

Anatomy of Firms' Margins of Adjustment: Evidence from the COVID Pandemic*

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Abstract

We trace the real effects of the pandemic shock on the universe of firms in Chile using a unique dataset. The rich administrative information that we use allows us to identify a set of stylized facts on firms' margins of adjustment in the wake of the shock and throughout the economy's recovery path along several dimensions: entry and exit, sales, links with suppliers, employment, investment, credit, and productivity. We document considerable heterogeneity in this adjustment across firm size and industry. Importantly, we also study firm access to public policies aimed at supporting credit and protecting employment relations. Results point to significant adjustments by firms along several markets and margins (extensive and intensive) throughout the crisis and recovery. We document widespread access to policies aimed at supporting credit to firms and protecting employment relations. A corollary of credit policies is a considerable increase in firms' leverage.

Keywords: Firms; Adjustment; COVID; Credit support policies; Employment protection policies.

JEL classification: D22; D24; F00; H81; J38.

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1 Introduction

This paper describes how firms adjusted to the COVID-19 pandemic, offering micro details on the well-known macro dynamics. The COVID shock generated the worst economic crisis in decades, with governments and central banks around the world responding with an array of policies to mitigate the adverse effects of the shock. Despite the latent threat of new variants of the virus, economic activity has recovered in most economies. Using a rich administrative dataset, we trace the real effects of the shock on the universe of formal firms in Chile throughout this V-shaped recession. We consider firm adjustment along several dimensions, such as entry and exit, sales, employment, links with suppliers, investment, and credit. We are also able to study productivity at the firm level. We emphasize the heterogeneous nature of the adjustment to the COVID shock across firm size and industry.

Our results point to significant adjustment by firms along several markets and margins (extensive and intensive). We find substantial heterogeneity in this adjustment, with more adverse effects centered on micro and small firms, and on firms in industries such as services, and restaurants and hotels. We document a large decline and a swift recovery in the number of firms reporting sales, as well as in sales themselves. Employment also experienced a large decline, and its recovery seems to be lagging that of sales, following a U shape rather than a V shape. Firm investment displays substantial volatility, with a larger decline and a stronger recovery than that of sales. We also find an unusually high destruction of firm linkages with suppliers, with only a partial recovery. Firm access to domestic bank credit increased during the COVID pandemic. This countercyclicality of credit marks a change with respect to previous crises in Chile, when credit contracted. The expansion of credit, however, has generated a considerable increase in firm leverage. Finally, we also find an unusual behavior of total factor productivity (TFP), which *increased* during the COVID pandemic, unlike in previous recessions, when productivity decreased.

Shortly after the crisis began, around April 2020, policymakers deployed two policies oriented at firms. The first was a credit support policy that consisted on government guarantees to small and medium-sized firms. The second was a furlough scheme designed to protect labor relations by reducing firms' employment costs. These policies were the first line of defense against the COVID shock. Other policies, such as fiscal transfers and pension-fund withdrawals, were approved in late-2020. We find that firm access to these policies was widespread, including by firms that were severely affected by the shock. In a companion paper (Albagli, Fernández, Guerra-Salas, Huneus, and Muñoz, 2022), we study the effects of these policies at the firm level.

The paper is organized as follows. Section 2 describes the unique dataset that allows us to

study firm adjustment in nearly all markets. Section 3 describes firm adjustment in the following markets: output, labor, suppliers, physical capital, and credit. It also describes the evolution of firm-level productivity during the COVID pandemic. Section 4 studies firm access to the credit and employment policies. Section 5 concludes.

2 Dataset

The firm-level data used in this project comes from merging five administrative datasets.¹ The first source of information employed is a firm production dataset, which contains firm-level information used for tax purposes on sales, revenues, expenditures in intermediate goods, and investment in machinery and equipment. The dataset covers the universe of formal firms in Chile and is available since the mid 2000s. The source is Form F29 collected by the Chilean tax authority (Servicio de Impuestos Internos, SII)².

The second source of information employed is the Firm-to-Firm Transactions Dataset, with firm-level information on all private firm-to-firm transactions, disaggregated into value flows, prices, and products and services traded. The dataset covers the universe of formal firms in Chile and became mandatory for firms of all sizes since mid 2018. The source is the electronic invoice collected by SII.

The third source of information employed is a firm-to-bank credit transactions dataset, which contains information on all credit transactions at the bank-firm-loan level, including the amount of the loan, interest rate, and other details of the credit contract. This credit registry also contains firm-level information on debt stocks consolidated at the banking sector. The dataset covers the universe of financial transactions between banks and firms in Chile and is available since 2012 for flows and since 2009 for stocks. The sources are forms D32 (flows) and C11 (stocks) collected by the Financial Regulatory Commission in Chile (Comisión para el Mercado Financiero, CMF).

The fourth source of information is a matched employer-employee dataset, which contains firm-level information on all formal labor contracts in Chile. This dataset registers contributions to unemployment insurance, which allows to approximate wage payments. The dataset

¹This paper was developed within the scope of the research agenda conducted by the Central Bank of Chile (CBC) in economic and financial affairs of its competence. The CBC has access to anonymized information from various public and private entities, by virtue of collaboration agreements signed with these institutions. To secure the privacy of households and firms, the CBC mandates that the development, extraction and publication of the results should not allow the identification, directly or indirectly, of individuals or firms. The analysis was implemented by the authors and did not involve nor compromise the institutions that provide the data (Servicio de Impuestos Internos, Comisión para el Mercado Financiero, and Superintendencia de Pensiones).

²The information contained in the databases of the Servicio de Impuestos Internos is of a tax nature originating in self-declarations of taxpayers presented to the Service; therefore, the veracity of the data is not the responsibility of the Service

is available since 2005 and the source is the Chilean pension regulator (Superintendencia de Pensiones).

The fifth source of information employed is the credit and employment policies dataset, which contains firm-level information on firms' access to credit support and employment protection policies in response to the COVID crisis. For the former, the information contains all credit flows to firms with sovereign guarantees as part of the FOGAPE-COVID program (explained in detail below). For the latter, the dataset contains information on the contracts that were furloughed under the Employment Protection Law. The dataset is available since march 2020 and the source is the CMF (credit flows under FOGAPE-COVID) and the Superintendencia de Pensiones (furloughed employees).

The dataset that results from merging the information from these five sources provides a unique tool of analysis to quantify the margins of adjustment of firms in virtually all markets in which they participate. We turn to this analysis in the next section.

3 Firms' Adjustment to the COVID Pandemic

This section documents how firms adjusted to the COVID shock. We organize the analysis by studying the margins of firms' adjustment along five markets: output markets (firm entry/exit and sales), labor markets (employment), markets for suppliers (firm-to-firm linkages), physical capital markets (investment), and credit markets (firms' access to bank debt). We also document changes in productivity at the firm level in response to the adjustment in these markets.

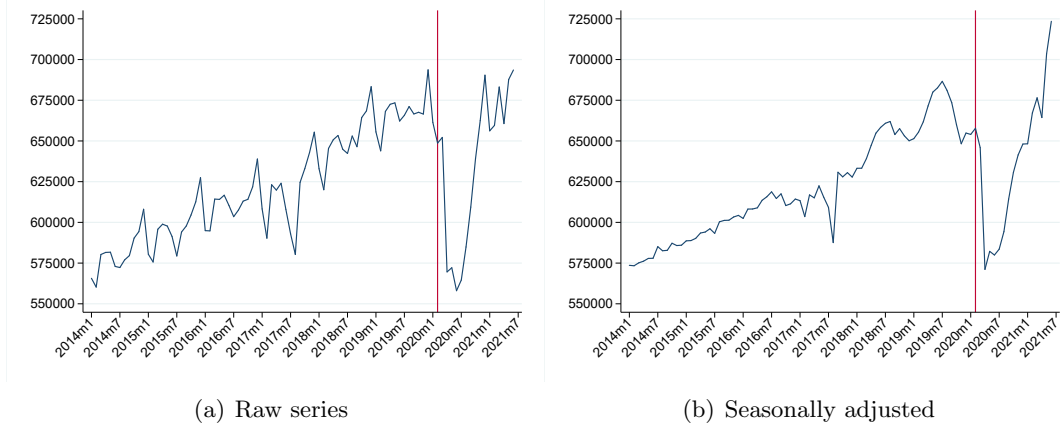
3.1 Output Market: Entry/Exit and Sales

Firms adjusted substantially in the output market, both at the extensive (i.e., entry/exit) and intensive (i.e., sales) margins. We also document substantial heterogeneity in the impact of the pandemic shock across firms of different size and industry.

Figure 1 shows how the COVID shock affected the number of firms in the economy. Panels (a) and (b) plot the raw and seasonally adjusted number of firms reporting positive sales each month. The red vertical lines mark February 2020, the month prior to the arrival of COVID in Chile, since the first cases were recorded in March. From March to June 2020, the number of firms declined sharply—about 14%. Subsequently, the number of firms reporting sales recovered vigorously, so that by the end of 2020, it had recovered its pre-pandemic level. As the right panel shows, this recovery is not an artifact of seasonality in the number of firms.

The number of firms in the economy is the result of firms entering and exiting. Figure 2 documents how these gross flows evolved around the pandemic shock. Panel (a) shows the

Figure 1: Number of firms



Note: Red vertical line marks February 2020, the last month with no COVID cases in Chile in that year. A firm is a single tax ID with positive sales. Only firms in the National Accounts’ directory of firms are considered. Source: Monthly tax form F29; and authors’ own calculations.

number of firms exiting each month. Our exit definition is not a legal one. Instead, we define a firm as exiting if it ceases to report sales for three or more consecutive months. Firm exit peaked in April 2020, when roughly 10% of firms had exited.³ Panel (b) shows the evolution of the number of new entrant firms, i.e., firms that report sales for the first time, and re-entering firms, which we define as firms that report sales after an exit spell, i.e., after not reporting sales for three or more consecutive months. The green dashed line in panel (b) shows that firm re-entry increased soon after exit peaked, whereas the blue line shows that the number of new firms reached a trough in April 2020, but recovered swiftly, reaching record numbers in the first semester of 2021.⁴

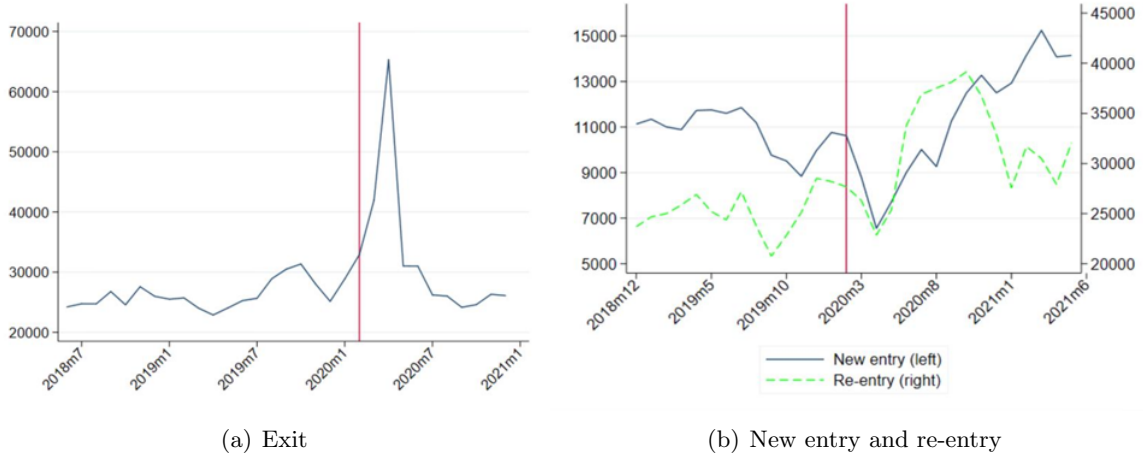
Figure 3 shows how gross flows—firm entry, re-entry and exit—interacted to determine the evolution of the number of firms, shown again in panel (a). In panel (b), black dots represent net entry of firms, expressed as the change in the number of firms with respect to February 2020, and the bars show the contribution of gross flows. Firm exit (red bars) is the main driver of net entry in the early months of the crisis, pushing down the number of firms. Around July, however, entry and re-entry begin pushing the number of firms up. The figure shows that about 2 of every 3 firms that exited re-entered at some point. The median duration of exit is 5 months in the period from March 2020 to June 2021.

Figure 4 documents heterogeneity in net entry of firms along two dimensions—industry and size. Panel (a) shows the evolution of the number of firms in four key sectors: manufacturing,

³This percentage is computed with respect to the number of firms reporting sales in February 2020.

