

# Covid-19 Pandemic and SMEs' Performance in Latin-America

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## Abstract

Covid-19 health pandemic generated a negative external shock to the global economy. Businesses around the world were affected by mobility, gathering, and other restrictions that impacted not only consumers' preferences but also the profitability and survival rates of firms. In this paper, we study the performances of Latin-American SMEs during the pandemic by investigating the evolution of SMEs' economic performance. We use disaggregated and high-frequent administrative banking data that can approximate firms' earnings in Brazil, Chile, Colombia, Mexico, Paraguay, and Peru. Besides observing a sharp short-term decline in the total amount of earnings due to the implementation of the first wave of lockdowns (implemented during the second half of March 2020), we go further and study the heterogeneous impact of the pandemic shock by economic sectors, firms' sizes, the gender of either the owner or the main shareholder, and the type of deposits (online vs. in-person). Our study focuses on fintech adoption by studying the migration from in-person to online banking transactions. Our main findings are: *i.* SMEs suffered most right after the lockdowns' implementations, but they could reach pre-pandemic levels in 2021 due to the acceleration of the digitalization process; *ii.* the earnings' gender gap are small during both the lockdown and recovery phases; and *iii.* industries facing higher exposure to the public experienced a larger decline and a slower recovery.

**JEL Classifications:** J16, L26, P52

**Keywords:** SMEs' Revenues, Digital Transformation, Covid-19's Lockdowns and Mobility Restrictions

# 1 Introduction

Covid-19 lockdowns together with mobility and gathering restrictions impacted the global economy. Although the long-term economic deterioration of the pandemic can still not be fully quantified, it is important to study the magnitude and the consequences that the virus has already caved on businesses and industries. To comprehend the various dimensions of the negative impact, we ought to use disaggregate and high-frequency data that can approximate the economic performance of small businesses in Latin America. We had access to administrative data that can approximate the revenues that Small and Medium Enterprises (SMEs) earned during the last two years. Specifically, we analyze detailed financial datasets provided to us by different banks located in Brazil, Chile, Colombia, Mexico, Paraguay, and Peru. The data extends from June 2019 to August 2021, is at the daily or weekly level, and contains relevant firm-specific transactional information such as the number and the total amount of deposits that each SME performed either in-person or online, and the sales performed at the SMEs' point-of-sale (POS). Our aggregated analysis shows a relevant decline in the total amount of SMEs revenues for all three types of deposits (in-person, online, and POS) right after the implementation of the first wave of the Latin American Covid-19 lockdowns (lockdowns that took place during the second half of March 2020 in all of the six countries part of our research).

We next go further and study the heterogeneous impact that the pandemic has created in small businesses by disaggregating the total amount of deposits using relevant SMEs features. Besides having access to the banking transactions, we could also access cross-sectional data that characterize SMEs. We could categorize small firms accordingly to the economic sector (based on either ISIC or MCC codes), the size of the business, the geographical location (capital *vs.* no capital), and the exposure degree of the business. This granular categorization allowed us to discern the type of businesses that were more or less severely impacted by mobility restrictions, and the difference in the economic recovery of the SMEs *post* lockdowns.

We then turn the analysis into our main topic: the impact of Covid-19 on SMEs' digitalization. We aim to study the financial technology adoption of small businesses in Latin America by studying the economic performance of SMEs and how the source of revenues evolve over time. Specifically, we were interested in the migration from in-person to digital deposits. Since we could observe whether deposits and POS sales

were done either in-person or online, we calculate the proportion of the total revenues that came from digital channels over time. The time series show that digital revenues declined less than in-person revenues as a consequence of the implementation of the first wave of lockdowns, and that there is a permanent substitution from in-person to online transactions that remains significant at least for the year and a half after the first pandemic restrictions took place.

This research is part of a huge and diverse recent economic literature motivated by the Covid-19 pandemic. Many studies explore the heterogeneous impact among industries and the substitution among goods with different levels of Covid exposure (Krueger, Uhlig, and Xie, 2020 [5]; Faria-e-Castro 2021 [4]). Papanikolaou and Schmidt (2020) [7] develop an index that quantifies the Covid exposure degree by industry. The authors find that this index is inversely correlated with the relevance of remote work. Cirelli and Gertler (2021) [3] use stock market data to construct revenue measures and compare these indexes between industries classified into the contact and non-contact sectors.

The rest of the paper is organized as follows. Section 2 describes the data and the financial information we use in this research. Here, we also explain the methodology and the data processing that we *ex-ante* perform to construct comparable metrics across all six countries part of the study. This preprocessing allows us to perform meaningful cross-country comparisons. In this section, we also detail the relevant SMEs' characteristics that we then use to study the heterogeneous impact of the pandemic on relevant economic indicators. Section 3 studies the aggregate impact of Covid-19's lockdowns and mobility restrictions using as main metric the total amount of deposits as the main proxy for SMEs' revenues. In this section, we also analyze the differentiated impact caused by these restrictions using as relevant dimensions the economic sector, the size of the small businesses, the geographical location, and the exposure degree of the businesses. The analysis here is univariate. Section 4 focuses on the SMEs' digitalization process and the evolution of the fintech adoption in Latin America during the pandemic. Here, we show that the most predominant source of the SMEs' total revenues switched from *in-person* to online. We observe that the main driver of this substantial switch was the implementation of the first wave of lockdowns in March 2020, and conclude that the substitution degree between these two types of deposits occurred across all industries, and regardless of the gender of the owner, the geographical location, and the size of the firm. Section 5 concludes.

## 2 Data and Methodology

The banking data consists of administrative financial firm-specific transactions. The time dimension of the transactions is either at the daily (Mexico, Peru, and Paraguay), weekly (Brazil and Colombia), or transaction (Chile) level. These administrative datasets include all the transactions that small and medium enterprises (SMEs) performed during the last two and a half years using the bank accounts that they have with the financial institutions. The transactions we use in this research are classified as deposits or *cash-in*, and the sales that the firm made at its point of sale (POS transactions). We generically denominate these transactions *deposits* and argue that the total amount of deposits is a good proxy for SMEs' revenues. In fact, we believe that the total amount of deposits is a good approximation since small businesses in Latin America only have access to banking accounts with only few banks, and they periodically deposit most of their sales in these accounts.

The financial information, the specific categorization of the transactions, and the extent of the time period that each country-specific dataset contains slightly differ. The information varies across countries since the financial institutions part of our study work with different digital technologies to process and store each transaction performed by their clients. Moreover, some banks face technical or financial constraints that make them hire a third party to externalize part or the whole storing process. Nevertheless, to answer our research questions and to perform the cross-country analysis, we homogenized the data as best as possible and worked with aggregate and similar categories across countries. For all intents and purposes, we were able to classify deposits into deposits in-person; deposits online; and POS transactions for most of the countries (see Table 1). Additionally, to make the analysis comparable over time, we decided to work only with the deposits made during or after June 2019. We then dropped from the analysis earlier information due to data quality concerns and because the sources that the banks used to extract the information pre-2019 were different and less accurate. Lastly, it is relevant to mention that this research is a work in progress. We currently continue working with the financial institutions to obtain new updated information that we will incorporate into the analysis as soon as possible.

In addition to the high-frequent administrative data encompassing banking transactions over the last two and a half years, we also accessed cross-sectional information

characterizing SMEs. The data is only available for a subset of the universe of SMEs since all financial institutions part of this project did not have the full characterization for all SME clients. In this paper, we focused on four different relevant SMEs' economic dimensions: i) the size of the firms; ii) the geographical location; iii) the economic sectors in which SMEs provide their goods and services, and; iv) the gender of the owner or main shareholder. To make the analysis manageable, we classify firms into micro, small and medium-sized SMEs. We also group geographic locations (which were available at the regional and/or district levels) into two categories: SMEs located inside the capital and SMEs located outside the capital (regional SMEs). Also, given the miscellaneous descriptions of economic activities that SMEs can have, we grouped economic sectors using the International Standard Industrial Classification of All Economic Activities (ISIC) and the Merchant Category Codes (MCC). We decided to work with 12-15 different economic sectors that follow a similar structure than these two international codings. Using the same ISIC and MCC codes, we also worked with a more disaggregated categorization of economic activities (more than 55 categories) to classify sectors into non-contact, low contact, and high contact industries. We classify economic activities into these three categories considering the degree of consumers' contact when they make a purchase and the expected distribution of in-person and digital sales within each category (for more details, see Tables 21 and 22 in the Appendix A.1). This categorization also follows a similar structure to Cirelli and Gertler (2021).

Regarding our methodology, we pre-processed and cleaned the data before performing cross-countries comparisons. First, instead of using the daily or weekly total amount of deposits, we calculate its simple-mean two-week moving average to reduce noise and the impact of seasonalities. We also eliminate the impact of outliers. Specifically, we replace extreme values by winsorizing the total amount of deposits using the 5 and 95 percentiles values. The winsorizing was done by type of deposit and included the entire period (data smoothing). Third, instead of working directly with the amount of deposits in levels, we instead create an index by scaling the total amount of deposits using as base the simple average of the total amount of deposits performed in February 2020. We use February 2020 as the base month since it was the last pre-Covid full month and does not include the seasonalities from the end-of-year holidays. Lastly, we intended to only include transactions that approximate SMEs' revenues. We then exclude transactions that were categorized as interest gains,

promotional fees, and others that we could not identify as potential revenues.

