



“Characterization of Small Family Business in Chile and Survival During COVID-19”

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Main Highlights:

1. Within Chile's SMEs, almost half are family businesses (literature).
2. Small family businesses face more financial and administrative barriers than small non-family businesses, which affect their business decisions and practices (literature and results).
3. The probability of permanent closure during Covid-19 was similar between family and non-family SMEs (results).
4. There is a positive correlation between better business practices and entrepreneurial survival in the first year of the pandemic (results).
5. Small family and non-family businesses had similar levels of mental health during the first six months of the pandemic, a variable that influenced business practices in 2020 (results).

Abstract

This study contributes to the recent research on the effects of the COVID-19 pandemic on SMEs of a developing economy like Chile's. The purpose of this study is to examine the impact of financial literacy, business practices, and mental health on survival differences between family and non-family business during the first year of the novel Covid-19. Given the economic importance of family SMEs and the struggle to keep the business running despite the confinement regulations, the research focuses on finding significant differences between these types of organizations, and investigating how these differences correlate to firm performance (survival) within a context of high economic uncertainty. Using the novel study *"Impact of the COVID-19 pandemic on small businesses, Chile 2021"*, the results suggest that family SMEs have lower levels of financial literacy and business practices than non-family SMEs. Nonetheless, family firms do not seem to be more vulnerable and prone to closure in times of crisis.

Key words: *Family SMEs, COVID-19, Financial Literacy, Business practices, Mental health.*

1 Introduction

Small businesses are one of the main actors of national and regional development in many countries (Keskin et al., 2010). Recently, due to the pandemic measures and the economic consequences they left, many Microenterprises and Small and Median Enterprises (MSME) were forced to close, especially in Chile because of the severe lockdowns¹ that limited market access. Besides, within the business field, there is a specific type of organization that stands out for its unique characteristics and relevance to the economy of any country: family firms (Arrubla, 2016). For these reasons, the study will focus on the survival of Chilean SMEs in the context of the novel Covid-19, and how the pandemic may have had a different effect on family businesses compared to non-family ones. More specifically, this investigation delves into how financial and managerial decisions impact MSMEs survival, and how initial levels of financial literacy, business practices, and mental health in family and non-family firms can correlate to this outcome through these channels.

The empirical evidence about the importance of entrepreneurship in economic growth and job creation is vast and extensive (Acs and Szerb, 2007; OECD, 2017). MSME represent approximately 99% of all firms in OECD economies, and on average account for around 70% of jobs and 50% to 70% of value creation. For this reason, many local Governments begun to plan public policies to promote this sector. For instance, Chile introduced the program Technical Assistance Agency of the Ministry of Economy (SERCOTEC) back in 1952. This project, based on the model of the United States for the development of SME, aims to provide microentrepreneurs assistance in sales growth, capital access, and adequate business practices (Johan and Valenzuela, 2021). The main problem is that in many emerging economies, microentrepreneurs lack the financial and management skills to enforce the business practices of the enterprises from more developed countries, and must face cash flows and management issues (McKenzie and Woodruff, 2014; Johan and Valenzuela, 2021).

On the other hand, SME seem to be especially vulnerable to global crises², and the COVID-19 pandemic wasn't the exception. According to The United Nations (2022), micro-enterprises account for 96% of all closing firms. A case in point is Chile, where COVID-19 had a strong impact on SMEs' employment level, and 80% of SMEs have declared to have serious solvency problems due to the social distancing and confinement regulations. How many will survive is a question yet to be answered. Consequently, SERCOTEC and the Center for Public Systems of the University of Chile started a study to evaluate the impact of COVID-19 on the small companies of SERCOTEC's Business Centers named the "*Impact of the COVID-19 pandemic on small businesses, Chile 2021*". Here they collected recent data on microentrepreneurs and their businesses during the first year of the pandemic.

Given that family firms are the leading form of business organization in Latin American countries³, and almost half of Chilean SME are 'family business'⁴, I want to focus on three possible barriers they faced meanwhile the novel COVID-19: absence of financial literacy, good business practices, and good mental health. This will provide important information for future policymakers, for instance, for a developing project called "Manos a la obra", a program which involves SERCOTECs

¹In Chile, for those breaking quarantine and curfew rules, a 5-year prison sentence could be imposed (United Nations, 2022).

²OECD, (2017)

³OECD, (2009)

⁴Ministry of Economy, development, and tourism, (2017).

clients and the main financial/administrative problems they had to face during the pandemic. This project consists of a financial education course for microentrepreneurs implemented by the Faculty of Economics and Business of the University of Chile, the Association of Banks and Financial Institutions (ABIF), and SERCOTEC's business centers. The main objective is that microentrepreneurs will be able to access financial tools for the successful development and management of their businesses, assessing one of the main problems/barriers this type of business faces.

Even though, SMEs play a very important role in developing economies like Chile because they promote regional growth and a healthy business climate (Kesk'in et al., 2010), a remarkable portion of these firms perform badly due to factors like the absence of financial literacy and good business practices (Johan and Valenzuela, 2021). Therefore, many governments have been focusing on developing public policies toward promoting and assessing entrepreneurs and MSME (Acs and Szerb, 2007; Cumming, 2007). That is why SERCOTEC implemented the advisory services program from the United States Small Business Development Center (SBDC) in Chile back in 2014. The project was funded by the Embassy of the United States, and executed by SERCOTEC in association with the University of Texas at San Antonio (UTSA). The first center opened in Valparaiso in 2015, and by 2018 there were 51 centers along the Chilean territory. Hence, the Chilean SBDC network is one of the largest outside the US and has been able to help more than 20,000 small firms (Johan and Valenzuela, 2021). The small business developing program offers economical training (for example the forthcoming financial education course 'Manos a la obra') and complimentary one-on-one advisory services for the microentrepreneur. It covers topics from general business skills to disaster recovery help.

The investigation targets one specific group of SME: family business. As mentioned above, a big portion of the enterprises in Chile are family businesses. To put this in numbers, family firms represent almost half of all Chilean firms (48%) and SMEs (49%)⁵. Given the prevalence of family firms in the economy in general, recent research has focused more and more on characterizing this type of organization, and distinguishing what makes them different from non-family businesses (Zellweger et al. 2010). The main question they have is how the family presence can affect business decisions and performance.

1.1 Research objectives

The literature on family business supports that this group of firms differ in many aspects from non-family business, for example in ownership, management, succession, etc. However, one important component of family business, that goes beyond the level of family involvement, is that their behavior varies from the one of non-family firms, meaning that they make different business decisions (Chua et al., 1999). This element of family firms, also known as "*family essence*", could affect the cost of capital, the levels of professionalization, and the innovation process (McConaughy, 1999; Stewart, 2011; Classen et al., 2014). In other words, previous studies show that this "*family essence*" can influence the adoption of *family-centered-non-economic goals* (Chrisman et al., 2012), explaining why they perform differently than non-family business (Bennedsen et al., 2019).

Therefore, the study measures how the first year of COVID-19 affected small firms' survival (closing rate) in Chile, distinguishing between family and non-family businesses. The main purpose is to

⁵Ministry of Economy, development, and tourism, (2017).

compare if family firms struggled more keeping their business running than no-family firms, and if this can be explained by differences in the levels of financial literacy, business practices, and mental health. For this, I am using the unique dataset from the *“Impact of the COVID-19 pandemic on small businesses”* survey in Chile, which gathers information of 2,042 small entrepreneurs and family businesses. It was implemented online between December 14, 2020, and January 10, 2021, and includes information on the businesses of the clients of the SBDC program. Specifically, it contains questions about some main challenges microentrepreneurs had to face during the first year of COVID-19, including financial practices of the administrators, business practices, and mental health. Valenzuela et al., (2022) found that family firms from this study were more vulnerable during COVID-19 (in sales and workers), thus they benefited more from innovation.

To begin with, according to many experts on microfinance, the level of financial literacy is a crucial indicator of people’s ability to make financial decisions (Lusardi, 2019). The Organization for Economic Cooperation and Development (OECD) defines financial education as *“The process by which financial consumers/investors improve their understanding of financial products, concepts, and risks and, through information, instruction and/or objective advice, develop the skills and confidence to become more aware of financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being”*⁶. Hence, financial literacy can be understood as the knowledge of financial concepts and risks, and the motivation and confidence to make effective financial decisions.

Moreover, many studies have shown that financial literacy is positively correlated with important outcomes like retirement planning, retirement wealth accumulation, and access to debt (Lusardi and Mitchell, 2007a, 2008a, 2009, 2011; Behrman et al. 2010; Alvarez and Ruiz-Tagle et al. 2016). These investigations also study some patterns of the financial knowledge distribution that repeat all over the world, for example a gender gap, an inverted U with aged, and a negative correlation between vulnerable groups and financial literacy. Stated the importance of financial literacy on financial decision-making, and the fact that financial skills are a key driver for good business practices and firm growth (Anderson and McKenzie, 2020), the study explores if there were significant differences in the initial levels of financial literacy between family and non-family, and whether this had an impact on performance (survival) differences during the first year or COVID-19.

Besides, the OECD (2017) stated that a big challenge that SMEs face is productivity and innovation, particularly small family business. This is due to skills shortage, poor management practices, and lack of an appropriate corporate governance structure. The management limitations include financing constraints, regulatory barriers, tax and administrative burden, others. For that reason, another variable that the study investigates is ‘business practices’, and examines whether differences in this measure can explain survival variation between family and non-family businesses during the first year of the pandemic.

Lastly, the investigation aims to study how deterioration in the levels of mental health during the pandemic correlates to the survivorship of the small business. Furthermore, the interaction between the family and the business is a key element to determine sustainability of family firms. As stated in previous research, *“Families make a substantial contribution to family businesses”* (Olson et al., 2003). Nevertheless, authors have pointed out the reciprocal nature of this relationship between

⁶OECD, (2017)

family dynamics and business performance. However, Olson et al., (2003) found that the effect of the family over the business was greater than the other way around. Because of this, another research objective is to inquire into the mental health of the small family business, and see how this correlates with the chances of survival of the company during the first year of COVID-19.