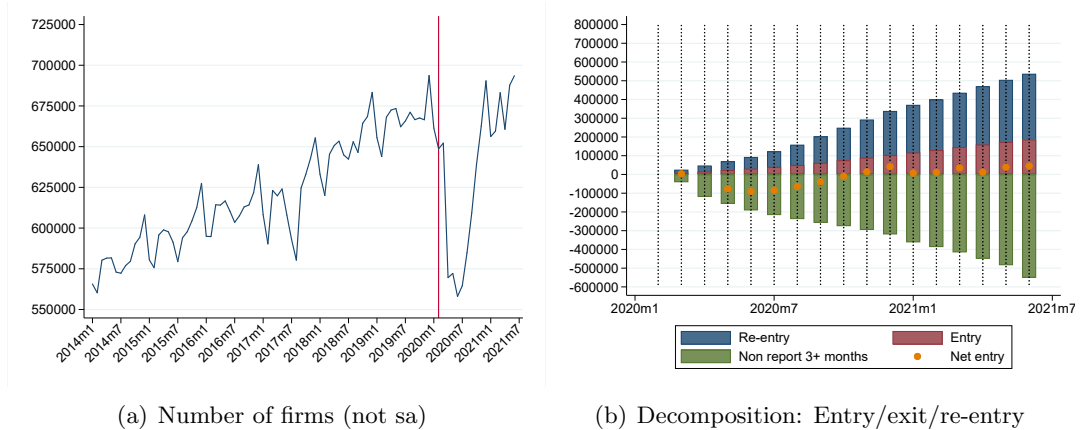
⁴Note that firm exit (entry) also displays an increase (decrease) in late 2019, which is linked to the violent episode of social unrest experienced in Chile after protests broke on October 18.

Figure 2: Firm entry and exit



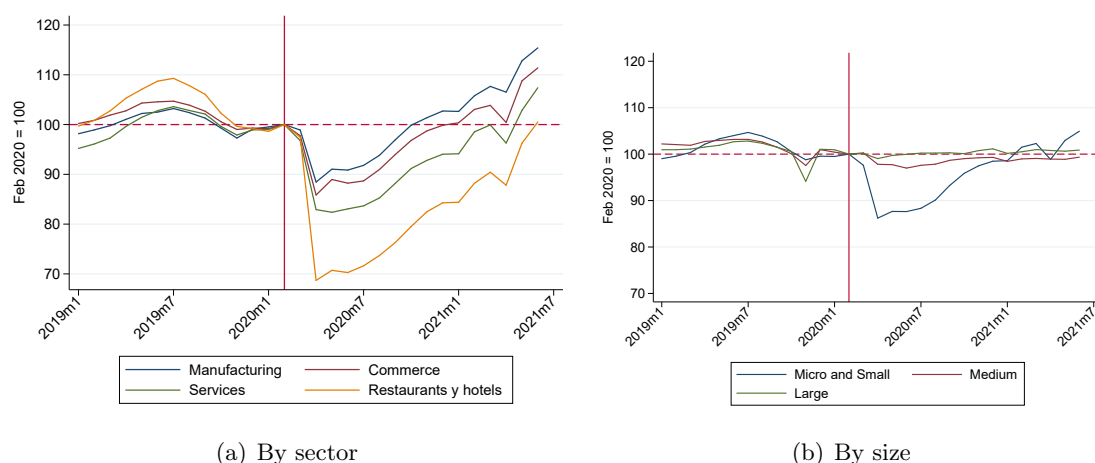
Note: Number of firms. Exit is computed as firms that do not report sales for three or more consecutive months. Entry is computed as new firms, i.e., firms with a tax ID that shows up in the database for the first time. Re-entrant firms are those that were classified as exiting at some point, but resume reporting of sales. Source: Monthly tax form F29, and authors' own calculations.

Figure 3: The role of entry, exit and re-entry in firm dynamics



Note: For panel (a), see the note to figure 1. In panel (b), black dots denote net entry of firms, expressed as the change in the number of firms with respect to February 2020. For the definition of gross flows (green bars refer to entry, red bars to exit, and yellow bars to re-entry), see the note to figure 2. Grey bars labeled NAT denote non-allocated turnover. These are a small fraction of firms that, given our definition of gross flows, cannot be classified as entering, re-entering, or exiting. Source: Monthly tax form F29, and authors' own calculations.

Figure 4: Number of firms by sector and size



Note: Number of firms with positive sales every period, normalized to 100 in February, 2020. Seasonally adjusted. In panel (a), the services sector includes personal services, and business services. In panel (b), the classification of firms by size considers annual real sales, following the National Accounts guidelines. The thresholds are based on yearly sales expressed in a unit of account indexed to inflation, called *unidad de fomento* (UF). Micro firms: less than 2,400 UF. Small firms: 2,400-25,000 UF. Medium firms: 25,000-100,000 UF. Large firms: more than 100,000 UF. Based on inflation and market exchange rates at the time of writing, 25,000 UF are approximately equivalent to USD 950,000. Source: Monthly tax form F29 and authors' own calculations.

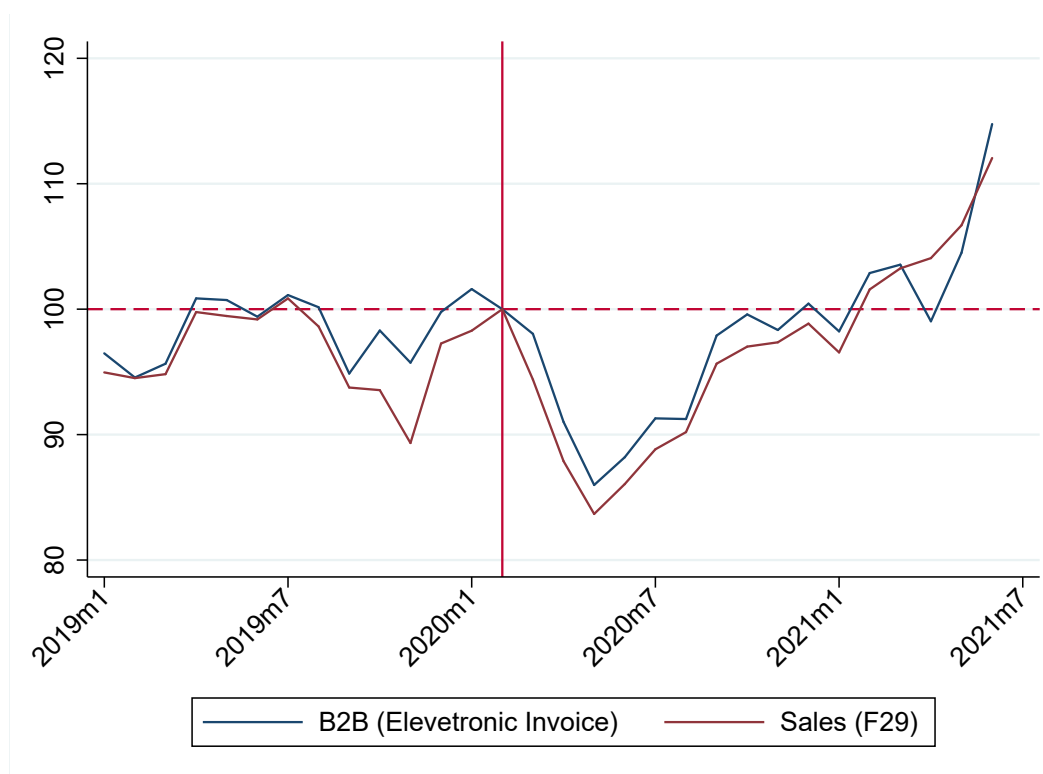
commerce (wholesale and retail trade), services, and restaurants and hotels.⁵ The number of firms declined in all of these industries. The decline of nearly 40% in the number of restaurants and hotels, however, dwarfs that in the other three industries. In services, the number of firms declined nearly 20%, whereas in manufacturing and commerce, the decline was about 10%. The latter two industries have led the recovery in the number of firms, while restaurants and hotels, and services, remained below their pre-pandemic level until 2021. Panel (b) shows the evolution of the number of firms of different size. The decline in the number of firms is completely driven by micro and small firms (firms with sales of less than approximately USD 950,000 in the previous year), with the number of medium and large firms hovering slightly above the pre-pandemic level throughout the sample.⁶ The evolution of the number of micro and small, medium, and large firms during the pandemic shock differs from the episode of social unrest that Chile experienced in October 2019, when violent protests broke across the country. In that episode, the number of firms of all sizes declined.

We now study how firms adjusted at the intensive margin in the output market, i.e., how sales evolved during the pandemic shock. Figure 5 shows two measures of total sales, both

⁵Services groups two sectors: personal services, and business services.

⁶To classify firms by size, we follow the National Accounts guidelines, which use thresholds of real annual sales based on a unit of account indexed to inflation, called *unidad de fomento* (UF). Micro firms: less than 2,400 UF. Small firms: 2,400-25,000 UF. Medium firms: 25,000-100,000 UF. Large firms: more than 100,000 UF. Based on inflation and market exchange rates at the time of writing, 25,000 UF are approximately equivalent to USD 950,000.

Figure 5: Performance of sales

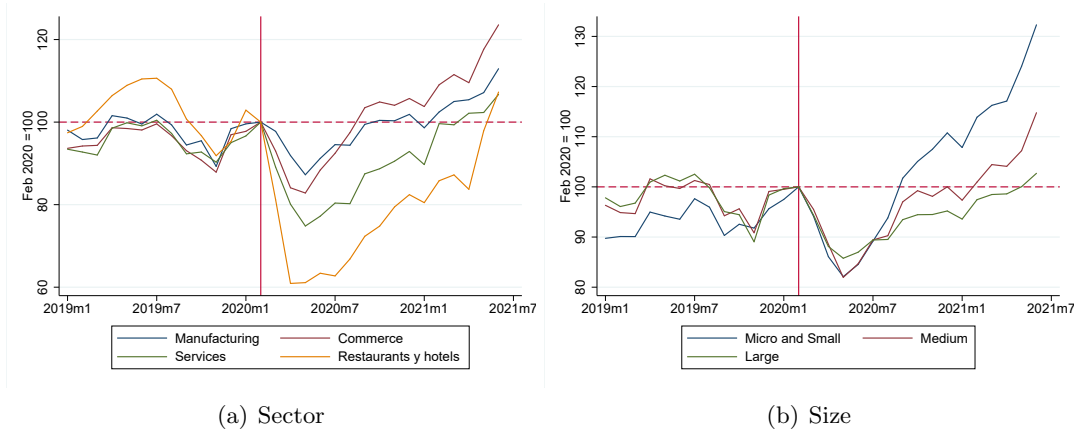


Note: Total sales from two sources: the electronic invoice, which registers firm-to-firm sales (blue line), and the F29 tax form, which registers final sales (red line). Observations above the 99.9th percentile are winsorized. The resulting series are seasonally adjusted and normalized at 100 in February 2020 (vertical line).

adjusted for inflation, seasonality, and expressed in levels, normalized at 100 in February 2020: the blue line shows firm-to-firm sales from the electronic invoice database, whereas the red line shows final sales from the F29 tax form. The two measures of sales are highly correlated and show a sharp decline of about 15% at the trough in May, followed by a strong recovery that put sales at the pre-pandemic level by the end of 2020.

The evolution of total sales masks substantial heterogeneity at the firm level. Figure 6 documents two dimensions of firm heterogeneity. Panel (a) shows heterogeneity across industries. The behavior of sales is qualitatively similar to that of the number of firms (panel a in figure 4): sales in restaurants and hotels declined dramatically and remain below their pre-pandemic level up to mid 2021. Sales in services also declined substantially and remain below their pre-pandemic level throughout 2020. Sales in manufacturing and commerce, on the other hand, display swift and strong recoveries. Panel (b) shows heterogeneity in the performance of sales across firm size. Micro and small, and medium-sized firms were the hardest hit by the COVID shock, with sales dropping about 20%. However, micro and small, and medium-sized firms also experienced the strongest recovery, with sales reaching pre-pandemic levels in the second half of 2020. Large firms display less fluctuation, with sales declining and expanding less than micro and small, and

Figure 6: Sales: Heterogeneity by sector and size



Note: Seasonally adjusted real sales, normalized at 100 in February 2020. The service sector includes personal services and business services. For details on the classification of firms by size, see the note to figure 4. Sources: Electronic invoice; and authors' own calculations.

medium-sized firms in the contractionary and recovery phases. It is important to note that our results on firm size are not an artifact of industry effects, e.g., that most restaurants and hotels are small firms and, since this industry was badly hit, it drives the decline we see for small firms. We have verified that micro and small firms are the most affected within each of the four industries we study.

Figure 7 studies the interaction of the extensive and intensive margins in the performance of sales. Panels (a) and (b) study the heterogeneity in the recovery of sales. They display the distribution of Davis and Haltiwanger (1992) growth rates, computed as the difference in real sales between Feb-Apr 2019 and Feb-Apr 2021 (three month averages), divided by the average across these two periods. Panel (a) plots the unweighted distribution, whereas the distribution in panel (b) weights the growth rate of each firm by its average sales across the two periods. For continuing firms, the growth rate lies in the $(-2, 2)$ interval, whereas exiting and entering firms have a value of -2 and 2 , respectively. The blue distributions refer to the 2019-2021 period, which highlights the heterogeneity in the recovery of sales from the pandemic shock. As a benchmark, the orange distributions show the average distribution for the more normal periods 2016-2018, 2017-2019, and 2018-2020. Continuing firms in the 2019-2021 period display more heterogeneity than in normal times, with more mass of the growth rates in the tails of the distribution and less mass in the middle. This holds for the unweighted and weighted cases. The plots also speak about the extent of firm entry and exit. The unweighted distribution shows that more than 30% of the growth rates correspond to firms that enter and exit. Furthermore, there is more destruction and less creation in the recovery from the pandemic shock than in normal times. This result disappears in the weighed distribution, where we see little difference in entry and

exit between the COVID pandemic and normal times. This result suggests that small firms account for the bulk entry and exit, which is consistent with the results in panel (b) of figure 6.

