uncertainty from dictatorship to democracy in Chile using text-based empirical analysis of business communications in the form of letters. Before the 1988 referendum which bolstered the country's democratization, the Pinochet dictatorship, in power since 1973, exploited economic policy uncertainty associated to the opposing coalition in order to increase its own political support (González and Prem, 2018a).[1] In particular, the dictator appealed to his perception of uncertain future policies and a deteriorated economy under the opposition. Although Augusto Pinochet lost the YES/NO referendum, he still obtained close to 45% of support.

We collect hundreds of business letters between 1986 and 1994 from official annual reports of the largest and most important firms in the country. These letters consist of business communications within firms and provide details about the concerns of leading businesspeople. To digitize these documents, we use newly developed deep learning-based image analysis (Shen et al., 2021). Then, we employ both human readings and machine-learning techniques to measure uncertainty about economic policy as perceived by incumbent business elites. We posit that the absence of

[1]The most well-known and popular form for communicating this message was through television advertisements emphasizing the negative effects of uncertain policy platforms if the opposition were to win the referendum.

high uncertainty among businesspeople before the referendum in 1988 and during the transition to democracy (1989-94) can be interpreted as the dictator having a misperceived high uncertainty.

Despite the increased uncertainty alleged by the dictatorship before the democratization was triggered, we fail to find evidence of it. We begin the empirical analysis by presenting our three measures of business uncertainty based on communications and then validate these using firm-level outcomes in balance sheets and income statements. Our main result is to document relatively constant levels of uncertainty around the transition to democracy, which we further confirm by comparing sub-samples of firms with different ties to the dictatorship and thus different degrees of exposure to the turbulent political times. We compare these results with a synthetic control analysis of uncertainty based on expert country reports (Ahir et al., 2022). Experts perceive uncertainty to increase before the election but to decrease markedly after the return to democracy.

Overall, the collection of results suggests that when elections threaten their power, dictators exploit a misperceived high level of uncertainty about the future. These results can be interpreted as one of potentially many explanations for the mistakes made by dictators (Treisman, 2020). In particular, autocratic leaders might be more likely to accept elections which threaten their power because they incorrectly assume that uncertainty about the future will tilt votes toward their side.

Our work relates to the literature documenting changes in uncertainty during critical economic and political events and their impact on the economy. Beyond volatility measures of key financial variables (e.g. Leahy and Whited 1996), the majority of researchers follow Baker et al. (2016) to construct time series of uncertainty measures based on keywords in newspaper articles or similar text-based data sources (e.g. Bontempi et al. 2021; Caldara and Iacoviello 2022; Ahir et al. 2022). Other work uses business surveys to construct firm-specific measures of uncertainty (e.g. Bachmann et al. 2013; Altig et al. 2020b). Regardless of the method used, these measures are routinely used to quantify changes in uncertainty before and after important events such as elections held under democracy, wars, financial or economic crises, recessions, and health crises (Bloom, 2014; Baker et al., 2020; Altig et al., 2020a). Importantly, increases in these measures of uncertainty have been found to negatively affect the economy primarily through investment decisions (Bloom et al., 2007; Bloom, 2009; Jens, 2017; Gulen and Ion, 2017; Baker et al., 2022). We contribute to this literature by constructing a firm-level measure of uncertainty as perceived by business elites

around a democratization by election. We also provide novel estimates of the negative impact of uncertainty on firm investment under authoritarian times and during transition.

We also contribute to several literatures in the social sciences using language-based communications in the form of text to learn about a wide range of social phenomena (Grimmer and Stewart, 2013; Evans and Aceves, 2016; Gentzkow et al., 2019).[2] In particular, we contribute to the firm-level uncertainty literature by empirically studying letters written directly by incumbent business elites. Previous work has used other forms of written communications produced by agents different from businesspeople (Baker et al., 2016). In economics, research systematically explores different sources of text such as newspapers, Google Books, Twitter, Congress and Parliamentary records, press releases, Central Bank communications, and public speeches, to learn about a wide range of issues such as the diffusion of scientific knowledge, company policies, media slant, the impact of climate change, and the behavior of CEOs and autocrats, among many others (Gentzkow and Shapiro, 2010; Burke et al., 2018; Guriev and Treisman, 2019; Bandiera et al., 2020; Alfaro-Ureña et al., 2022; Biasi and Ma, 2022; Giorcelli et al., 2022). We add to the literature by studying letters, a relatively understudied source of data but historically one of the most important forms of communication among businesspeople, scientists, artists, and politicians.[3]

2 From dictatorship to democracy

Augusto Pinochet was the leader of a dictatorship which began on September of 1973 with a coup against socialist Salvador Allende, and ended with a referendum in October of 1988. The Pinochet dictatorship was characterized by state-led repression and the implementation of market-oriented policies recommended by a group of economists known as the Chicago Boys (González and Prem, 2018b; Bautista et al., 2022b,a). The most important economic policies implemented by the regime attempted to reduce the role of the state in the economy. Among these policies, we find the trade liberalization and privatization reforms which ranged from the sale of state-owned firms to market-

[2]One of the earliest business studies analyzes forecasters using articles in the *Wall Street Journal* (Cowles, 1933). The study of language-based communications different from text is also growing. An example is Michalopoulos and Xue (2021), who document the oral history of 1,000 societies and its importance for a range of economic decisions.

[3]A notable exception is recent research using text analysis to study letters of recommendations in the economics job market and for undergraduate admissions (Eberhard et al., 2022; Baltrunaite et al., 2022; Rothstein, 2022).

oriented shifts in critical sectors such as education, health, and pensions (Huneeus, 2006).

The link between the dictatorship's policies and the economy had a large impact on the business world (Rojas, 2015). These economic policies contributed both to the destruction of firms and the renovation of business elites. For example, the 1982-83 economic crisis was partially a result of radical macroeconomic reforms in the preceding years and constituted a large negative shock for existing firms, contributing to the extinction of leading business groups of the time. Similarly, the privatization reform was perhaps the most important policy directly affecting important industries in the economy. The reform helped to create new business groups and a renovation of economic elites (Aldunate et al., 2020). As a result, new links between the state and the business world were created. In fact, an analysis of the board of directors of more than 100 firms in 1987 found that more than one-third were directly connected to the regime mostly through former state secretaries transformed into board members (González and Prem, 2020).

The end of the Pinochet dictatorship began with a referendum in October of 1988. The regime attempted to transform its leader into a democratic president with a simple YES/NO question to all citizens. Political advertisement was heavily used before the referendum, with daily television clips the month before the vote. The dictatorship's campaign emphasized its economic achievements and the negative impacts of a potential opposition victory on prosperity (Hirmas, 1993; González and Prem, 2018a). Shortages, inflation, and chaos were just some of the terms that the regime associated with the opposition. "When you go to vote, think about all the things you might lose" stated the narrator's voice-off in one of the clips. "If the opposition wins, I have doubts about the existence of property rights" (September 16, 1988) and "in the country of the NO, there is no respect for your goods, your future, nor your security" (September 18, 1988), were some examples in television clips. The dictatorship exploited their perceived high uncertainty about the future policy platform of the opposition in order to win political support. The election officially backfired when 55% voted against Pinochet and a path for democratization opened. Financial investors perceived the result of this election as unexpected and the stock market crashed the Monday after the election, leading business leaders to prepare for the transition to a new democratic era.

