Five facts about relationship lending: The case of Chile 2012-2020*

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Abstract

Using confidential credit-registry data, we characterize the monthly behavior of relationship lending in Chile between 2012 and 2020. We focus on two dimensions of the state of a relationship between a firm and a bank: its duration, and its concentration. We uncover five stylized facts related to the behavior of lending relationships through time, their cyclicality, their relation with credit conditions, how they affect monetary policy transmission, and how they interact with unconventional policies during the COVID-19 crisis. Our results show that relationship lending is crucial in the process of credit allocation. Therefore, the state of relationships lending along different dimensions should be considered in the design and implementation of different policies of financial nature.

Keywords: Relationship Lending, Credit Conditions, Monetary Policy, Unconventional Policy.

JEL Codes: E44, E52, G20.

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1 Introduction

In this paper we uncover five facts about relationship lending, defined as the provision of credit by financial intermediaries (typically banks) that acquire specific–private and proprietary–information about their borrowers over time (Boot, 2000), in Chile. Using a unique monthly credit-registry dataset covering the universe of financial credits between 2012 and 2020, we build three relationship measures relating to the duration (or distance) of a relationship between firms and banks, and three relating to the concentration of such relationships. We include in our data COVID-FOGAPE loans, a set of government-backed credits implemented in the midst of the COVID-19 crisis, which had special characteristics such as limited use (mainly to cover working-capital needs), a ceiling for their interest rate, and a threshold of revenues that allowed access to them.

First, we document that aggregate duration (concentration) has increased (decreased) over time, albeit this trend was reversed during the COVID-19 pandemic crisis. Second, we show that relationship duration (concentration) has been procyclical (acyclical) during normal times (i.e. before the crisis). However, during crisis duration exhibits mixed patters, and concentration remains acyclical. Third, relationship duration (concentration) is positively (negatively) correlated with loan amounts, and negatively (positively) correlated with interest rates. However, these relationships are partially offset by the phase of the business cycle. Fourth, during normal times duration leads to more (less) credit in response to contractionary (expansionary) monetary shocks, while concentration does not affect monetary transmission over loan amounts. Conversely, monetary policy shocks have lower (higher) pass-through to interest rates for firms with more duration (concentration). These results reverse during the crisis. Fifth, higher distance is related to more access to COVID-FOGAPE loans, while for concentration it depends on whether firms are first-time borrowers or not. Firms with more concentrated relationships are more likely to take these type of loans from their main bank, but also more likely to form a new relationship with a bank they never met before.

Our findings point out that relationship lending is crucial in the determination of credit conditions. Moreover, it interacts with the transmission of monetary policy, as shown by Hachem (2011), being able to either hinder its transmission or exacerbate it. Also, relationships matter for having access to special lending programs, such as COVID-FOGAPE loans, but such programs also foster the formation of new relationships, as Mullins and Toro (2018) show for the case of Chile with a previous FOGAPE program. As Boot (2000) points out, there are benefits associated with stronger (i.e. higher distance) relationships, such as better credit terms, which is related to the decrease in information asymmetries that comes with the formation and development of each relationship. Our findings support this results. However, we interpret them with caution, because there is another dimension of relationships that has negative effects over credit conditions. This is, concentration. Our results show that once firms have lending relationships that are too concentrated, banks seem to have a hold-up over them by obtaining a monopoly of information of the borrowers' quality; making them able to charge those firms higher interest rates. This intuition is the one provided by Petersen and Rajan (1994), and is confirmed in our estimations. Thus, looking into just one dimension of relationship lending might be misleading when thinking about the trade-offs that relationship-lending yields for policy making.

Even though it seems that in Chile duration has increased over time, and concentration has decreased, the COVID-19 crisis reversed these trends. In this sense, unconventional policies such as COVID-FOGAPE loans contributed to form new relationships with firms that were already part of the lending market, but also induced the entry of a significant number of first-time borrowing firms. The evolution of these variables matters for the future determination of monetary policy once the economy has recovered, because the future state of relationships will affect the transmission of monetary policy at that time.