Panel (c) of figure 7 shows the contribution of the extensive margin to the year-on-year growth rate of sales (black line). Even though we documented substantial adjustment on the extensive margin in the output market, the bulk of the *fluctuation* of sales over the pandemic shock is driven by incumbent firms (blue bars). Firms that enter, exit, and re-enter contribute little to the fluctuation of the annual growth rate of sales. In particular, note the small role of firm re-entry (green bars). Although re-entry is key for the recovery of the number of firms in the economy, re-entering firms contribute little to the recovery of sales. Finally, in panel (d) we study the performance of sales in re-entering and incumbent firms. In this analysis, we track the performance of a group of firms in each category, before and after the pandemic hit the economy. Re-entrants are firms that exited (reported no sales for three or more consecutive months) after February 2020 and subsequently reported sales (blue line).⁷ Total sales in re-entering firms are much more volatile than sales in incumbent firms (red line), reaching a trough nearly 60% lower than their pre-pandemic level. This decline is surely driven by many of these firms reporting no sales in the second quarter of 2020.⁸ In sum, although re-entering firms are key for the evolution of the number of firms, and have highly volatile sales, they contribute little to the fluctuation of total sales, which is driven by incumbent firms.

3.2 Labor Market: Employment

Employment is another important margin of firms' adjustment to the pandemic shock. Figure 8 shows the evolution of total real sales and total employment, in levels, both seasonally adjusted and normalized at 100 in February 2020.⁹ The decline in employment is larger and more persistent than that of sales, so that by the end of 2020, it remained below its pre-pandemic level. It is important to note that figure 8 shows effective employment, i.e., it excludes workers enrolled in the employment protection program (*Ley de Protección del Empleo* or LPE), a furlough scheme funded by the government, which we study in detail in section 4. This implies that the decline of nearly 20% of employment in figure 8 is partly due to job separation, but also due to workers enrolling in the employment policy.

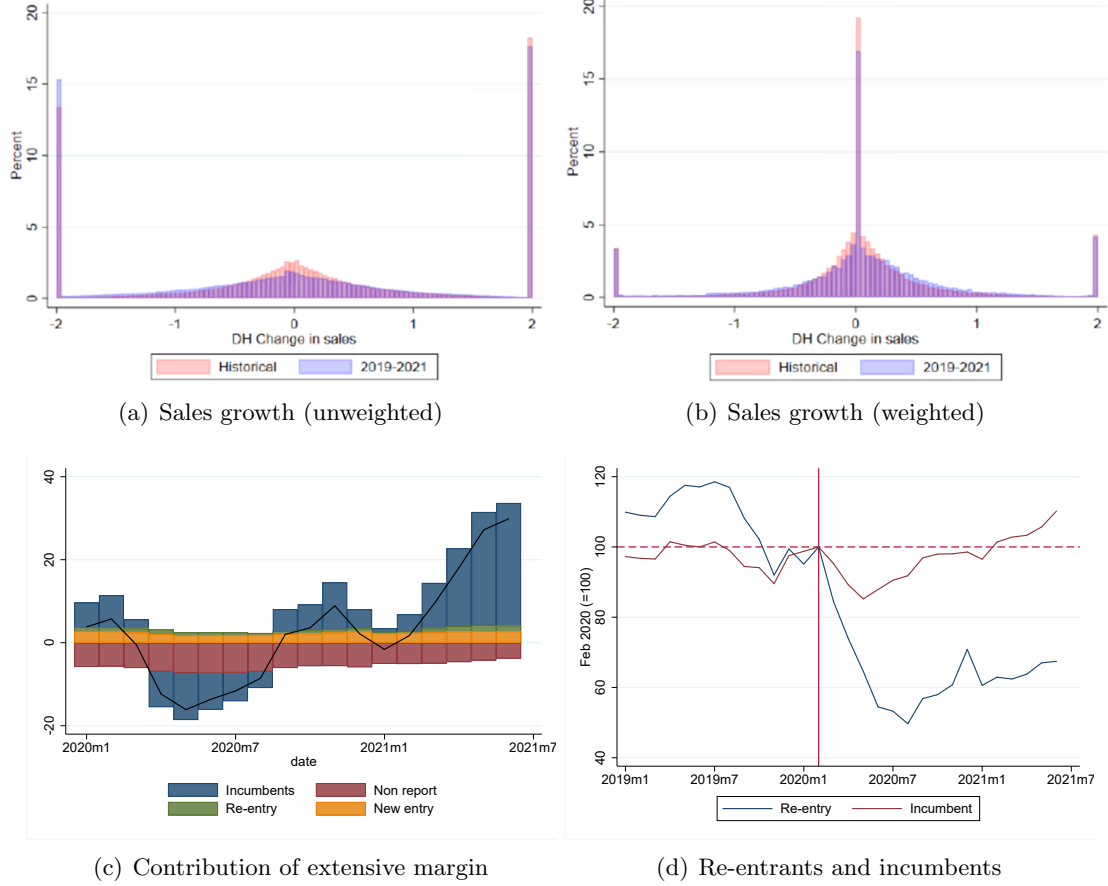
The total performance of employment masks substantial heterogeneity. Figure 9 documents

⁷We also require re-entering firms to report sales in January 2018, so as to avoid considering firms that may have opened only a few months prior to the COVID shock.

⁸We classify a firm as incumbent if, after February 2020, it does not cease to report sales more than two consecutive months, and reported sales in January 2018.

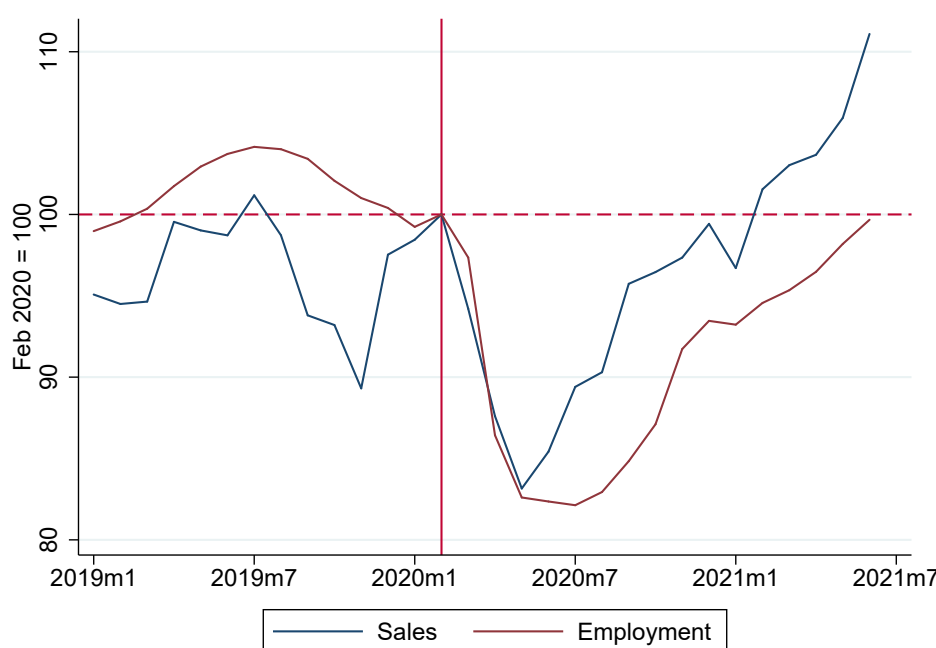
⁹The number of firms in the computation of total sales may differ from the number of firms in the computation of total employment, because not all firms that report sales in the electronic invoice database report employment in the employer-employee database.

Figure 7: Sales: Extensive and intensive margins



Note: Panel (a) shows the distribution of the growth rate of average real sales in Feb-Apr 2021 with respect to Feb-Apr 2019. The growth rate is computed as in Davis and Haltiwanger (1992), i.e., as the change in real sales between the two periods divided by the average across the two periods. For continuing firms, the growth rate is bounded at $(-2, 2)$. For firms that exit and for new firms, the growth rate takes a value of -2 and 2 , respectively. Panel (b) shows the distribution of the Davis-Haltiwanger growth rate weighted by average sales. Panel (c) shows the contribution of incumbent, entering (new entry), exiting (no report), and re-entering firms to the year-on-year growth rate of total real sales. Entering firms are 6-months old or younger. Exiting firms are defined as firms that have ceased to report sales for three consecutive months or more. Re-entering firms are firms that experienced an exit spell and resume reporting sales; a re-entering firm keeps that label during the first 6 months after re-entering. Incumbent firms are all others. The decomposition is computed as follows: for each category, we add up the firm-level annual change in real sales (sales in firm i in period t minus sales in firm i in period $t - 12$), and divide by the group total in $t - 12$. This means that the contribution of, for example, entering firms, adds up firm-level changes and divides by total sales in firms that were entrants 12 months ago. Panel (d) tracks sales of firms that at any point after the pandemic hit the economy were classified as re-entering, as well as firms that after the pandemic hit did not suffer exit spells (incumbent) Re-entering firms are those that exited (i.e., reported no sales for three or more consecutive months) after February 2020 and subsequently reported sales; and reported sales in January 2018, so as to avoid considering firms that may have opened only a few months prior to the COVID shock. Incumbent firms are those that, after February 2020, do not cease to report sales more than two consecutive months, and reported sales in January 2018. Sources: Tax form F29, and authors' own calculations.

Figure 8: Performance of employment and sales

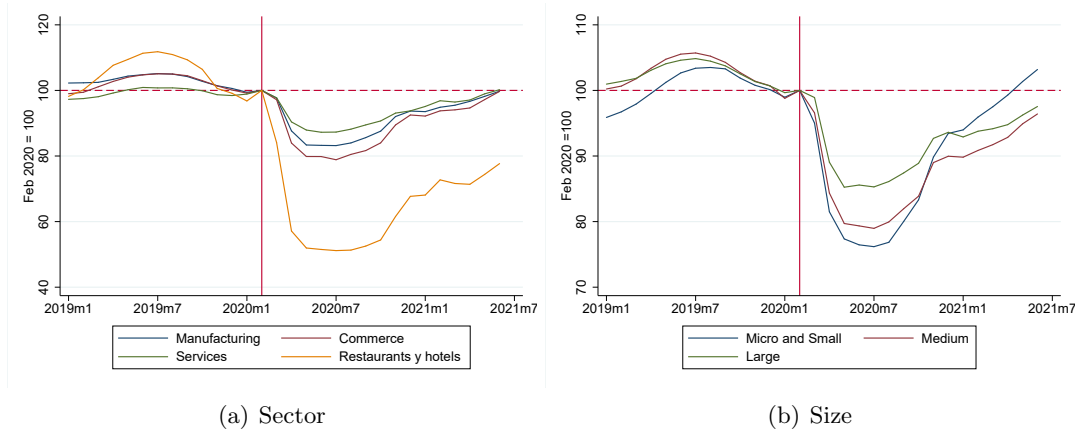


Note: For details on sales, see the note to figure 5. Employment refers to the total number of employer-employee relations in the employer-employee dataset, excluding workers enrolled in the employment protection program (LPE). Seasonally adjusted. Sources: Tax form F29; employer-employee dataset; employment protection law (LPE) dataset; and authors' own calculations.

two dimensions of firm heterogeneity analogous to those previously explored for the case of sales—industry and size. In terms of the four key industries (panel a), effective employment declined dramatically in restaurants and hotels. Although it exhibits signs of recovery in the second half of 2020, it remains about 30% below its pre-pandemic level by the end of the year. The decline in employment in manufacturing, commerce, and services ranged from about 10% to 20%. As in the case of sales, micro and small firms, and medium-sized firms, experienced the largest decline in effective employment, followed by large firms (panel b). Micro and small firms are also those that have experienced a stronger recovery in employment.

