



## Business advisory services and innovation during crises: Evidence from small businesses in Chile<sup>☆</sup>

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### ABSTRACT

State-sponsored business advisory services face pressure to demonstrate value-added effects among their assisted enterprises. We employ a unique survey to measure the effectiveness of a business advisory program in promoting innovation in small businesses in Chile during the COVID-19 pandemic. We also seek to determine the role of innovation in mitigating the negative effects of the pandemic on enterprises' closure, sales, and job creation. We observe a large likelihood of innovation and a lower likelihood of closure by assisted enterprises. We also find a reduction in sales and employment during the pandemic. However, these negative effects are mitigated in enterprises that implemented innovations such as online sales, delivery, commercialization through internet channels, and the creation of new products and/or services during the pandemic. The effects of the pandemic and induced innovation are more pronounced in family businesses than in non-family businesses. This finding suggests small family firms are both more vulnerable to crises but benefit more from crises-induced innovation.

### 1. Introduction

The COVID-19 pandemic produced an unprecedented and long-lasting shock to small businesses around the world. Social distancing, health-protection protocols, reduced production, and disruption in demand and supply processes led to numerous bankruptcies in more strongly affected sectors (Kraus et al., 2020; Clark et al., 2021). In a retail-focused sample of small businesses, Bartik et al. (2020) find that 43% of businesses were temporarily closed and employment had fallen by 40% as a consequence of the COVID-19 pandemic. This event represents a shock to U.S. small businesses with little parallel since the Great Depression of the 1930s. In the early stages of crises, one critical element that characterizes entrepreneurs and small businesses is the management of risk and uncertainty, which is determined by the lack of relevant information about the environment (Maas et al., 2014). In this context, public policies and publicly funded business advisory services have been necessary for small businesses to survive the economic crisis caused by the coronavirus.

Although the literature on the innovative and entrepreneurial behavior of small firms has been ambiguous (Classen et al., 2014), recent

research suggests crises are able to foster innovation in firms. Empirical evidence on the effects of crises on innovation suggests family-owned and small businesses were able to exploit new business opportunities during the pandemic by adapting their business models and risk-taking behavior (Kraus et al., 2020; Leppäaho & Ritala, 2021; Breier et al., 2021; Antonioli & Montresor, 2019). For example, the single-case study of a traditional Finnish-based family firm by Leppäaho and Ritala (2021) finds family businesses engage in risk-taking and innovative orientation. This behavior, described as “preference reversal,” is characterized by slack resources accumulated during periods of calm that are then mobilized to back up innovation and renewal efforts during a crisis.

In this paper, we employ a unique, large dataset of 2,042 small entrepreneurs from the *Impact of the COVID-19 pandemic on small businesses* survey in Chile to investigate the effectiveness of a publicly funded business advisory program on promoting innovation in small businesses during the economic crisis caused by the COVID-19 pandemic. We also seek to determine the role of innovation in mitigating the negative effects of the pandemic on enterprises' survival, sales, and employment. Finally, we examine potential differences between family and non-family businesses in their response to the crisis and the advisory services.

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By estimating cross-sectional and difference-in-differences regressions, we find pandemic-induced advisory services fostered innovation in small businesses, which in turn reduced the likelihood of closure as well as the negative effects of the pandemic on sales and employment. Finally, we also find more pronounced effects in family businesses than in non-family businesses, which suggests family firms were both more vulnerable to crises, but benefited more from crises-induced innovation.

A rich body of research documents the positive effects of publicly funded business advisory services on the performance of small businesses in the US (Chrisman, 2017; Chrisman, 1989; Chrisman & Katrisha, 1994; Chrisman, Gateway, & Donlevy, 2002; Robinson, 1982). New international evidence also exists (Johan and Valenzuela, 2021). However, scholarship examining the channels through which these programs mitigate the pernicious effects of crises remains limited. We exploit the COVID-19 pandemic to investigate the nexus between economic crises, business advisory services, and the performance of small businesses through an “innovation channel.”

This study contributes to the literature in four key ways. First, it contributes to the new body of research that explores the effects of the COVID-19 pandemic on small businesses using a novel dataset of 2,048 small entrepreneurs from the *Impact of the COVID-19 pandemic on small businesses* survey in Chile. The survey was implemented online between December 14, 2020, and January 10, 2021, and contains current and retrospective information on the businesses of the clients of the Small Business Development Centers (SBDC) program. Second, this study explores the relationship between innovation and the performance in small businesses before and during the COVID-19 pandemic. This constitutes a departure from most studies that exclusively focus their analysis on periods of economic stability. Specifically, it explores whether innovation mitigates the effect of crises on small enterprises' sales and jobs. Third, this study takes an additional step beyond the literature that explores the relationship between innovation and entrepreneurship, by exploring whether sales and employment of family and non-family firms respond differently to crises and business advisory services. Finally, this paper adds to the evidence that is relatively scarce outside developed countries. In contrast to most studies that evaluate the value-added effects of publicly funded business advisory services in the US, this study utilizes an unexploited, large dataset of small entrepreneurs in Chile.