To summarize, in general terms the study examines the survivorship (permanent closing rate) of Chilean micro-enterprises during the first year of the pandemic, and explores whether family businesses faced more barriers than non-family businesses to keep the business open during this time. According to the idea that family SMEs lack management and financial skills, I would expect them to have a lower survival rate than non-family SMEs during an economic crisis like this pandemic. As well, the research aims to investigate if differences in performance or sustainability between family business and non-family business could be partially explained by variation in levels of financial literacy, business practices, and mental health between both groups.

This study contributes to the literature in at least three ways. First, it adds new information to the recent branch of empirical evidence on the effects of COVID-19 on the performance of small business, in the context of a developing economy. Second, it explores how specific barriers within this context, particularly financial literacy, good business practices, and mental health, could explain differences in the probability of closure between family and non-family SMEs. Third, it digs into the mechanisms behind these predictors, aiming to explore the details of how differences in the causal channels could affect the final outcome through direct and indirect effects.

The paper proceeds as follows. The next section continues with the contextualization of the problem by reviewing the literature on specific behaviors of family businesses. Then, the third section displays the empirical strategy, focusing on the main variables and mechanisms, and then analyzes the data. Section four displays a characterization of family and non-family SMEs with sociodemographic variables, performance indicators, the set of variables used to construct the main variables (indices), and some important correlations between these. Then, section five presents the main results for the multivariate analysis to test the hypotheses raised, which includes exploring whether financial literacy, business practices, and mental health had an impact on the survivorship of the business during the first year of Covid-19, and if such effects were significantly different for family firms. The last section concludes the investigation, discussing the main findings, limitations of the research, and implications for public policy.

2 Literature review

This section will deepen in the problem discussed earlier in the introduction. SMEs clearly play an important role in the economy, but why are family businesses different from non-family businesses? Did Covid-19 actually have a different impact on survival between both groups? Could differences in financial literacy, business practices, and mental health explain this? From the definition of family businesses, specific characteristics and behaviors can be proposed for this type of business in the context of the pandemic.

Definition of family business

As mentioned earlier, SMEs make a major contribution to growth and job creation in most countries, and family business compose the grand majority of these. The theoretical and empirical

evidence suggests that family businesses behave and perform differently than non-family businesses (Chrisman et al., 2012). In a sense, the literature suggests that pursuing family interests could have costs in terms of economic performance (Chrisman et al., 2012). According to this, family firms are usually more vulnerable due to financial constraints and the family orientation of the organization (Kraus et al., 2020). However, the results are mixed and/or inconclusive, probably due to divergences in measures of family involvement and performance (Chrisman et al., 2012). In general, family business prefer long-term survival than short-term performance (Lins et al., 2013). Still, do Paço et al., (2021) points out the importance of improving survivorship among these firms, as they present serious difficulties with planning succession.

On the first hand, part of the literature finds that, in general, family businesses do not perform better than non-family businesses (Chua et al., 1999). Family SMEs are less formal, grow less, and have lower labor productivity than no-family SMEs (Kotey, 2005; Classen et al., 2014). On the second hand, some studies find better results for family SMEs in outcomes like profits and propensity to invest in innovation (Kotey, 2005; Classen et al., 2014). For example, a recent study about the effects of Covid-19 also shows that family firms go through a “preference reversal” behavior towards a more innovative one within the context of an economic crisis (Leppaaho and Ritala, 2021).

In the family business literature, there are many definitions for this type of organization, and there is still not much unanimity on this topic. For this particular study, I emphasize in using a generic definition, which integrates other more specific definitions previously used in other studies, in order to reduce the noise of the variable used to classify family businesses in the survey. Chua et al., 1999 proposed a theoretical definition for family business, which in general overlaps with other operational definitions (like management and ownership of the business). In the theoretical definition, the particular feature of these types of firms is their ‘essence’, that translates to the presence of the family in the vision of the company and a clear intention of passing it to the next generations. In other words, the formal definition contemplates that *“The family business is a business governed and/or managed with the intention to shape and pursue the vision of the business held by a dominant coalition controlled by members of the same family or a small number of families in a manner that is potentially sustainable across generations of the family or families.”* (Chua et al., 1999). Thus, the family essence influences business decisions, which has an impact on performance.

In addition, this investigation studies whether the Covid-19 pandemic had a differentiated effect between small family and non-family business through financial literacy, business practices, and mental health. Most previous studies on family SMEs focus more on finding statistical differences in performance between family and no family SMEs, rather than discovering the channels that make family SMEs different from no-family SMEs (Gils et al., 2004). For this reason, I intend to study both: potential channels for a differentiated effect and performance (survival) outcomes. The idea behind this is to test whether there were any initial differences in the explanatory variables between groups (family and non-family business) and then correlate these results to the final outcome, attempting a first approach to the direction and magnitude of the causal effect of the selected channels. This will be useful to expand our knowledge of the barriers that family SMEs face during an economic crisis.

According to the definition of family business selected for this paper, there could be many channels that explain the different performance or continuity of family firms versus non-family firms. How-

ever, the focal point of this research is to find differences in survival's predictors between family and non-family SMEs for the first year of COVID-19, not the causal channel through which the involvement of the family makes the organization behave differently. Thus, the first step should be to compute and compare results on the explanatory and outcome variables between groups. The three main channels are financial literacy, business practices, and mental health. For many reasons discussed below, I expect that different levels of these variables can partially account for some variance (if there is any) in the performance of the microentrepreneurs. To test this, I start by correlating the intermediate results to the survival outcomes, and then follows a multivariate analysis that includes all the variables already studied.

In the introduction, I shared some main reasons to why I chose these channels to study the effect of Covid-19 on SMEs survival. In the first place, according to the United Nations (2022), Chile was one of the countries most affected by Covid-19, leaving most of its SMEs with solvency issues and problems to stay open. This gives scope to explore if the impact of an economic crisis like COVID-19 is different for family businesses than non-family businesses, given the unique behavior and business decisions they make. In spite of the mixed evidence that exists on small family business performance (Classen et al., 2014), Krauss et al., 2020 describes how family businesses are usually more vulnerable due to their family-oriented position and their financial constraints. For these reasons, I would expect Chilean family SMEs to be more vulnerable and face extra financial barriers in time of crisis.

In the second place, we focus on financial literacy because of its importance on financial decisions, which could impact both business practices and the survival of family businesses. According to McKenzie and Woodruff (2014), business practices of microentrepreneurs in developing economies are not as accurate for business growth and performance as the ones implemented by microentrepreneurs in most developed countries. Therefore, I await that business practices explain a lot of the variation in the survival rate of microentrepreneurs, specially in a time of economic uncertainty. I also expect family business to reveal lower levels of financial literacy and business practices, as they present more limitations on financial and management skills (OECD, 2017).

In the third place, there are statistics on the economic consequences that the pandemic left, but there is also evidence on how the isolating measures left psychological damage on the society (de Lima et al., 2020). This provides a reason to think that this variable could have had an impact on the survivorship of microentrepreneurs during Covid-19, and also an opportunity to study if family businesses have different levels of mental health than non-family business during crisis like this one. In line with the idea that conflict is prone to arise in family business during times of organizational change, thus affecting the firm (Harvey and Evans, 1994), I expect lower levels of mental health in small family business. The argument behind this is that a crisis like Covid-19 leaves the owners of the family business having to endure with both personal and business losses (Runyan, 2006). Furthermore, if the microentrepreneur faces financial and management constraints, the stress of overcoming a pandemic could be worse, as they lack the mechanisms to do so. This could partially explain differences in survival between family and no-family firms.

3 Empirical strategy and Data

The research objectives discussed above can be summarized in the two hypotheses that the study seeks to test:

H1: In an emerging economy, family SMEs lack financial and management skills (financial education and good business practices). These limitations negatively impact their performance (continuity).

H2: In times of crisis, the mental health of family SMEs deteriorate. This impacts negatively on their performance (continuity).

It is important to highlight the theoretical mechanisms behind the variables selected, which are also going to be tested. First, the channel for financial literacy and business decision-making can be summed up as follows:

Note 1: Financial education has an impact on \rightarrow Financial decisions, which has an impact on \rightarrow Business practices, which has an impact on \rightarrow Performance and sustainability of the firm.

For the effect of mental health on survival, the causal channel suggested is the following:

Note 2: Financial and management constraints have an impact on \rightarrow Mental health of family business owners, which has an impact on \rightarrow Business practices, which has an impact on \rightarrow Performance and sustainability of the firm.

Therefore, I propose that both, financial literacy and mental health had a direct and indirect effect on the survivorship of SMEs during the first year of the Covid-19 pandemic. First, levels of financial literacy have an indirect effect through business practices, since it affects financial decisions and constraints. Then, the financial decisions affect the business practices, while the financial constraints also affect the levels of mental health during the pandemic. This predictor also has an indirect effect through business practices. Given that the indirect effects of these two channels are through business practices, this explanatory variable should have the largest direct effect on the performance indicators of the firm. This would imply that there is a strong correlation between business practices and company survival, and, furthermore, between business decisions and levels of financial education and mental health.

Hence, the empirical investigation begins with a study of the levels of financial literacy, business practices, and mental health of the sample, and then compares these results across family and non-family business. It also explores whether there were any significant differences in performance indicators, like closing rate and size of the business.

The database used was assembled by SERCOTEC and the Center for Public Systems of the University of Chile for a study entitled "*Impact of the COVID-19 pandemic on small businesses*". The online survey took place nationwide between December 14, 2020, and January 10, 2021, and contains individual observations of the microentrepreneurs from SERCOTEC's centers and their business during the first year of the pandemic. The questionnaire includes socio-economical characteristics of the owners, business history, financial literacy of the administrator, business performance (sales, innovation, workers, and survival), business practices, specific constraints they faced in 2020, and

their mental health.

Since it was a non-probabilistic voluntary survey, not everyone answered it or finished all the questions, so there have an important number of missing values. From the 2,042 entrepreneurs that participated in the study, only 1,203 answered all the questions needed to estimate the differentiated effect of Covid-19 through the financial literacy, business practices, and mental health channels. Therefore, I lost a little over 800 observations in order to have complete information of the observations I kept. Besides, Table 11 and 12 in the Annex displays summary statistics for the geographic distribution of all SERCOTEC clients across the country, and the ones from the sample collected for the *“Impact of the COVID-19 pandemic on small businesses”* study. It shows that SERCOTEC had around 24,695 clients across the country, and only about 8.3% answered the survey. Nonetheless, the statistics show that the sample’s geographic distribution is almost identical to the population’s geographic distribution, illustrating the national representativeness of the sample and thus the results.