Table 1 summarizes the data by country and clarifies the different analyses that we were able to perform given the cross-sectional data attainable up to date. As the notes in Table 1 highlight, we continue working with the financial institutions to obtain new updates that will allow us to measure more accurately each of the economic variables that we are interested in measuring the Covid-19 pandemic impact.

Table 1: Distribution of SMEs by Country and Firm Features

Country/ Disaggregation	Brazil <sup>(1)</sup>	Chile <sup>(2)</sup>	Colombia <sup>(6)</sup>	Mexico <sup>(3)</sup>	Paraguay	Peru
Source	Mastercard	BCI	Davivienda	BBVA	Basa	Interbank
Unit of Analysis	Aggregate	SME	SME	SME	SME	SME
Data:						
- POS	Yes	No	No	Yes	Yes	Yes
- Deposits	No	Yes	Yes	No	Yes	Yes
Gender Owner	No	Yes	Yes	No	Yes	Yes
SME Size	Yes	Yes	Yes	No	Yes	Yes
Location	No	Yes	Yes	Yes	Yes	Yes
Econ. Sectors <sup>(4)</sup>	Yes	Yes	Yes	Yes	Yes	Yes
Contact Degree <sup>(5)</sup>	No	Yes	Yes	Yes	Yes	Yes

Notes: (1) Data was aggregate accordingly to the SMEs features. The data only contains information for the Sao Paulo region and it does not contain any private information of the merchants. (2) POS data will be available early March-22. (3) Data on gender will be available soon. (4) For Chile, Colombia, Mexico, and Peru, Economic sectors are classified by ISIC and MCC. Given the small number of SMEs in Paraguay, we use the economic sectors defined by Basa. For Brazil, we use the classification defined ex-ante by Mastercard. (5) Contact degree is categorized as non-contact, low contact, and high contact using the economic sectors as defining variable. (6) We do have POS transactions, but we are fixing some quality issues for the first months of 2019. Data should be available soon.

Table 2 describes relevant statistics by country and characteristic of the SMEs. The table shows the total number of SMEs and the distribution of firms for each category of interest. As we mentioned before, we could not have access to the full

characterization for all SMEs part of our study. The distribution and the total number of SMEs vary by country and category. Nevertheless, we were able to obtain a representative sample size (except for Paraguay) that will let us draw robust conclusions.

Table 2: Distribution of SMEs by Country and Firm Features

Country / Categories	Chile		Colombia		Mexico		Paraguay		Peru	
	N	%	N	%	N	%	N	%	N	%
Total	105,594	-	193,981	-			878	-	73,922	-
Gender:	50,080	-	50,387	-			871	-	73,992	-
- Female	15,842	32	10,840	22			273	31	24,822	35
- Male	34,238	68	39,547	78			598	69	49,170	65
SME Size:	39,900	-	190,907	-			878	-	22,336	-
- Micro	11,350	28	44,657	23			422	48	14,586	65
- Small	21,960	55	137,813	72			284	32	6,722	30
Medium-sized	6,590	17	8,437	5			172	20	1,028	5
Location:	104,604	-	193,709	-			878	-	73,349	-
- Capital	56,395	54	83,035	43			440	50	46,289	63
- No Capital	48,209	46	110,674	57			438	50	27,060	37
Contact Degree:	48,241	-	129,320	-			872	-	69,815	-
- No	31,385	65	58,102	45			508	58	18,340	26
- Low	2,759	6	15,849	12			241	28	10,088	15
- High	14,097	29	55,369	43			123	14	41,387	59

Note: Brazilian stats are not available because we did not have access to the data at the SME level.

Lastly, Appendix A.2 describes the different administrative datasets each financial institution provided us during this research. In the appendix, we also clarify the different types of transactions, the length of the period, and the specific categorizations that each financial institution was able to manage (taking into account their financial and technological constraints).

### 3 Firm Revenues and the Covid-19 Pandemic

Most Latin-American economies enforced the first wave of strict lockdowns during the second half of March 2020. These lockdowns suddenly imposed mobility and gathering restrictions that triggered a considerable negative shock across economic sectors and geographical regions. Subsections 3.1-3.5 highlight the decline in revenues that SMEs faced after the implementation of the lockdowns by displaying the evolution of the total amount of deposits at both the aggregate level and by SMEs' features. The severe decline in SMEs' revenues observed during April and May 2020 can be explained by different factors. First, the unexpected health-related policy shut down entire industries (such as pubs and restaurants, airlines, entertainment venues, and social activities). Second, the significant level of uncertainty about the future. Third, the lack of relevant economic programs focused on helping small businesses that were facing short-term financial constraints.

#### 3.1 Revenues: Aggregated Analysis

Figure 1 shows the sharp decline in both the total amount and the total number of deposits right after the implementation of the first wave of lockdowns in Latin America (the two indexes use the average amount and number of deposits performed in February 2020). The negative impact on SMEs' revenues was significant and similar across all six Latin American economies parts of our research. As the figure shows, countries like Brazil, Colombia, and Peru suffered a deterioration of around 50% when we compare the index to pre-pandemic months. Additionally, the figure shows that the total amount and the total number of deposits confronted similar recoveries in all six countries during the second semester of 2020 and reached pre-pandemic levels towards the end of that year.

Lastly, it is relevant to mention that Figure 1 also highlights that both the immediate decline and the posterior recovery are strongly correlated with mobility indexes. Here, we employ the mobility index in pharmacy and grocery stores from Google. Although Google mentions that the comparison among countries is not entirely truthful, we still observe a strong positive correlation between the severity of the mobility and gathering restrictions and the magnitude of the decline in the transactional banking data.





Figure 1: *Correlation Main Banking Metrics and Indexes of Mobility*

## 3.2 Firms Sizes

The first breakdown worth studying is whether small SMEs performed worse than larger SMEs. The intuition behind this conjecture is that small businesses faced additional short-term financial constraints and hardships to obtain accessible credit in the financial system. Although we only had access to administrative banking deposits from SMEs, we were able to categorize SMEs into micro, small, and medium-sized businesses in light of either the private banks or the Government classification. We prefer using the official definitions from the governments. However, when this categorization was not available, we instead group SMEs accordingly to the specific commercial segments defined by the financial institution.

Figure 2 shows the evolution of the total amount of deposits by SMEs size and country. Although the differences seem to be negligible, the evolution of the series shows a more significant decline right after the first-lockdown enactments for micro and small firms. Two additional factors are worth mentioning. First, micro-SMEs recovered faster than medium-sized SMEs. Second, SMEs -regardless of their size- reached pre-pandemic levels by the end of 2020. The faster recovery experimented by micro SMEs can be in part explained due to the implementation of significant economic Covid-19 packages/programs that primarily helped smaller and local businesses during the second semester of 2020 (see Appendix A.4).

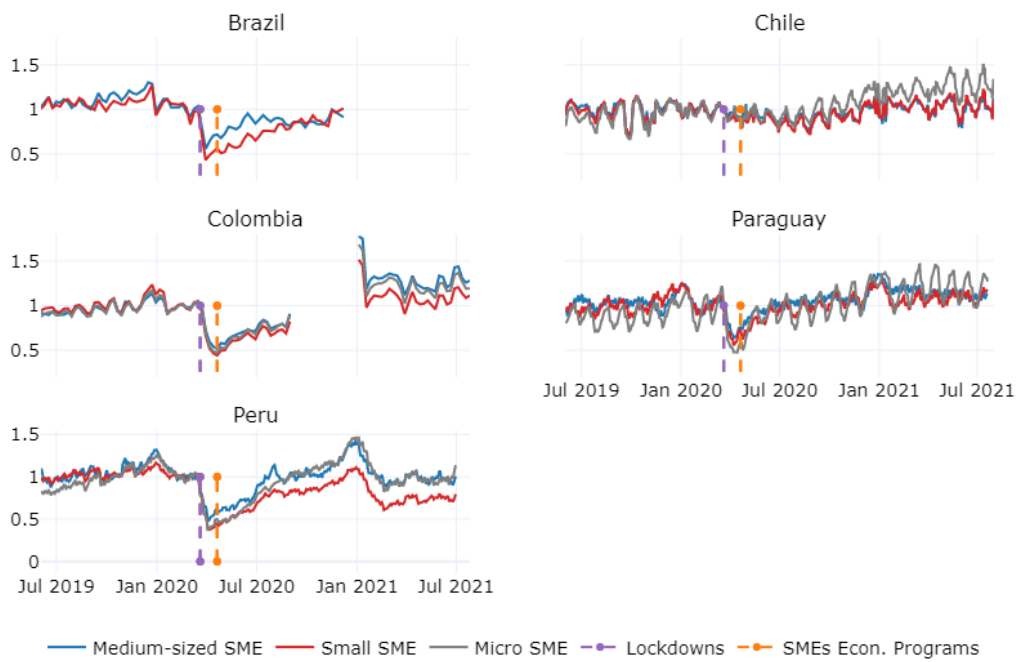


Figure 2: *Normalized Total Deposits by Country and Firm Size*

### 3.3 Geographical Location

The second dimension we wanted to explore is the geographical scope of the Covid-19 pandemic. Specifically, we were interested in studying whether SMEs located in the capital were more or less severely impacted by the mobility restrictions in comparison to the SMEs located outside the capital (regional SMEs). As Table 2 showed before, we had access to the geographical location of most of the SME clients of the banks in most of the countries that are part of our research (the exception is Brazil). Although the administrative geographical divisions are different across countries, we had access to detailed information about the location of the SME. In fact, we could identify the location at either the municipality, district, or department levels (categories that are more granular than regions or states). However, to make the cross-country analysis comparable, we decided to aggregate these categories into capital and regions.