Chile provides the context for an interesting case study for several reasons. First, local economic activity in Chile dropped significantly in 2020 because of lockdowns caused by the COVID-19 pandemic. In fact, a three-to-four-month lockdown had a similar effect on economic activity to a year of the 2009 great recession (Asahi et al., 2021). Moreover, unemployment rates increased from 8.2% in the first quarter to 10.3% in the fourth quarter of 2020 (INE, 2021). Second, roughly 20% of workers in Chile are self-employed or business owners (Cea et al., 2009). In this context, the study of the impact of the SBDC model Chile is attractive because small-business owners in emerging countries often do not adopt best practices in business that might be considered standard in most developed countries (McKenzie & Woodruff, 2014). Thus, SBDCs may be equipped to markedly improve the knowledge of strong business practices in these areas. Third, the Chilean SBDC network represents one of the most comprehensive resources outside the United States for small businesses. With 62 centers by the end of 2021, the SBDC program has already helped more than 50,000 small businesses. Fourth, Chile is the most innovative country in Latin America, reaching an overall 54th position in the Global Index of Innovation. Nevertheless, as a typical emerging economy, Chile focuses on primary products in which innovation has not played a very relevant role. Fifth, as emphasized by Olavarrieta & Villena (2014), most governments in Latin America have faced significant obstacles to increase innovation and entrepreneurship. Therefore, appropriate institutional, governmental, and business policies merit further evaluation to determine how their implementation can promote such innovation.

The layout of this paper is as follows: The next section reviews prior

theory and research on the impact of business advisory services and innovation on the performance of small businesses and derives the hypotheses to be tested. We continue by describing the research method used in this paper, including the description of the advisory service studied here, the survey, the data, and the summary statistics. Thereafter, we explain our empirical strategies and report the main results from cross-sectional and difference-in-differences regressions. The last section provides a conclusion.

## 2. Theory and hypotheses

Extant research into the impact of state-sponsored business advisory services on the performance of entrepreneurs and small businesses illustrate their positive effects on employment, sales, tax revenues, the number of businesses start-ups, and the rate of survival (Chrisman et al., 2002; Robinson, 1982; Chrisman, 1989; Chrisman & Katrisha, 1994; Chrisman, 2017; Chrisman, Gateway, & Donlevy, 2002). Given the considerable resources that governments invest in the provision of business advisory services, prior research has also considered whether business advisory services are cost effective (Robinson, 1982; Chrisman, 1989; Chrisman & Katrisha, 1994; Cumming & Fischer, 2012; Cumming et al., 2019). These cost-effective analyses are particularly relevant in emerging economies, where political pressures may exacerbate the need to show results associated with state-sponsored programs to maximize the benefits of public financing (Cumming, Leung, & Rui, 2015; Cumming, Rui, & Yu, 2016).

In the case of the United States, Chrisman (2017) studies the performance improvements of long-term clients who indicated the SBDC's assistance was beneficial in the 2015–2016 period. The results show that long-term SBDC clients generated 96,095 new full-time-equivalent jobs and approximately \$6.4 billion in sales, creating approximately \$22.11 in incremental tax revenues for every dollar expended on the program. International evidence also highlights the impact of publicly funded advisory services. Johan & Valenzuela (2021) measured the effectiveness of a state-sponsored business advisory program in Chile. They observed a positive effect on job creation and formalization and a reduction in unpaid family work.

Despite the rich body of research on the effects of public business advisory services on economic outcomes such as sales and job creation, our understanding of the channels through which these programs improve firm performance is still limited. The focus of this paper is not on the effect of publicly funded business advisory services on the performance of small businesses, but on how advisory services that induce innovation makes small businesses more resilient to crises.

### 2.1. Business advisory services and innovation during crises

The process of innovation forms new combinations of knowledge, resources, equipment, and other factors: In other words, it is a process where new ideas are generated and put into commercial practice (Schumpeter, 1934). Applied to entrepreneurship, innovation not only discovers opportunities for profit but also recombines resources to exploit those opportunities and generate new business ideas (Shane, 2012). In this study, we use the definition of innovation within a firm introduced by Gault (2018): “Innovation is simply the implementation of a new or significantly changed product or process.” The advantage of using a general definition of innovation is that it can be measured in a consistent way in all sectors.

Several studies identify the adoption of innovations as a key driver of firm growth (Löf & Heshmati, 2002; Löf et al., 2003; Janz et al., 2004; Van Leeuwen & Klomp, 2006; OECD, 2009; Álvarez et al. 2015). However, it remains less clear whether the effects of innovation on firm performance persist during times of crisis. Research suggests that crises can promote innovation under certain strategic responses (McKinley, Latham, & Braun, 2014; Wenzel, Stanske, & Lieberman, 2020). Specifically, a crisis may help businesses to think openly about new things

(Roy et al., 2018) and overcome organizational inertia (Uçaktürk et al., 2011). In an exploration of the persistence of UK firms' innovation investments, Archibugi et al. (2013) find that innovation tends to be more prominent during crises than during normal times.

Research shows that business model innovation can be triggered by external developments, such as new technologies (Pateli & Giagliis, 2005) and changes in the competitive environment (Clauss et al., 2019). However, innovation adoption by firms is difficult as businesses need to recognize which parts of their business model are more robust than others (Clauss, 2017). During crises, business advisory services can affect the decision-making framework, generating learning skills and new knowledge that trigger an optimal response to uncertainty (Koellinger, 2008). Thus, these services could operate as bridges that connect entrepreneurship to different organizations, consequently providing resources for developing creativity and new ideas when businesses are forced to adapt to make their businesses more resilient to crises (Breier et al., 2021; Kraus et al., 2020). Based on the latter arguments we test the following hypothesis:

**H1:** In an emerging economy, business advisory services can promote innovation during crises.

We exploit the COVID-19 lockdowns and the economic crisis in Chile to examine whether state-sponsored business advisory services promoted innovation during this period. Thus, we hypothesize that in emerging economies during times of crisis characterized by higher levels of uncertainty—such as that caused by the COVID-19 outbreak—access to business advisory services could benefit small businesses.