Main variables

The main dependent variable is the survival of SMEs during the first year of Covid-19. The survey offers two measures for this outcome: permanent and temporal closure of the firm. Moreover, the questionnaire asks if the firm had to temporarily (permanently) close meanwhile of the pandemic, which allows measuring (two) closing rates. Both questions can be answered as Yes/No/Does not apply. Another performance indicator is the amount of total workers during COVID-19, which can impact firms’ profits and growth (Hall and Weiss, 1967b).

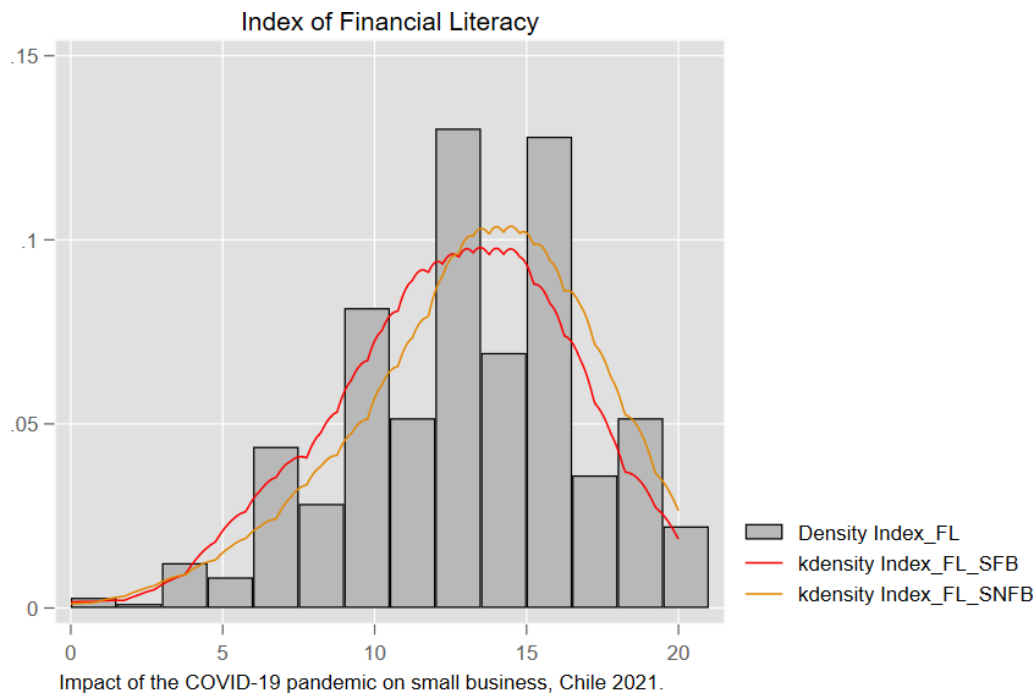
The channels that the study focuses on can be divided into three groups of explanatory variables: financial literacy, business practices, and mental health. Each of these variables can be measured by several questions from the survey, and most of them are displayed in the tables discussed in the next Section. To encompass all the questions that measure financial literacy, business practices, and mental health of the entrepreneur, I created an index for each of these variables. Each index is a sum of the points that I assigned to each answer of the questionnaire. For more details see Appendix A, B, C. For all three indices, higher (lower) scores represent higher (lower) levels of the explanatory variable⁷, which should negatively (positively) impact the closing rate of the firm. Nonetheless, the scores are not comparable across indices. Besides, the Financial Literacy Index (FLI) is static (only measured once), while the Business Practices Index (BPI) and Good Mental Health Index (GMHI) are dynamic (measured twice, before/during the pandemic). For the BPI, ‘before’ computed practices prior to 2020, while for the GMHI ‘before’ measured levels of mental health for the first six months of the pandemic.

For the first index, the sample distribution concentrates on the mean score of the FLI (12.8). This means that, on average, small businesses’ administrators record, project, and separate income and expenses, do not have problems with financial literacy, and have trust in the financial system, *‘regularly’*. The two lines in 1 represent the Kernel density estimations for both groups. We can see that the distribution of Small Family Business (SFB) is a little more to the left than that of Small Non-Family Business (SNFB), showing that in general they have lower levels of financial education. More specifically, SFB have on average a FLI of 12.6, while the average for SNFB is

⁷For example, higher scores for the GMHI imply that the entrepreneur has higher levels of mental health.

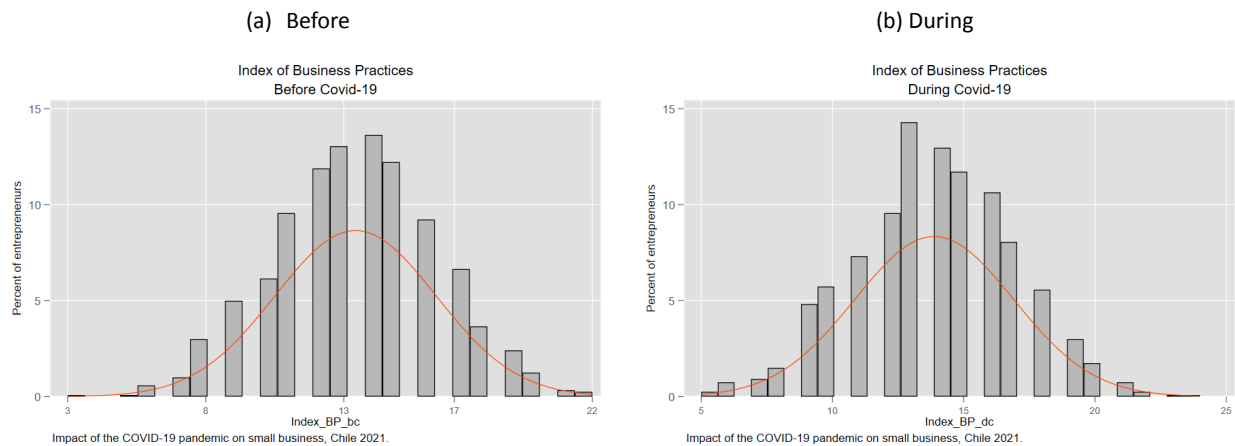
13.3. This shows a difference of almost 0.7 points, which, according to the estimations in Table 1, is significant at 5%. According to **H1**, this negative difference in the levels of financial literacy of SFB should negatively impact their chances of survival during the pandemic.

Figure 1: Sample Distribution of the Financial Literacy Index



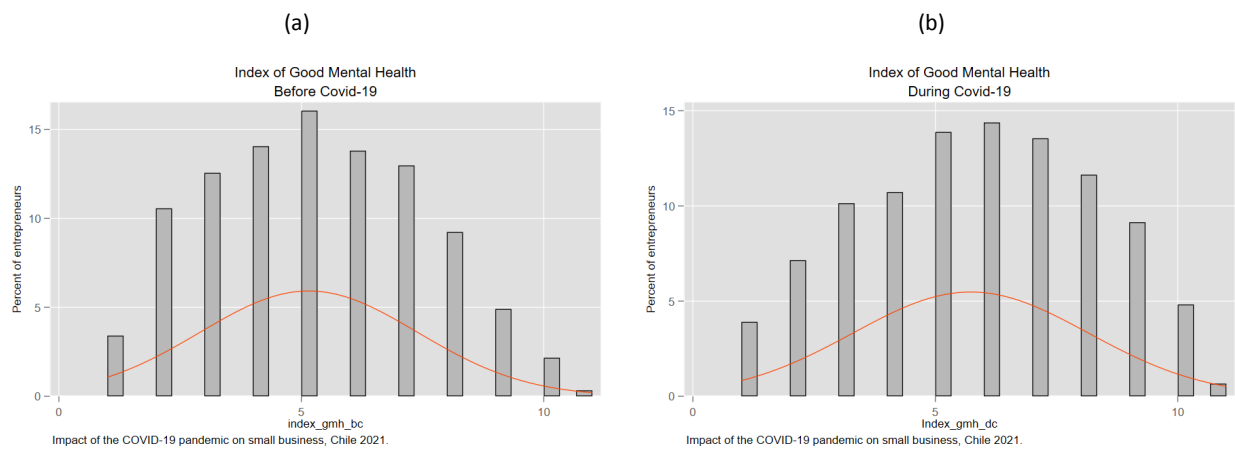
For the BPI distribution, the graphs in Figure 2 show that the media moved around half a point over the course of 2020. This indicates a positive correlation (in the short run) between the Covid-19 pandemic and better business practices in small business. This stipulates that in the short run, small businesses adapted very quickly to the pandemic health regulations. In general, the sample concentrates around the average score of the BPI (14 points). This means that, on average, small businesses do around half of the *good business practices* considered in the BPI (Append B).

Figure 2: Sample Distribution of the Business Practices Index



In the case of the GMHI the median also moved around half a point during 2020. This means that in the short run, there is a positive correlation between the pandemic (it's regulations) and small businesses' mental health. In other words, small entrepreneurs were more stressed before they had to deal with the Covid-19 disease and the health regulations that followed. This in part could be related to the fact that the pandemic felt more like a 'continuation' of the political and social crisis experimented after the 'Social Burst' in October 2019 (Heiss, 2020). This result can be due to variations in mental health level of family business, non-family business, or both, so nothing can be concluded about **H2** yet.