3 Uncertainty in business letters

3.1 Information extraction and measures of uncertainty

We collect hundreds of business reports from the regulatory agency in charge of monitoring the business operations of the most relevant firms in the country.[4] All reports present balance sheets and approximately half exhibit what we, for expositional purposes, call "business letters."[5] These letters represent the formal annual communication between the board of directors and shareholders. These communications provide a valuable and yet under-explored source of historical information to learn about the most salient concerns of companies during turbulent political times. Figure A.1 presents examples of two letters written in the 1980s and 1990s. In terms of content, the letters reveal the most important economic and political factors driving critical business decisions.

We extract the information revealed in these business communications by digitalizing all letters in the reports using the `LayoutParser` library developed by Shen et al. (2021). The library is a unified toolkit for deep learning-based document image analysis which enables the extraction of information from complex document structures. The letters constitute complex data in the sense that the characteristics of images (i.e. font, size, columns, scan quality) vary over time and across companies. Operationally, we use different pre-trained deep learning models to extract the text from each letter. More precisely, we use all pre-trained models available in the library for our type of file format (i.e. scanned text documents). The multiple models available lead us to extract the text from each letter three times and we use the text with more words extracted.

To construct firm-level measures of business uncertainty from 1986 to 1994, we use three text-based empirical methods. The first method consists of simply reading all business letters and we refer to it as "report readings." For each firm-year pair, we constructed an indicator if the letter mentioned economic or political uncertainty as a critical factor driving decisions and another indicator if the letter mentioned economic policy. We follow the previous literature as closely as

[4]Firms with more than 500 shareholders or listed in the stock market were mandated to submit reports. These firms were leaders in important industries such as agriculture, mining, and telecommunications, among others. Balance sheets and income statements have been used by previous research (González et al., 2020; González and Prem, 2020).

[5]Table A.1 shows that firms with letters are larger, more likely to participate in international markets, and more likely to be politically connected to the Pinochet dictatorship as measured by González and Prem (2020).

possible using both a specific set of keywords (e.g. uncertain, risk, predict) and writing context to infer uncertainty concerns in each business letter. An example of a business letter revealing uncertainty, risk, and policy concerns comes from an important wood manufacturer: "*We hope the economic authority returns to an exchange parity system [...] Regarding markets, we expect a possible recession [...] In a not risk-free environment, with a lower rate of economic growth, it is hard to predict the future*" (Letter, 1989). Another example of uncertain economic policy comes from a large fishing company: "*We hope that a potential new fishing law considers the valuable experience from all these years of continuous effort [...] We are prepared to face all potential future scenarios*" (Letter, 1988). And finally, an example of a letter mentioning economic policy without uncertainty comes from a leading tobacco company: "*The prevailing economic policy, grounded on stable and coherent rules, together with our continuous effort, has resulted in highly satisfactory results*" (Letter, 1987). In the year before the transition to democracy (1987), we observe that 21% of firms discussed uncertainty and 32% talked about economic policy.

The second method relies on machine-driven counts of keywords related to uncertainty and policy. To implement this method, we first need to select the relevant words in both sets. We construct one "dictionary" for words related to uncertainty and another one for policy using two sources of information. The first source are the words chosen by Baker et al. (2016) – in fact the Spanish version constructed by related research articles (Perico, 2018; Cerda et al., 2018) – and the second source is the finance-specific dictionary constructed by Loughran and McDonald (2011). Once the words have been determined by the dictionaries (Table A.2), we use an algorithm to count the number of words related to uncertainty and policy. This method delivers that more than two-thirds of firms discussed uncertainty and almost 60% policy-related issues in 1987.

The last method exploits the information from the report readings to train a machine-learning prediction model with the goal of constructing the same two indicators mentioned above. Recent advances in computational power, and the availability of large amounts of historical information, have given rise to a literature exploring how much automation can help economic historians to construct datasets and extract information (Abramitzky et al., 2021). Our analysis is an exploration of machine-learning models trained by human readings, a tool particularly useful when complete reading of historical documents is unfeasible. We proceed in three steps. In the first step, we

construct a term frequency (TF) matrix with a total of 6,000 words (after cleaning). In the second step, we combine the TF matrix with the indicators from the readings. We select 70% of letters for training, 30% for testing, and performed a 5-fold cross-validation to choose the optimal combination of parameters following Colonnelli et al. (2022). In the third step, we use the training data to run a least absolute average shrinkage and selection operator (LASSO) for each indicator in the readings, adjusting by word frequency as in Eberhard et al. (2022).[6] In all, using this method we observed that 44% of firms mentioned uncertainty and 50% policy-related issues in 1987.

3.2 Correlation across uncertainty measures

We begin the empirical analysis by estimating the correlations between our text-based indicators of uncertainty and policy concerns. These correlations are important as foundation to understand the following set of results. While negative associations could trigger doubts about what uncertainty measures actually capture, positive correlations can be interpreted as empirical support for the hypothesis that there is meaningful information in business letters which can be captured by different text-based methods. We estimate different specifications of the following model:

$$C(r)_{ijt} = \rho C(k)_{ijt} + \phi_i + \phi_{jt} + \eta_{ijt} \quad (1)$$

where $C(r)_{ijt}$ is an indicator of concern about uncertainty or policy based on report readings (r) of the letter in firm i, which operates in industry j in year t. Similarly, $C(k)_{ijt}$ represents the same indicator but constructed using word count (ω) or machine-learning (ℓ), i.e. $k \in \{\omega, \ell\}$. The parameters ϕ_i and ϕ_{jt} represent fixed effects by firm and industry-year, and η_{ijt} is a mean-zero and robust error term clustered by firm. The coefficient of interest is ρ and measures the correlation across the same indicator constructed using different text-based methods to detect concerns.

Table 1 reports estimates of equation (1). In panel A, we report different types of correlations ρ between the indicators constructed using the report readings and the machine-driven word counts. Both measures are strongly and positively correlated across firms (column 1), across firms in the same year (column 2), across firms in the same industry-year (column 3), and even within firms

[6]Panel A in Table A.3 presents performance results using the Term-Frequency-Inverse-Document-Frequency (TF-IDF) approach. Panel B presents performance results without the TF-IDF adjustment for comparison.

over time (column 4). The positive correlation is important because it implies both measures capture a similar type of business uncertainty. At the same time, the imperfect nature of the correlation implies either different aspects of uncertainty or simply measurement error in the indicators. Panel B presents the same correlation but now between report readings (r) and the machine-learning (ℓ) methods. Given that the latter method was trained in the former, the positive correlation between both is less surprising. In all, we interpret the three measures of uncertainty as having the potential to complement each other and therefore we use all of them in the remainder of the analysis.