Figure 3 shows that no significant differences exist between the economic performances of the SMEs located in the capital and the regional SMEs. The evolution of the revenues is similar not only after the first wave of lockdowns but also during the posterior 2020 recovery. We believe that the differences are not sizeable due to the following two opposite factors. First, we should have expected a better performance from the SMEs located in the capital since they may be larger firms facing lower financial constraints. However, at the same time, the mobility and gathering restrictions seemed to be harsher in the capital following the virus spreading process.

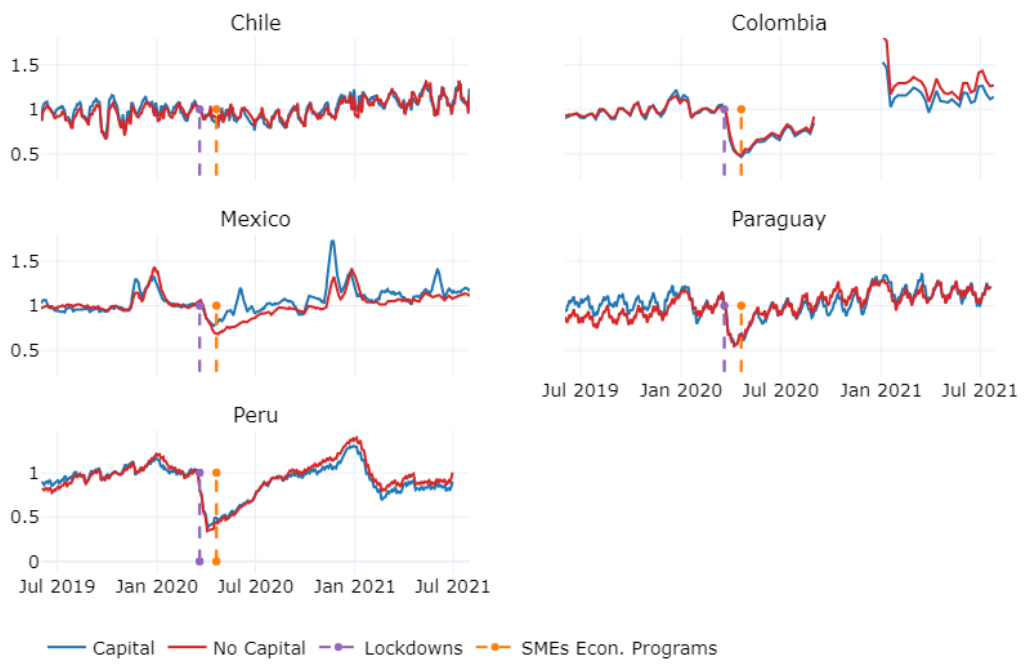


Figure 3: *Normalized Total Deposits by Country and Geographical Location*

### 3.4 Economic Sectors

We next study the heterogeneous impact of the Covid-19 pandemic on economic sectors. Taking into account the relationship between how Covid-19 spreads and the implementation of the mobility restrictions, it seems natural to expect a significant heterogeneous impact on revenues across the different economic activities of the small businesses part of our study. Several studies and reports found that industries such as airlines, tourism, entertainment venues, and social activities faced substantial declines in sales. Figures 4-9 show the evolution of the total amount of deposits for all six Latin American economies part of this research. The figures support our initial intuition by showing substantial differences across economic sectors within each country -especially in the sharp decline experimented immediately after the March 2020 lockdowns-. The figures also show that the economic sectors where businesses rely less on direct contact with consumers (such as agriculture, construction, and manufacturing) suffered less from mobility and gathering constraints. Lastly, it is relevant to note that retail sales associated with food did not face a similar decline in comparison to the rest of retail sales and other businesses like services. We think that a significant proportion of SMEs that operate in this industry was able to incorporate online channels and payment methods to sell their products in the short term.