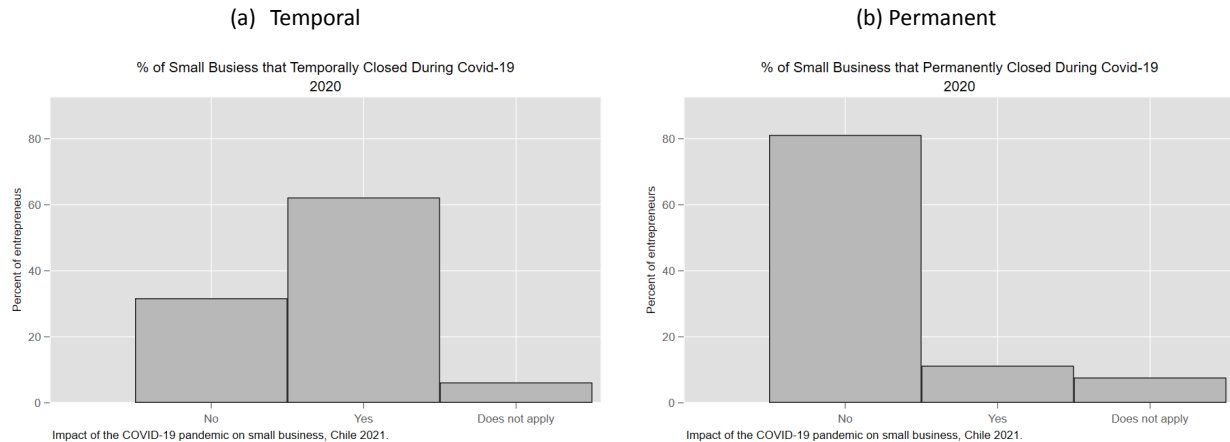
Figure 3: Sample Distribution of the Good Mental Health Index



For a first approach, I evaluate the performance of small firms during the Covid-19 pandemic using outcomes such as the current state of the business, permanent and temporal closure during 2020, and total workers (size of the business). Figure 6 in the Annex shows that almost 80% of the businesses in the sample were open at the time of the survey. But this measure of survival does not isolate the COVID-19 effect, as it considers those SMEs that closed for other (more) reasons

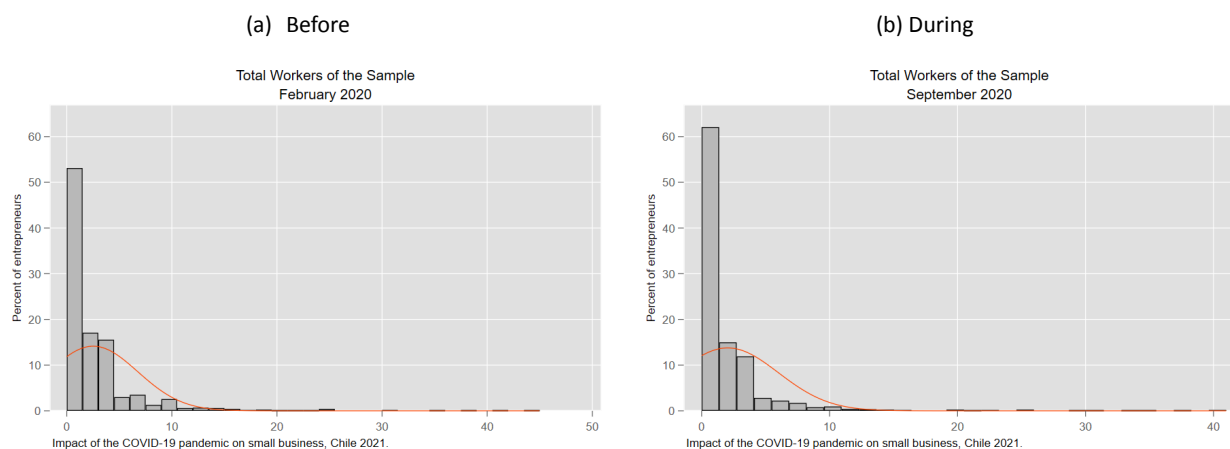
than the pandemic. Figure 4 shows that over 60% of small businesses had to temporarily close in 2020, while a little less than 20% had to permanently close. In this study, the focus point will be on the impact of the COVID-19 pandemic on the permanent closing rate, as the temporal closure considers other external factors not necessary correlated to financial literacy or business practices, like the health regulations and constitutional state of exception imposed in Chile (Heiss, 2020).

Figure 4: Sample Distribution of the Closing Rate During the First Year of Covid-19



According to Figure 5, before COVID-19 a little over 50% of the ventures had only one worker besides the owner, and during the pandemic that number raised to a little over 60%. This illustrates that in the short run, the pandemic had a negative correlation with the number of workers, or the size of the small business.

Figure 5: Sample Distribution: Total Workers



To examine what the data says about the hypothesis raised, Table 1 displays the results just analyzed, differentiating between SFB and SNFB. Here it shows that SFB had significant lower levels of financial literacy and business practices, before and during the COVID-19 pandemic. This goes

in line with **H1**. Nonetheless, the difference in the BPI is not significant during COVID-19, indicating SFB had a better upgrade in their score than SNFB. Finally, as concluded before, there is no significant difference between SFB and SNFB in their levels of mental health during the pandemic. This does not support **H2**.

To test whether SFB were more vulnerable during Covid-19, the results show there are no significant differences in the closing rates between both groups. This goes against **H1**, since lower levels of financial education and business practices do not seem to correlate with significant differences in firm survival. Nevertheless, there are significant differences in the total workers during the pandemic, demonstrating that SFB loosed more workers (size) than SNFB between February 2020 and September 2020, which could have an impact on revenues and survivorship of the firm.

Table 1: Differences in Main Variables Between Family and Non-Family Business Before and During Covid-19

Main Variables	Before			During		
	SFB	SNFB	ttest	SFB	SNFB	ttest
Financial Literacy Index	13.27 12.62 (3.84)	(3.92)	-2.51** (0.01)	-	-	-
Business Practice Index	13.74 (2.95)	-1.98** (0.05) -0.17 (0.87)	13.83 (3.03)	14.15 (3.02)	-1.60 (0.11)	-0.04 (0.97)
Good Mental Health Index	5.15 (2.21)		5.73 (2.44)	5.73 (2.40)		
State of the Business			Open	-	-	-
			Temporarily Closed	-	-	-
			Permanently Closed	2%	3%	-
Closing Rate 1 (% Permanently Closed During the Pandemic)	13%	(0.34)	10% (0.30)		1.5 (0.14)	
Closing rate 2 (% Temporarily Closed During the Pandemic)			64%		1.00	
Total Workers						67%

*Note: ***, **, and * indicate significance at 1, 5, and 10% levels, respectively. Impact of the COVID-19 pandemic on small business, Chile 2021.*

4 Characterization of SFB and SNFB

This section details the differences *within* the main variables of this study. Specifically, looks over the *Impact of the COVID-19 pandemic on small businesses'* questionnaire and gathers all the information related to financial literacy, business practices, and mental health, socioeconomic characteristics, and survivorship of the SMEs, and studies whether there were significant differences between SFB and SNFB in 2020. These were the same questions considered for the indices.

Sociodemographic and performance variables

Table 2 shows descriptive statistics on demographic and socio-economic variables such as age, gender, location, and years of education of the microentrepreneur. It also presents some characteristics of the business, like opening year, variation in total workers and family workers, variation in sales, state of the business (open/closed), productivity level, formalization, and % of ecommerce. Overall, businesses in the sample are small, and we can see some significant differences between family and

non-family business in variables such as age, gender, location, education years, opening year of the business, and variation of total workers.

On the first hand, SFB owners have an older average age, higher representation of female entrepreneurs, greater presence in rural areas, and lower average years of education. On the second hand, SFB on average opened one year earlier and loosed more workers during 2020, in comparison with SNFB. Although it's not statistically significant, we can appreciate that there is a relatively large difference in sales (approximately \$1, 000, 000 Chilean pesos, which is equivalent to around USD\$1, 180) between both groups, in both periods of time. Therefore, this is evidence that SFB differs in some aspects from SNFB, which could correlate with differences in the levels of financial literacy, good business practices, and mental health of both groups. This goes in line with **H1**.

On the second hand, the state of the business (survival rate) is basically the same for both groups, which neither supports nor rejects the hypothesis, since many external variables before/besides Covid-19 could have affected this outcome. Furthermore, SFB lost approximately ten percent more workers than SNFB in the first year of Covid-19 (significant at 5%), but this loss did not happen in family workers, as the mean in this variable did not change. Notice there is a variation in the mean difference tests of family-related workers, even though the average number of family workers did not change during the pandemic. This can be explained with the results exhibited in Table 13 in the Annex, which shows that there are between 32 (around 2.6% of the total observations) and 41 (3.4% of total observations) missing values in family workers is February 2020 and September 2020, respectively.

Table 2: Differences in Sociodemographic Variables Between Family and non-family business

Variables	Family business (n=837)	No-family busines (n=366)	Mean difference (ttest)
	Frecuency (N=1203)		
Age	50	43	2.78***
Gender (Woman=1)	63%	49%	4.51***
Location (Urban=1)	78%	86%	-3.36***
Education (years)	13.9	14.6	-5.07***
Opening year	2013.6	2014.7	-2.28**
SERCOTEC client (Yes=1)	98%	98%	-0.32
Total workers Feb 2020	2.5	2.7	-0.82
Total workers Sept 2020	1.9	2.3	-1.73*
Variation in total workers	-24%	-14%	2.16**
Family workers Feb 2020	0.9	0.4	8.78***
Family workers Sept 2020	0.9	0.4	5.28***
Variation in family workers (%)	0%	0%	-0.44
Sales in Feb 2020	\$3.203.924	\$4.277.399	-1.24
Sales in Sept 2020	\$2.484.123	\$3.531.810	-1.31
Variation in sales (%)	-22%	-17%	0.4
Survival rate (Open=1)	76%	79%	-1.20
Production level (% of total production)	41%	44%	-1.45
Monopsony	16%	18%	-1.15
Formalization	94%	94%	0.19
Ecommerce (% of total sales)	33%	31%	1.08

*Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Impact of the COVID-19 pandemic on small businesses, Chile 2021.*

After analyzing the main sociodemographic variables in more detail, I move on to survivorship

indicators. Table 14 in the Annex displays the two measures I used for this outcome, which cover temporal and permanent closure of the firms. There we can see there is no significant difference in survivorship between groups. Although SFB were three percent more susceptible to permanent closure of the venture, and four percent more likely to permanently stop, this difference is marginal. These results do not support the hypothesis, as family SMEs were not more vulnerable than no-family SMEs in this past economic crisis. Nonetheless, as I mentioned earlier, this does not rule out the possibility that SFB were more vulnerable in other performance outcomes, like number of workers or revenues⁸.