Figure 10 studies the interaction of the extensive and intensive margins in the performance of employment. Panels (a) and (b) show the heterogeneity in the recovery of employment, by means of the distribution of the Davis and Haltiwanger (1992) growth rates. The blue distributions compare average employment in Oct-Dec 2020 with Oct-Dec 2018, and thus, speak about heterogeneity in the recovery from the COVID pandemic. The orange distributions serve as a benchmark of “normal times.” This benchmark averages the distributions of the periods 2015-2017, 2016-2018, and 2017-2019. Panel (a) displays unweighted distributions, whereas panel (b) refers to distributions in which each firm’s growth rate is weighted by average employment across the two periods. For continuing firms, both panels show that in the COVID period (blue

Figure 9: Employment: Heterogeneity by sector and size

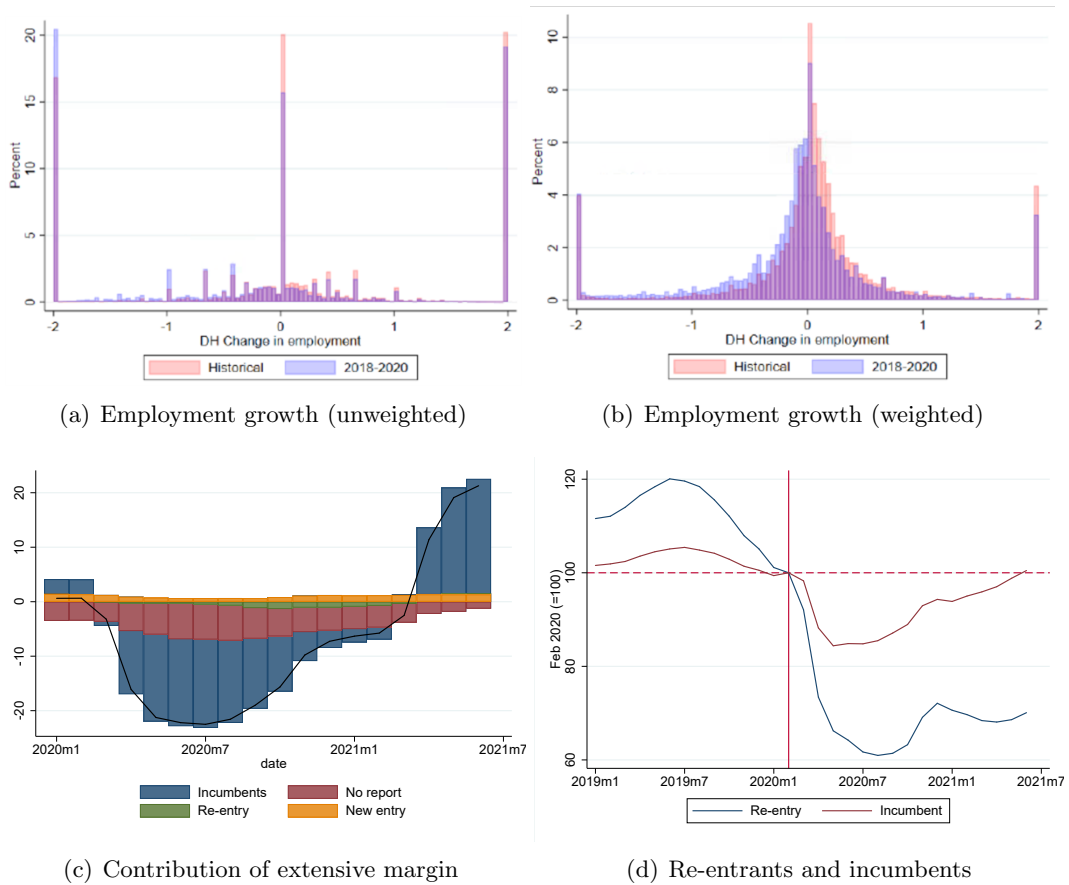


Note: Seasonally adjusted employment, excluding workers enrolled in the employment protection program (LPE), normalized at 100 in February 2020. The service sector includes personal services and business services. For details on the classification of firms by size, see the note to figure 4. Sources: Employer-employee dataset (AFC); employment protection law (LPE) dataset; and authors' own calculations.

distributions), there is more mass in the left side of the distribution, i.e., a larger share of firms employs less workers than two years ago. In normal times, there is more mass on the right side of the distribution. In other words, the distribution of the growth rate of employment is shifted to the left, which is consistent with an economy where employment has not recovered its pre-pandemic level. For exiting and entering firms, in the unweighted distribution there is higher destruction and lower creation in the recovery from the COVID pandemic than in normal times. In the weighted distribution, we only see lower creation, which suggests smaller firms account for the bulk of employment destruction.

Panel (c) of figure 10 shows the contribution of the extensive margin to the year-on-year growth rate of employment (black line). As in the case of sales, the bulk of the fluctuation of employment is driven by the behavior of incumbent firms (blue bars). Exiting firms (red bars) are more important for the dynamics of employment than for the dynamics of sales, since their contribution to the decline of employment is much more visible than that of sales. Finally, panel (d) tracks the performance of employment in re-entering and incumbent firms. As in the analysis of sales (panel d of figure 7), we follow a group of firms in each category. As expected, effective employment in re-entering firms fared much worse than in of incumbent firms. However, re-entering firms are much smaller, which explains why they contribute little to the fluctuation of total employment.

Figure 10: Employment: Extensive and intensive margins

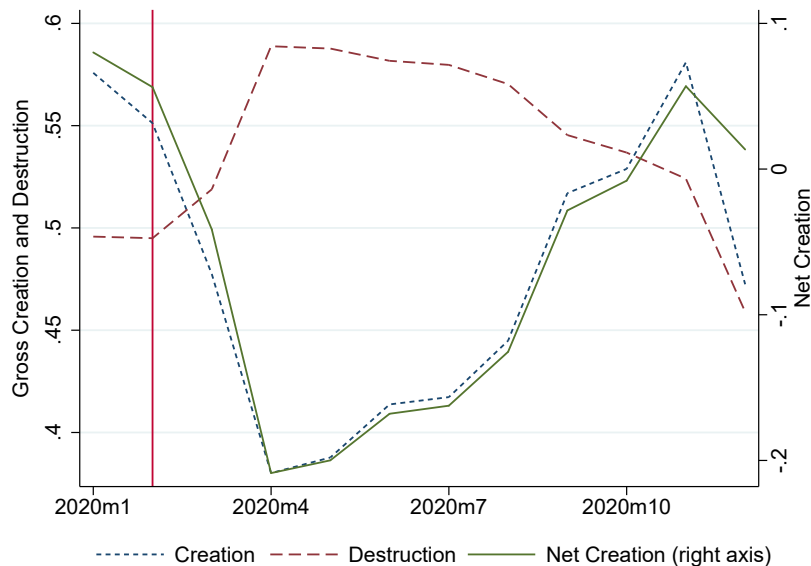


Note: Employment excludes workers enrolled in the employment protection program (LPE). Panels (a) and (b) show the distribution of the Davis and Haltiwanger (1992) growth rate of average employment in Oct-Dec 2020 relative to Oct-Dec 2018. Panel (a) refers to the unweighted distribution, whereas panel (b) refers to the distribution weighted by average employment. Panel (c) shows the contribution of incumbent, entering (new entry), exiting (no report), and re-entering firms to the year-on-year growth rate of employment. Panel (d) tracks employment of firms that at any point after the pandemic hit the economy were classified as re-entrants, as well as firms that after the pandemic hit did not suffer exit spells (incumbents). For details on the classification of firms in panels (c) and (d), see the notes to figure 7. Sources: Employer-employee dataset (AFC); employment protection law (LPE) dataset; and authors' own calculations.

3.3 Market for Suppliers: Linkages between Firms

One important margin of adjustment of firms is the creation and destruction of relationships with suppliers.¹⁰ Figure 11 shows the gross creation and destruction of links with suppliers over time and also the net creation, which is the gross creation minus the gross destruction. The gross destruction (creation) rate in a given month t is computed as the number of linkages destroyed (created) with respect to the same month in the previous year ($t - 12$). It shows that the net creation was positive before the pandemic and it became negative reaching a decline of around 20 percentage points in April 2020, followed by a slow recovery back to slightly positive net creation by the end of that year. The decline in net creation is driven by both an increase in gross destruction and a decline in gross creation. Both types of flows contribute substantially to the decline in net creation of linkages with suppliers.

Figure 11: Gross Creation and Destruction of Productive Linkages between Firms



Note: This graph documents gross creation and destruction (left axis) and net creation (right axis) of productive relationships of firms with their suppliers, expressed in 12-month growth. Firms belonging to the National Accounts Directory are included, except those linked to utilities and public administration. The red vertical line marks February 2020. Source: firm-to-firm transactions dataset and authors' own calculations.

The destruction of linkages with suppliers during the COVID pandemic is high even when compared with normal times. The first three columns of table 1 show the gross destruction rate during 2020, when the COVID pandemic impacted the economy, and during 2018, a more normal year. Between April and August 2020, firms experienced destruction rates far higher than those in the same months of a normal year. In April and May, for example, the destruction

¹⁰Since we show aggregate numbers, it is equivalent to show this fact for supplier or buyers, given that the intermediate input market has to clear at the aggregate level.

Table 1: Destruction and Recovery of Links with Suppliers

	Share of Links Destroyed			Share of Links Recovered		
	2020	2018	Difference	2020	2018	Difference
January	50	50	0			
February	49	51	-2	38	37	1
March	52	51	1	39	36	3
April	59	49	10	46	36	10
May	59	50	9	46	36	10
June	58	50	8	47	36	11
July	58	50	8	47	37	10
August	57	50	7	46	36	10
September	55	51	4	44	38	6
October	54	49	5	43	35	8
November	52	51	1	42	35	7
December	46	50	-4	42	36	6

rate is nearly 10 percentage points higher than in the same months of 2018.

Although the destruction of links with suppliers was unusually high during 2020, we also see that a higher proportion of destroyed linkages is eventually recovered. The last three columns of table 1 show the fraction of destroyed linkages that are recovered in the following 12 months, for the years 2020 and 2018. In a normal year, slightly more than a third of destroyed linkages are recovered. In 2020, this fraction was up to 10 percentage points higher.

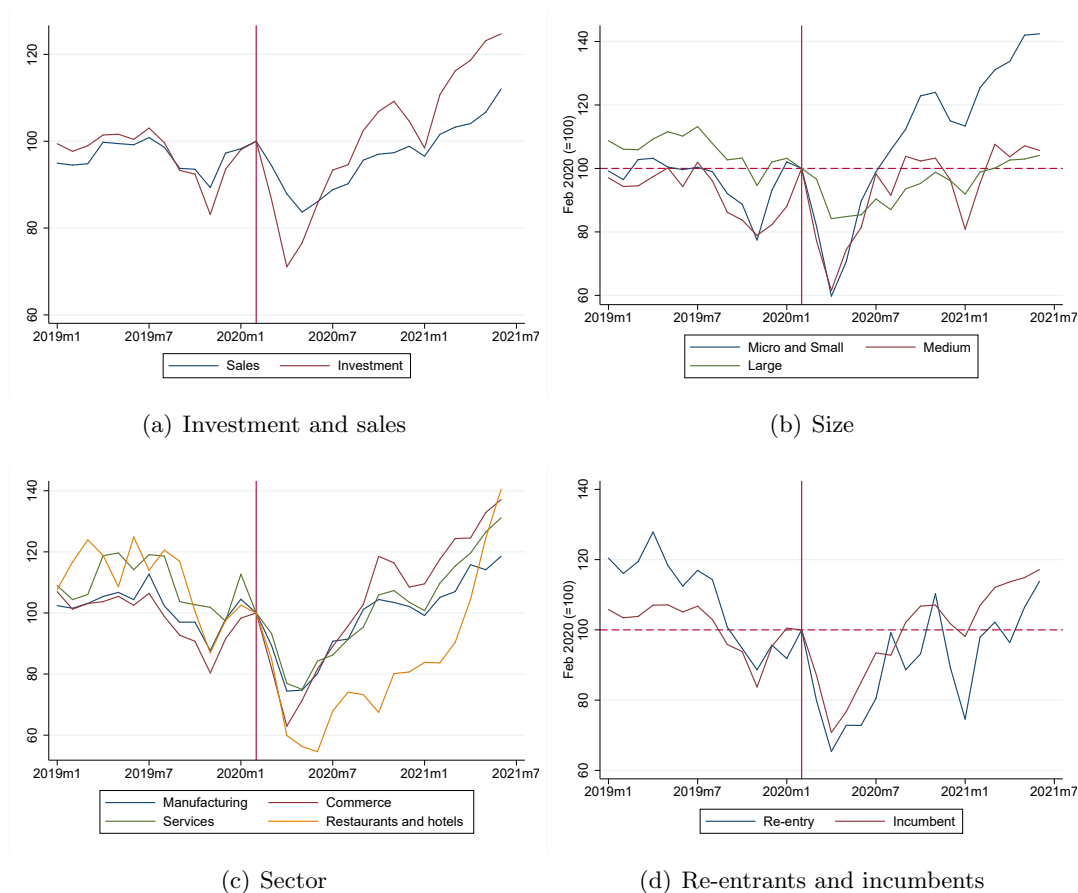
3.4 Physical Capital Market: Investment

We now study firm adjustment in the market for physical capital, i.e., investment. Panel (a) of figure 12 shows the evolution of total real investment in machinery and equipment,¹¹ in levels, seasonally adjusted and normalized at 100 in February 2020, and compares it to total sales. Investment displays more volatility than sales, with a contraction roughly two times larger than that of sales when the pandemic hit the economy, but also a stronger recovery over the following months.