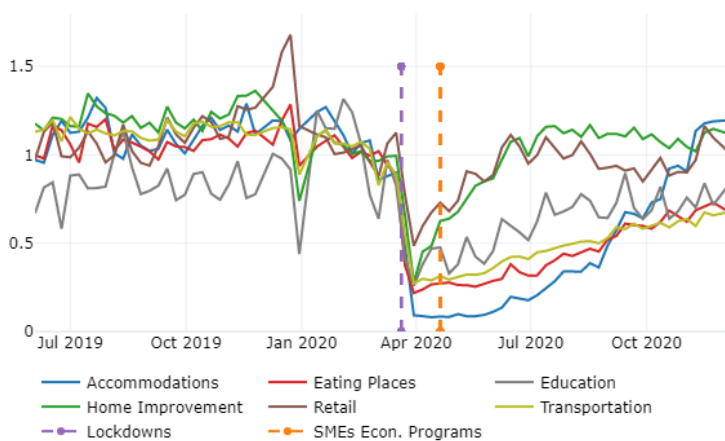


Figure 4: *Normalized Total Deposits, Main Economic Sectors, Brazil*

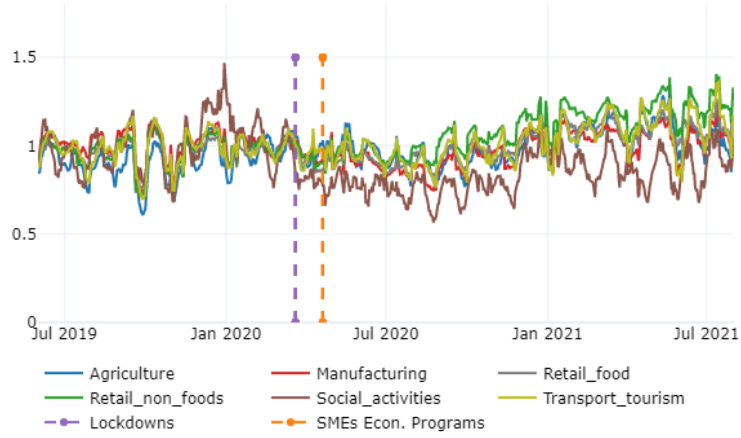


Figure 5: *Normalized Total Deposits, Main Economic Sectors, Chile*

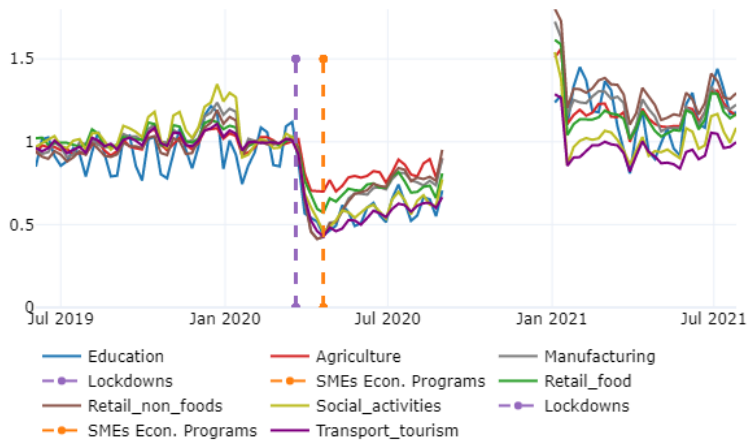


Figure 6: *Normalized Total Deposits, Main Economic Sectors, Colombia*

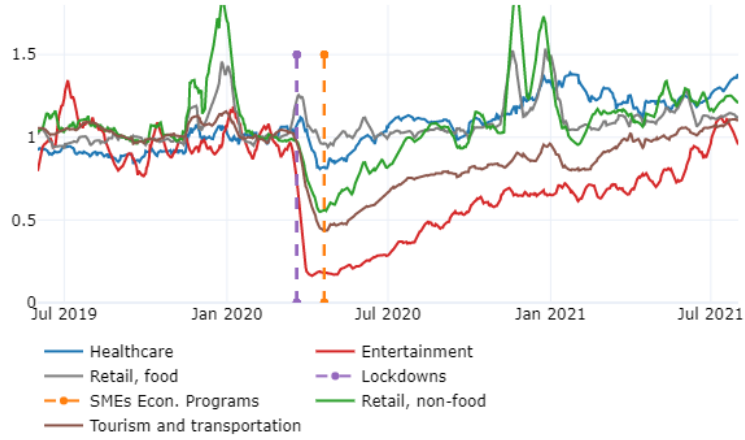


Figure 7: *Normalized Total Deposits, Main Economic Sectors, Mexico*

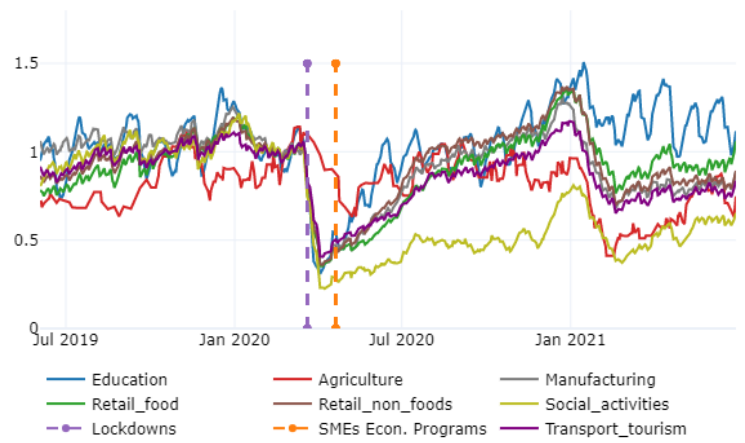


Figure 8: *Normalized Total Deposits, Main Economic Sectors, Peru*



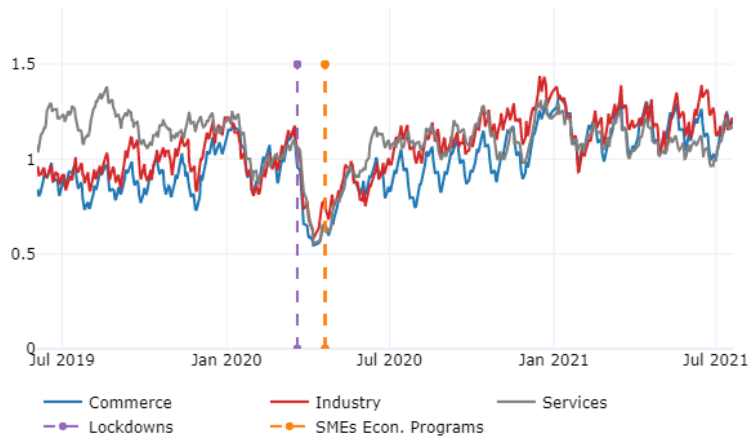


Figure 9: *Normalized Total Deposits, Main Economic Sectors, Paraguay*

### 3.5 Businesses Exposure-Degree

Lastly, we take Cirelli and Gertler’s strategy and classify economic activities into non-exposed (non-contact sector) and exposed (high contact and low contact sectors) industries. We follow the following two-step approach. First, we use the ISIC and MCC codes to categorize SMEs into a more granular classification than the economic sectors defined in the previous subsection. Tables 23 and 24 in Appendix A.1 display the final classification of the more aggregate economic sectors into this more granular description. Second, we categorize SMEs into non-contact and contact sectors using the previous categories. The categorization considers both the exposure degree or direct contact with customers that each economic activity must face when selling its product or service, and the relevance that online sales may have. Using this two-step approach, we ended up with a classification similar to the categorizing used in Cirelli and Gertler. Figure 10 shows evolution of the total amount of deposits for each of the Latin American countries part of our research. The figure shows that the non-contact sector in Mexico, Paraguay, and Peru faced both a smaller immediate decline and a faster post-recovery in comparison to the contact sectors.

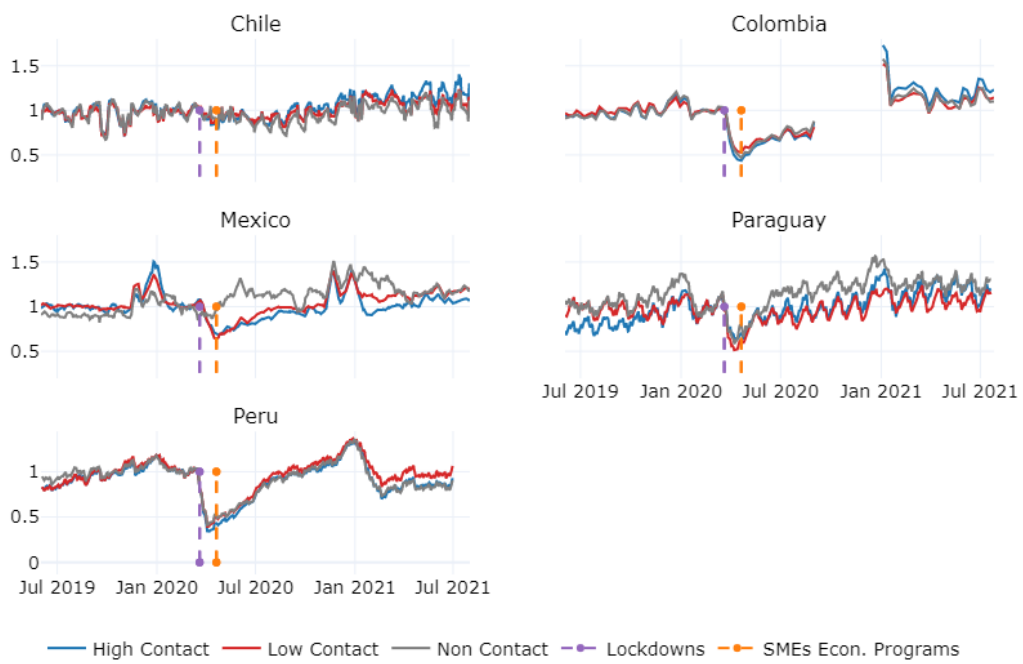


Figure 10: *Normalized Total Deposits by Country and SMEs' Contact Degree (based on econ. sectors)*

## 4 Covid-19 and the SMEs' Digital Transformation

Considering the magnitude, the scope, and the length of the Covid-19 restrictions on mobility and gatherings, we expect to observe a faster digitalization process, especially from small firms in developing economies. Different studies and reports have confirmed that the Covid-19 shock has been one of the paramount accelerators by creating the right incentives to businesses to increase the adoption of modern digital technologies regardless the geographical location, the firm size, and the economic activity. The major role played by remote work and the unfeasibility of customers purchasing goods and services in-stores favored the migration from old fashioned in-person to new digital and online technologies.

The range of Covid-19 restrictive measures -including local and national lockdowns, social distancing policies, and the closure of borders- forced many businesses to adapt not only the organization within the firm, but also the way they sell their products, and interact with customers, suppliers, and stakeholders. The OECD (2021) report [6] emphasizes that the pandemic forced firms to accommodate the work process and the selling methods to the pandemic dynamic to keep employees and customers safe. At the same time, many studies have shown the significant migration from working in the office to working from home during the pandemic (Beland *et al.* 2020 [1], Brynjolfsson *et al.* 2020 [2]).

Here, instead of studying the impact of the Covid-19 pandemic on employees and the how firms internally adapted, we investigate the digitalization process of SMEs from the business perspective. The administrative banking data allows us to categorize deposits into in-person and online transactions. We first compare the relevance of these two types of deposits *pre* and *post* implementation of the first wave of lockdowns by looking at the evolution of the total amount of deposits from June 2019 to October 2021. We conclude that the Covid-19 pandemic expanded the use of digital technologies by increasing the proportion of deposits online counteracting the previous relevance of in-person transactions.

Table 3 shows the total number of SMEs that performed in-person and online transactions during the last two and a half years by country. The table shows that a higher proportion of SMEs have been performing in-person transactions in comparison to online transactions (with the exception of Peru).

Table 3: Distribution of SMEs by Type of Transaction

Country	In-person		Online		Total
	N	%	N	%	N
Brazil <sup>(1)</sup>	65.7M	61	57.1M	53	108M
Chile <sup>(2)</sup>	-	-	-	-	-
Colombia	173,993	90	154,074	79	193,981
Mexico <sup>(2)</sup>					
Paraguay	842	96	744	85	878
Peru	55,387	75	63,691	87	73,582

Notes: (1) Stats are calculated using consumers' cards.

(2) Information will be available soon.

Subsections 4.1-4.5 study the significant immediate and permanent substitution from in-person deposits to online deposits. The predominance of online deposits began once the first Covid-19 mobility restrictions took place. The analysis also shows that the migration to online deposits materialized across all industries, regardless of the geographical location, the gender of the owner, and the size of the SMEs.

## 4.1 Total Amount of Deposits by Type of Deposits

Figure 11 compares the time evolution of in-person and online deposits using the scaled total amount of deposits as index. The figure highlights that the immediate decline due to the implementation of the first wave of lockdowns was relatively more significant on in-person deposits than online deposits. The conclusion is the same for all five countries for which we were able to perform this disaggregation.

Figure 11 also shows that the switch from in-person to online deposits was permanent. In fact, the gap between both time series remained significant not only during the 2020 economic recovery but also during the first ten months of 2021. SMEs then have been using more digital banking at least for the year and a half after the enactment of the March 2020 lockdowns.