Measurement variables of the indices

After analyzing the main socioeconomic differences between both types of businesses, the study searches for specific differences within each group of explanatory variables. For this, I compared the answers of the questions that were used to create each index. We start by analyzing differences in the variables of the first channel, that is, financial education. For this index, I used several questions about the administrator's financial abilities for running the business. Table 15 in the Annex displays the main results for these variables. Shortly, SFB and SNFB have almost the same level of financial literacy in every measurement of the survey, except in separating expenses of the firm. While 58% on SNFB always separate expenses, only 44% on SFB do it. Although the results in general do not go in line with **H1**, the difference in this measurement of financial literacy could have had a big impact on the performance of the business, specially in a situation like the first year of Covid-19.

The second channel is business practices. Here it is important to go back to *Note 1* and *Note 2* where I described the mechanism by which financial literacy, business decisions, and mental health impact on firm performance. Since the proposition is that the channels of financial literacy and mental health have an indirect effect on the outcome through business practices, I expect that the estimation yields a bigger direct effect for this last predictor. Thus, when it comes to finding explanations for differences in firms' survivorship, variations in business practices weight more than in financial literacy and mental health.

Table 16 in the Annex displays the main results for this group of variables. We can appreciate that in general, there is not a lot of variation between the groups, only in some specific indicators. In the first place, SFB owners have access to different sources of capital (types of accounts) than SNFB. On the first hand, while 34% of non-family businesses have a current account for the company, only 23% of family businesses do. On the second hand, only 47% of SFB owners have a current account of their own, while 57% of SNFB owners do. In the second place, there is a difference in the percentage of firms that had a website before COVID-19. Whereas 51% of no-family firms had a website before the pandemic, only 39% of family firms did. This could have had a big impact on sales and thus the survival of the business, specially the first year of Covid-19, when there were dynamic quarantines that lasted for over a year (Villalobos et al., 2021) and people could go out of their houses limited times per week. Like the previous results, this does not support **H1** as much as I would have expected, as these differences are not significant.

⁸Valenzuela et al., (working paper) shows that family business from this survey were more vulnerable than non-family firms in terms of sales and size (total workers).

Finally, the third channel of interest is the level of mental health, and its variation through the pandemic. Table 17 in the Annex suggests that there were no major differences in the questions used to measure this channel. The state of mind of the entrepreneurs of both groups was the same the first six months of the pandemic, and it actually got considerably better after those months. This is contrary to the proposition of **H2**, thus a psychological and economical explanation must be found for this behavior.

Correlation between main variables and SFB

The correlation between family business and the main variables could give some insight to the causal effect we are after: how does financial literacy, business practices, and mental health explain differences in survival between SFB and SNFB in times of high economical uncertainty? Table 3 shows that the only significant correlation is between SFB and the FLI. The correlation is negative, meaning that SFB have significant lower levels of financial literacy. This goes in line with **H1** and the proposition that the levels of financial literacy has an indirect effect on survivorship through the other channels, thus the differences in the other channels should be smaller in magnitude.

Table 3: Correlation Between Main Variables and SFB

	SFB
FLI	-0.0762*
BPI before COVID-19	-0.0581
BPI during COVID-19	-0.0438
GMHI before COVID-19	-0.00213
GMHI during COVID-19	-0.000338
Total workers February 2020	-0.0258
Total workers September 2020	-0.0513
Pandemic permanent closure	0.0396
Observations	1111

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4 shows that family SMEs have a significant correlation with gender (women entrepreneurs), educational level, and family workers. In Chile, the SFBs are associated with a higher average age, a greater predominance of the female gender, fewer years of education, and greater hiring of employees related to the owner before and during Covid-19. Same as with the results of Table 11, the variation in the correlation between family workers and family business even though the means of such indicators did not change in time (Table 2), can be explained by the missing values (Table 13 in the Annex). An interesting conclusion from this section, is that the empirical evidence goes in line with the results founded by Lusardi and Mitchell (2014), as there is a significant correlation between female entrepreneurs and lower levels of financial literacy, demonstrating the gender gap in topics of financial literacy. Here we also found a significant correlation between SFB and this gender gap.

Table 4: Correlation Between SFB, Performance Indicators, and Demographic Variables.

	SFB
Pandemic temporal closure	0.00839
Pandemic permanent closure	-0.00290
Sales Feb 2020	-0.0366
Sales Sept 2020	-0.0388
Survival Rate	-0.0345
Age	0.0799**
Gender	0.129***
Educational Level	-0.147***
Total workers Feb 2020	-0.0241
Total workers Sept 2020	-0.0506
Family workers Feb 2020	0.249***
Family workers Sept 2020	0.152***
Observations	1203

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5 Multivariate analysis of SFB

The focus point of the previous section was to analyze the explanatory variables and outcomes of interest individually, and to detect significant differences and correlations between groups. However, since all the explanatory variables analyzed intervene simultaneously in the effect of the COVID-19 pandemic on the closing rate of small business, the emphasis of this section is to test a model that considers the joint effect of all the channels of interest on the outcome of interest.

Overall, the results yield a significant effect of financial literacy and business practices on the closing rate, but no significant interaction with SFB. Therefore, the empirical evidence does not fully support what is proposed in **H1** and **H2**, but does suggest that family SMEs have significantly more financial barriers, which may indirectly affect the permanent closing rate. Besides, larger ventures were less likely to close during 2020.

5.1 Linear Probability Model (LPM) with Ordinary Least Squares (OLS)

Many econometric books (e.g., Green, 2000) air the limitations of using OLS estimators for a binary dependent variable. The most problematic one is that OLS is almost always a biased and inconsistent estimator of the LPM. For these reasons, most economists prefer non-linear models like Logit or Probit for estimating probabilities. Nonetheless, LPM is still widely used in economics for many reasons, for example the simple interpretation of the marginal effects of the regressors and direct comparison of the coefficients across groups (Holm and Karlson, 2015). Therefore, for the first conceptualization of the multivariate analysis, I am estimating a cross-sectional LPM with OLS.

To set ideas, Equation 1 represents the original problem from a simplistic model without interactions. This serves as a first approach to understand how SFB and the other channels of interest explain variations in the permanent closing rate of SMEs, in the context of COVID-19. The model also includes a set of control variables to isolate the effect of the main explanatory variables. However, the model is endogenous, since there are relevant omitted variables (ROV) that have an impact on the outcome and correlate with the regressors (E.g., ability). Thus, the results can be interpreted only as correlations.

$$Y_{i,t=1} = \alpha_0 + \beta_1 SFB_{i,t=1} + \beta_2 FLI_{i,t=0} + \beta_3 BPI_{i,t=0} + \beta_4 GMHI_{i,t=0} + \beta_5 X_{i,t=1} + \epsilon_{i,t=1} \quad (1)$$

Then, Equation 2 adds the interaction between the channels and SFB is to estimate the specific coefficients for this group.

$$Y_{i,t=1} = \alpha_0 + \beta_1 FLI_{i,t=0} * SFB_i + \beta_2 BPI_{i,t=0} * SFB_i + \beta_3 BPI_{i,t=1} * SFB_i + \beta_4 GMHI_{i,t=0} * SFB_i + \beta_5 GMHI_{i,t=1} * SFB_i + \beta_6 X_{i,t=1} + \epsilon_{i,t=1} \quad (2)$$

The model with level variables before and during the pandemic can also be rewritten and estimated as equation 3. This LPM includes variations of the explanatory variables of interest as the main regressors. The controls are the same as in model 1.

$$Y_{i,t=1} = \alpha_0 + \beta_1 FLI_{i,t=0} * SFB_i + \beta_2 \Delta BPI_i * SFB_i + \beta_3 \Delta GMHI_i * SFB_i + \beta_4 \Delta X_i + \epsilon_{i,t=1} \quad (3)$$

For the estimation, the regressors selected are the small family business (SFB) dummy, the Index for financial literacy (FLI), business practices (BPI), and mental health (GMHI) studied previously in Section 3.2. In both models, $t = 0$ means the variable contains pre-pandemic information, and $t = 1$ that it is measured during it. Then, to test **H1** and **H2**, the three main channels (FLI, BPI, GMHI) are interacted with the SFB dummy, which takes the value one if the entrepreneurs consider its business to be a SFB. The binary dependent variable takes the value of one if the business had to permanently close in 2020 because of the pandemic, and zero if not. The controls include dummies for gender (*female* = 1), zone (*urban* = 1), and innovation (*innovation* = 1 if business innovated in the pandemic), and continuous measures of age and total workers in September 2020. It is better for the estimation to use the Index rather than each question of the survey by itself, as the observations are limited.

To test the mechanisms stated in *Note 1* and *Note 2*, equation 4 estimate a first look at the problem. The first note suggests that FLI is important for firm survival because it has an impact on financial decisions, which influences the BPI, thus affecting the closing rate. The second mechanism arguments that financial and management constraints also have an impact on the GMHI (during the first six months of the pandemic and at the moment of the survey), which affects the adaptability of the entrepreneur (changes in the BPI), thus influencing the closing rate of the business. The proposition is that entrepreneurs with lower levels of FLI and GMHI, had a lower BPI during the pandemic, which led to a higher probability of having to permanently close the business. The regression also includes control variables for age, gender (*female* = 1), high school dummy, and innovation during the pandemic dummy.

$$BPI_{i,t=1} = \alpha_0 + \beta_1 FLI_{i,t=0} + \beta_2 GMHI_{i,t=0} + \beta_3 GMHI_{i,t=1} + \beta_4 X_i + \epsilon_{i,t=1} \quad (4)$$

This can also be rewritten as equation 5.

$$\Delta BPI_i = \alpha_0 + \beta_1 FLI_{i,t=0} + \beta_2 GMHI_{i,t=0} + \beta_3 GMHI_{i,t=1} + \beta_4 X_i + \epsilon_{i,t=1} \quad (5)$$

5.2 Results

Because previous research has pointed this out before (Johan and Valenzuela, 2021), to rule out the possibility that a few “outliers” or relatively large business (Figure 5) could influence the average statistics for performance, I dropped all observations for which the number of total workers in February and September 2020 exceeded the sample mean by more than four standard deviations⁹.