## 2.2. Innovation and firm performance during crises

Recent papers explore the responses of small and medium businesses to the economic crisis caused by COVID-19. Issah et al. (2023) show that founding generation-managed family firms only do better at strategic renewal as a response to crises when they have suitable managerial capabilities. Yunus, Ernawati & Tuniarti (2023) show that Indonesian batik small and medium enterprises experienced at least a 70% revenue reduction during the COVID-19 pandemic. At the same time, the study shows that the survived enterprises implemented retrenchment, persevering, and innovation strategies to achieve their short- and long-term goals. Klockner et al. (2023) identify five firms' tactical responses to the COVID-19 crisis, including operational, digitalization, financial, supportive, and organizational responses. The responses are different across firms: some firms leverage potential; other firms primarily mitigate risk. In analysis of 6,076 firms across 20 countries during the COVID-19 crisis, Shekarian, Ramirez & Khuntia (2022) find that flexibility through a combination of a change in a firm's product and service offerings, with movement to selling through a digital channel, comparatively increased firm sales. On these grounds, we hypothesize the following:

**H2a:** In an emerging economy, the negative effect of crises on sales is stronger for small businesses that do not innovate than for businesses that adopt new processes and/or products.

**H2b:** In an emerging economy, the negative effect of crises on job creation is stronger for small businesses that do not innovate than for businesses that adopt innovations such as new processes and/or products.

## 2.3. Innovation and performance of family businesses during crises

Next, we explore potential differences between the performance of family and non-family firms during the COVID-19 pandemic. Although the role of innovation in businesses has received increasing attention, the literature is ambiguous about the innovative and entrepreneurial behavior of family firms. Aspects such as distinctive incentives,

authority structures, and legitimacy norms that characterize family firms have specific advantages and obstacles that may significantly affect innovation (De Massis et al., 2013).

Numerous studies claim family that firms tend to possess high levels of entrepreneurship (Aldrich & Cliff, 2003; McCann et al., 2001; Rogoff & Heck, 2003; Zahra et al., 2004; Zellweger & Sieger, 2012). Moreover, family businesses tend to be less driven by short term objectives and give priority to the longevity of the business (Ward, 1997); therefore, these firms are often more willing to sacrifice short-term financial gains for the long-term survival of the firm (Lins et al., 2013; Minichilli et al., 2016). Finally, they can better mobilize their resources to maintain their activities more resilient (Amann & Jaussaud, 2012).

Crisis often involve unexpected challenges that require fast and decisive strategic decision-making (Heath, 1995; Ritchie, 2004). Family businesses have always been particularly good at reacting quickly, decisively, and creatively to acute situations during (Ward, 1997). They can also act faster as they are less likely to follow formal procedures during crises (Faghfoury et al., 2015). Importantly, family firms follow both family- and business-oriented goals (Chua et al., 1999). Llach et al. (2012) suggest innovation is crucial to the survival of many family firms. Family firms are more inclined to pursue product innovation due to their long-term orientation, patience, and persistence. Lumpkin et al. (2010) argue that the short-term orientation of family firms could benefit innovativeness by increasing the urgency to innovate.

Using data from family businesses in the accommodation industry during the COVID-19 pandemic, Crespo et al. (2002) find that family businesses that invest in operational marketing have a high expectation of surviving crises, family businesses that reduce their operational and labor costs have a low expectation of surviving crises, and the family businesses' adaptability is fundamental to their expectation of survival. This is leading to the following hypothesis:

**H3:** In an emerging economy, the benefits of innovation during crises for small family firms are stronger than for small non-family firms.

## 3. Research method

### 3.1. Institutional context: The small-business development center program in Chile

This study examines the small-business development center (SBDC) program, which was created in the United States in 1977 with the main objective of increasing employment, sales, and tax revenues. To achieve this objective, the program has provided current and aspiring small-business owners with free, one-on-one, long-term consulting advising and low-cost training services to their clients. The program covers general business skills and strategy training. It also considers client-specific problem-solving such as business-plan development, financial packaging, lending assistance, exporting/importing support, and disaster recovery assistance, among other issues. In the United States, the centers are hosted by state economic development agencies or leading universities and are partially funded through a partnership with the Small Business Administration (SBA).

The success of the US SBDC program encouraged the University of Texas at San Antonio (UTSA) to export the model globally. Since 2003, UTSA has been supporting and advising foreign governments on how to adapt, implement, and establish the SBDC program in their respective countries (Institute for Economic Development, 2017). So far, the program has expanded to countries in most regions of the world.<sup>1</sup>

<sup>1</sup> The other centers are in Africa (Tunisia), the Caribbean (Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Jamaica, Saint Kitts and Nevis, and St. Lucia), Central America (Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, and Panama), North America (Mexico), and South America (Argentina, Chile, Colombia, and Peru).

In Chilean SBDC program was established in 2014 with the SBDC Certificate Training that transferred the SBDC methodology to local professionals. It was funded by the Embassy of the United States in Santiago, Chile. Currently, the program is executed by SERCOTEC in partnership with UTSA. The first center in Chile opened in the city of Valparaiso in 2015. Since the beginning of Chilean program, centers throughout Chilean have rapidly expanded. With 62 centers by the end of 2021, the Chilean SBDC network had become one of the most comprehensive resources outside the US for small business. These centers have already helped more than 50,000 small businesses.

### 3.2. Survey

The empirical analysis conducted in this study is based on a novel, nationwide, large-scale dataset from the *Impact of the COVID-19 pandemic on small businesses* survey conducted in Chile. The survey was implemented online between December 14, 2020, and January 10, 2021. It contains current and retrospective information on the businesses serviced by the 62 SBDC centers in Chile. We believe the unique, large data collected by this survey enable us to overcome several problems to identify the effect of business advisory services on innovation adoption during the COVID-19 pandemic and explore whether innovation makes small businesses more resilient to crises. We focus on innovation and state-sponsored business advisory services as they became helpful tools to help small businesses to navigate the COVID-19 pandemic.