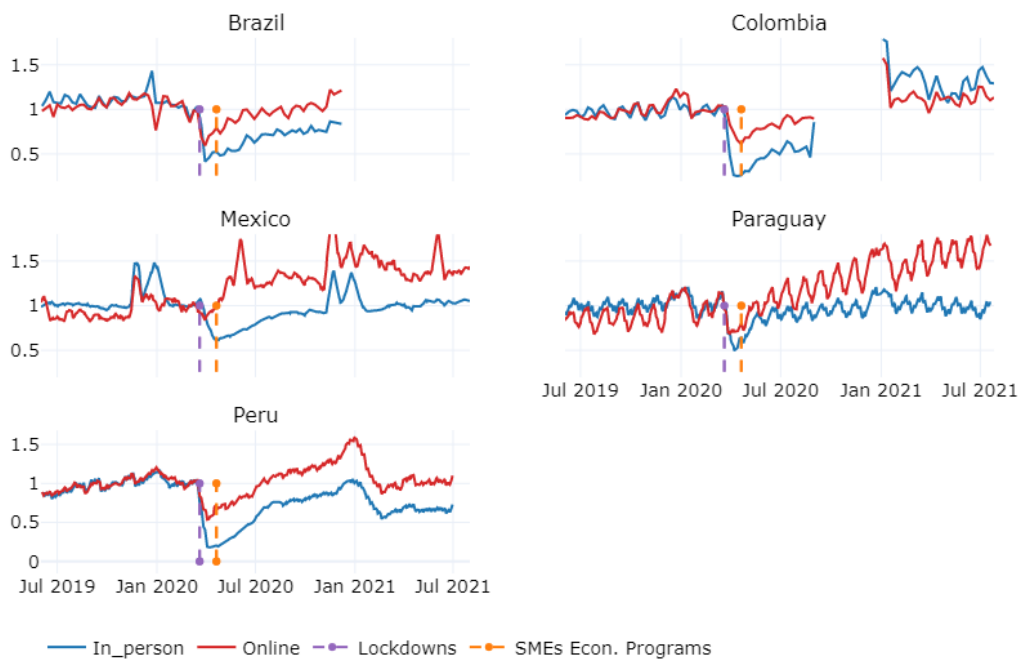


Figure 11: *Normalized Total Deposits by Country and Type of Transaction*

To study further the relevance and scope of the digitalization process of businesses during the pandemic, we next perform a similar analysis for each of the economic variables characterizing SMEs. To make meaningful comparison across categories, we proceed calculating the proportion of the total deposits that were performed online. A positive short-term Covid-19 impact in the digitalization process of small businesses will then be reflected as an instantaneous jump in this metric after the implementation of the first wave of lockdowns forced in March 2020. A long-term effect in the digitalization process will instead be characterized by a stable higher proportion of online deposits toward the end of the 2020 economic recovery and beyond.

## **4.2 Proportion of Deposits Performed Online by SME Sizes**

Figure 12 shows the proportion of the total amount of deposits that were made online disaggregate the sizes of the businesses. Figure 12 not only shows the immediate impact caused by the first wave of lockdowns, but also the larger proportion of online deposits post-recovery. As expected, medium-sized SMEs (the largest firms part of our study) relatively used more online technologies than smaller firms pre-pandemic. However, the immediate post-lockdown increase in the proportion of online deposits experimented by small and micro SMEs was more significant, shrinking the pre-pandemic gap.

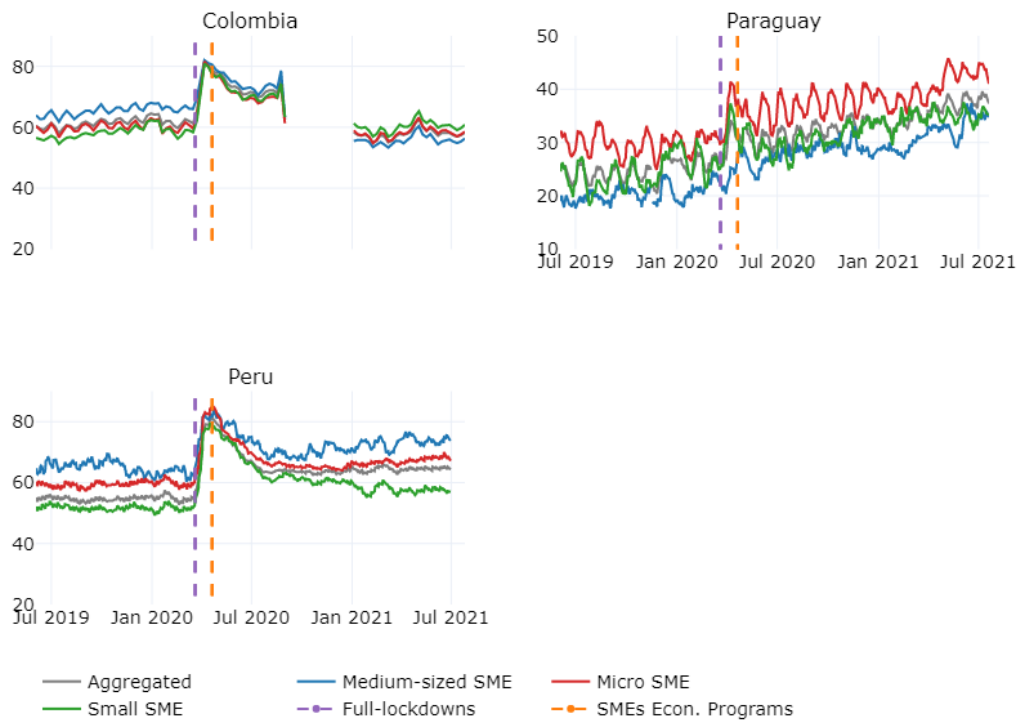


Figure 12: *Proportion of Deposits Performed Online by SME Sizes*

### 4.3 Proportion of Deposits Performed Online by Geographical Location

Figure 13 shows a similar analysis, however, the focus is now on the geographic location of the SMEs. Once again, we perform this analysis using two aggregate categories: SMEs located in the capital and regional SMEs. As expected, the figure shows -regardless of the country- that SMEs located in the capital have been using relatively more the digital banking than regional SMEs.

Similar to the previous two subsections, Figure 13 highlights the abrupt increase in the use of digital technologies after the enactment of the first wave of lockdowns. Also, the proportion of deposits performed online post-2020 economic recovery remained higher and stable regardless of the location of the SMEs. Although regional SMEs still rely relatively more on in-person deposits, Figure 13 reinforces our conclusion that Covid-19 and the mobility restrictions broadly increased and accelerated the digitalization process across small businesses.



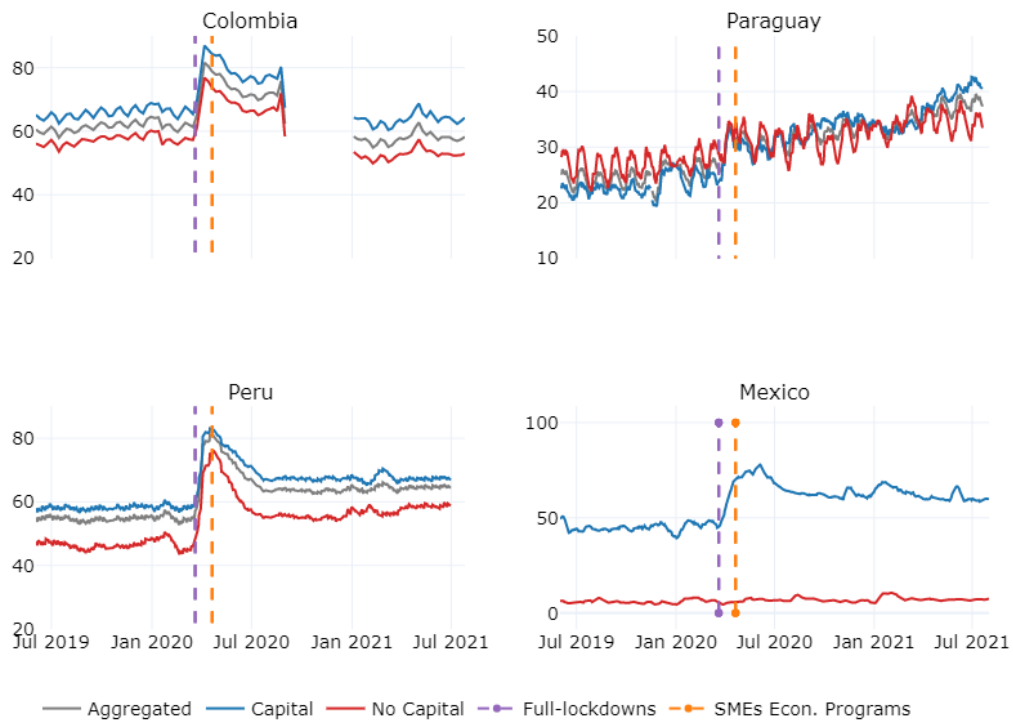


Figure 13: *Proportion of Deposits Online by Geographical Location*

#### 4.4 Proportion of Deposits Performed Online by SMEs Exposure Degree

Next, we use our classification based on the contact exposure of industries as the relevant dimension to determine in which economic sectors the Covid-19 pandemic created a more significant impact on the diffusion of digital technologies. The more noticeable findings from Figure 14 are similar to the conclusions mined in the previous analyses: the implementation of the first wave of lockdowns accelerated the digitalization of SMEs in all industries.

Figure 14 shows the relevant surge in the total amount of deposits performed online in all three contact-based economic sectors. Moreover, the instantaneous surge generated a long-term impact. As expected, the figure shows that industries that are not less exposed to the direct contact with costumers have mainly been using digital technologies to perform banking transactions in comparison to the industries where clients can presentially purchase products in store. Finally, it is relevant to notice that SMEs providing services in the most exposed sector mightily increased the use of online banking immediately after the implementation of the lockdowns in comparison to the other two sectors. This sharp rise gives us an idea of the fast move that SMEs selling products and services in-store were able to perform.