To test the hypothesis, the model should estimate how the specific mechanisms of financial literacy, business practices, and mental health, impact on the survival rate of family SMEs. But before getting into the more specific problems, it is worth understanding the general problem and how the selected channels work. For this, we must first understand how the predictors impact the closing rate of SMEs during the first year of COVID-19, then understand the mechanism behind these effects, and finally focus on the differences between SFB and SNFB. It is important to emphasize that none of these coefficients can be interpreted as causal effects, just simple correlations.

Table 5 displays the main results for equations 1 and 3, estimated with a LPM and a Logistic regression, with robust errors. Because the dependent variable is a dummy and the mean is far away from 0.5¹⁰, the OLS estimator can be inefficient and escape the logical parameters of a probability, thus I decided to present and compare both estimations. Therefore, column (1) and (2) estimate equation 1 by OLS and Logit respectively, and column (3) displays the mean marginal effects (MME). As well, column (4) and (5) show the results from a regression like equation 3, which considers the variations of the indices, and the interaction with SFB. Given the complex process for calculating the MME of interactive variables, Table 6 yields the MME of column (5) for each group, and whether the differences between effects is significant or not. The controls mentioned earlier were included in all the specifications¹¹.

At first glance, in all the columns of Table 5, small family businesses do not appear to have a higher probability of closure during the first year of Covid-19. Nonetheless, for the simplest model represented by equation 1 in column (2), the direction of the SFB effects meets the hypothesis that they were more vulnerable during this crisis, meaning that on average, belonging to this group increases the closing rate by 1.6 percentage points (PP), even though this is not significant. For the same specification, the only significant regressor is $GMHI_{t=0}$, where on average one more point¹² diminishes the closing rate by 2.3 PP, and is significant at 0.1%. Still, the variation in total workers between February and September 2020 is a significant control at 5%, meaning that in general, each extra worker decreases the closing rate by 0.9 PP. If we look at the other channels included, both the FLI and BPI before the pandemic have the expected sign, meaning that higher scores correlates with lower probabilities of closing, though this is not significant at any relevant level. Comparing both estimators, OLS is less efficient and underestimates the effects.

Then, we move on to the more specific problem, with a more complex interpretation. To test **H1** that states that family SMEs lack financial and management skills (lower scores in FLI and BPI), and that these limitations increase the closing rate of such business, the regressions from columns (4) and (5) include the interaction between such channels and the SFB dummy. It also considers

⁹It was 42 and 23 observations for February and September, respectively.

¹⁰The mean of the permanent closing rate for the first year of Covid-19 is 12.2%.

¹¹Dummy controls for *high school* and *innovation* are not included because they were not significant

¹²i.e., higher levels of mental health at the beginning of the pandemic.

the variation of the BPI during the first year of the COVID-19 pandemic, because the study focuses on how changes in this index (how the firms adapted) affected the closing rate. I do the same to test **H2** which proposes that family businesses suffered a bigger deterioration of their GMHI and thus faced more constraints to stay open.

Before analyzing the mean marginal effects of the interacting variables of the Logit, column (4) shows the estimation of the LPM for equation 2. Here, unlike the regressions for model 1, the significant channels are levels of financial literacy and variation in business practices. In general, one more point in the FLI lowers the closing rate of the entrepreneur by 1.1 PP, and is significant at 5%. Second, for the most part, a positive change of one point in the BPI during the pandemic, decreased the closing rate by 3.5 PP, and this is significant at 1%. Finally, on average, each extra worker between February and September 2020 diminishes the closing rate by 1.1 PP, and this control is significant at 5%. It is also important to highlight that, same as above with model 1, the Logistic estimators are more efficient, thus for this regression the effect of the interaction between $SFB*FLI$ is significant at 5%, but it does not have the expected direction as it increases the closing rate. Apart from this, a first indicator that the casual mechanisms holds is in column (4), since the magnitude and significance from ΔBPI higher than those from FLI and $\Delta GMHI$.

Table 5: Determinant of the Closing Rate

	Equation 1			Equation 3	
	(1)	(2)	(3)	(4)	(5)
	LPM	Logit	MME	LPM	Logit
Closing rate					
<i>SFB</i>	0.014 (0.023)	0.145 (0.254)	0.016 (0.028)	-0.116 (0.083)	-0.996 (0.685)
<i>FLI</i> _{t=0}	-0.002 (0.003)	-0.031 (0.026)	-0.003 (0.003)	-0.011* (0.005)	-0.112* (0.044)
<i>BPI</i> _{t=0}	-0.003 (0.004)	-0.042 (0.039)	-0.005 (0.004)		
<i>GMHI</i> _{t=0}	-0.019*** (0.005)	-0.211*** (0.051)	-0.023*** (0.006)		
<i>SFB * FLI</i> _{t=0}				0.010 (0.006)	0.104* (0.053)
ΔBPI				-0.035**	-0.362**
<i>SFB * ΔBPI</i>				0.014 (0.014)	0.181 (0.141)
$\Delta GMHI$				0.005	0.094
<i>SFB * $\Delta GMHI$</i>				-0.007 (0.014)	-0.097 (0.144)

$\Delta Totworkers$	-0.011 (0.006)	-0.080* (0.039)	-0.009* (0.004)	-0.011* (0.006)	-0.084* (0.041)
<i>cons</i>	0.462* (0.234)	1.226 (1.430)		0.451 (0.264)	0.723 (1.764)
<i>N</i>	1046	930	930	1046	930
adj. R^2	0.052			0.058	
<i>AIC</i>	610.428	725.078	.	606.547	726.044
<i>BIC</i>	768.916	836.287	.	779.893	851.759

(0.012) (0.121)

(0.010) (0.116)

Note: controls for age, gender, zone, prime activity, and innovation included.
 * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

To test the hypothesis, Table 6 compares whether the MME from the estimation of column (5) were significantly different between SFB and SNFB. Even though the effects for FLI and ΔBPI for SNFB are higher in magnitude and significance, this difference is not significant. One explanation for these differences in magnitude could be that there were non-identical implementations of these financial and management practices. Therefore, these results do not support the hypothesis that Covid-19 impacted Chilean SFB differently because they faced more financial, managerial, and psychological constraints compared to SNFB.

Table 6: Comparison of the MME of the Three Main Channels on the Closing Rate between SFB and SNFB

	(1) $FLI_{t=0}$	(2) ΔBPI	(3) $\Delta GMHI$
<i>SNFB</i>	-0.011* (0.004)	-0.034** (0.010)	0.009 (0.011)
<i>SFB</i>	-0.001 (0.003)	-0.021** (0.008)	-0.000 (0.010)
Contrast Delta-method	0.01 (0.005)	0.014 (0.013)	-0.009 (0.015)
<i>N</i>	930	930	930

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Finally, Table 7 shows the results for the regressions for equations 4 and 5, to test whether the data supports the mechanisms proposed in *Note 1* and *Note 2*. First, columns (1), (2) and (3) show that SFB has an insignificant but negative effect on the mean of the BPI (level variable), which is correct according to the results from Table 1 in Section 3. Second, the effect of SFB, even not significant, also has the expected effect for ΔBPI , as family firms showed a better improvement in their index during the pandemic according to the results from Table 1 previously discussed.

It is interesting to start by looking at how levels of financial literacy and good mental health explain the business practices *before* 2020, and then move on to the mechanism during the pandemic. Column (1) shows that the only predictor that has a significant effect on $BPI_{t=0}$ is the level of financial education, implying that entrepreneurs with one more point in the FLI were associated with a BPI on average 0.116 points higher before Covid-19. This is expected as $GMHI_{t=0}$ measures the levels of mental health for the first six months of the pandemic, which should not have an impact on the business practices before it. Then, for $BPI_{t=1}$, column (2) shows that, on average, an increase of one point in the FLI is positively correlated with a rise of 0.115 in the BPI during the pandemic, and this is significant at 0.1%. This goes with accordance with *Note 1*. Next, the level of $GMHI_{t=0}$ has the expected direction, as one point improvement associated with an average increase of 0.15 points in the $BPI_{t=1}$. This is significant at all relevant levels. Subsequently, column (3) shows that when you add the level of GMHI at the moment of the survey, the significance from $GMHI_{t=0}$ disappears and the only significant regressor at 0.01% is the FLI and $GMHI_{t=1}$, where a one point increase in each positively correlates with an improvement of approximately 0.11 and 0.1 points in the BPI, respectively. Finally, column (4) displays the results for equation 5, which shows how FLI and both GMHI measures impact the variation of the BPI during the pandemic (adaptation of the business). There we can see that the only significant predictor is $GMHI_{t=1}$, revealing the expected direction as those businesses that have higher levels of GMHI at the time of the survey positively correlate with better improvements in the BPI, meaning that they adapted faster in 2020.

Notice that the level of financial literacy only has a significant effect on levels of the BPI, but not on its variation. Hence, the level of mental health at the moment of the survey is the only significant predictor of ΔBPI . This suggests that *Note 2* holds, and that entrepreneurs that had lower levels of financial literacy faced more barriers to staying competitive, which deteriorated their mental health levels, affecting their speed of adaptation (adoption of new business practices), and thus increasing their chances of having to close the business due to the pandemic. In general, the results from Table 7 go in line with the mechanisms proposed, which point out that those entrepreneurs with lower levels of financial literacy and mental health adapted slower, which leads to a lower increase in their BPI, which leads to a higher probability of having to permanently close the business. Besides, observe that in Table 5 in column (1), the only significant predictor is $GMHI_{t=0}$, as it has the highest explanatory power of $BPI_{t=1}$ (besides $GMHI_{t=1}$), while for column (4) the most significant is ΔBPI (as expected). The interpretation of this is that *before* Covid-19 (2020), the level of financial education was more important in explaining the level of the business practices of the entrepreneur, but this does not explain variation in the closing rate during the first year of the pandemic. Furthermore, *in* 2020, the level of good mental health at the moment of the survey played a much more important role in explaining $BPI_{t=1}$ levels, and its variation, a significant predictor in the probability of closure in 2020. Therefore, during the pandemic, the FLI lost explanatory power of the BPIs relative to the GMHI, which in part explains why COVID-19 did not have significantly different effects between SFB and SNFB (since both had similar levels of mental health).