The survey questionnaire collected information on basic demographic characteristics, entrepreneurs' employment and educational history, industry and history of the business, and the enterprises' innovations status, sales, and number of workers, among other variables. The questionnaire also includes variables that allow us to examine the effects of the COVID-19 pandemic on small business. Finally, it includes questions related to strategies to cope with business problems, and the role of technology.

### 3.3. Main variables

The main variables employed in this study are divided into three groups: advisory services, innovation, and firm performance. The measure of advisory services includes a variable that goes from 0 to 3. The variable increase with the intensity/ of the advisory services to respond to the pandemic. This variable is practically uniformly distributed: 26% of the observations take the value of 0, 23% the value of 1, 27% the value of 2, and 24% the value of 3.

Measures of process and product innovation include indicator variables for the adoption of the following: (1) online sales through social networks, WhatsApp, or shopping cart; (2) delivery of goods and services; (3) use of the internet as the most frequent means of communication; and (4) new products and/or services different from the usual ones.<sup>2</sup> These variables are equal to 1 if the entrepreneurs adopted each of the innovations mentioned above during the pandemic, and 0 otherwise. Table A1 in the appendix reports the proportion of small business that adopted online sales, delivery, internet, and new products, the proportions of businesses that were evaluating to adopt the mentioned innovations, and the proportions of businesses for which it is not an option to adopt those innovations. Note that although the survey design is cross-sectional, the innovation variables allow us to capture innovation adoption (i.e., change on the level of innovation) during the pandemic as reported by entrepreneurs.

Finally, measures of performance include the enterprises' closure, sales (expressed in natural logarithm), and number of workers. For sales

<sup>2</sup> In this study, we take a general definition of innovation within a firm introduced by Gault (2018): "Innovation is simply the implementation of a new or significantly changed product or process."

and the number of workers, we have a panel dataset that covers four periods: September 2019, February 2020, June 2020, and September 2020. We created a dummy variable for the COVID-19 pandemic that takes the value of 1 for June 2020 and September 2020, and 0 otherwise.

Table 1 reports descriptive statistics of the main variables from our *Impact of the COVID-19 pandemic on small businesses* survey. The table reports that 51% of the businesses received intense advisory services to face the COVID-19 pandemic. Regarding innovation adoption, 78% of the interviewed entrepreneurs adopted the use of the internet as the most frequent means of communication, 63% adopted online sales of their goods and/or services, 50% adopted delivery of their sales, and 36% started commercializing products or services different from the usual ones. The table also shows 28% of the firms stop operating permanently during the pandemic. Finally, the table suggests the businesses in our sample are small. The average monthly sales are \$2,161,005 Chilean pesos (about US\$3,000 in USD of September 2019), and the businesses in our final sample have, on average, 2 workers (between 0 and 19 workers), excluding the owner of the business. Most enterprises in our sample are emergent businesses. Fig. A1 displays the distribution of the age of the businesses (in years) in our sample. According to our survey, 51 % of the surveyed businesses are 3 years old or less, 66% are 5 years old or less, and 83% are 10 years old or less.

It is important to emphasize we do not observe attrition on sales and number of workers of enterprises did not survive the pandemic. The enterprises that closed during the pandemic were also asked to answer the questions associated to sales and workers. Thus, as reported in Table 1, enterprises that did not survive the pandemic reported they did not have workers and did not experienced sales during the pandemic period. Finally, to rule out the possibility that a few "superstar winners" could influence the average statistics of entrepreneurs' performance (Rosen, 1981; Hamilton, 2000), we dropped all observations for which sales and the number of workers exceeded the sample mean by more than four standard deviations.

### 3.4. Sample and summary statistics

We collected current and retrospective information on the businesses of 2,042 clients of the SBDC program in Chile.<sup>3</sup> To illustrate the representativeness of our sample, Table 2 reports both the distribution of the population and the distribution of our sample by region. Our sample represents 8.26% of the 24,695 entrepreneurs who received business advisory services from a center of the SBDC program in Chile between August 6, 2019, and August 6, 2020. Although our sample is not random, we observe limited statistically significant differences between the

**Table 1**  
Descriptive Statistics: Main Variables.

Variable	Mean	Std. Dev.	Min	Max
Advisory services	1.49	1.11	0	3
Online sales	0.63	0.48	0	1
Delivery	0.50	0.50	0	1
Internet	0.78	0.41	0	1
New products	0.36	0.48	0	1
Closure	0.28	0.45	0	1
Sales (Chilean \$)	2,161,005	5,261,515	0	53,000,000
Number of workers	2.01	2.81	0	19

<sup>3</sup> Given that the effects we investigate in this study are mainly based on historical information from a survey that was not designed in the context of a specific experiment, potential Hawthorne effects are not a concern in our context. The Hawthorne effect is the supposed inclination of individuals who are the subjects of an experiment to improve the behavior being evaluated only because it is being studied and not because of changes in the experiment stimulus.