Panels (b), (c) and (d) of figure 12 show the heterogeneity in investment along firm size, industry, and incumbent status. Large firms experienced a substantially lower decline in investment than micro and small, and medium-sized firms (panel b). The three groups of firms, however, have recovered their pre-pandemic levels, with investment in micro and small firms substantially above that level. In terms of industries (panel c), the behavior of restaurants and hotels again stands out due to size of the decline relative to the other three industries. Investment in manufacturing, commerce, and services recovered relatively quickly to pre-pandemic

¹¹The source of machinery and equipment investment is the tax form F29, which does not include information on building investment.

Figure 12: Heterogeneity in investment



Note: The figure shows the evolution of real investment in machinery and equipment, which comes from tax form F29. Observations above the 99.9th percentile of the distribution are winsorized. Panel (a) compares total investment to total firm-to-firm sales (see the note to figure 5 for details on sales). Panels (b)-(d) show the evolution of investment according to firm size, sector, and incumbent status. The service sector includes personal services and business services. For details on the classification of firms by size, see the note to figure 4. For details on the classification of firms by incumbent status, see the note to figure 6. All the series are seasonally adjusted. Sources: Electronic invoice; tax form F29; and authors' own calculations.

levels. Investment among re-entering and incumbent firms (panel d) displays less heterogeneity than in variables such as sales and employment (figures 6 and 9). Both groups of firms experienced a decline of roughly 30%, and have recovered pre-pandemic levels, with a faster recovery among incumbent firms.

3.5 Credit Market: Bank Debt

Access to financing is a key determinant of how firms adjust to shocks. This was particularly true for the COVID crisis. Panel (a) of figure 13 shows that domestic bank credit increased in the months that followed the impact of the COVID shock, with annual credit growth reaching a peak of about 10 percentage points higher than that in the month prior to the beginning of

the crisis (February 2020).¹² The countercyclicality of bank credit in the COVID crisis marks a stark contrast with two previous crises—the global financial crisis of the late 2000s and the Asian financial crisis of the late 1990s, when domestic bank credit decelerated. Crucially, the countercyclical response of bank credit was driven by policies implemented by the Central Bank and the government, which we study in detail in section 4. Panel (b) of figure 13 describes how bank credit flowed to firms according to the performance of sales during the COVID pandemic. It shows year-on-year bank credit growth relative to that in February 2020, expressed as a difference, in percentage points, for five groups of firms classified according to the 12-month growth rate of sales in April 2020 relative to that in February 2020. Firms with a significant decrease (increase) in sales are those that experienced declines (increases) in the growth rate of sales of 20 to 100 percentage points. Firms with a slight decrease (slight increase) in sales are those that experienced declines (increases) in the growth rate of sales of 1 to 20 percentage points. Firms classified as experiencing no change in sales growth saw changes of less than 1 percentage point.¹³ The figure shows a widespread increase in credit growth and, importantly, with credit flowing to highly affected firms.

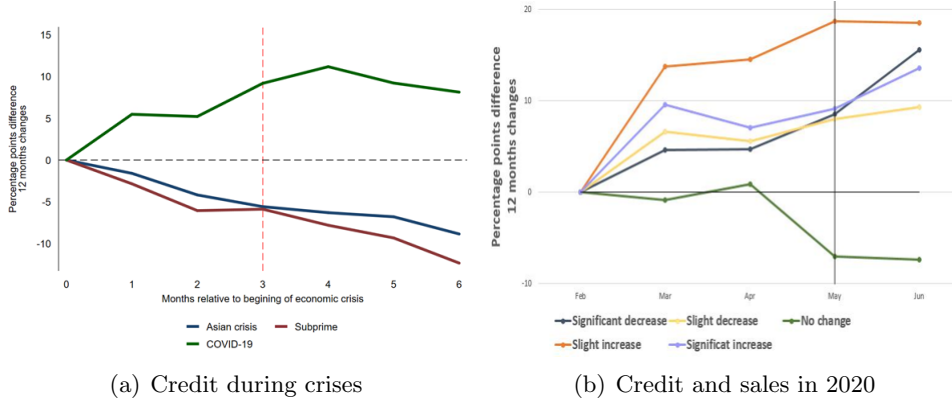
The substantial increase in domestic bank credit is, naturally, associated with higher firm leverage. Figure 14 shows the evolution of the bank debt-to-sales ratio, a common indicator of leverage. Importantly, we fix the denominator, so that changes in the ratio reflect changes in the stock of debt, rather than the sharp decline in sales due to the crisis. Specifically, we compute the stock of debt each period as a ratio of total real sales for the 12-month period covering October 2018 to September 2019, so as to avoid the social unrest episode of October 2019. Panel (a) shows the evolution of leverage in the median firm with a positive stock of bank debt. In a few months, leverage tripled, increasing by more than 9 percentage points.

Panels (b)-(d) in figure 14 show that there is less heterogeneity in the evolution of leverage across firm size, industry, and incumbent status than that found for other variables. Panel (b) shows that leverage in large firms increased less than in micro and small, and medium-sized firms. Panel (c) shows that the median firm in all four industries we study experienced the roughly tripling of leverage documented in the aggregate. This is the case even for the services sector, which displays low historical levels of leverage. Finally, panel (d) shows that incumbent firms experienced a larger increase in leverage than re-entering firms.

¹²Panel a shows aggregate bank credit to firms and households.

¹³The classification of firms according to the performance of sales uses data on firm-to-firm sales from the electronic invoice. The fraction of firms that fall within each category is as follows. Significant decrease: 46%; slight decrease: 17%; no change: 3%; slight increase: 13%; significant increase: 21%.

Figure 13: Bank credit to firms



Note: Panel (a) shows the total stock of bank credit to firms each month, expressed as the difference, in percentage points, of the 12-month growth rate with respect to the the growth rate in the month in which the crisis begins. For the Asian and subprime crises, $t=0$ is the first month of negative GDP growth, according to the monthly GDP proxy IMACEC. For the COVID crisis, $t=0$ is February 2020. Panel (b) compares the change in the annual growth rate of bank credit, in percentage points, relative to that in February 2020, for five groups of firms classified according to the performance of sales growth. The classification considers the difference, in percentage points, of the annual growth rate of sales in April 2020 relative to that in February 2020. Firms that experienced significant changes in sales growth (decreases or increases) are those with changes of 20 to 100 percentage points. Firms that experienced slight changes in sales growth are those with changes of 1 to 20 percentage points. Firms classified as having no change in sales growth experienced changes of less than 1 percentage point. According to this classification, 46% of firms experienced a significant decrease in sales growth, 17% experienced a slight decrease, 3% experienced no change, 13% experienced a slight increase, and 21% experienced a significant increase. Sources: Financial Regulatory Commission; electronic invoice; and authors' own calculations.

3.6 Productivity

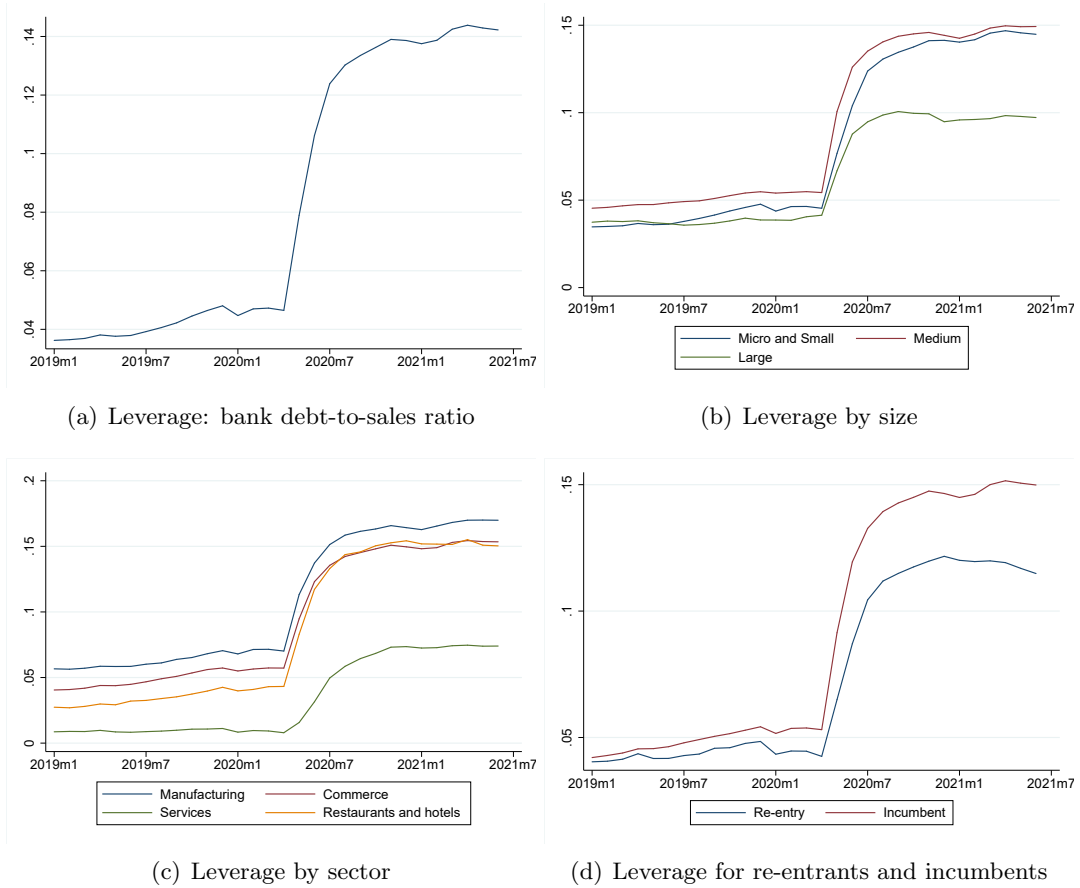
To understand the effect of the pandemic on firm-level and aggregate productivity and its connections with the previous margins of adjustment, we estimate total factor productivity (TFP) following the procedure by Akerberg, Caves, and Frazer (2015). In particular, we estimate the following production function:

$$\log y_{it} = \log A_{it} + \alpha^L \log l_{it} + \alpha^K \log k_{it}, \quad (1)$$

where i indexes a firm, t indexes a year, y_{it} is value added, l_{it} is number of workers, k_{it} is the stock of capital and A_{it} is firm-level TFP, which we estimate. Following Akerberg et al. (2015), we find that $\alpha^L = 0.9$ and $\alpha^K = 0.1$, which are in line with previous estimates with Chilean data (Gandhi, Navarro, and Rivers, 2020). To aggregate firm-level TFP, we weight each firm by its value-added.

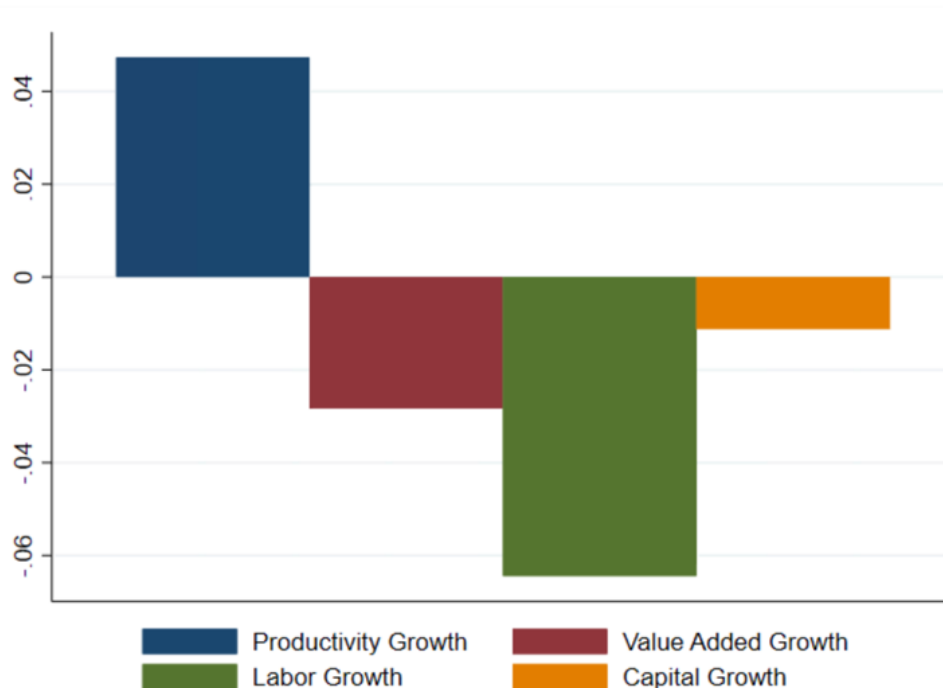
Figure 15 shows that TFP increased by 4.7% during 2020. The figure shows that all inputs declined during 2020, but value-added declined relatively less than labor, and thus measured productivity increased. This increase in productivity masks, however, substantial heterogeneity. Figure 16 shows in panel (a) that around 56% (38%) of firms saw their productivity decrease

Figure 14: Leverage



Note: Leverage is measured as the ratio of the stock of bank debt each to real sales for the 12-month period covering October 2018 to September 2019, so as to avoid the social unrest episode of October 2019. By fixing the denominator, changes in leverage reflect only changes in the stock of debt, and not the sharp decline in sales during the pandemic. Panel (a) shows the evolution of leverage in the median firm with a positive stock of bank debt. Panels (b)-(d) show the evolution of leverage by firm size, industry and incumbent status. The service sector includes personal services and business services. For details on the classification of firms by size, see the note to figure 4. For details on the classification of firms by incumbent status, see the note to figure 6. Sources: Financial Regulatory Commission; electronic invoices; and authors' own calculations.