3.3 Business uncertainty and firm investment

The empirical relationship between political uncertainty and firm investment during democratic times is well documented. In particular, previous research has shown that firm investment is lower in the presence of important elections to be held or changes in future policies (Julio and Yook, 2012; Baker et al., 2016; Gulen and Ion, 2017). There is significantly less research during dictatorial times. To estimate the empirical relationship between uncertainty and firm investment in the context of the Pinochet regime, we estimate econometric models of the following form:

$$Y_{ijt} = \beta C(k)_{ijt} + \phi_i + \phi_{jt} + \nu_{ijt} \tag{2}$$

where Y_{ijt} is investment defined as the change in fixed assets or assets between year t and $t+1$, $C(k)_{ijt}$ is uncertainty measured by one of our three text-based methods, ϕ_i are firm fixed effects, ϕ_{jt} are industry-year fixed effects, and ν_{ijt} is an error term clustered by firm. If the relationship documented by previous research holds during transition to democracy, we should observe $\widehat{\beta} < 0$.

Table 2 presents estimates of equation (2). Point estimates reveal that uncertainty in business letters is a relatively strong predictor of firm investment in the period 1986-1994. A letter classified as revealing uncertainty by report readings leads to approximately 70% decrease (0.05 over 0.07) in annual firm investment defined as change in fixed assets (column 3) or all assets (column 7). The most demanding specifications with firm fixed effects also reveal negative coefficients but of smaller magnitude and sometimes not statistically different from zero. Table A.4 shows that the estimated coefficients are similar – although less precise due to the smaller number of observations

– if we restrict the estimation to the dictatorship period 1986-1988. This exercise is useful to check whether the relationship between uncertainty and investment holds during authoritarian regimes. Firm investment reacts the most to the uncertainty measured based on report readings, either directly (panel A) or used as a training device in a machine-learning framework (panel C), while the relationship is significantly weaker with the machine-driven word counts (panel B).

Overall, the empirical evidence suggests that higher uncertainty should reduce firm investment in the eve of an election which could put an end to a dictatorship. However, the question that remains is whether uncertainty actually increases before a potential democratization by election.

4 Uncertainty and democratization by election

Economic policy uncertainty has been shown to rise before elections held under democracy (Baker et al., 2020), but the relationship is a priori less clear during dictatorial times. Moreover, it is also unclear whether uncertainty increases or decreases after electoral results become public and democracy is expected in the near future. Does uncertainty increase before elections held in dictatorship? What happens to uncertainty after the return to democracy? The answers to these questions are crucial to understand the foundations in which dictators can exploit uncertainty to gain popular support. We provide three pieces of evidence to answer these questions.

4.1 Uncertainty in business letters

The first piece of evidence comes from an examination of our business uncertainty measures around the 1988 plebiscite. Econometrically, we estimate the following regression equation:

$$C(k)_{ijt} = \sum_{t=1986}^{1994} \gamma_t D_t + \phi_i + \varepsilon_{ijt} \tag{3}$$

where D_t is an indicator for each year between 1986 and 1994, with 1987 as the omitted category. The coefficients of interest measure how uncertainty $C(k)_{ijt}$ changes the year of the plebiscite (γ_{1988}) and after the transition to democracy ($\gamma_{1990}, \ldots, \gamma_{1994}$) relative to the benchmark year which we selected to be 1987. Standard errors are clustered at the firm level. Our main interest is on

changes in uncertainty, but we always present changes in policy concerns for comparison purposes. Moreover, we prefer the measures based on report readings and machine-learning since these are the ones predicting firm investment. Table 3 presents estimates and reveals that uncertainty remains constant in 1988 (columns 1 and 5). If anything, uncertainty decreases in 1988 and after the transition to democracy. Although point estimates are not different from zero from 1990 until 1995, they are all negative when looking at report readings (column 1), our preferred measure of business uncertainty given the analysis in the previous section.

The second piece of evidence comes an empirical analysis of business uncertainty across politically connected and unconnected firms around the plebiscite. The motivation behind this exercise is to focus on a subset of firms which are more likely to experience uncertainty. We follow the previous literature and consider a firm to be politically connected to the Pinochet dictatorship if a board member worked as cabinet member or secretary of the dictatorship before 1986. Theoretically, politically connected firms could experience *less* uncertainty because they have better sources of information about future policy changes or they might experience *more* uncertainty because of the perceived risk in losing the privileges associated with political connections, e.g. privileged access to loans from state banks. Empirical evidence suggests that the latter mechanism is more important and thus politically connected firms should perceive higher uncertainty before the 1988 plebiscite.[7] Figure 1 visually presents trends in business uncertainty before the election and after the transition to democracy for all of our uncertainty measures. Once again, we failed to find evidence of higher uncertainty among politically connected firms now compared to a control group of unconnected firms. Table A.5 presents the corresponding regression estimates.

4.2 Uncertainty in expert reports

The third and final piece of evidence comes from a synthetic control analysis we implement using country-level data originally constructed by Ahir et al. (2022). In particular, we focus on their World Uncertainty Index (WUI), an uncertainty measure based on counts of uncertainty-related words in Economist Intelligence Unit (EIU) country reports. These data cover 143 countries across

[7]Firms politically connected to the Pinochet dictatorship benefited from resource misallocation and had access to privileged loans in state banks during the transition to democracy. See González and Prem (2020) for details.

the world from the 1950s until 2020. The WUI is normalized by the total number of words in the corresponding report and rescaled in such a way that a higher number means higher uncertainty. We use yearly data from 1980 until 1994, drop countries with at least one missing observation, and obtained a balanced panel of uncertainty measures for 122 countries (N =1,830).

To implement the synthetic control analysis, we consider the first treatment year to be 1988, the year of the plebiscite. This is, we construct the synthetic control using values of the WUI in all years before the election year, i.e. 1980-1987. Our interest is on changes in uncertainty in the election year (1988) and after the transition to democracy (1989-1994). Recent analysis of elections in the U.S. (Baker et al., 2020) suggest that uncertainty could be higher during the election year (1988) and lower after it. Figure 2 presents results which clearly show an increase in uncertainty in the year of the plebiscite with an immediate decrease in uncertainty from 1989 onwards. In particular, the WUI increases from approximately 0.06 in the synthetic control to 0.12. The year 1989 is also interesting because it hosted a presidential election for the new democratic era. However, the victory of the opposition was largely expected and uncertainty was thus lower when compared to the 1988 plebiscite. After the return to democracy in March of 1990, uncertainty decreases markedly to 0.02 when the synthetic control was almost seven times larger.[8] This significantly lower uncertainty differs from the period after elections in democracy when uncertainty returns to pre-election levels (Baker et al., 2020). Overall, we failed to find empirical evidence of the significantly higher uncertainty exploited by the dictatorship to win political support.