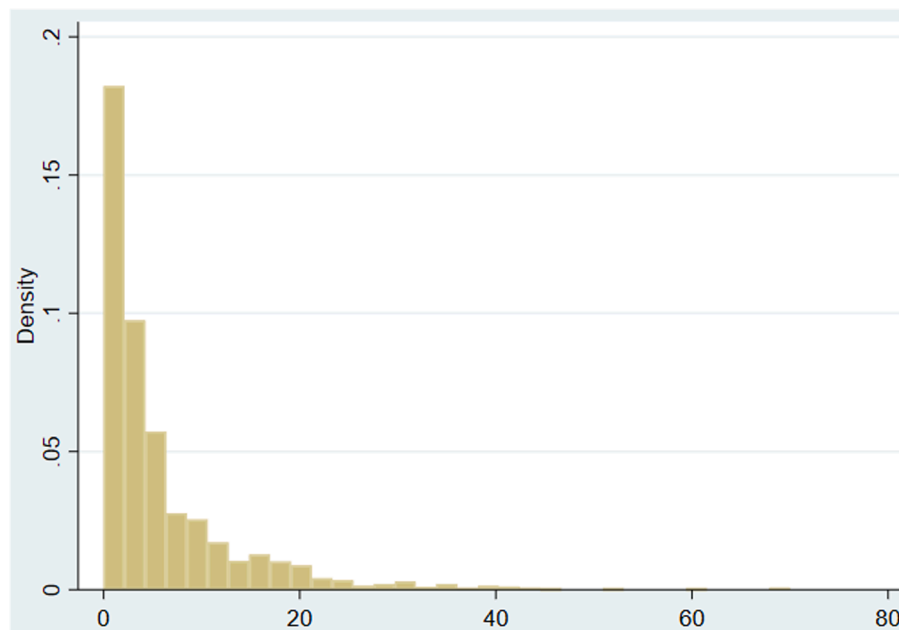


Fig. A1. Distribution Age of Businesses in the Sample, Notes: This figure displays the density of the age of the businesses (in years) in our sample.

Table 2  
Population Distribution versus Sample Distribution.

Region	Population		Sample	
	Clients	%	Clients	%
Arica y Parinacota	500	2	35	2
Tarapaca	802	3	52	3
Antofagasta	805	3	57	3
Atacama	872	4	59	3
Coquimbo	1,024	4	95	5
Valparaiso	2,358	10	219	11
Metropolitana	7,683	31	612	30
O'Higgins	1,708	7	127	6
Maule	1,280	5	120	6
Ñuble	576	2	53	3
Biobio	1,367	6	112	5
La Araucania	1,489	6	139	7
Los Rios	1,028	4	94	5
Los Lagos	1,425	6	116	6
Aysén	747	3	66	3
Magallanes	1,031	4	86	4
<b>Total</b>	<b>24,695</b>	<b>100</b>	<b>2,042</b>	<b>100</b>

Notes: This table reports the number and share of entrepreneurs in our population and sample, by region. *Impact of the COVID-19 pandemic on small businesses, Chile 2021.*

geographic distributions of the population and our sample. On the one hand, the share of entrepreneurs in the Metropolitan region represents 31% in the distribution of the population and 30% in the distribution of our sample. On the other hand, the share of entrepreneurs in Arica y Parinacota represents 2% in both distributions. Thus, our study presents nationally representative quasi-experimental evidence on the relationship between advisory services, innovation, and performance of small family and non-family business.

#### 4. Empirical analyses and results

In this section, we report the results from estimating cross-sectional and difference-in-differences regressions by ordinary least squares (OLS). We first report cross-sectional regressions for the relationship between business advisory services and innovation adoption, and for the relationship between innovation and enterprise closure. We then report

difference-in-differences regressions to estimate whether innovation mitigated the effect of the pandemic on sales and the number of workers.

We conduct difference-in-differences estimations to address potential endogeneity biases associated with macro- and time-invariant entrepreneur-level omitted variables. Empirical evidence has demonstrated that macro-level factors such as economic conditions, technology progress, and political risk play a crucial role in determining entrepreneurial performance (Thai and Turkina, 2014). We therefore posit that sales and job creation by small businesses are both driven by underlying entrepreneurs' traits, enterprise characteristics, and macro-economic conditions. One way to mitigate biases from these macro-level spurious drivers is to focus on sales and number of workers between innovative and non-innovative enterprises, before and during the pandemic. As long as the evolution of sales and the number of workers for both type of enterprises change similarly to their trajectory before the pandemic—the parallel-trends assumption—the difference-in-differences estimator will identify the causal effect of the innovation. This is a plausible assumption given the homogeneity of the enterprises in our sample (i.e., small entrepreneurs that are clients of the SBDC program). To further mitigate omitted-variable bias, we include consider entrepreneur fixed effects to provide more granular controls than a treatment dummy variable as in the traditional difference-in-differences approach. These entrepreneur-fixed effects control for all the observable and unobservable time-invariant characteristics of the entrepreneur and the enterprise.

Overall, our findings suggest the technical assistance provided by the SBDC program during the COVID-19 crisis in Chile promoted the adoption of innovations of process and product, and that these innovations mitigated the negative effects of the pandemic on enterprises' closure, sales, and number of workers.

##### 4.1. Business advisory services and innovation

We begin our analysis by examining the impact of the SBDC program on innovation adoption, following a cross-sectional linear probability model (LPM):

$$Innovation_i = \alpha + \beta Assistance_i + \gamma X_i + \epsilon_i,$$

where  $Innovation_i$  is a dependent variable of interest of enterprise  $i$  (adoption of online sales, delivery, the internet, and new products,

respectively).  $Assistance_i$  represents the business assistance received by the entrepreneurs on issues associated with innovation. We include a set of control variables in the vector  $X_i$ . Control variables include a set of dummy variables by age category, education achievement, activity of the businesses, and location (or “comuna,” which have a resemblance to U.S. counties).<sup>4</sup> Standard errors are clustered by comuna.