Figure 15: Aggregate Productivity Growth in 2020

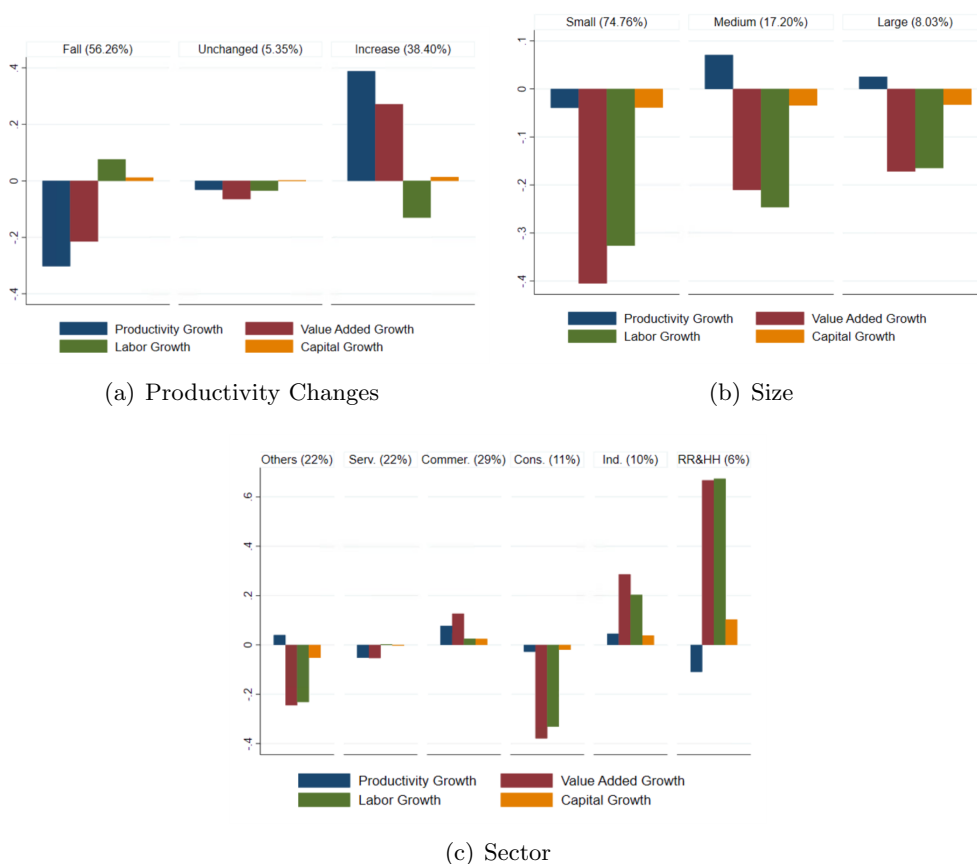


Note: This figure presents the aggregate productivity growth between 2020 and 2019 and the aggregate growth of each of the variables that are used to measure productivity. Thus, the red, green and yellow bar sum up to the blue bar. When going from firm-level variable to these aggregates, we weight with value-added of each firm. Source: authors' own calculations.

(increase) by an average of around 30% (40%). Panel (b) shows the heterogeneity across size. The productivity of small firms declined, whereas the productivity of medium and large firms increased. Finally, panel (c) shows the heterogeneity across industries. Productivity increased in commerce and manufacturing, but decreased in services, hotels and restaurants, and construction. Taking these results together, the increase in productivity during 2020 is driven by medium and large firms, and firms in commerce and manufacturing.

To further illustrate the heterogeneity in the evolution of productivity, we correlate, at the firm-level, productivity growth with growth of different observables that affect productivity. In order to isolate between-industry variation, we extract industry-level averages. For comparison, besides 2020, we show these correlations for 2019, a year marked by massive protests, and 2009 a crisis year due to the global financial crisis. Figure 17 presents the results. Panel (a) shows that the correlation between productivity and value added growth is basically the same for 2009 and 2019, and very similar in 2020, except for the upper tail of productivity growth, which had a relatively weaker growth of value added. Panel (b) correlates productivity and employment growth, and shows a different pattern in each year. First, 2020 represents a downward shift of the correlation relative to 2019. This implies that for a given change in employment, productivity

Figure 16: Heterogeneity of Productivity Growth in 2020



Note: This figure presents the aggregate productivity growth between 2020 and 2019 and the aggregate growth of each of the variables that are used to measure productivity, for different groups of firms. Panel (a) divides firms into three groups according to their productivity growth. If their productivity fell by more than 3% they are considered as "Fall", if it increased by more than 3%, they are considered as "Increase", otherwise they are considered as "Unchanged". Panel (b) divides firms by size, small firms are those who sell less than 25.000 UF, medium firms sell between 25.000 UF and 100.000 UF, and large firms sell more than 100.000 UF. Panel (c) divides firms by sector, between Services, Commerce, Construction, Industry and Restaurants and Hotels. The remaining sectors are included in "Others". Numbers in parenthesis represent the share of value added of each group. As in Figure 15, the aggregate measures are weighted using firm-level value added. Source: authors' own calculations.

increased more in 2019. For the firms with negative productivity growth, there was almost no increase in employment during 2020. Finally, the shape of the correlation for 2009 is different relative to 2020. In 2009, the firms that increased productivity substantially (above 30%), did so with a larger decline in employment than firms in 2020. On the other hand, for firms with a smaller increase in productivity, employment declined less in 2020 relative to 2009. In other words, the correlation between productivity and employment growth became flatter in 2020 relative to 2009.

Panel (c) shows the correlation between productivity and investment growth. The correlation is close to zero in 2019, and even slightly negative for positive productivity growth, whereas it is positive in 2020. It is also positive in 2009, although with a downward shift, suggesting

that investment had an overall better performance in 2020 relative to 2009. Finally, we explore the relation between productivity growth and the growth of linkages between firms, both with suppliers and buyers (panels d and e). We find that there is a positive correlation between productivity growth and the growth in the number of buyers and suppliers in 2020. In 2009, these correlations are almost zero. This suggests that the capability of recovering buyers and suppliers in 2020 was important for productivity growth.

4 Credit and Employment Policies Oriented to Firms

This section describes firm access to two policies that were oriented to firms in Chile at the onset of the COVID crisis, between March and May of 2020. One policy aimed at supporting credit to firms by offering government guarantees, whereas the other policy was a furlough scheme designed to protect employment by lowering firms' wage expenses avoiding permanent job separations. In addition to describing access to these policies, this section offers evidence on the performance of firms that accessed the policies. It does not, however, study their causal effect. A companion paper (Albagli et al., 2022) focuses on the issue of causality.

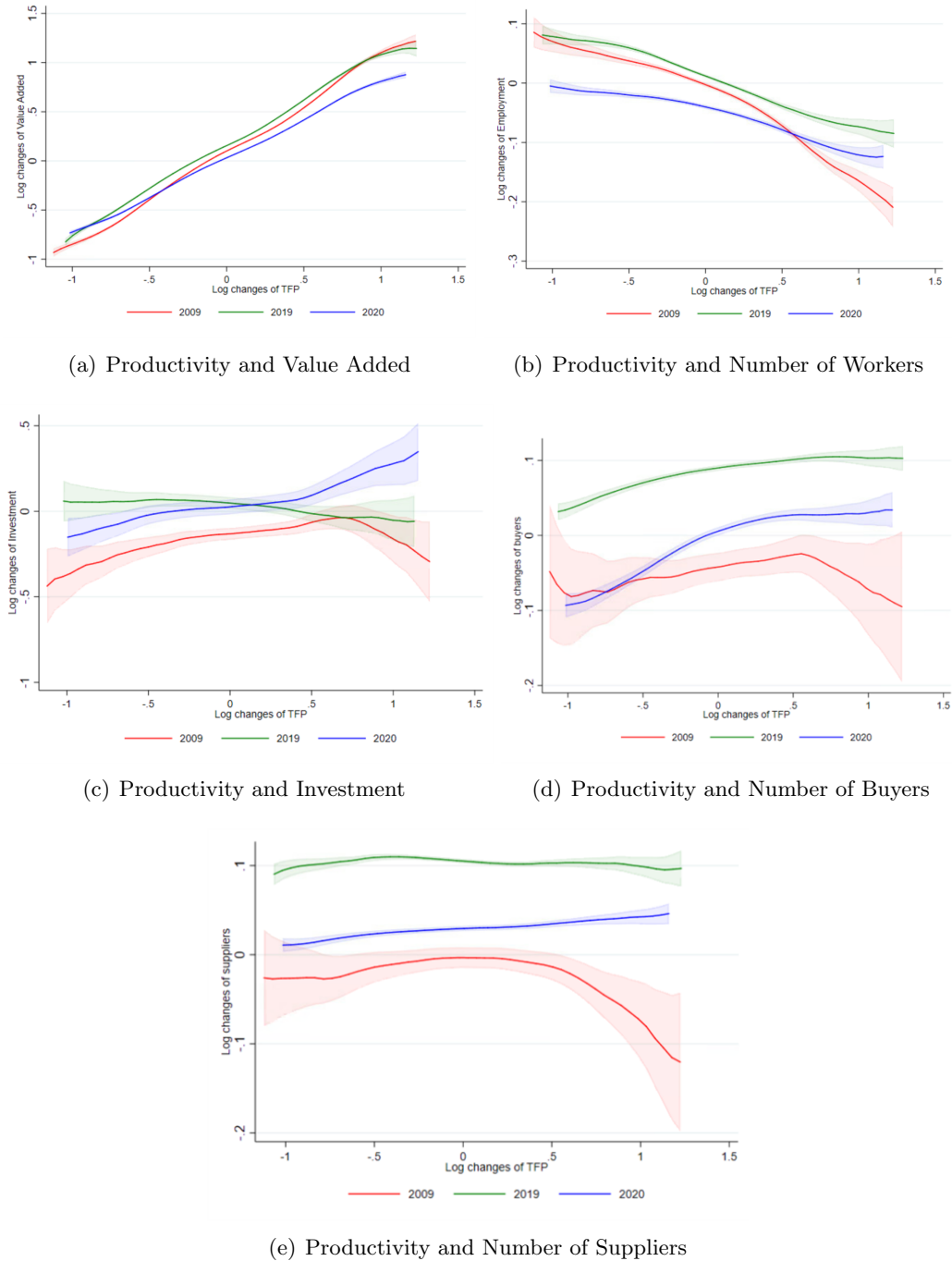
We begin by documenting access to these two policies in terms of how many firms voluntarily accessed the programs, when they did so, and the intensity with which they did it. We also continue to track the heterogeneity in access across firms' industry, size, and incumbent status. We present further evidence in terms of outcomes related to accessing these programs. The outcomes we explore are sales, employment, and investment.

While these were the two main policies implemented to support firms in Chile due to COVID, and the first line of defense as the crisis unfolded, there were other policies mostly aimed at supporting households via, e.g., fiscal transfers and early pension-fund withdraws. Importantly, these additional policies were enacted throughout the second half of 2020, after the two policies that we study here were implemented.

4.1 Access to Credit Support

On March 16, 2020, two weeks after the first COVID case was identified in Chile, the Central Bank of Chile announced it was lowering its monetary policy rate to 50 bp, which it considered its effective lower bound. Importantly, a separate set of unconventional policies to counteract the economic effects of COVID were also announced. At the core of these measures was a new credit facility (FCIC by its acronym in Spanish) aimed at providing medium-term liquidity to commercial banks at very low rates for up to 4 years, conditional on banks providing loans to small and medium-sized firms. Throughout the COVID pandemic, FCIC provided nearly 40

Figure 17: Productivity and Observables Growth in 2020, 2019 and 2009



Note: This figure presents correlations between firm-level productivity growth between 2020 and 2019 (X axis) and the growth of different observables. The correlations are shown non-parametrically with local linear regressions. Source: authors' own calculations.

billion U.S. dollars in loans to banks.

A few weeks after this, in April 2020, a complementary policy to FCIC was launched by the Chilean government through FOGAPE-COVID, a state-backed fund that would provide sovereign guarantees of up to 85% of commercial bank loans to firms. The recapitalization

of the fund by 3 billion U.S. dollars provided guarantees for loans of up to 24 billion.¹⁴ The combination of these two credit support policies provided resources and incentives for banks to lend to firms affected by the COVID shock.

Panel (a) in figure 18 documents firm access to FOGAPE-COVID loans. There was widespread access to this program. By the end of 2020, nearly 250.000 firms (40% of firms reporting positive sales in February 2020) obtained at least one loan through this program. Importantly, access was equally strong among firms that were performing relatively well and those that were being highly impacted by the crisis. Panel (b) shows that credit flowed largely to firms with significant decreases in sales, only comparable to those with significant increases. Lastly, panel (c) shows that the lion's share of the program was provided in the first two months of the implementation of the FCIC-FOGAPE joint programs in May and June, with flows that amounted to about 3% and 2% of GDP, respectively.