Table 7: Testing the Mechanisms of the Main Channels with Equations 4 and 5

	(1) $BPI_{t=0}$	(2) $BPI_{t=1}$	(3) $BPI_{t=1}$	(4) ΔBPI
<i>SFB</i>	-0.327 (0.191)	-0.273 (0.189)	-0.270 (0.188)	0.055 (0.126)
$FLI_{t=0}$	0.116*** (0.023)	0.115*** (0.024)	0.110*** (0.023)	-0.003 (0.014)
$GMHI_{t=0}$	0.040 (0.038)	0.150*** (0.037)	-0.095 (0.064)	0.023 (0.044)
$GMHI_{t=1}$			0.278*** (0.059)	0.098* (0.044)
<i>_cons</i>	9.973*** (0.585)	9.155*** (0.605)	8.988*** (0.592)	-0.877* (0.398)
<i>N</i>	1046	1046	1046	1046
adj. R^2	0.077	0.173	0.189	0.076
<i>AIC</i>	5108.930	5095.881	5076.714	4270.295
<i>BIC</i>	5148.552	5135.503	5121.289	4314.870

Controls for age, gender, high school, and innovation.

Columns (1), (2), and (3) estimate equation 4, and column (4), 5.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In summary, the general results do not meet the hypothesis proposed, as COVID-19 did not have a significant differentiated effect between SFB and SNFB, but the mechanisms evaluated seem to be coherent and supported by the empirical evidence. First, the regressions suggest that SFBs did not face significantly more financial, administrative, or mental health barriers than SNFBs, making them more vulnerable to the effects of the first year of the pandemic on the probability of permanent business closure. Second, the results, even though they can not be interpreted as causal

effects, do imply a positive correlation between the levels of FLI and GMHI, and the adaptations and improvements in the BPI during Covid-19, which negatively correlates with the closing rate, as expected. One way of seeing this is that microentrepreneurs that had higher levels of financial literacy and suffered less deterioration in their levels of mental health during the pandemic, were able to adapt faster, thus improving their business practices, and lowering the probabilities of having to permanently close in 2020.

6 Conclusion

The investigation used the novel survey from the *Impact of the COVID-19 pandemic on small businesses* study to explore if Chilean small family business (SFB) had lower levels of financial literacy, business practices, and mental health than small non-family business (SNFB), and if these differences had an impact on the performance (permanent closing rate) of this group during the first year of the pandemic. To do this, the research first looked for significant differences in the indices that measured each explanatory channel, and in the survivorship indicators. One of the main findings from this part was that SFB in Chile had lower levels of financial literacy (FLI) and business practices (BPI) before the Covid-19 pandemic than SNFB. However, the evidence shows that there were no major differences in the survival indicators, despite the significant differences in these predictors. Furthermore, during the first year of COVID-19, SFB had a larger increase in their BPI than SNFB, thus reducing the significant difference between groups. These results go in line with the new branch of research that studies the effects of the pandemic on SMEs, which finds that family businesses change their behavior in times of economic crisis, taking more risks and exploiting new business opportunities in order to survive (Krauss et al., 2020; Leppaaho and Ritala, 2021; Valenzuela et al., 2021).

Analyzing the data and the differences in the predictors, the study also finds that the level of mental health (GMHI) was the same for both groups before and during COVID-19, and that the GMHI rose in the meanwhile. Contrary to what I would have expected, entrepreneurs were less stressed out one year after the pandemic than when it started. Finding the psychological reason behind this result is beyond the scope of the study, but one plausible explanation is that the survey took place between December 2021/January 2021, summer and holidays time in Chile. During this time, the restrictions started to lose up to let the people enjoy the summer, so people in general might have been more optimistic than when Covid-19 started. Another reasonable explanation, previously discussed, is that entrepreneurs at the beginning of the pandemic were already very stressed because Chile experimented its worst economic and social crisis in decades, which adversely impacted entrepreneurs and SMEs (Mun˜oz, 2020), just a few months before 2020.

Then, the study compared specific differences within the variables used to construct each index between groups, to get a better idea of family SMEs characteristics and how they acted/adapted to the effects of Covid-19. From a sociodemographic perspective, there were more significant contrasts between groups, for instance, the majority of SFB owners are women, have an older average age, have fewer average years of education, and hire significantly more family workers. On the other hand, overall, for most questions used to measure FLI, BPI, and GMHI there were no large differences between groups. But the results do suggest that SFB face financial and managerial constraints in some specific areas compared to SNFB, for example, in separating the expenses of the business, access to capital, and having a business website before the pandemic.

The investigation ends with a multivariate analysis that integrates all the results previously discussed, to see how the three main channels (FLI, BPI, GMHI) simultaneously impact the closing rate of SMEs, the mechanisms behind, and if the effects varied across SFB and SNFB. First, the results support the idea that better levels of FLI, BPI, and GMHI are positively (negatively) correlated with the survival (closing rate) of SMEs during the first year of Covid-19. For the first question, the estimation yields that the levels of mental health in the first six months of the pandemic was the most significant predictor. The explanation given is that both the FLI and the GMHI have a direct and indirect effect on the outcome. On the first hand, more educated and healthier entrepreneurs at the beginning of COVID-19 had lower probabilities of closing the business (direct effect). On the second hand, mental health positively impacted the BPI during the pandemic and its variation. This change in the BPI (how fast the business adapted) is correlated with lower closing rates (indirect effects). Thus, the proposed mechanisms seem to hold, as those entrepreneurs with lower levels of FLI and GMHI adapted slower (lower-level upgrade in their BPI), which lead to a higher probability of having to close the business. Lastly, the interactive models suggest that SFB did face more financial constraints, and that this increased their probabilities of closure. Nonetheless, if we test for significant differences, the results suggest that Covid-19 did not have a differentiated effect on SFB through these predictors.

This has several implications for public policy issues. Firstly, it is worth doing more research on the financial barriers faced by Chilean family SMEs. For example, for the future financial education program for micro-entrepreneurs 'Manos a la obra', a special section for family businesses could be added to teach them how to separate expenses efficiently. Second, given that mental health during the pandemic seems to have an important correlation with the entrepreneur's ability to adapt and the probability that their business will survive, SERCOTEC and other public programs to help entrepreneurs could give more emphasis to this variable. Third, this analysis can also be done to compare the effect of the COVID-19 pandemic between male and female entrepreneurs, and determine what are the specific financial barriers Chilean women entrepreneurs face.

Discussion of the limitations

The first limitation of this investigation is that the empirical model is endogenous, as relevant variables (ROV) that also explain the survival rate and correlate with the other explanatory variables, like ability, are omitted in the specifications. This generates a bias in the causal effects estimated by the model, thus, the results from the multivariate analysis do not serve to make public policies. Besides, this problem cannot be solved by changing the estimation model, such as from OLS to Logit.

Therefore, this research is limited to variations in the variables of interest, and correlations with the performance (closing rate) of the family business. Even though I does not focus on the causal effect needed for public policies, the investigation inquires into some interesting characteristics of family business, and examines whether they were more vulnerable or not during the novel Covid-19 pandemic. Furthermore, the correlations founded are a first glance of the direction and magnitude of the effect of the variables of interest, which lays the foundation for further research.

A second limitation in this research is the variable to classify "*family business*". Chua et al., (1999) said that a good deal of mixed evidence from the literature on family business comes from not

having one definition for this type of organization. The problem with this survey is that it only asks one categorical question (dummy) about if you would classify your firm as a family business or not. This means that we do not have additional information on family involvement like ownership, management, or intentions of succession to empirically classify the company as a family business or not (Chrisman et al., 2012). Consequently, the study uses the auto-classification of the micro-entrepreneur of his business as a family business, and not on other academic definitions/classifications for this group. The ambiguous classification could limit our analysis of family involvement effects and of the explanatory channels on the performance of the firm (Classen et al., 2014).

Third, there is a considerable amount of missing values in the observations, which makes it much more difficult to accurately estimate the effects we are looking for. As mentioned earlier, almost 40% of the entrepreneurs did not complete the survey and had missing information for the causal channels the study investigates. Therefore, the sample for the regressions was considerably smaller than expected, thus making the estimator less efficient and accurate.

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7 Appendix 1

7.1 Append A: Financial Literacy Index

The questions used for this index were asked once and in general terms, not specifically before during the COVID-19 pandemic. Therefore, we only have one general measure for the level of financial literacy of small business. Lower (higher) levels of the index means lower (higher) levels of financial literacy.

Table 8: Financial Literacy Index

Index of Financial Literacy	Score assigned to each answer
<i>Administrator records income and expenses</i>	
Never	0
Sometimes	1
Regularly	2
Enough	3
Always	4
<i>Administrator projects income and expenses</i>	
Never	0
Sometimes	1
Regularly	2
Enough	3
Always	4
<i>Administrator separates expenses</i>	
Never	0
Sometimes	1
Regularly	2
Enough	3
Always	4
<i>Administrator does not have problems with financial literacy</i>	
Never	0
Sometimes	1
Regularly	2
Enough	3
Always	4
<i>Administrator trusts the financial system</i>	
Never	0
Sometimes	1
Regularly	2
Enough	3
Always	4
Minimum score	0
Maximum score	20

7.2 Append B: Business Practices Index

There are two measures of this index: before and during Covid-19. Both use the same variables, only that measured in different periods of time. The variables for which I have a panel-data are specified with (*). Lower (higher) levels of the index means lower (higher) levels of good business practices.

Table 9: Business Practices Index

Index of Business Practices (*)	Score assigned to each answer
Business current account	1
Personal current account	1
Business debit account	1
Personal debit account	1
Does not prefer third parties account	1
Participates in savings and credit cooperatives	1
Does not prefer cash	1
Own financing	1
Formal credit financing	1
Other bank financing (credit line, leasing, etc.)	1
Supplier credit financing	1
State subsidies financing	1
Does not have pledge credits financing	1
Does not prefer informal financing	1
Does not have late payments	1
Is not afraid of incurring payments	1
Has support from other public institutions	1
Has support from other private institutions	1
Has support from other business associations	1
Accepts credit cards as payment method (*)	1
Accepts debit cards as payment method (*)	1
Accepts electronic transfers (*)	1
Accepts web pay and PayPal as payment methods (*)	1
Accepts payment through applications (*)	1
Accepts other payment methods (*)	1
Business has connection to the internet (*)	1
Business has a website (*)	1
Business has social networks (*)	1
Business has delivery services (*)	1
Minimum score	0
Maximum score	28

Note: () means the variable was measured before and during Covid-19, thus changes in these variables would explain variations in the Business Practices Index.*

7.3 Append C: Mental Health Index

There are two measures of this index: before and during Covid-19. Both use the same variables, only that measured in different periods of time. The variables for which I have a panel-data are specified with (*). Lower (higher) levels of the index means lower (higher) levels of mental health.