Table 3 reports the results on the relationship between advisory assistance and innovation. In accordance with H1, our findings indicate firms that received advising assistance related to innovation were more likely to adopt online sales (column (1)), adopt delivery of their products and/or services (column (2)), adopt the use of internet on their businesses (column (3)), and adopt new products or services (column (4)). These effects are highly statistically significant at the 1% level and economically meaningful. Thus, our results are consistent with the hypothesis that firms who are satisfied with the advisory programs are more likely to take risky ideas-even in crisis times-and generate new products, services, and processes to exploit business opportunities and enhance their competitive advantages.

#### 4.2. Innovation and firm closure

We then proceed to examine the relationship between innovation and firm closure during the pandemic, according to the following econometric model:

$$Closure_i = \alpha + \beta Innovation_i + \gamma X_i + \varepsilon_i,$$

where  $Closure_i$  is a dummy variable that represents whether the firm closed permanently during the COVID-19 pandemic. As in our previous set of regressions, we control for a comprehensive set of dummy variables associated with age, activity, education, and location.

The results, which are reported in Table 4, are consistent with H2 and prior research suggesting that innovation is a crucial element for small-businesses survival (Llach et al., 2012). Specifically, the results reported in columns (1) to (3) indicate the small businesses that adopted online sales, delivery of their products, and use of internet in their businesses during the COVID-19 pandemic were less likely to close permanently. These effects are highly statistically significant and economically meaningful. For example, we find a positive effect of innovation adoption between 13 (column (2)) and 20 (column (3)) percentage points.

**Table 3**  
Publicly Funded Advisory Services and Innovation.

	(1) Online sales	(2) Delivery	(3) Internet	(4) New products
Innovation advisory services	0.050*** (0.012)	0.057*** (0.013)	0.041*** (0.010)	0.058*** (0.014)
Observations	1,528	1,528	1,528	1,528
Adjusted R-squared	0.104	0.183	0.095	0.052
Age dummies	YES	YES	YES	YES
Activity dummies	YES	YES	YES	YES
Education level dummies	YES	YES	YES	YES
Comuna dummies	YES	YES	YES	YES

Notes: Numbers in parentheses are standard errors. Standard errors are clustered at the “comuna” level. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively. *Impact of the COVID-19 pandemic on small businesses, Chile 2021.*

<sup>4</sup> We have conducted linear probability models (LPMs) because estimating logit or probit models with many dummy variables may introduce an incidental parameter problem. However, all our findings are robust to estimations via logit or probit models.

**Table 4**  
Innovation and Firm Survival.

Closure	(1)	(2)	(3)	(4)
Online sales	-0.159*** (0.028)			
Delivery		-0.127*** (0.024)		
Internet			-0.197*** (0.032)	
New products				-0.032 (0.023)
Observations	2,042	2,042	2,042	2,042
Adjusted R-squared	0.117	0.107	0.120	0.091
Age dummies	YES	YES	YES	YES
Activity dummies	YES	YES	YES	YES
Education level dummies	YES	YES	YES	YES
Comuna dummies	YES	YES	YES	YES

Notes: Numbers in parentheses are standard errors. Standard errors are clustered at the “comuna” level. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively. *Impact of the COVID-19 pandemic on small businesses, Chile 2021.*

Although the coefficient associated with the adoption of new products is also negative, it is not statistically significant at standard levels of confidence.

#### 4.3. Innovation and firm performance

In this section, we explore whether firms that adopted innovation such as online sales, delivery, use of internet, and new products and/or services were less vulnerable in terms of sales and job creation to the pandemic. We identify the impact of the pandemic on sales and job creation between enterprises that innovated and those that did not innovate through the following difference-in-differences model, which exploits our panel dataset on sales and number of workers:

$$y_{i,t} = A_i + \beta Pandemic_t + \gamma Innovation_i \times Pandemic_t + \varepsilon_{i,t},$$

where  $y_{i,t}$  denotes the sales (in natural logarithm) and the number of workers, respectively, of enterprise  $i$  at time  $t$ .  $A_i$  is an entrepreneur (enterprise) fixed-effects vector that controls for all observable and unobservable time-invariant factors that directly affect the sales and the number of workers of the business.  $Pandemic_t$  is a binary variable equal to 1 if the observation corresponds to the pandemic period (i.e., June and September of 2020), and 0 otherwise.  $Innovation_i$  is a binary variable equal to 1 for the group of businesses that adopted innovation during the pandemic period, and 0 otherwise.  $\varepsilon_{i,t}$  denotes the error term.

The results are reported in the Tables 5 and 6, and they are consistent with H2. They suggest the COVID-19 pandemic negatively affected small businesses in terms of sales and employment, but innovation adoption mitigated the pernicious effects on sales and employment. All the effects are highly statistically significant and economically meaningful.

The results reported in Table 5 indicate firms that implemented online sales during the pandemic were less vulnerable to decreases in sales than firms that did not implement online sales (column (1)). The coefficients associated with the pandemic dummy variable and the interaction term indicate that the pandemic reduced sales by, on average, 2.92% in firms that did not implement online sales during the pandemic. However, this effect is mitigated in firms that did adopt online sales during the pandemic (i.e.,  $-0.983 = -2.920 + 1.937$ ). Firms that implemented delivery of their products and/or services during the pandemic were also less vulnerable in terms of sales drop than the firms that did not implement delivery (column (2)). The pandemic reduced sales by 3.178% in firms that did not implement delivery during the pandemic. However, this effect is not significant in firms that did start delivering their products (i.e.,  $-0.248 = -3.178 + 2.930$ ). Firms that started using the internet and social networks to promote their products and services during the pandemic were less vulnerable in terms of sales