5 Conclusion

We have found that the text in internal business communications predicts firm investment but does not reveal significantly higher or lower business uncertainty before and after the election which triggered Chile's democratization in 1988. In contrast, uncertainty as perceived by expert outsiders increases before the same election and decreases markedly after the transition to democracy.

Our results provide at least two important lessons. First, we interpret the Economist Intelli-

[8]Figure A.2 repeats the synthetic control analysis but using a quarterly instead of a yearly panel data of countries. The results are similar but less clear visually given the relatively discrete nature of the variation in the WUI measure.

gence Unit reports as the perception of experts working outside of the business world under study. In contrast, our uncertainty measures are based on the perceptions of businesspeople in Chile. In fact, both measures correlate positively but imperfectly, suggesting that perceptions of insiders versus outsiders can contain different types of information.[9] Second, periods with a potential democratization by election do not seem to be particularly characterized by higher uncertainty. Moreover, after democracy arrives uncertainty remains low thus suggesting that allegations of an uncertain future might be grounded on misperceptions of the incumbent dictatorship.

[9]The correlation is strongest with report readings (coef. 0.37, s.e. 0.15, *p*-value 0.04), then the machine-learning measure (coef. 0.71, s.e. 0.44, *p*-value 0.15), and then the word-count (coef. 0.24, s.e. 0.35, *p*-value 0.52).

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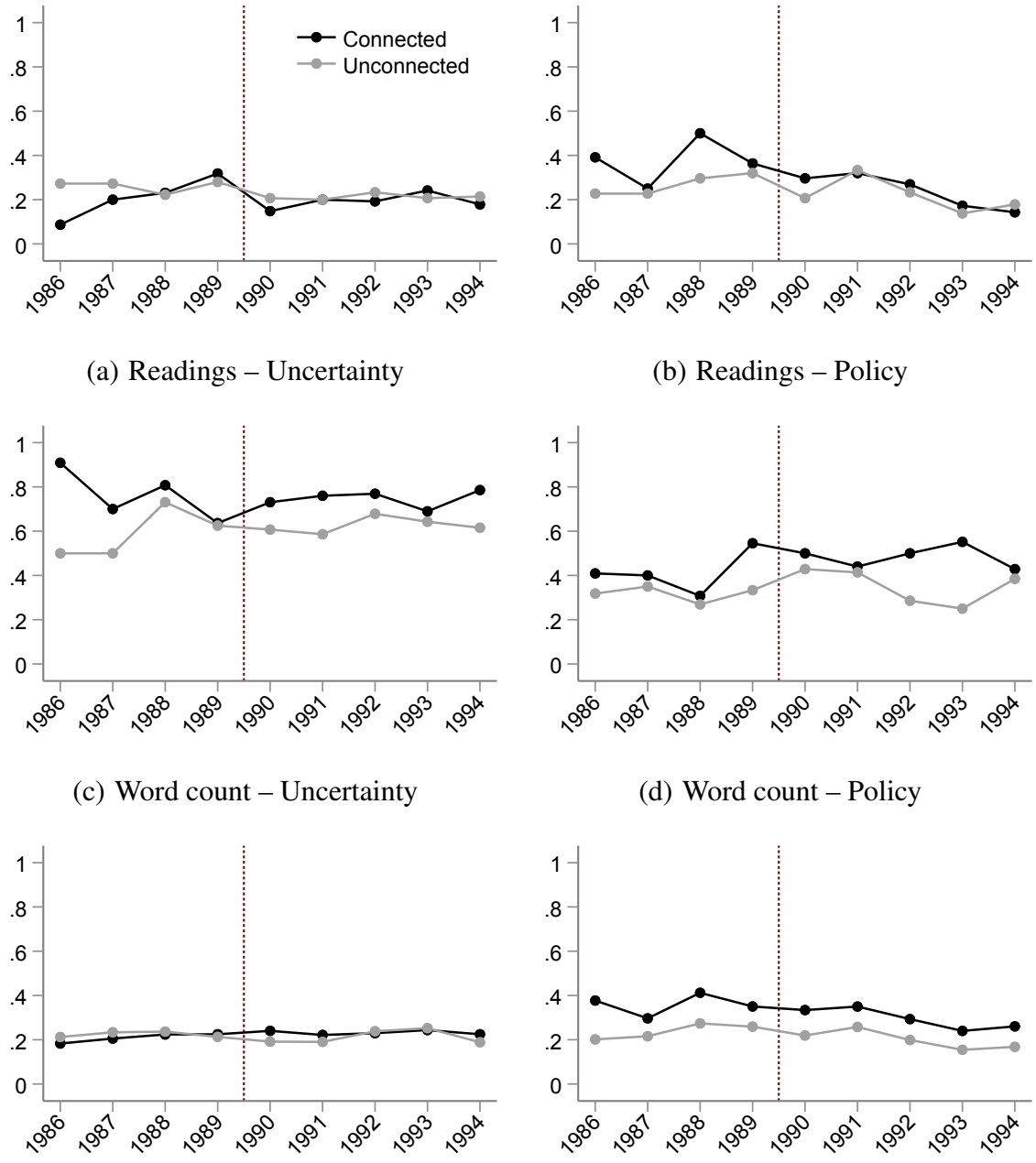
Figure 1: Business uncertainty by political connectedness