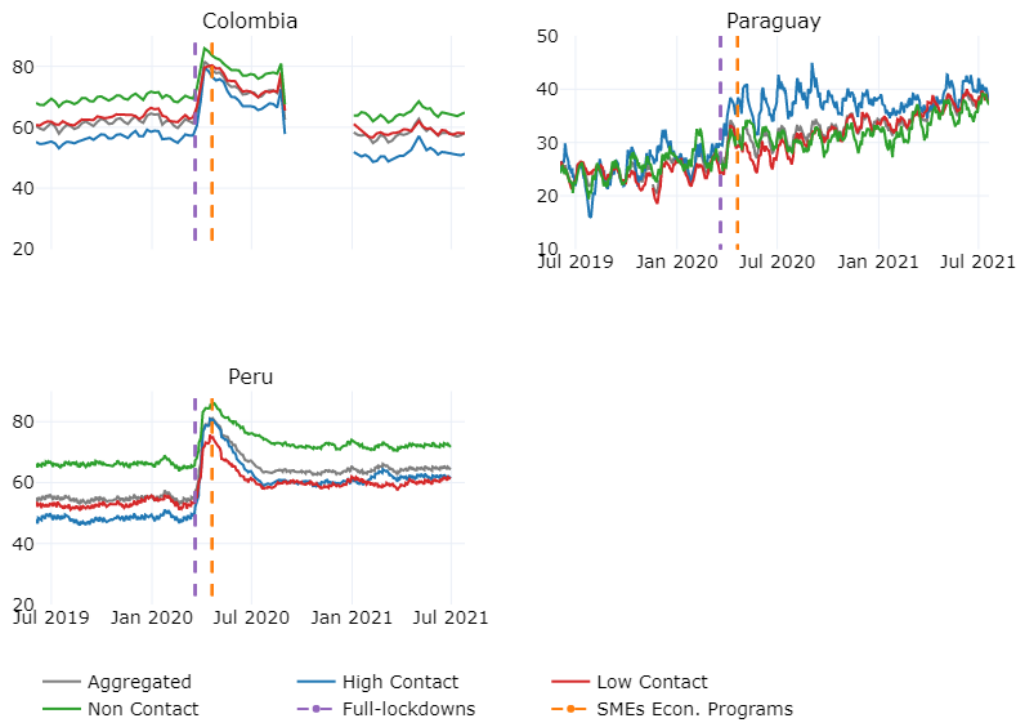


Figure 14: *Proportion of Deposits Online by SMEs' Contact Degree*

## 4.5 Proportion of Deposits Performed Online by Gender of the Owner

Lastly, we study whether the increase in the use of the digital banking experimented by SMEs was comparable regardless of whether the owner or main shareholder of the firm is a female or a male. Figure 15 shows that SMEs owned by a female and SMEs owned by a male performed similarly posterior to the enactment of the March 2020 lockdowns. Regardless of the gender of the owner, we again notice the significant and instantaneous increase in the total amount of deposits performed online and the prominent role gained by digital banking after the 2020 economic recovery. Figure 15 shows that these two Covid-19 effects are present in all SMEs regardless of the gender of the owner.

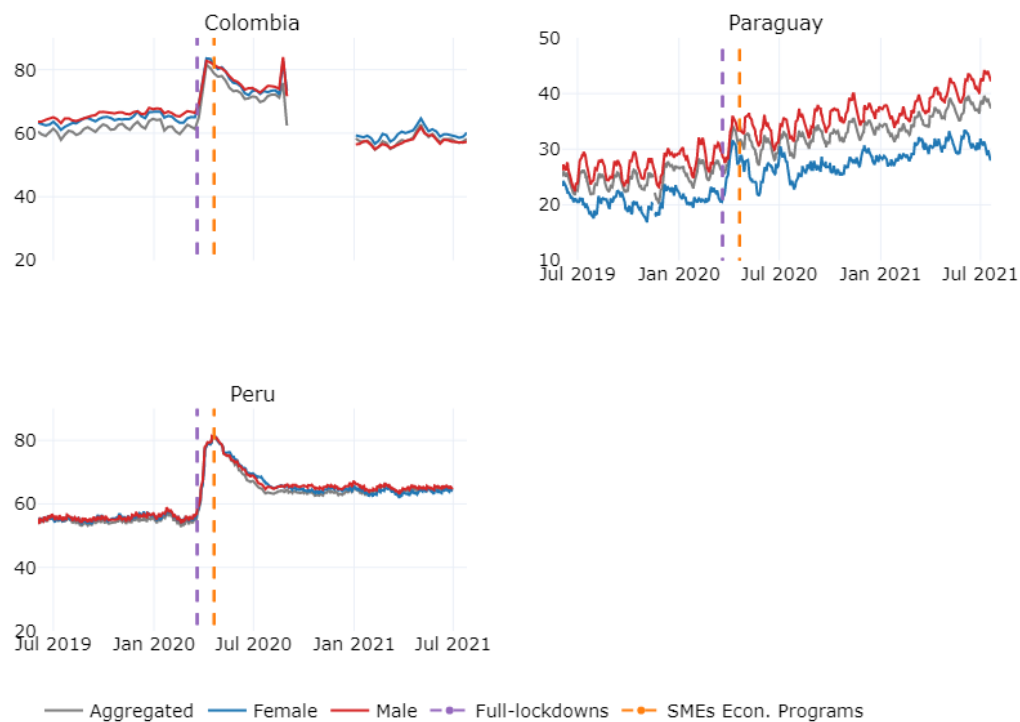


Figure 15: *Proportion of Deposits Online by Gender of the Owner*

The main conclusion we extract from the analyses we performed in Subsections 4.2-4.5 is that the Covid-19 pandemic accelerated the digitalization process of SMEs in Latin America. Here, we show the significant immediate and permanent substitution from in-person deposits to online deposits that we interpret as greater use of digital banking by small businesses. Online transactions became the predominant type of transactions not only during the immediate months posterior to the implementation of the March 2020 lockdowns but also during and after the 2020 economic recovery. This substitution pattern and the financial technology adoption are present across all industries, firms' sizes, and geographical locations.

## 5 Conclusion

In this research, we study the impact of mobility restrictions on SMEs performance in Latin-America by analyzing the heterogeneous immediate drop and subsequent recovery of the businesses earnings. We exploit rich and diverse financial datasets coming from six different banks that allows us to construct time-series covering the period from June 2019 to October 2021. First, we report that the largest drop on earnings were due to the implementation of the first lockdowns that were implemented during the second half of March 2020. The huge drop in both the total amount of deposits and total number of transactions was transversal across industries, firms' sizes and location.

Second, we combine our panel data (transactions by SMEs at the daily or weekly level) with administrative cross-sectional datasets that characterize SMEs. This allows us to study and report the heterogeneous impact of Covid-19 restrictions which vary across industries, location and sizes. We then document the substitution experimented in all countries from deposits performed in-person towards deposits performed online. The switch seems to be permanent since the gap between both types of transactions has remained relatively stable after one and a half years from the implementation of the full lockdowns.

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# Appendix

## A.1 Non-exposed and Exposed Economic Sectors

Tables 16 and 17 detail how the economic activities of SMEs are classified into contact (exposed) and non-contact (non-exposed) sectors. We use a slightly different classification for Mexico taking into consideration that these datasets use MCC codes (instead of ISIC codes), and Mexican SMEs part of the study are mainly firms that provide their services in the commerce, retail, and services industries.

A. Non Contact Sector		B. Contact Sector	
Agriculture	agriculture fishing_and_aquaculture forestry_and_logging	Education	others
Construction	building_repairs new_buildings	Healthcare	doctors_and_physicians veterinary
Financial Intermediation	financial_intermediation insurance	Retail Food	wholesale_clubs_and_discount_stores
Government and Defense	government_and_defense	Retail Non Foods	equipment_and_machinery_rentals machinery_equipment_and_materials_wholesaling
Healthcare	medical_equipment	Social Activities	business
Legal and Business Services	legal_and_business_services	Tourism	travel_agencies
Manufacturing	chemical_and_electricity_products construction_materials_and_industrial_machinery edible_products equipment_and_machinery_reparations medical_equipment motorized_vehicles others retail_products textil_wood_paper_plastic_glass	Transport	gas_station
Mining	mining mining_support_activities	<b>B.2 High Contact</b>	
Real State	real_state	Education	primary_and_secondary_educ social_cultural tertiary_educ
Tech Consulting	tech_consulting	Healthcare	hospitals social_services
Telecommunication	services telecommunication	Others	services
Transport	land_freight_transport logistic_transport maritime	Retail Food	corner_stores restaurants_and_bars
Utilities	utilities_generation_infraestructure	Retail Non Foods	clothing_stores corner_stores drug_stores durable_goods nondurable_goods services
		Social Activities	artistic_and_entertainment religious_and_politics
		Tourism	hotels
		Transport	air airlines passenger_transport rail_transport

Figure 16: Contact and Non-Contact Classification Based on ISIC codes and economic activities (Chile, Colombia, Paraguay, Peru)