**Table 5**  
Innovation and Firm Performance.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log(1 + sales)				Total workers			
Pandemic	-2.920*** (0.406)	-3.178*** (0.359)	-3.439*** (0.514)	-2.134*** (0.306)	-1.037*** (0.122)	-0.980*** (0.099)	-0.839*** (0.139)	-0.761*** (0.074)
Pandemic × Online sales	1.937*** (0.500)				0.490*** (0.149)			
Pandemic × Delivery		2.930*** (0.462)				0.507*** (0.129)		
Pandemic × Internet			2.220*** (0.572)				0.150 (0.151)	
Pandemic × New products				1.303*** (0.396)				0.120 (0.127)
Observations	4,813	4,813	4,813	4,813	4,896	4,896	4,896	4,896
Adjusted R-squared	0.462	0.473	0.462	0.459	0.749	0.750	0.747	0.747
Entrepreneur FE	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Numbers in parentheses are standard errors. Standard errors are clustered at the “comuna” level. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively. *Impact of the COVID-19 pandemic on small businesses, Chile 2021.*

**Table 6**  
Small Family and Non-family Business: Sales.

Log(1 + sales)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Small Non-Family Business				Small Family Business			
Pandemic	-2.026*** (0.670)	-2.041*** (0.539)	-3.314*** (0.877)	-1.516*** (0.458)	-3.349*** (0.467)	-3.785*** (0.439)	-3.491*** (0.640)	-2.413*** (0.349)
Pandemic × Online sales	1.423* (0.756)				2.206*** (0.584)			
Pandemic × Delivery		2.027*** (0.713)				3.453*** (0.581)		
Pandemic × Internet			2.692*** (0.956)				2.005*** (0.704)	
Pandemic × New products				1.098* (0.602)				1.410*** (0.509)
Observations	1,467	1,467	1,467	1,467	3,346	3,346	3,346	3,346
Adjusted R-squared	0.514	0.518	0.519	0.513	0.436	0.451	0.432	0.431
Entrepreneur FE	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Numbers in parentheses are standard errors. Standard errors are clustered at the “comuna” level. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively. *Impact of the COVID-19 pandemic on small businesses, Chile 2021.*

drop than their peers that did not (column (3)). The pandemic reduced sales by 3.439% in firms that did not start using the internet and social networks during the pandemic; the effect is smaller in firms that started selling online (i.e.,  $-0.831 = -3.439 + 2.220$ ). Finally, firms that started producing or offering new products and/or services during the pandemic were less vulnerable in terms of sales drop than the that firms did not (column (4)). The pandemic reduced sales by 2.134% in firms that did not innovate in products during the pandemic. However, this

effect is mitigated in firms that did adopt product innovations (i.e.,  $-0.831 = -2.134 + 1.303$ ).

Likewise, the results reported in columns (1) to (4) of Table 6 indicate small businesses had to reduce their number of workers during the pandemic. However, this effect was smaller in businesses that adopted online sales (column (1)) and delivery (column (2)). We do not find that the use of the internet and the introduction of new products and/or services significantly reduced the negative effect of the COVID-19

**Table 7**  
Small Family and Non-family Business: Employment.

Total workers	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Small Non-Family Business				Small Family Business			
Pandemic	-0.861*** (0.199)	-0.769*** (0.167)	-0.794*** (0.246)	-0.679*** (0.136)	-1.120*** (0.144)	-1.094*** (0.125)	-0.857*** (0.175)	-0.798*** (0.096)
Pandemic × Online sales	0.386 (0.260)				0.543*** (0.159)			
Pandemic × Delivery		0.335 (0.236)				0.606*** (0.147)		
Pandemic × Internet			0.217 (0.279)				0.119 (0.195)	
Pandemic × New products				0.176 (0.256)				0.099 (0.138)
Observations	1,499	1,499	1,499	1,499	3,397	3,397	3,397	3,397
Adjusted R-squared	0.744	0.743	0.743	0.743	0.752	0.753	0.749	0.749
Entrepreneur FE	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Numbers in parentheses are standard errors. Standard errors are clustered at the “comuna” level. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively. *Impact of the COVID-19 pandemic on small businesses, Chile 2021.*

pandemic on employment.

#### 4.4. Small family and non-family businesses

In Tables 6 and 7, we replicate our difference-in-differences regressions for sales and number of workers, respectively, after splitting the businesses of our sample into two categories: family and non-family. Table 6 shows that the effects of the pandemic and innovation on sales are more pronounced in family businesses than in small non-family businesses. This finding suggests small family firms are both more vulnerable to crises and benefit more from innovation. Table 7 shows that online sales and delivery mitigate the effect of the COVID-19 crisis on the number of workers only in the sample of small family firms. Thus, we observe that innovation does not appear to play a statistically significant role in mitigating the effect of the pandemic on = employment in non-family businesses. Overall, these results are consistent with H3, which suggests innovation is a crucial element for the survival of many small family firms.

### 5. Discussion and implications

The current research offers novel insight into the effectiveness of a publicly funded business advisory program in promoting innovation and mitigating negative shocks of crises in small businesses. We theorized about whether business advisory services could affect the decision-making framework of small firms, generating learning skills and new knowledge that trigger an optimal response to economic crises (Koelinger, 2008).

Using a sample of 2,042 Chilean small entrepreneurs during the economic crises caused by the COVID-19 pandemic, we examined the research question by estimating cross-sectional and difference-in-differences regressions. The findings suggest that businesses advised by the SBDC were more likely to innovate and less likely to during the pandemic. Although we find that these firms experienced an overall reduction in sales and employment during the pandemic, this effect was mitigated in businesses with innovative practices. Finally, we find these two opposite effects are more pronounced in small family businesses than in small non-family businesses, suggesting family firms are more vulnerable to crises and benefit more from innovation.