Table 10: Mental Heal Index

Index of Mental Health (*)	Score assigned to each answer
<i>State of mind (*)</i>	
Very discouraged	0
Discouraged	1
Neither encouraged nor discouraged	2
Encouraged	3
Very encouraged	4
<i>Trouble sleeping during the pandemic</i>	
Very often	0
Often	1
Sometimes	2
Never	3
<i>Conflicts in personal relationships during the pandemic</i>	
Worse than before	0
Have not changed	1
Less than before	2
<i>Need for psychological help (*)</i>	
Very necessary	0
Moderately necessary	1
Not necessary	2
Minimum score	0
Maximum score	11

Note: () means the variable was measured before and during Covid-19, thus changes in these variables would explain variations in the Business Practices Index.*

8 Appendix 2

8.1

	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	1024	5	95	5
Valparaiso	2358	10	219	11
Metropolitana	7683	27	612	30
O'Higgins	1708	6	127	6
Maule	1280	6	120	6
Nuble	576	2	53	3
Biobio	1367	6	112	5
La Araucania	1489	8	139	7
Los Rios	1028	4	94	5
Los Lagos	1425	6	116	6
Ays'en	747	4	66	3
Magallanes	1031	4	86	4
Total	24,695	100	2042	100

Table 11: Population and Sample's Geographic Distribution

Region	Population	Sample
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	Clients	%	Clients	%
Arica y Parinacota	500	2	14	1
Tarapaca	802	3	22	2
Antofagasta	805	3	37	3
Atacama	872	4	33	3
Coquimbo	1024	5	45	4
Valparaiso	2358	10	135	11
Metropolitana	7683	27	392	33
O'Higgins	1708	6	78	7
Maule	1280	6	65	5
Nuble	576	2	30	3
Biobio	1367	6	65	5
La Araucania	1489	8	74	6

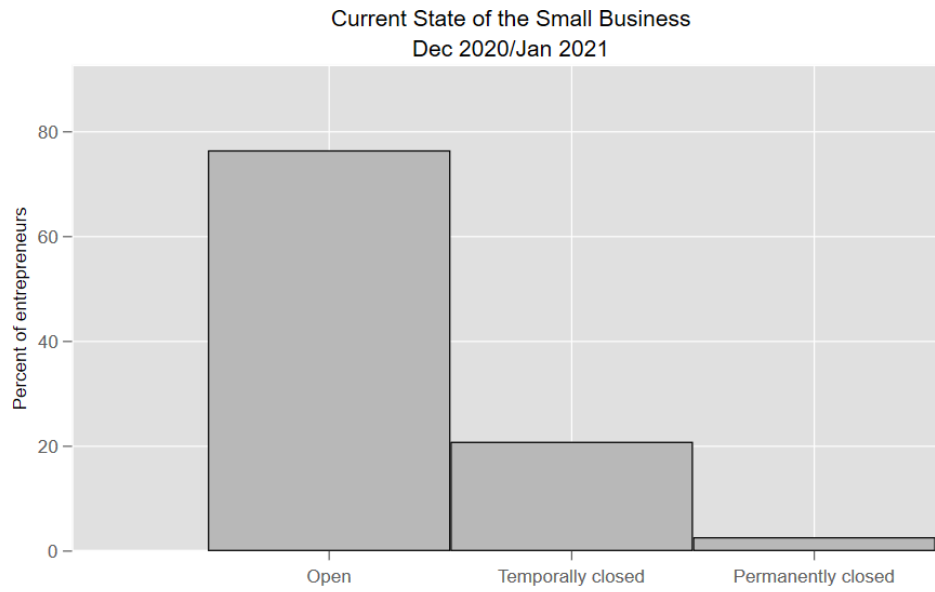
Los Rios	1028	4	65	5
Los Lagos	1425	6	70	6
Ays'en	747	4	36	3
Magallanes	1031	4	42	4
Total	24,695	100	1203	100

Table 12: Population and Sample's (With Complete Information) Geographic Distribution

Region	Population	Sample
--------	------------	--------

8.2

Figure 6: Sample Distribution of the Current State of the Business



Impact of the COVID-19 pandemic on small business, Chile 2021.

8.3

Table 13: Missing Values

Variables	Missing values	Total observations	Percent missing
Tot workers Feb 2020	32	1203	2.6%
Tot workers Sept 2020	35	1203	2.9%
Family workers Feb 2020	36	1203	3%
Family workers Sept 2020	41	1203	3.4%

8.4

Table 14: Differences in Survival During the First Year of COVID-19 Between Family and non- family business

Closing rate	Family business (n=837)	No-family busines (n=366)	Mean difference (ttest)
Frequency (N=1203)			
Temporally closed			
Yes	63%	60%	1.24
No	31%	33%	-0.82
Does not apply	6%	7%	-0.91
Permanently closed			
Yes	12%	9%	1.40
No	81%	82%	-0.49
Does not apply	7%	9%	-0.95

8.5

Table 15: Differences in Financial Literacy Between Family and non-family business

Variables	Family business (n=837)	No-family busines (n=366)
	Percentage (%)	
Record income and expenses		
Never	3	3
Sometimes	6	3
Regularly	17	14
Enough	20	22
Always	53	58
Projects income and expenses		
Never	11	10
Sometimes	11	13
Regularly	21	20
Enough	22	22
Always	34	35
Separate expenses		
Never	11	8
Sometimes	10	8
Regularly	18	13
Enough	17	12
Always	44	58
Problems with financial education		
Never	29	28
Sometimes	17	17
Regularly	22	22
Enough	17	16
Always	15	15
Confidence in the financial system		
Never	21	14
Sometimes	19	15
Regularly	28	32
Enough	17	23
Always	15	16

8.6

Table 16: Differences in Business Practices Between Family and non-family business

Variables	Family business (n=837)	No-family busines (n=366)
	Frecuency (N=1203)	
Types of accounts you have (1=yes)		
Company or business current account	23%	34%
Current account as a natural person	47%	57%
Business debit account (entrepreneur account)	36%	40%
Personal debit account	70%	65%
Account of a third party (partner, family, friend, etc.)	10%	8%
Participation in savings and credit cooperatives	4%	5%
I prefer cash	1%	1%
Types of financing		
Own financing (savings, own resources, profits)	92%	92%
Formal loans (banks, cooperatives, etc.)	22%	21%
Other bank (credit line, leasing, factoring, etc.)	8%	10%
Supplier credit	13%	14%
State subsidies	11%	9%
Pledge credits	1%	3%
Informal loans (family, friends, individuals, etc.)	31%	26%
(%) Have debts with late payments	34%	32%
(%) Has a lot of debt with late payments	8%	6%
(%) Are afraid of incurring in late payment	65%	60%
(%) With support from other public institutions	36%	30%
(%) With support from private institutions	5%	3%
(%) With support from other business associations	4%	3%
Type of payment method (before-after the pandemic)		
% Credit cards (Visa, Mastercard, etc.)	41-42 (+1%)	37-38 (+1%)
% Debit cards (Redcompra)	51-53 (+2%)	45-46 (+1%)
% Electronic transfer	84-88 (+4%)	88-90 (+2%)
% Paypal / Webpay	18-24 (+6%)	23-29 (+6%)
% Payment through applications	24-30 (+6%)	21-25 (+4%)
(%) With internet access (before-after the pandemic)	89-91 (+2%)	92-95 (+3%)
(%) With website (before-after the pandemic)	39-48 (+9%)	51-60 (+9%)
(%) With social networks (before-after the pandemic)	74-79 (+5%)	71-78 (+7%)
(%) With delivery sevice (before-after the pandemic)	52-63 (+11%)	50-55 (+5%)

8.7

Table 17: Differences in Mental Health Between Family and non-family business

Variables	Family business (n=837)	No-family busines (n=366)
	Frecuency (N=1203)	
State of mind, first six months of Covid-19		
Very lively	5%	5%
Animated	14%	14%
Neither encouraged nor discouraged	17%	17%
Discouraged	30%	30%
Very discouraged	32%	32%
Current tate of mind		
Very lively	15% (+10%)	13% (+8%)
Animated	32% (+18%)	18% (+4%)
Neither encouraged nor discouraged	19% (+2%)	22% (+5%)
Discouraged	19% (-11%)	28% (-2%)
Very discouraged	14% (-18%)	16% (-16%)
Trouble sleeping during Covid-19		
Very often	20%	22%
Often	25%	23%
Sometimes	44%	39%
Never	11%	14%
Conflicts in relationships between people in your home and business (include yourself)		
They are more frequent than before	42%	37%
They have not changed their frequency	17%	16%
They are less frequent than before	40%	45%
Before the pandemic, need for help for psychological stress		
Very necessary	0%	0%
Moderately necessary	34%	38%
It has not been necessary	66%	61%
During the pandemic, need for help for psychological stress		
Very necessary	0%	0%
Moderately necessary	39% (+5%)	33% (-5%)
It has not been necessary	61% (-5%)	67% (+5%)

8.8

Table 18: Correlation Between Family Business and Performance During the First Year of COVID- 19.

	(1)	(2)
	Family business	Non-family business
Pandemic temporal closure	0.00839	-0.00839
Pandemic permanent closure	-0.00290	0.00290
Sales February 2020	-0.0366	0.0366
Sales September 2020	-0.0388	0.0388
Survival rate	-0.0345	0.0345
Age	0.0799**	-0.0799**
Gender	0.129***	-0.129***
Educational level	-0.147***	0.147***
Total worker February 2020	-0.0241	0.0241
Total workers September 2020	-0.0506	0.0506
Family workers February 2020	0.249***	-0.249***
Family workers September 2020	0.152***	-0.152***
Observations	1203	1203

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$