A. Non Contact Sector		B. Contact Sector	
		B.2 High Contact	
Financial, gov. and prof. serv	Contractors	Education	Schools
	Utilities	Entertainment	Entertainment venues and services
Healthcare	Medical and hospital equipment	Healthcare	Hospitals
	Insurance	Retail, food	Bakeries
Retail, non-food	Direct marketing		Bars and nightclubs
B. Contact Sector			Caterers
B.1 Low Contact			Restaurants
Financial, gov. and prof. serv	Civil society and political organizations		Corner stores
	Financial and government services		Grocery stores and supermarkets
	Professional and personal services	Retail, non-food	Clothing stores
Healthcare	Drug stores		Department stores
	Doctors and physicians	Tourism and transportation	Airlines
Retail, food	Confectionery stores		Hotels
	Liquor stores		Public transportation and transportation services
	Meat provisioners		
	Wholesale clubs and discount stores		
Retail, non-food	Construction materials and home improvement		
	Electronic stores		
	Miscellaneous stores		
Tourism and transportation	Travel agencies		
	Autoparts and repair shops		
	Car rentals		
	Service stations and fuel		
	Vehicle dealers		

Figure 17: Contact and Non-Contact Classification Based on MCC codes and economic activities (Mexico)

## A.2 Datasets

### Brazil

Financial Institution: Mastercard

TBA

### Chile

Financial Institution: BCI

TBA

### Colombia

Financial Institution: Davivienda

TBA



## **Mexico**

Financial Institution: BBVA

TBA

## **Paraguay**

Financial Institution: Basa

TBA

## **Peru**

Financial Institution: Interbank

TBA

### **A.3 Implementation of Lockdown and Mobility Restrictions: The Case of Brazil, Paraguay, and Peru**

#### **Brazil**

Once the first Covid-19 case was detected at the end of February 2020, pre-lockdown measures were announced in most of the big cities in Brazil. On March 16th, the city of Sao Paulo determined that schools, universities, theaters, and cinemas should remain closed, working at home should be implemented, and social events should be avoided. Subsequently, On March 23rd, non-essential sectors were closed and public transportation was limited. These restrictions did not apply to critical sectors such as hospitals, clinics, pharmacies, hotels, supermarkets, and companies working in the supply chain. The partial lockdown reduced mobility: the circulation of people in Sao Paulo was reduced by 75%–80% (accordingly to government estimations).

Taking into consideration the evolution of the pandemic and considering the negative impacts of the restrictions in the economy, the government announced a gradual opening plan known as *Retomada Consciente* at the end of May 2020. The plan determined the opening degree and the functioning of the economic sectors and followed the following five phases:

- Phase 1 – Maximum alert: only essential services are permitted.

- Phase 2 – Control: commercial activities, services, restaurants, cultural and religious events are permitted, although with reduced hours (8 hours maximum), limited seating capacity (40%), and the adoption of all health protocols.
- Phase 3 – Flexibilization: the same activities as in phase two are allowed, although with greater flexibility in terms of schedules (maximum of ten hours).
- Phase 4 – Partial opening: most activities are allowed to operate for a maximum of 10 hours and with a capacity equivalent to 60% of the activity.
- Phase 5 – Control: all activities are permitted following the sanitary protocols.

The plan followed the sanitary context and rules determined by each Health Region. It is worth mentioning that despite the progress in controlling the pandemic experimented the second half of 2020, all Health Regions returned to Phase 1 of the Plan, and a new phase called *Emergency Phase* was implemented in March 2021. The emergency phase implied a new total closure of activities in Sao Paulo that extended until April 2021, when a new transition towards the reopening of the economic sectors began.

Figure 18 resumes the situation of the Health Regions in 2020 according the “Retomada Consciente” plan since the first lockdown in March, 2020.

## Paraguay

After the detection of the first Covid-19 case, pre-lockdown measures were announced on March 10th, 2020. The first restrictions were focused on school closures, prohibition of entertainment events and group activities, and the implementation of a curfew effective from 8 pm to 4 am. Despite this, and due to health considerations and spreading levels, a total lockdown was enforced from March 20th to May 3rd. The total lockdown consisted of mobility restrictions, the prohibition of all economic activities except for those considered as essential, the suspension of international flights, and the closure of borders.

Similar to the Brazilian and Peruvian cases, a new system called Smart Lockdown was implemented at the end of March. This strategy intended to reopen progressively the economy through a four-phase plan that still held some restrictions to mobility and on non-essential economic sectors. The phases are described below.

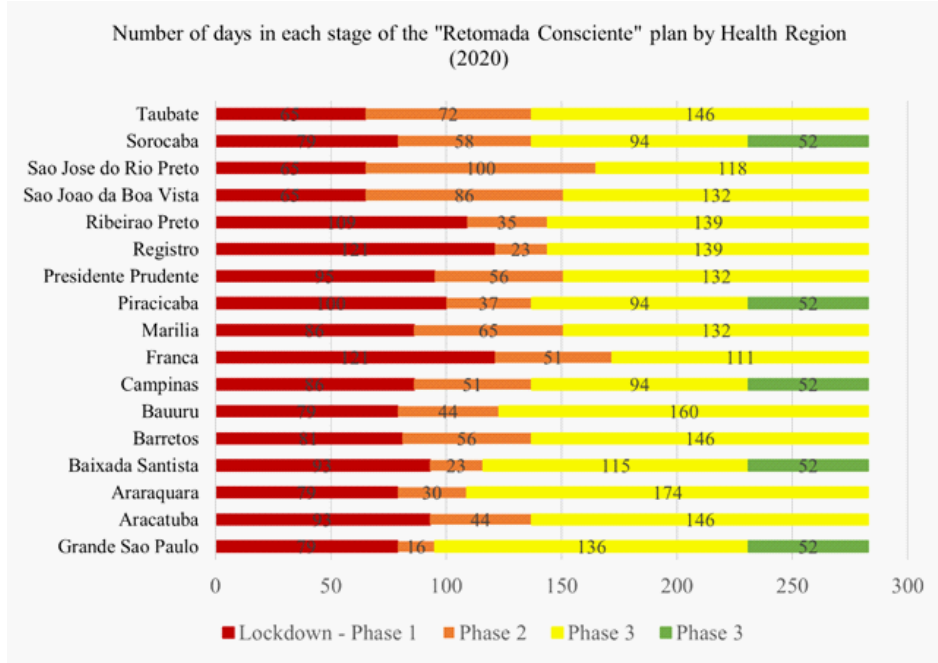


Figure 18: *Distribution of Days in Lockdown by Brazilian Health regions, 2020*

- Phase 1: May 4 to May 24: considers the reopening of nearly 60% of economic activity. Includes the operation of all types of industry, construction activities, delivery, and collection services. This phase allows mobility under certain circumstances (work and essential activities) and as long as a circulation form has been completed.
- Phase 2: May 25 – June 14: considers the reopening of 80% of the economic activity. Commercial stores (only until 800 m<sup>2</sup>), corporate offices, sports, and cultural activities are allowed. Regarding mobility, this phase authorizes long-distance travel and non-essential shops from 10 am to 7 pm.
- Phase 3: June 15 – July 19: the operation of all commercial stores plus the activity of gyms, academies, religious ceremonies up to 20 people, bars, restaurants with reservations, and sports are allowed. This phase considers a curfew being effective from 11 pm to 5 am from Sunday to Thursday, and from 12 am to 5 am on Fridays and Saturdays.
- Phase 4: July 20 – October 4: this phase allows the opening of hotels and also allows religious, cinemas, and cultural events up to 50 people. Family gatherings

were allowed up to 20 people.

With the implementation of the Smart Lockdown, all the Paraguayan Departments systematically adopted the new rules according to the schedule, but in some circumstances, some departments or districts remained at earlier stages due to their epidemiological status. On October 5th, the whole country entered a state of *new normality* which allowed all economic sectors to get back to work, progressively ending borders closure with international flight starting on October 21st. During the last three months of 2020, few restrictions were implemented. However, the government reinstalled restrictions measures at the beginning of 2021 due to the second wave of new Covid-19 cases. Between March and May, the government implemented stricter mobility restrictions (such as traffic restrictions, school closures, prohibition of social events, and operation of essential activities) in those districts considered as *red zones*.<sup>1</sup>

## Peru

The Peruvian experience follows a similar path to the Brazilian and Paraguayan experiences. The implementation of the first lockdown occurred on March 16th, 2020. The initial extension of the lockdown (state of emergency) was 15 days, but these restrictions were extended five times and remained in place until the end of June 2020. Curfews, the closure of borders, and restrictions on transportation among regions were some of the main restrictions implemented during this period. The state of emergency remained until September, however, the lockdown was replaced by focalized measures.

To avoid greater negative impacts on the economy, the government implemented the *Reactivacion Economica* plan at the end of April. The plan initially consisted of 4 phases (one phase in each month from May to August). The plan allowed a gradual opening of the economy with a focus on economic sectors and geographical areas where new Covid-19 cases were controlled. The first phase of the plan allowed the functioning of 27 activities that belonged to the economic sectors of mining, industry, construction, services, and commerce. The remaining phases were not clearly defined, but the initial goal was to have 90% of the jobs active in September.

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<sup>1</sup>Red zones are districts having a "very high" level of community Covid-19 transmission. In particular, the districts that exceed 150 new confirmed cases per 100,000 inhabitants per-week, and/or have more than 5 deaths per 100,000 inhabitants, within a two-week average.

The lockdown was fully lifted at the end of October, taking into consideration the decrease in the number of new cases. Together with this measure, the opening of borders and international travel started to operate once again. However, the restrictions were in place again shortly due to the arrival of the Delta variant at the beginning of 2021. In fact, the implementation of a new lockdown took place at the end of January.