#### 5.1. Theoretical contributions

The study makes three main contributions the literature regarding training programs and innovation, which has received little attention on the crisis management literature. Extant research has focused mainly on the positive effects of business advisory programs on employment, sales, or jobs in small businesses (Chrisman et al., 2002; Chrisman, Hoy, & Robinson, 1987; Chrisman, 1989; Chrisman & Katrishen, 1994;

**Table A1**  
Innovation Adoption.

	(1) Online sales	(2) Delivery	(3) Internet	(4) New products
It is not an alternative for the business to adopt this innovation	17	33	29	6
The business was evaluating to adopt this innovation	20	17	35	16
The business adopted this innovation	63	50	36	78
	100	100	100	100

Notes: This table reports the proportions of firms that adopted, evaluated or were not able to adopt the following types of innovations (1) online sales through social networks, WhatsApp, or shopping cart; (2) delivery of goods and services; (3) use of the internet as the most frequent means of communication; and (4) new products and/or services different from the usual ones.

Chrisman, 2017; Chrisman, Gateway, & Donlevy, 2002). First, it explores the effect of publicly funded business advisory programs on innovation adoption during crises. Our results are in consistent with the arguments that emphasize that training programs, by using the learning-networks approach, could work as platforms for innovation and new ideas against environmental uncertainty (Cordoba & Cancino, 2020; Martin, Gözöbüyük, & Becerra, 2013).

Second, it examines the relationship between innovation and firm performance during crises. Our findings suggest that firms using business advisory services are more able to take risky ideas—even during times of crisis—and leverage that entrepreneurial spirit to generate new products, services, and processes to enhance their competitive advantages, sales, and employment creation.

Finally, this paper contributes to the literature by analyzing family firms’ entrepreneurialism via innovation behavior during crises. Our findings show that small family firms are both more vulnerable to crises, but they benefit more from innovation. Thus, the findings confirmed recent research that suggests family firms are more inclined to engage in product innovation due to their long-term orientation, patience, and persistence in their strategic work. Results are also in line with the argument that family businesses’ adaptability is fundamental to their expectation of survival.

#### 5.2. Practical implications

Understanding how innovation and public policies that promote their adoption mitigate the pernicious effects of crises on small businesses’ sales and employment has important implications. Our findings suggest that the assistance provided by the SBDCs is impactful because it increases small businesses’ resilience to crises by encouraging and enabling innovation adoption. Therefore, developing countries should help established small- and medium-sized enterprises adopt innovations and navigate crises by providing similar programs. In addition, our findings recommend that managers should prioritize investments in the skills of their workers, especially focusing on digital capabilities. According to this, firms should create an enabling context for developing innovative strategies such as online sales, delivery, and commercialization through internet channels.

#### 5.3. Limitations and future research

Despite the positive results, the study has some limitations related to design and measures. First, we used a dataset that only covers entrepreneurs that are (or were) clients of the program, which implies that surveyed entrepreneurs are inclined to participate in this type of program. Therefore, our results could be more robust if the survey included entrepreneurs that are not regular customers of advisory services public programs, addressing selectivity bias. Another limitation of the study is that our measure of the variable related to the business advisory services, which is the businesses’ perception of the program assistance during the pandemic rather than objective information of the quality of the assistance. Finally, because most businesses in our sample are small, emergent enterprises, it is not possible to explore the importance of longevity on innovation adoption and resilience to crises.

We believe the study of the relationship between longevity, innovation, and businesses performance is a promising avenue for future research. In addition, future research should include longitudinal methods for analyzing firm behavior during crises in the medium- and long-term. Finally, given that the innovation adoption is a decision of the entrepreneur, future research should explore mechanisms to mitigate potential biases associated with endogeneity.

### 6. Conclusion

This constitutes what we believe to be the first study of the role of the SBDC counselling activities and innovation adoption in mitigating the



pernicious effects of crises on small businesses' closure, sales, and job creation in a developing country. This program, being developed in the United States and implemented in a developing country like Chile, is noteworthy because its proven success in the United States leads us to ask whether the same success could be replicated in an emerging economy and whether its effects are visible in both normal and crisis times. Additionally, Chile provides an interesting case study to explore the impact of the COVID-19 pandemic on sales and job creation and the role of the SBDC program in mitigating such effects through the promotion of innovation. First, mobility restrictions and quarantine had a large impact on economic activity. Second, with 62 centers located in all regions of the country, Chile has the largest network of small-business development centers in an emerging economy.

The paper's major findings suggest that SBDC intervention can increase the likelihood of innovation and reduce the likelihood of closure during times of crisis. We also find that despite a reduction in sales and employment during the pandemic, the increased innovation in small- and medium-sized businesses helped to mitigate this effect. Finally, we find that these two opposite effects are more pronounced in family businesses than in non-family businesses, suggesting that family firms are both more vulnerable to crises and stand to benefit more from adopting innovations.

The evidence presented in this study suggests the assistance provided by the SBDCs can increase small businesses' resilience to crises through innovation adoption. The results provide key evidence reinforcing how state-sponsored business advisory services make an important contribution to the economy by helping established small and medium-sized enterprises adopt innovation and navigate crises, because the costs of crises may be tempered by the adoption of online sales, delivery, the internet, and new products.

#### CRediT authorship contribution statement

**Juan Acevedo:** Conceptualization, Data curation, Writing – original draft, Methodology. **Iván Díaz-Molina:** Conceptualization, Data curation, Writing – original draft, Methodology. **Sofía Johan:** Conceptualization, Data curation, Writing – original draft, Writing – review & editing, Formal analysis, Methodology. **Patricio Valenzuela:** Conceptualization, Funding acquisition, Data curation, Writing – original draft, Writing – review & editing, Methodology.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Data availability

Data will be made available on request.

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