(a) Readings – Uncertainty

(b) Readings – Policy

(c) Word count – Uncertainty

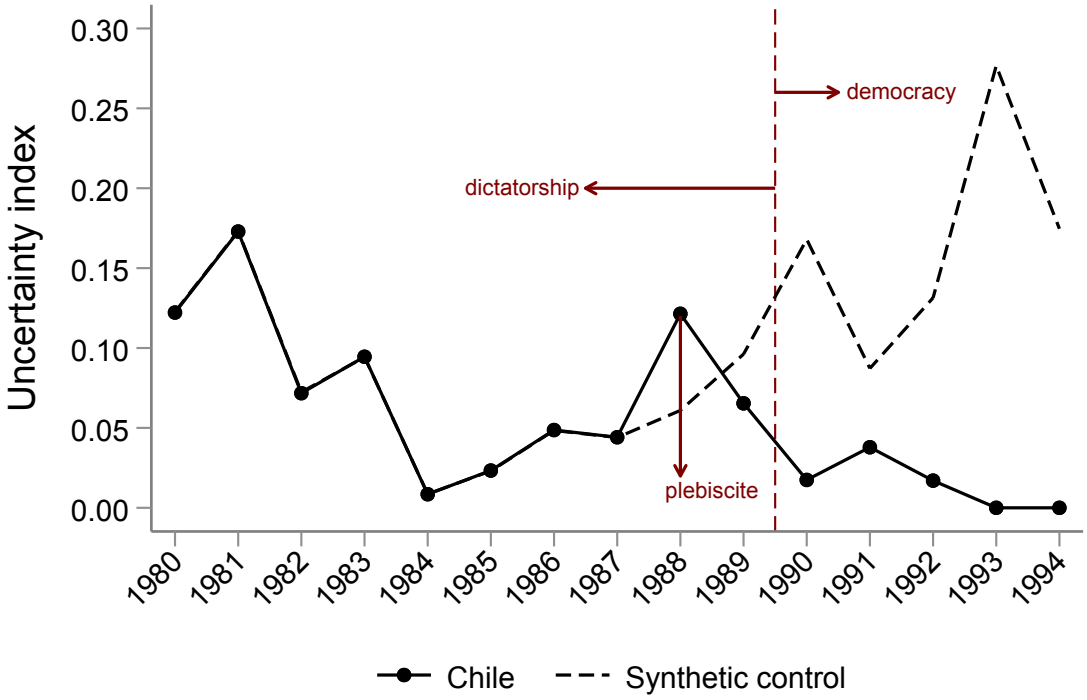
(d) Word count – Policy

(e) Machine learning – Uncertainty

(f) Machine learning – Policy

Notes: Each figure presents the percentage of firms mentioning uncertainty/policy in business letters in the period 1986-1994. We present figures using three methods (readings, word count, machine learning) and split the full sample ($N = 66$) into a subset managed by former secretaries of the Pinochet dictatorship (i.e. 32 "Connected" firms) and the rest (i.e. 34 "Unconnected" firms). The vertical line denotes the beginning of the democratic period (1990 onwards). Sources: Letters come from the Superintendencia de Valores y Seguros, political connections from González and Prem (2020).

Figure 2: Synthetic control estimates



Notes: Synthetic control estimates for the impact of the 1988 plebiscite – the election which triggered the democratization in Chile – on economic policy uncertainty as measured by country expert reports. The estimation uses an annual balanced panel of 122 countries observed in the period 1980-1994. Higher values of the uncertainty index in the *y*-axis imply higher uncertainty. Sources: Uncertainty country-level data from Ahir et al. (2022) based on reports produced by the Economist Intelligence Unit.

Table 1: Correlations across text-based measures of uncertainty and policy

	Dependent variable: Indicator based on report readings							
	Uncertainty				Policy			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Word count								
Indicator uncertainty/policy	0.15***	0.15***	0.13***	0.08**	0.24***	0.25***	0.25***	0.16***
	(0.05)	(0.05)	(0.05)	(0.03)	(0.06)	(0.06)	(0.05)	(0.04)
Panel B: Machine-learning								
Score uncertainty/policy	0.33***	0.33***	0.33***	0.32***	0.39***	0.38***	0.38***	0.41***
	(0.03)	(0.03)	(0.02)	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	455	455	455	454	455	455	455	454
Firms	66	66	66	65	66	66	66	65
Firm fixed effects	N	N	N	Y	N	N	N	Y
Year fixed effects	N	Y	Y	Y	N	Y	Y	Y
Industry-year fixed effects	N	N	Y	N	N	N	Y	N
Avg. dependent variable	0.21	0.21	0.21	0.21	0.26	0.26	0.26	0.25

Notes: This table presents correlations across measures of uncertainty (columns 1-4) or policy (columns 5-8) which we constructed from business letters. Each observation comes from a business letter in a year. The dependent variable is always an indicator which takes the value of one if a firm mentions uncertainty or policy. Panel A uses an indicator for uncertainty/policy constructed from word counts as explanatory variable. Panel B uses the machine-learning 0-1 score as explanatory variable. Each columns uses a different combination of fixed effects to test for correlations within and across firms or industries. Standard errors are clustered at the firm level. Statistical significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 2: Business uncertainty in letters and firm investment

	Dependent variable							
	Investment in fixed assets				Growth of all assets			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Report reading								
Indicator uncertainty	-0.05**	-0.05**	-0.05**	-0.01	-0.07***	-0.06***	-0.06**	-0.05**
	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.03)
Panel B: Word count								
Indicator uncertainty	-0.00	-0.00	0.00	-0.00	-0.01	-0.01	-0.01	0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Panel C: Machine-learning								
Score uncertainty	-0.02**	-0.02**	-0.02*	-0.01	-0.03***	-0.03***	-0.03**	-0.03**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	468	468	468	468	468	468	468	468
Firms	66	66	66	66	66	66	66	66
Year fixed effects	N	Y	N	Y	N	Y	N	Y
Industry-year fixed effects	N	N	Y	N	N	N	Y	N
Firm fixed effects	N	N	N	Y	N	N	N	Y
Avg. dependent variable	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07

Notes: This table presents panel data estimates of the relationship between uncertainty as revealed by business letters in year t and firm investment between year t and $t + 1$. The unit of observation is a firm in a given year in the period 1986-1994. Columns 1-4 use investment in fixed assets as dependent variable and columns 5-8 use growth of all assets. Standard errors are clustered at the firm level. Statistical significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 3: Change in business uncertainty around the end of the Pinochet dictatorship, 1986-1994

	Report readings		Word counts		Machine-learning	
Dependent variable is indicator for:	Uncertainty	Policy	Uncertainty	Policy	Uncertainty	Policy
	(1)	(2)	(3)	(4)	(5)	(6)
Year 1986	-0.05	0.04	0.10	-0.01	-0.01	-0.00
	(0.07)	(0.07)	(0.11)	(0.04)	(0.03)	(0.04)
Year 1988: Plebiscite	-0.03	0.15*	0.14	0.06	0.00	0.07
	(0.07)	(0.08)	(0.09)	(0.05)	(0.03)	(0.05)
Year 1989: Presidential Election	0.04	0.09	0.02	0.04	-0.01	0.04
	(0.09)	(0.08)	(0.11)	(0.04)	(0.04)	(0.05)
Year 1990: Democracy arrives	-0.07	-0.01	0.04	-0.00	-0.01	0.00
	(0.06)	(0.08)	(0.11)	(0.05)	(0.03)	(0.05)
Year 1991	-0.05	0.07	0.05	0.03	-0.02	0.03
	(0.08)	(0.06)	(0.09)	(0.04)	(0.03)	(0.04)
Year 1992	-0.03	0.00	0.09	-0.03	0.01	-0.03
	(0.09)	(0.08)	(0.09)	(0.04)	(0.03)	(0.04)
Year 1993: Presidential Election	-0.02	-0.09	0.05	-0.06	0.03	-0.07*
	(0.07)	(0.07)	(0.09)	(0.04)	(0.03)	(0.04)
Year 1994	-0.04	-0.08	0.06	-0.06*	-0.01	-0.06
	(0.08)	(0.06)	(0.09)	(0.03)	(0.04)	(0.03)
Observations	468	468	454	454	454	454
Firms	66	66	65	65	65	65
Firm fixed effects	Y	Y	Y	Y	Y	Y
Avg. dependent variable	0.21	0.32	0.70	0.30	0.22	0.30