## **A.4 Economic Measures and Financial Support to SMEs**

In the context of the pandemic and its impact on the economy, several Latin American countries have been oriented towards mitigating the negative effects of the crisis by implementing transversal policies to help the most affected economic sectors and small and medium enterprises. Different policies were adopted to provide liquidity and ensure the solvency of these institutions, especially micro and small enterprises. The strategies adopted to preserve the financing needs of companies include programs to facilitate access to credit through government guarantees or new lines of credit and programs to ensure the short-term liquidity of companies through tax relief measures or extensions in the payment of utilities and critical services. The following are examples of these strategies considering the cases of Chile, Paraguay, Peru, Mexico, and Brazil.

### **Access to credit through special guarantees**

The first programs to be adopted for the relief of companies, especially SMEs, include an increase in resources and more flexible requirements for special guarantee funds for micro, small and medium-sized companies to facilitate access to credit. The FOGAPE (Chile), Reactive Perú, and FOGAPY (Paraguay) funds received US\$3 billion, US\$7.268 billion, and US\$100 million, respectively, to enable companies to cover their working capital needs, including the payment of salaries and social security obligations, leases, supplies, invoices, and others.

Thus, since its implementation, approximately 346,000, 25,000, and 501,000 guarantees have been granted in Chile, Paraguay, and Peru, respectively. However, as shown in Table 1, most of the guarantees have been oriented to micro and small enterprises. In fact, 81.4%, 80.3%, and 98.3% of the guarantees granted in Chile, Paraguay, and Peru went to micro and small enterprises.

Firm size	Chile		Paraguay		Peru	
	Nº guarantees	Amounts (MM US\$)	Nº guarantees	Amounts (MM US\$)	Nº guarantees	Amounts (MM US\$)
Micro	281,637* 81.4%	6,253.3* 35.0%	11,048 44.1%	105.0 16.7%	445,534 88.9%	1,973.0 14.2%
Small			9,089 36.2%	234.6 37.2%	47,234 9.4%	4,434.6 31.9%
Medium	43,771 12.6%	3,125.0 17.5%	3,538 14.1%	173.6 27.5%	2,011 0.4%	681.2 4.9%
Big	20,628 6.0%	8,489.3 47.5%	1,403 5.6%	117.4 18.6%	6,519 1.3%	6,798.5 49.0%
Total	346,036	17,867.6	25,078	630.6	501,298	13,887.3
Total (% PIB 2020)		7.1%		1.8%		6.9%

Note: \* Includes information for both micro and small firms.

Figure 19: Number of Guaranteed and Total Amounts of Loans Granted Under Covid-19 Emergency Economic Programs (2020-2021)

Figure 19 shows that the programs in Chile, Paraguay, and Peru have financed loans totaling US\$17.867 billion in Chile, US\$630 million in Paraguay, and US\$13.887 billion in Peru, representing 7.1%, 1.8%, and 6.9% of GDP, respectively.

### Loans with improved terms and conditions

Other strategies used in the context of the pandemic and its effects on enterprises were the creation or improvement of lines of credit for SMEs to provide resources for companies to finance their working capital, but also for investment and debt refinancing.

As shown in Figure 20, different Latin American countries provided lines of credit with below-market interest rates, flexible payment terms, and grace periods and significant amounts. As with the special guarantee funds, the Covid-19 lines of credit had micro and small enterprises as a priority group.

### Short-term Liquidity Support, and Tax Relief Measures

Preserving short-term liquidity was another of the objectives pursued by Latin American countries during the crisis. The extension of corporate tax burdens was a policy promoted by several governments. In this area, the tax strategies used ranged from the extension of corporate tax payment deadlines to the temporary implementation

Country	Credit line	Target	Detail
Chile	Corfo MIPYME	Firms with annual sales of less than US\$ 3 billion	US\$ 150 million in loans through non-bank financial intermediaries.
Paraguay	Crédito BNF para pago de planillas	MSMES	Loans of up to 10 times the employer's total payroll, with a term of one year and an annual rate of 7%.
Peru	FAE-Turismo, FAE-Agro, PAE-MYPE	MSES (tourism, agriculture and commerce)	Loans of up to US\$ 180,000, with a 60-month term, 18-month grace period and an annual rate of 5%.
Brazil	PESE	Firms with annual sales of more than US\$ 70,000 and less than US\$ 2 million	Loans for up to 100% of the employer's payroll, with a term of 36 months, 6 months grace period and an interest rate of 3.75%.
Mexico	Crédito a la Palabra	MSES and self-employed	Loans of up to US\$ 1,270, for a three-year term, with a three-month grace period and a 6% interest rate.

Source: public information from governments.

Figure 20: Covid-19 Emergency Lines of Credit Implemented in Latin America.

of differentiated tax rates for the most negatively impacted firms. In addition to these policies, and to guarantee companies' liquidity, the deferment of payments of utilities such as water, electricity, and rent was also implemented.

Country	Policy	Target
Chile	Suspension of monthly pension payments (PPM) for the months of July, August and September	Firms with a 30% decrease in revenues
	Early income tax refund (from May through April)	SMES with a 30% decrease in revenues
	Extension of VAT payment until September 2020	SMES
	Deferral of first category tax until July 2021	SMES
Paraguay	Transitory income tax reduction (from 25% to 15%)	Firms under the PRO-PYME regime
	Extension of payment of income tax until April	SMES
	Exceptional regime for VAT, agricultural VAT and income tax payment facilities	SMES
Peru	Extension of the declaration and monthly payment of taxes corresponding to the months of February through August 2020	SMES
	Extension of up to 4 months of the 2019 annual income tax return and payment of the annual income tax	SMES
Brazil	Extension for the payment of taxes from July through December 2020	SMES
	Extension to June 30 of the deadline for filing income tax returns	SMES
Mexico	Extension of the deadline for payment of employer's contributions	SMES
	Transitory tax reductions (only in some states)	SMES

Source: public information from governments.

Figure 21: Covid-19 Tax Relief Measures



# Table of Contents

1	Introduction . . . . .	2
2	Data and Methodology . . . . .	4
3	Firm Revenues and the Covid-19 Pandemic . . . . .	8
3.1	Revenues: Aggregated Analysis . . . . .	8
3.2	Firms Sizes . . . . .	10
3.3	Geographical Location . . . . .	12
3.4	Economic Sectors . . . . .	14
3.5	Businesses Exposure-Degree . . . . .	17
4	Covid-19 and the SMEs' Digital Transformation . . . . .	19
4.1	Total Amount of Deposits by Type of Deposits . . . . .	20
4.2	Proportion of Deposits Performed Online by SME Sizes . . . . .	22
4.3	Proportion of Deposits Performed Online by Geographical Location . . . . .	24
4.4	Proportion of Deposits Performed Online by SMEs Exposure Degree . . . . .	26
4.5	Proportion of Deposits Performed Online by Gender of the Owner . . . . .	28
5	Conclusion . . . . .	29
	List of Figures . . . . .	i
	List of Tables . . . . .	ii

## List of Figures

1	<i>Correlation Main Banking Metrics and Indexes of Mobility</i> . . . . .	9
2	<i>Normalized Total Deposits by Country and Firm Size</i> . . . . .	11
3	<i>Normalized Total Deposits by Country and Geographical Location</i> . . . . .	13
4	<i>Normalized Total Deposits, Main Economic Sectors, Brazil</i> . . . . .	14
5	<i>Normalized Total Deposits, Main Economic Sectors, Chile</i> . . . . .	15
6	<i>Normalized Total Deposits, Main Economic Sectors, Colombia</i> . . . . .	15
7	<i>Normalized Total Deposits, Main Economic Sectors, Mexico</i> . . . . .	16
8	<i>Normalized Total Deposits, Main Economic Sectors, Peru</i> . . . . .	16
9	<i>Normalized Total Deposits, Main Economic Sectors, Paraguay</i> . . . . .	17
10	<i>Normalized Total Deposits by Country and SMEs' Contact Degree (based on econ. sectors)</i> . . . . .	18
11	<i>Normalized Total Deposits by Country and Type of Transaction</i> . . . . .	21
12	<i>Proportion of Deposits Performed Online by SME Sizes</i> . . . . .	23
13	<i>Proportion of Deposits Online by Geographical Location</i> . . . . .	25
14	<i>Proportion of Deposits Online by SMEs' Contact Degree</i> . . . . .	27
15	<i>Proportion of Deposits Online by Gender of the Owner</i> . . . . .	28
16	Contact and Non-Contact Classification Based on ISIC codes and economic activities (Chile, Colombia, Paraguay, Peru) . . . . .	31
17	Contact and Non-Contact Classification Based on MCC codes and economic activities (Mexico) . . . . .	32
18	<i>Distribution of Days in Lockdown by Brazilian Health regions, 2020</i> . . . . .	35
19	Number of Guaranteed and Total Amounts of Loans Granted Under Covid-19 Emergency Economic Programs (2020-2021) . . . . .	38
20	Covid-19 Emergency Lines of Credit Implemented in Latin America. . . . .	39
21	Covid-19 Tax Relief Measures . . . . .	40

## List of Tables

1	Distribution of SMEs by Country and Firm Features . . . . .	6
2	Distribution of SMEs by Country and Firm Features . . . . .	7
3	Distribution of SMEs by Type of Transaction . . . . .	20