Our work contributes to the literature in at least three novel ways: First, we propose novel distance (strength) measures that capture different aspects of relationships. Second, we untangle positive and negative aspects of relationships by creating relationship-concentration

indicators at the firm-bank level in addition to the standard distance measures. We also uncover the relevance of the state of the business cycle in the relationship between credit conditions and the state of firm-bank relationships. Third, we confirm previous findings on the transmission of monetary policy and access to unconventional credit-support policies during a crisis in the presence of relationship lending. However, in complement to the literature, we also document that such findings depend on the state of the economy, and on whether firms are firs-time borrowers or not. Altogether, our results point out to the relevance of relationship lending in the allocation of credit, and towards the design and implementation of monetary and credit-support policies. Importantly, as opposed to the vast majority of the literature, our study is among the first ones to uncover relevant facts about relationship lending, credit conditions and policies in an emerging economy.

The rest of the paper proceeds as follows: Section 2 reviews the relevant literature on relationship lending. Section 3 describes our data and how we build the firm-bank level relationship measures. Section 4 documents in depth each stylized fact and provides, within each of them, a discussion of its implications. Section 5 concludes.

2 Relevant literature

An abundant literature has studied the connection of relationship lending (as opposed to transactional lending) to credit conditions, such as quantity and cost of funds, and to macroeconomic variables. [1] Our paper contributes to this literature on two dimensions that relate to each other. The first one, is the study of the effects of bank relationships at the firm level and at aggregate level. Duration and concentration affect credit conditions that each firm faces but also the aggregate state of relationships affect, and are affected by, the transmission of monetary policy, the business cycle and other macroeconomic variables. The second dimension divides studies into empirical-focused or theoretical-focused.

The first approximations to this literature were empirical, at the firm-level. In a rela-

[1] See chapters 4 and 5 of Degryse et al. (2009) for an excellent summary.

tionship, banks invest in obtaining private information and evaluate the profitability of that investment through repeated interaction (Berger and Udell, 2002). Better relationships are associated with a greater availability of funds (Petersen and Rajan, 1994; Cole, 1998; Elsas and Krahnen, 1998; Machauer and Weber, 2000) and lower interest rates (Berger and Udell, 1995; Degryse and Van Cayseele, 2000). All these early studies use the length of the relationship as main or only measure of it's strength. Duration has been used in most of the relationship-lending literature thereafter.

Other studies focus on the market power that is generated through an information monopoly in banking relationships. A bank can aim to hold-up such monopoly by committing to increase the switching costs for the firm. Possible strategies for this are increasing closure fees or even set all credit rating of firms at the maximum to confuse other banks (Ioannidou and Ongena, 2007). Petersen and Rajan (1995) develop a theoretical model that rationalizes the inter-temporal nature of relationships. They find that young, firms with opaque information benefit from a concentrated bank industry. It is possible for young firms to obtain cheap financing at early stages and then credibly pay a premium if there is no ex-post competition. Switching cost can have real effects by preventing the formation of a price system and thus blocking the allocative power of markets. Kim et al. (2003) find that switching cost are even larger for small firms. They also estimate that the value for the bank of an additional locked-in client is 16% of the customer's value added.

Nevertheless, some authors highlight possible benefits of concentrated relationships. Bris and Welch (2005) argue that higher quality firms choose fewer creditors signaling their confidence of not going bankrupt given that concentration enhances their creditors' bargaining power. Also, confidentiality issues may favor concentration to reduce contracting costs and reduce the probability of a leakage (Bhattacharya and Chiesa, 1995; Von Rheinbaben and Ruckes, 2004; Yosha, 1995). Interestingly, Ongena and Smith (2000) estimate a in a cross-country regression to argue that judicial efficiency and creditor protection reduce the number of banks per firm.

Another strand of literature focuses on physical distance as opposed to relational distance. Degryse and Ongena (2005) show that Banks derive market power ex ante from their relative physical proximity to the borrowing firms or ex-post from private information they obtain about firms during the course of the lending relationship. This dimension is out of the scope of our paper since our data does not disclose information on geographic location of banks and firms.

More recently, Kim and Miner (2007), Botsch and Vanasco (2019) and López-Espinosa et al. (2017) show that the terms of credit evolve over the course of a relationship. Kim and Miner (2007) develops a theoretical model that predicts an inverted U shape for the interest rates markups. At first, banks lure firms with low rates, then extract benefits and finally stabilize a mark-up. Looking at heterogeneous trajectories, Botsch and Vanasco (2019) finds that in the market for syndicated loans, higher-quality corporate borrowers face differentially lower rates as their relationship develops, while lower-quality borrowers see rates increase and loan amounts fall. López-Espinosa et al. (2017) concludes that firms only start capitalizing the gains of relationship lending when the relationship extends beyond two years. Banerjee et al. (2017) find that Italian firms with longer relationships got credit on favorable terms in the credit crunch that followed the collapse of Lehman Brothers. These firms also exhibit stronger investment and labor utilization, suggesting that relationships could be beneficial for the economy. We complement this finding by showing how firms with stronger relationships right-before the implementation of unconventional credit support policies had more probability of obtaining government-backed loans.