Notes: Estimates of changes in uncertainty or policy around the 1988 plebiscite which triggered Chile's democratization. The omitted category is always the year 1987 and therefore estimates should be interpreted as changes with respect to that year. Odd columns present changes in uncertainty and even columns changes in policy mentions. Standard errors are clustered at the firm level. Statistical significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

ONLINE APPENDIX

Uncertainty from dictatorship to democracy: Evidence from business communications

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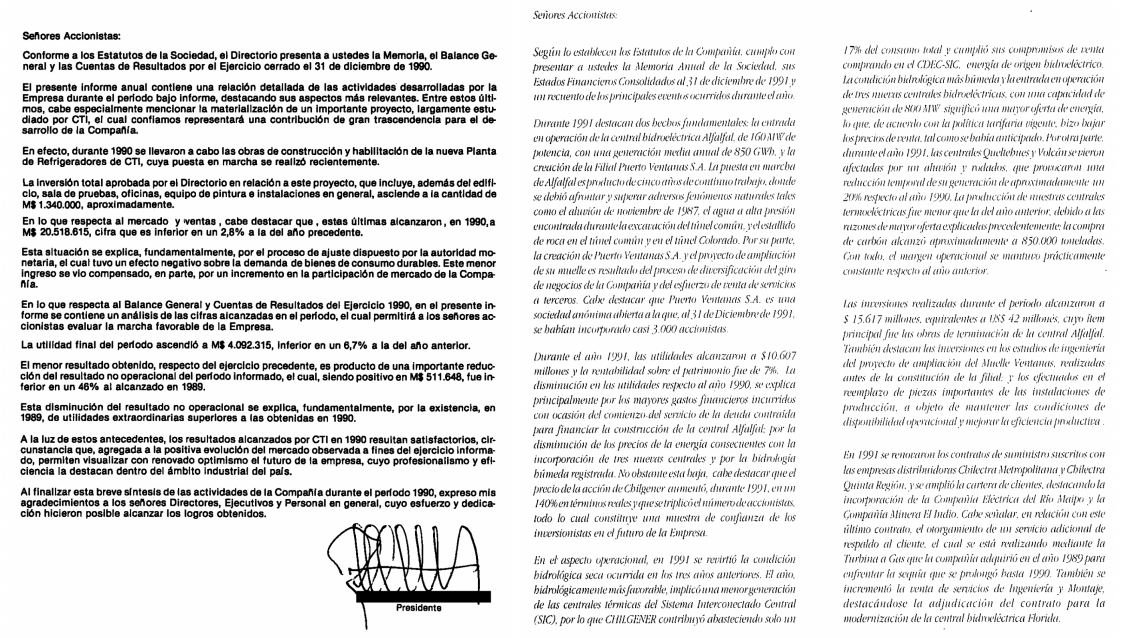
Figure A.1: Examples of business letters



Señores Accionistas:

Conforme a los Estatutos de la Sociedad, el Directorio presenta a ustedes la Memoria, el Balance General y las Cuentas de Resultados por el Ejercicio cerrado el 31 de diciembre de 1990.

El presente informe anual contiene una relación detallada de las actividades desarrolladas por la Empresa durante el período bajo informe, destacando sus aspectos más relevantes. Entre estos últimos, cabe especialmente mencionar la materialización de un importante proyecto, largamente estudiado por CTI, el cual confiamos representará una contribución de gran trascendencia para el desarrollo de la Compañía.

En efecto, durante 1990 se llevaron a cabo las obras de construcción y habilitación de la nueva Planta de Refrigeradores de CTI, cuya puesta en marcha se realizó recientemente.

La inversión total aprobada por el Directorio en relación a este proyecto, que incluye, además del edificio, sala de pruebas, oficinas, equipo de pintura e instalaciones en general, asciende a la cantidad de M$ 1.340.000, aproximadamente.

En lo que respecta al mercado y ventas, cabe destacar que, estas últimas alcanzaron, en 1990, a M$ 20.518.615, cifra que es inferior en un 2,8% a la del año precedente.

Esta situación se explica, fundamentalmente, por el proceso de ajuste dispuesto por la autoridad monetaria, el cual tuvo un efecto negativo sobre la demanda de bienes de consumo durables. Este menor ingreso se vio compensado, en parte, por un incremento en la participación de mercado de la Compañía.

En lo que respecta al Balance General y Cuentas de Resultados del Ejercicio 1990, en el presente informe se contiene un análisis de las cifras alcanzadas en el período, el cual permitirá a los señores accionistas evaluar la marcha favorable de la Empresa.

La utilidad final del período ascendió a M$ 4.092.315, inferior en un 6,7% a la del año anterior.

El menor resultado obtenido, respecto del ejercicio precedente, es producto de una importante reducción del resultado no operacional del período informado, el cual, siendo positivo en M$ 511.648, fue inferior en un 46% al alcanzado en 1989.

Esta disminución del resultado no operacional se explica, fundamentalmente, por la existencia, en 1989, de utilidades extraordinarias superiores a las obtenidas en 1990.

A la luz de estos antecedentes, los resultados alcanzados por CTI en 1990 resultan satisfactorios, circunstancia que, agregada a la positiva evolución del mercado observada a fines del ejercicio informado, permiten visualizar con renovado optimismo el futuro de la empresa, cuyo profesionalismo y eficiencia la destacan dentro del ámbito industrial del país.

Al finalizar esta breve síntesis de las actividades de la Compañía durante el período 1990, expreso mis agradecimientos a los señores Directores, Ejecutivos y Personal en general, cuyo esfuerzo y dedicación hicieron posible alcanzar los logros obtenidos.

Presidente

(a)

Señores Accionistas:

Según lo establecen los Estatutos de la Compañía, cumplo con presentar a ustedes la Memoria Anual de la Sociedad, sus Estados Financieros Consolidados al 31 de diciembre de 1991 y un recuento de los principales eventos ocurridos durante el año.

Durante 1991 destacan dos hechos fundamentales: la entrada en operación de la central hidroeléctrica Alfalfal, de 160 MW de potencia, con una generación media anual de 850 GWh, y la creación de la Filial Puerto Ventanas S.A. La puesta en marcha de Alfalfal es producto de cinco años de continuo trabajo, donde se debió afrontar y superar adversos fenómenos naturales tales como el aluvión de noviembre de 1987, el agua a alta presión encontrada durante la excavación del túnel común, y el estallido de roca en el túnel común y en el túnel Colorado. Por su parte, la creación de Puerto Ventanas S.A. y el proyecto de ampliación de su muelle es resultado del proceso de diversificación del giro de negocios de la Compañía y del esfuerzo de venta de servicios a terceros. Cabe destacar que Puerto Ventanas S.A. es una sociedad anónima abierta a la que, al 31 de Diciembre de 1991, se habían incorporado casi 3.000 accionistas.