Figure 19 documents the heterogeneity in access to the credit policy across firms. Loans were given relatively more to firms in commerce and manufacturing, and mostly to micro and small, incumbent firms (panels a-c). In terms of flows, FOGAPE-COVID loans were directed more to commerce and manufacturing too, and they were evenly distributed across firm sizes. Lastly, most were given to incumbent firms (panels d-f).

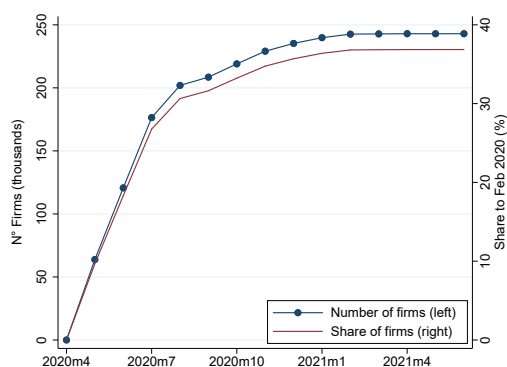
Figure 20 presents the dynamics of sales and investment by grouping firms into two groups: those that did not get FOGAPE-COVID loans and those that did. Results indicate that firms that accessed loans from the credit support program had an initial sharper decline in sales and investment of about 10 and 20 percentage points for these two variables, respectively, relative to the group that did not access the policy. Interestingly, firms that obtained FOGAPE-COVID loans recovered more rapidly in those two dimensions relative to the other group. Of course, these results should not be interpreted in causal terms, since firms that accessed the policy might be precisely those that were more exposed to the COVID shock. In a companion paper (Albagli et al., 2022), we use a matching approach to study the causal effect of this credit policy at the firm level.

4.2 Access to the Employment Protection Policy

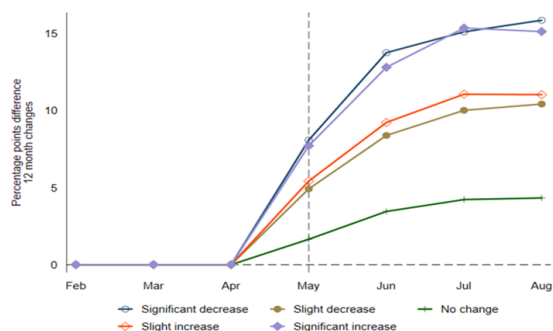
In April 2020 the Employment Protection Law (LPE for its acronym in Spanish) was approved by Congress and became another landmark program in the set of policies aimed at supporting firms and, in particular, the relationships they have formed over time with their workers. LPE would provide firms a legal way to furlough some or all employees quickly and easily. Importantly, the

¹⁴The sovereign credit guarantees program, FOGAPE, dates back to 1980. Before the COVID crisis and the recapitalization the fund had only 100 million U.S. dollars in capital.

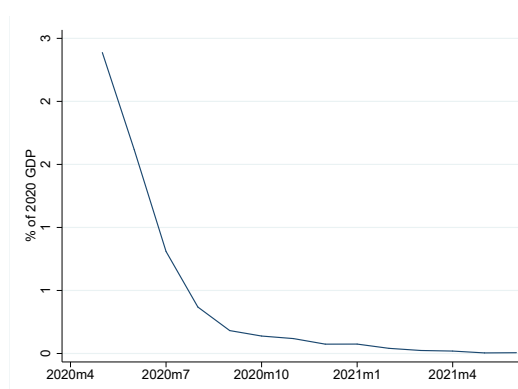
Figure 18: Firm access to bank loans under the FOGAPE program



(a) Firms with FOGAPE loans



(b) FOGAPE and sales



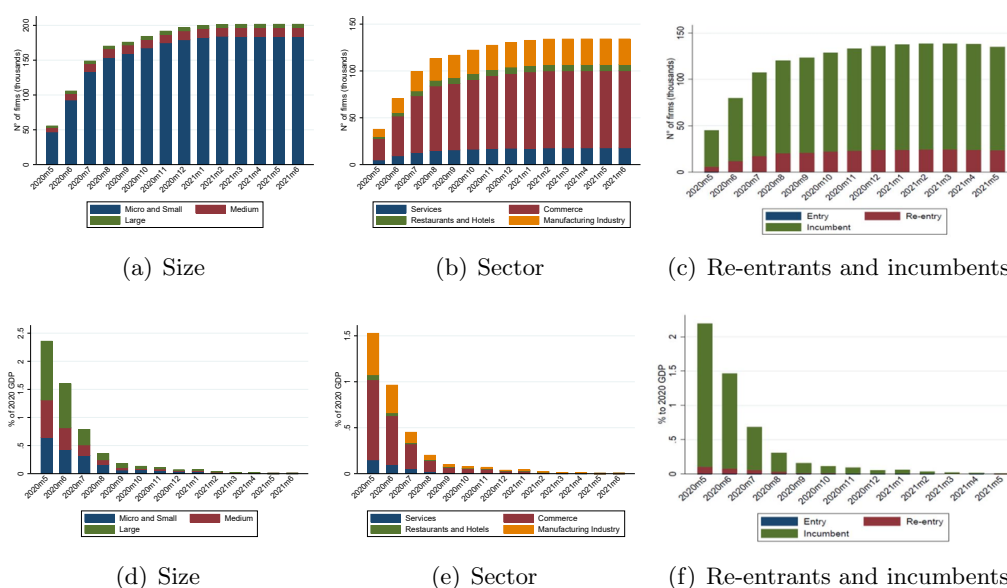
(c) FOGAPE flows

Note: Panel (a) shows the cumulative number of firms that had received a FOGAPE loan. Panel (b) compares the change in the annual growth rate of FOGAPE loans, in percentage points, relative to that in April 2020, the month prior to implementation of FOGAPE-COVID program, for five groups of firms classified according to the performance of sales growth. The classification considers the difference, in percentage points, of the annual growth rate of sales in April 2020 relative to that in February 2020. Firms that experienced significant changes in sales growth (decreases or increases) are those with changes of 20 to 100 percentage points. Firms that experienced slight changes in sales growth are those with changes of 1 to 20 percentage points. Firms classified as having no change in sales growth experienced changes of less than 1 percentage point. Panel (c) shows the evolution of bank credit under the FOGAPE-COVID program, as a share of 2020 GDP. Sources: Financial Regulatory Commission, and tax form F29 and authors' own calculations.

program reduced firms' costs, since they had to pay only a small fraction of benefits, while the employee would continue receiving a fraction of her salary from the unemployment insurance fund. Fully reinstating employees back to work was also a fast and costless process. Thus, LPE gave firms important room to maneuver and scale back production without incurring in costly layoffs, while giving them also the chance to scale up quickly and without incurring in hiring costs once the economy recovered.

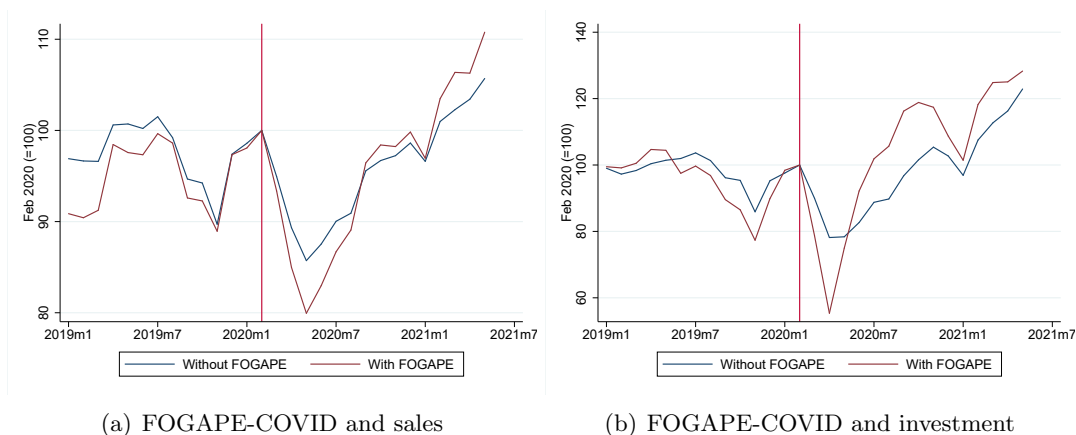
The employment policy also received widespread access by firms. Panel (a) of figure 21 shows that the month of highest take-up was April 2020. Throughout the program, nearly 120.000 firms enrolled at least one worker. This number represents about 45% of firms that had at

Figure 19: Heterogeneity in firm access to FOGAPE loans



Note: Panels (a)-(c) show the cumulative number of firms that had accessed a loan under the FOGAPE-COVID program, by firm size, sector, and incumbent status, respectively. Panels (d)-(f) show the evolution of bank credit under the FOGAPE-COVID program, as a share of 2020 GDP, by firm size, sector, and incumbent status. For details on the classification of firms by size, see the note to figure 4. The services sector includes personal services and business services. For details on the classification of firms by incumbent status, see the note to figure 6. Source: Financial Regulatory Commission and authors' own calculations.

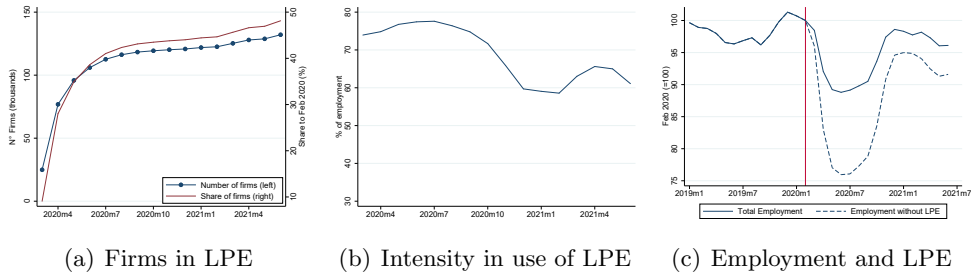
Figure 20: Performance of sales and investment in firms that accessed FOGAPE loans



Note: The two groups presented split Sales and investment of firms that, on one hand, accessed bank credit under the FOGAPE-COVID program in any month starting in May 2020, when the FOGAPE-COVID program began ("With FOGAPE") and those that never accessed loans through this program ("Without FOGAPE"). All series are seasonally adjusted. Sources: Financial Regulatory Commission, tax form F29, and authors' own calculations.

least one worker in February 2020. Conditional on accessing the program, the high intensity in its use was also a distinctive characteristic. Panel (b) shows that, for an average firm that accessed LPE, the share of employees enrolled in the program reached nearly 80% by mid 2020 and stayed higher than 60% throughout the period of analysis. Importantly, LPE contributed

Figure 21: Firm access to employment protection program (LPE)



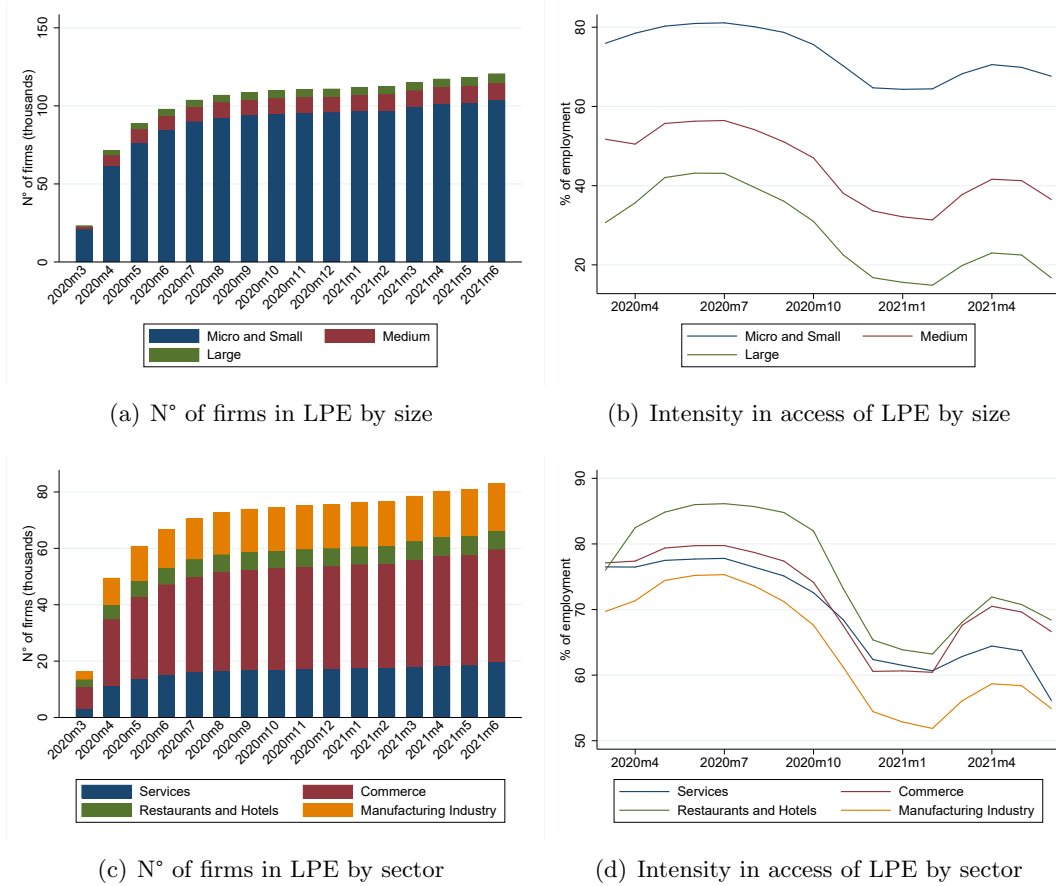
Note: In panel (a) we consider the cumulative number of firms that at one point had at least one worker enrolled in LPE. Panel (b) shows the fraction of the payroll enrolled in LPE among firms that accessed the policy. In panel (c) the blue line refers to total employment relations in the employer-employee database; the red line computes effective employment by excluding workers enrolled in LPE. Both series are not seasonally adjusted. Sources: Employer-employee dataset, employment protection program (LPE) dataset, and authors' own calculations.

to mitigating the decline in aggregate employment due to the COVID shock. Panel (c) presents the evolution of employment relations, in levels and normalized at 100 in February 2020, when workers enrolled in the employment policy are included (solid line), and when they are excluded (dashed line). Recall that we excluded these workers when we described the evolution of *effective* employment previously. At the trough of the crisis, about 10% of employment relations were destroyed, and 15% were enrolled in the policy, which suggests LPE mitigated the decline in employment.