Durante el año 1991, las utilidades alcanzaron a $10.607 millones y la rentabilidad sobre el patrimonio fue de 7%. La disminución en las utilidades respecto al año 1990, se explica principalmente por los mayores gastos financieros incurridos con ocasión del comienzo del servicio de la deuda contraída para financiar la construcción de la central Alfalfal; por la disminución de los precios de la energía consecuentes con la incorporación de tres nuevas centrales y por la hidrología húmeda registrada. No obstante esta baja, cabe destacar que el precio de la acción de Chilgener aumentó, durante 1991, en un 140% en términos reales y que se triplicó el número de accionistas, todo lo cual constituye una muestra de confianza de los inversionistas en el futuro de la Empresa.

En el aspecto operacional, en 1991 se revirtió la condición hidrológica seca ocurrida en los tres años anteriores. El año, hidrológicamente más favorable, implicó una menor generación de las centrales térmicas del Sistema Interconectado Central (SIC), por lo que CHILGENER contribuyó abasteciendo solo un 17% del consumo total y cumplió sus compromisos de venta comprando en el CDEC-SIC, energía de origen hidroeléctrico. La condición hidrológica más húmeda y la entrada en operación de tres nuevas centrales hidroeléctricas, con una capacidad de generación de 800 MW, significó una mayor oferta de energía, lo que, de acuerdo con la política tarifaria vigente, hizo bajar los precios de venta, tal como se había anticipado. Por otra parte, durante el año 1991, las centrales Quelleboes y Volcán se vieron afectadas por un aluvión y rodados, que provocaron una reducción temporal de su generación de aproximadamente un 20% respecto al año 1990. La producción de nuestras centrales termoeléctricas fue menor que la del año anterior, debido a las razones de mayor oferta explicadas precedentemente: la compra de carbón alcanzó aproximadamente a 850.000 toneladas. Con todo, el margen operacional se mantuvo prácticamente constante respecto al año anterior.

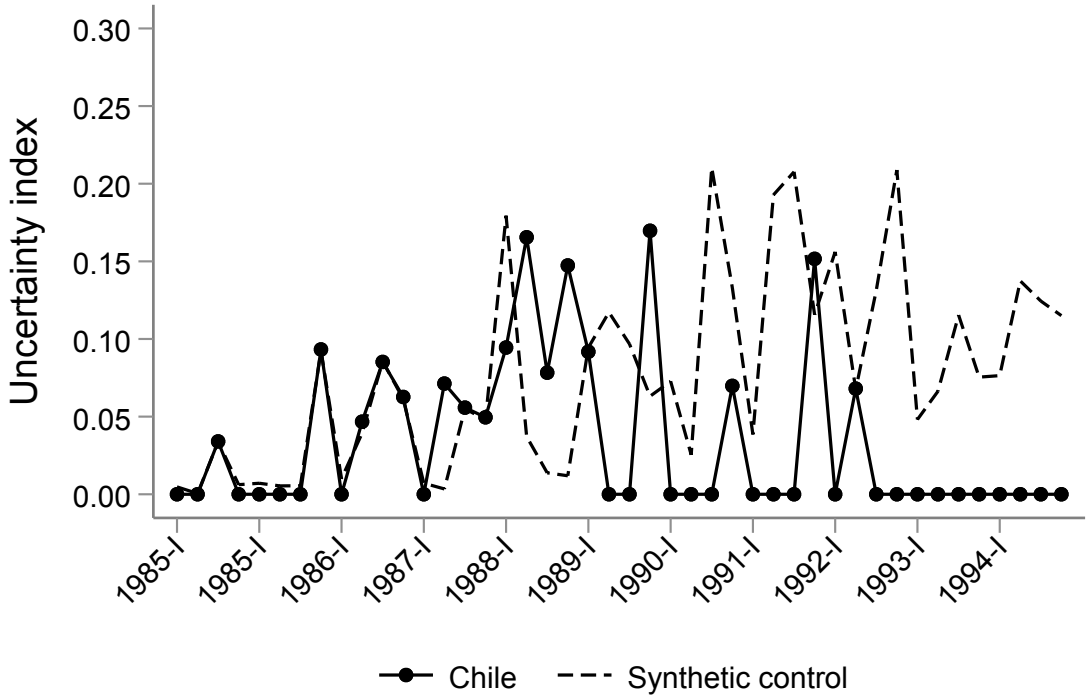
Las inversiones realizadas durante el período alcanzaron a $ 15.617 millones, equivalentes a US$ 42 millones, cuyo ítem principal fue las obras de terminación de la central Alfalfal. También destacan las inversiones en los estudios de ingeniería del proyecto de ampliación del Muelle Ventanas, realizadas antes de la constitución de la filial, y los efectuados en el reemplazo de piezas importantes de las instalaciones de producción, a objeto de mantener las condiciones de disponibilidad operacional y mejorar la eficiencia productiva.

En 1991 se renovaron los contratos de suministro suscritos con las empresas distribuidoras Chilectra Metropolitana y Chilectra Quinta Región, y se amplió la cartera de clientes, destacando la incorporación de la Compañía Eléctrica del Río Maipo y la Compañía Minera El Indio. Cabe señalar, en relación con este último contrato, el otorgamiento de un servicio adicional de respaldo al cliente, el cual se está realizando mediante la Turbina a Gas que la compañía adquirió en el año 1989 para enfrentar la sequía que se prolongó hasta 1990. También se incrementó la venta de servicios de Ingeniería y Montaje, destacándose la adjudicación del contrato para la modernización de la central hidroeléctrica Florida.

(b)

Notes: Two examples of business letters in annual reports. Letters are addressed to shareholders and signed by board members. Source: Superintendencia de Valores y Seguros.

Figure A.2: Synthetic control estimates using quarterly data



Notes: Synthetic control estimates for the impact of the 1988 plebiscite – the election which triggered the democratization in Chile – on economic policy uncertainty as measured by country expert reports. The estimation uses a quarterly balanced panel of 122 countries observed in the period 1985-1994. Higher values of the uncertainty index in the *y*-axis imply higher uncertainty. Sources: Uncertainty country-level data from Ahir et al. (2022) based on reports produced by the Economist Intelligence Unit.

Table A.1: Comparison of firms with and without business letters

	Summary statistics for firms without letters	Univariate regression
	(1)	(2)
Log total assets	15.03	2.22***
	(2.28)	[0.40]
Leverage	0.51	-0.01
	(0.70)	[0.12]
Cash holdings	0.34	0.00
	(0.26)	[0.05]
Years since foundation	44.13	5.17
	(29.25)	[5.45]
Indicator business group	0.15	0.07
	(0.36)	[0.07]
Indicator exports	0.18	0.31***
	(0.39)	[0.08]
Indicator political connection	0.21	0.27***
	(0.41)	[0.08]
Firms	52	118

Notes: This table compares firms with and without letters in terms of observable variables in the year 1987. The number of firms without letters is 52 and the number of firms with letters is 66. Column presents the average and standard deviation (in parentheses) for seven variables among firms without letters. Column 2 presents the difference (β) among firms with letters by estimating a cross-sectional regression equation $X_i = \alpha + \beta L_i + \varepsilon_i$ using data from firms with and without letters ($N = 118$), where L_i is an indicator for firms with letters. Robust standard errors in square brackets. Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

Table A.2: Dictionary words

Dictionary	Words	English translation
Uncertainty	Imprev (prefix), Inciert (prefix), Incert (prefix) and Impredeci (prefix)	Uncert (prefix) and Unpredic (prefix)
Risk	Suerte, Azar, Duda, Rumor, Desconocido, Inusual, Inexac (prefix), Riesgo, Arriesg (prefix), Inseg (prefix), Varia (prefix), Inest (prefix), Volat (prefix), Reestr (prefix), Indeter (prefix), Posib (prefix), Podr (prefix), Imprec (prefix)	Luck, Chance, Doubt, Rumor, Unknown, Unusual Inexac (prefix), Risk (prefix) Unsecure, Varia (prefix) Unsta (prefix), Volatil (prefix) Reestructure, Indeterminate Posib (prefix), Inexac (prefix) Imprec (prefix)
Policy	Senado, Congreso, Gobierno, Regulación, Ley, Crisis, Arancel, Politica Macroeconómica, Banco central, Banco de la republica, Impuesto, Plebiscito, Decreto, Referendo, Tribut (prefix), Gasto público, Politica fiscal, Deficit fiscal, Politica monetaria	Senate, Congress, Government, Regulation, Law, Crisis, Tariff Macroeconomic policy, Central Bank Republic Bank, Tax Plebiscite, Decrete, Referendum Public spending, Fiscal policy Fiscal deficit, Monetary policy

Table A.3: Performance of machine-learning model (TF-IDF)

	Uncertainty (1)	Risk (2)	Uncert. & Risk (3)	Policy (4)
Panel A: Words (TF-IDF)				
Positives (baseline)	16.79	7.30	19.71	19.71
AUC	78.18	73.46	83.47	76.53
Accuracy	82.48	92.70	83.21	81.75
Precision	42.86	.	61.11	57.14
Recall	13.04	0.00	40.74	29.63
F1	20.00	.	48.90	39.02
Panel B: Words				
Positives (baseline)	16.79	7.30	19.71	19.71
AUC	81.70	69.92	80.87	71.26
Accuracy	83.21	92.70	84.67	78.83
Precision	.	.	87.50	43.75
Recall	0.00	0.00	25.93	25.93
F1	.	.	40.00	32.56
Observations	137	137	137	137

Notes: All values are in percentage points. "Positives (baselines)" refer to the percentage of documents/letters with the response variable indicator. "AUC" is an aggregate performance measure in which the closer it is to 100, the better the model can distinguish between positive and false cases. "Accuracy" is the percentage of the correct predictions out of all predictions made. "Precision" is the percentage of the correct predictions out of all positive predictions. "Recall" is the percentage of correct predictions out of all positive classes (either predicted as positive or not). Finally, "F1" combines recall and precision weighting equally both measures.

Table A.4: Business uncertainty in letters and firm investment, 1986-1988

	Dependent variable							
	Investment in fixed assets				Growth of all assets			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Report readings								
Indicator uncertainty	-0.06**	-0.07**	-0.08***	-0.09*	-0.11***	-0.12***	-0.09**	-0.06
	(0.03)	(0.03)	(0.03)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
Panel B: Word count								
Indicator uncertainty	-0.03	-0.03	-0.04	-0.05	-0.04	-0.04	-0.05*	-0.03
	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Panel C: Machine-learning								
Score uncertainty	-0.02*	-0.02*	-0.02*	-0.02	-0.05***	-0.05***	-0.04**	-0.01
	(0.01)	(0.01)	(0.01)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
Observations	140	140	140	127	140	140	140	127
Firms	58	58	58	45	58	58	58	45
Year fixed effects	N	Y	N	Y	N	Y	N	Y
Industry-year fixed effects	N	N	Y	N	N	N	Y	N
Firm fixed effects	N	N	N	Y	N	N	N	Y
Avg. dependent variable	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.06

Notes: This table presents panel data estimates of the relationship between uncertainty as revealed by business letters in year t and firm investment between year t and $t + 1$. The unit of observation is a firm in a given year in the period 1986-1988. Columns 1-4 use investment in fixed assets as dependent variable and columns 5-8 use growth of all assets. Standard errors are clustered at the firm level. Statistical significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A.5: Changes in business uncertainty by ties to the Pinochet dictatorship, 1986-1994

	Report readings		Word counts		Machine-learning	
Dependent variable is indicator for:	Uncertainty	Policy	Uncertainty	Policy	Uncertainty	Policy
	(1)	(2)	(3)	(4)	(5)	(6)
Politically connected × Year 1986	-0.11	0.14	0.22	0.08	-0.00	0.09
	(0.13)	(0.14)	(0.22)	(0.08)	(0.06)	(0.08)
Politically connected × Year 1988: Plebiscite	0.17	0.15	-0.14	0.03	0.05	0.05
	(0.14)	(0.16)	(0.19)	(0.09)	(0.06)	(0.10)
Politically connected × Year 1989: Presidential Election	0.16	-0.03	-0.22	0.01	0.06	-0.01
	(0.18)	(0.16)	(0.22)	(0.09)	(0.07)	(0.09)
Politically connected × Year 1990: Democracy arrives	0.06	0.02	-0.13	0.03	0.11*	0.05
	(0.12)	(0.17)	(0.22)	(0.10)	(0.06)	(0.10)
Politically connected × Year 1991	0.11	-0.09	-0.11	-0.00	0.08	0.01
	(0.16)	(0.13)	(0.19)	(0.08)	(0.06)	(0.09)
Politically connected × Year 1992	0.07	-0.04	-0.20	0.01	0.05	0.02
	(0.18)	(0.16)	(0.18)	(0.08)	(0.06)	(0.09)
Politically connected × Year 1993: Presidential Election	0.17	-0.01	-0.23	0.02	0.05	0.03
	(0.15)	(0.14)	(0.18)	(0.09)	(0.06)	(0.09)
Politically connected × Year 1994	0.07	-0.10	-0.09	-0.02	0.08	0.02
	(0.16)	(0.12)	(0.19)	(0.07)	(0.07)	(0.07)
Observations	468	468	454	454	454	454
Firms	66	66	65	65	65	65
Firm fixed effects	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y
Avg. dependent variable	0.21	0.32	0.70	0.30	0.22	0.30

Notes: Estimates of changes in uncertainty or policy among firms with political links to the Pinochet dictatorship ("Politically connected") around the 1988 plebiscite which triggered Chile's democratization. Connections are defined as board members who used to be secretaries during the Pinochet regime (1973-1986). The omitted category is always the year 1987 and therefore estimates should be interpreted as changes with respect to that year in the group of unconnected firms, i.e. firms without political links to the Pinochet dictatorship. Odd columns present changes in uncertainty and even columns changes in policy mentions. Standard errors are clustered at the firm level. Statistical significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.