Figure 22 documents heterogeneity in access to the employment policy. It was largely concentrated in micro and small firms where, conditional on accessing this program, the typical firm had more than 80% of workers furloughed in LPE. Access to LPE has been largely concentrated in commerce and manufacturing firms. Among the firms that accessed LPE, those in the restaurants and hotels industry enrolled a larger fraction of their payroll, close to 90% of the labor force in the average firm in this industry.

In Figure 23 we identify firms that accessed LPE from March to December 2020, and those that did not access it in this period, and track their performance before and after the crisis in terms of sales and employment. Among firms that accessed LPE, the level of sales dropped substantially more, with a trough in May 2020 of about 30% less sales than in February 2020, while sales of firms that did not enroll employees in LPE saw their sales fall by about 10% with respect to their pre-COVID levels, and displayed a relatively faster recovery. Indeed, recovery of sales in firms that did access the policy lagged behind those that did not. In contrast, the decline in total employment (including workers enrolled in the policy) across the two types of firms was much more similar, as documented in panel (b), suggesting that LPE did help absorb some of the effects on employment from the large shock in sales.

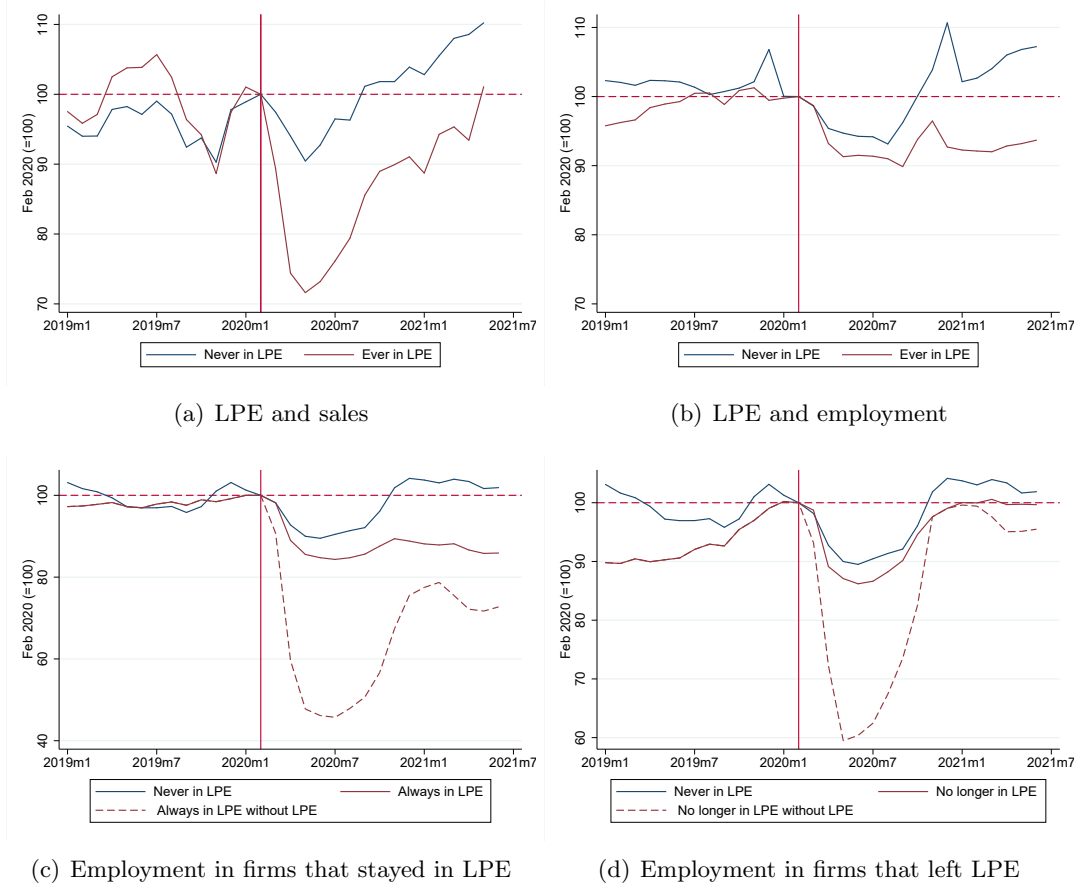
Figure 22: Heterogeneity in access to employment protection (LPE)



Note: Panels (a) and (c) show the cumulative number of firms with at least one worker enrolled in LPE at any point in time by firm size and sector, respectively. Panels (b) and (d) show the fraction of the payroll enrolled in LPE among firms that accessed the policy, by firm size and sector, respectively. For details on the classification of firms by size, see the note to figure 4. The services sector includes personal services and business services. Source: Employer-employee dataset, employment protection program (LPE) dataset, and authors' own calculations.

A caveat in the analysis of panel (b) comes from the fact that, among the group of firms that accessed LPE at the onset of the program, we do not differentiate between firms that continued in LPE throughout 2020 and those that terminated access to the program before the end of the year. The lower panels in figure 23 focus on firms that accessed LPE at the start of the crisis (Mar-May 2020). While panel (c) looks at employment in firms that continuously have workers enrolled in the policy throughout the year, those in panel (d) no longer have workers enrolled in the policy by November 2020 at the latest. As a benchmark, panels (c) and (d) also show the evolution of employment in firms that did not enroll workers in the policy (blue line). In both cases, effective employment (excluding workers enrolled in LPE) has recovered considerably. For firms in panel (c), which have workers enrolled throughout the year, effective employment declined by nearly 60% at the trough, and had recovered by nearly half with respect

Figure 23: Performance of firms that accessed employment protection (LPE)



Note: Panels (a) and (b) show the evolution of sales and total employment, respectively, in firms that accessed LPE in any month during the period March-December 2020. Total employment includes workers enrolled in LPE, and the series in both panels are seasonally adjusted. Panel (c) shows the evolution of employment in firms that enrolled workers in LPE in March, April or May 2020 and had at least one worker enrolled each month until December. Solid and dashed red lines refer to total employment, and employment excluding workers enrolled in LPE, respectively, in these firms, whereas the blue line considers total employment in firms that did not access the LPE program at any point during 2020. Panel (d) shows the evolution of employment in firms that enrolled workers in March, April or May 2020 and had no workers enrolled by November, at the latest; and have positive sales in Nov and Dec. All figures in panels (c) and (d) are not seasonally adjusted. Sources: tax form F29, employer-employee dataset, employment protection program (LPE) dataset, and authors' own calculations.

to pre-pandemic levels. For the case of firms in panel (d), which no longer had workers enrolled in the policy, effective employment declined by 40% at the trough, and had nearly recovered pre-pandemic levels by early 2021.

We now focus on worker transitions from LPE to non-LPE. Table 2 documents the status of workers that had enrolled in LPE from March to May 2020. It reports the share of these employees that continued enrolled in LPE, those that had already been reinstated in the same firm, and those that had left the firm. It is remarkable to see that, by December 2020, more than 75% of employees were still with the firm they worked for at the time they enrolled in LPE, with 53% back to work, and the remaining 23% still enrolled in the program.¹⁵

¹⁵Employees that neither continue in LPE nor are back to work in the same firm are either unemployed or have

Table 2: Transition of workers that enrolled in LPE in March-May 2020

	2020						
	June	July	August	September	October	November	December
In LPE	94.1%	89.5%	82.1%	75.3%	65.2%	40.5%	23.5%
Back to work in the same firm	4.4%	7.1%	11.3%	15.8%	22.4%	41.1%	52.6%
Other	1.5%	3.4%	6.6%	8.9%	12.5%	18.4%	23.9%

Note: We track the status of the pool of workers whose firm enrolled them in LPE between March and May 2020 throughout the rest of the year. “In LPE”: workers enrolled in LPE; “Back to work in the same firm”: workers recalled to the firm they worked for in Mar-May; “Other”: workers that may be out of the labor force, unemployed, or working for a firm other than the one they were working for when they enrolled in LPE. Source: Employer-employee dataset, and authors’ own calculations.

Table 3 completes the analysis by considering the extent to which firms accessed LPE and FOGAPE-COVID policies simultaneously. Among firms that accessed any of the two policies in March-June 2020 (second row), 31% accessed LPE only, 41% accessed FOGAPE-COVID only, and 28% accessed both policies. For each of these three sets of firms, we compute the median year-on-year growth rate of sales at the start of the crisis (Mar-Apr). Firms that suffered the sharpest decline in sales growth (49%) accessed LPE only, while those that were relatively less affected (16% median decline in sales growth) accessed FOGAPE-COVID only. The median firm that accessed both programs experienced an initial decline of sales growth of about 39%. These results hold when we consider access to these policies throughout 2020 (first row).

Table 3 also provides information in terms of size and industries. Micro and small firms were the most affected in terms of sales, in all three categories—firms that accessed the employment policy only, firms that accessed the credit policy only, and firms that accessed both policies. Across all firm sizes, the performance of sales is qualitatively similar than in the aggregate, i.e., firms that accessed only the employment policy were the most affected, firms that accessed only the credit policy were the least affected, and firms that accessed both policies lie between these two groups. These results are also qualitatively similar across industries.

started working at another firm.

Table 3: Firm access to employment protection (LPE) and credit guarantee (FOGAPE) policies

	Employment protection (LPE) only			Credits guarantee (FOGAPE) only			LPE and FOGAPE		
	Number of firms	Share of firms	Median sales growth	Number of firms	Share of firms	Median sales growth	Number of firms	Share of firms	Median sales growth
2020	50566	25.6%	-45.4%	106324	53.9%	-17.6%	40552	20.5%	-37.8%
Mar-Jun 2020	42488	30.9%	-49.2%	56290	40.9%	-16.3%	38723	28.2%	-38.9%
Micro and Small	38435	32.1%	-52.0%	49560	41.4%	-21.0%	31709	26.5%	-45.0%
Medium	2531	20.4%	-23.6%	4962	39.9%	9.1%	4933	39.7%	-16.3%
Large	1522	28.3%	-14.5%	1767	32.9%	9.7%	2081	38.8%	-12.7%
Services	6373	42.4%	-44.5%	4308	28.6%	-24.6%	4366	29.0%	-35.6%
Commerce	14163	27.4%	-51.8%	23769	46.0%	-14.8%	13710	26.5%	-40.4%
RRHH	4967	42.4%	-68.3%	2280	19.5%	-56.5%	4469	38.1%	-67.9%
Manufacturing	5486	28.2%	-39.6%	7682	39.5%	-15.3%	6303	32.4%	-31.0%
Industry									

Note: The first row considers firm access to these policies throughout 2020. The second row focuses on access in March-June 2020, the period when most firm accessed these policies. Rows 3-5 show access in March-June 2020 by firm size. For details on the classification of firms by size, see the note to figure 4. Rows 6-9 show access in March-June 2020 by firm sector. Services include personal services and business services. Median sales growth refers to March-April 2020, the initial period of the COVID shock. To compute median sales growth in Mar-Apr of each group of firms, we begin by computing, for each firm, average annual sales growth in March-April; we then compute the median across firms. Source: Electronic invoice, employer-employee dataset, employment protection law (LPE) dataset, Financial Regulatory Commission, and FOGAPE credits dataset.

5 Conclusion

This paper offers a complete and detailed account of how firms adjusted to the COVID pandemic, adding substance to the standard macro view of the shock. Our analysis exploits a rich administrative dataset for Chile that allows us to trace the real effects of the shock on firm-level output, employment, investment, links with suppliers, access to credit, and productivity. We also find that credit support and employment protection policies were widely accessed by firms, which probably contributed to mitigating the adverse effects of the COVID pandemic.

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