Lending relationship also affect macroeconomic variables and the transmission of monetary policy. This occurs through the credit channel by making bank loans and public debt imperfect substitutes (Hoshi et al., 1993). More recently, Aliaga-Díaz and Olivero (2010) show that the borrower hold-up effect partly causes the counter-cyclicality of price-cost margins in the market for bank credit. This counter-cyclical margins generate a "financial accelerator" and contribute to the propagation of macroeconomic shocks. Bolton et al. (2016)

also develop a model in which relationship-banks charge a higher intermediation spread in normal times, but offer continuation-lending at more favorable terms than transaction banks to profitable firms in a crisis, confirming their predictions with data for Italian loans. Beatriz et al. (2018), Fernández and Gulan (2015), Finkelstein and Olivero (2020) provide more evidence and theory about other propagation mechanism of shocks through banking relationships interacting with productivity, firm leverage and labor force participation.

Cahn et al. (2017) show that in France, firms with stronger single-bank lending relations received more credit due to targeted unconventional monetary policy. Hachem (2011) develops a theoretical framework which shows how the presence of relationships smooths out (and potentially vitiates) the effects of monetary policy. These results are in line with our findings. Díaz and Olivero (2010) propose a DSGE model with and "augmented" version of the bank lending channel that allows for firm heterogeneity in size and risk (smaller and riskier firms opting for bank financing). This type of heterogeneity reproduces the dynamics of firm-level data better than the balance sheet channel. Bosshardt (2020) examines how loan behavior is affected by financial policy (tightening of credit standards), showing that it leads to more concentrated relationships, uncertain effect on aggregated efficiency but a surplus transfer from firms to banks.

3 Data description

3.1 Dataset

We use a unique credit-registry data set from Chile which contains all credit transactions between firms and financial intermediaries–namely banks–between April 2012 and December 2020. We have information on loan amounts, type of loan, interest rate, and maturity. We drop financial-sector and public-administration borrowers, to constraint our analysis to non-financial firms. The final sample covers over 8 million loans from more than 2 million firm which represent on average over 60% of GDP per year. We break loans down into two main

categories: Market Loans and COVID-FOGAPE loans. The former are the typical firm-bank loans, while the latter correspond to a special policy activated during May of 2020, in the midst of the COVID-19 crisis in Chile. Those special loans were an unconventional policy where the government acts as a guarantor of working-capital loans to firms with less than approximately 26.3 billion Chilean pesos (about 36 million dollars) in annual revenue, and have an interest rate ceiling of 3% plus the monetary policy rate.[2]

Table 1: Descriptive statistics - Market and COVID-FOGAPE loans

Market loans	mean	median	sd
loan amount (M$CLP)	113.07	5.59	4155.58
real rate	0.124	0.104	0.115
maturity (months)	58.98	35.97	82.86
n. of loans/firm	3.95	3.00	7.41
n. of lenders/firm	1.60	1.00	0.92
FOGAPE loans			
loan amount (M$CLP)	35.82	7.81	122.60
real rate	0.009	0.009	0.002
maturity (months)	40.80	42.67	8.31
n. of loans/firm	1.12	1.00	0.39
n. of lenders/firm	1.11	1.00	0.37
Observations	8,929,196		

Note: Loan amounts are in 2020 millions of CLP, real interest rates discounts past 12 months inflation. The time-period goes from April 2012 to December 2020. The financial-intermediation sector and public-administration borrowers are excluded from the sample.

Table 1 shows the mean, median, and standard the loan amounts (in millions of CLP), real interest rates, average loans per firm, and average lenders per firm for both market and COVID-FOGAPE loans. While the mean loan amount is 113 millions of CLP, the median is 5.6 millions of CLP. The mean and median real interest rate in our sample are, respectively, 12.4% and 10.4%. The mean and median maturities are 59 and 36 months, respectively. These differences between the mean and median values, which is more remarkable in the loan amounts, are related to the fact that most of the loans are of small amounts, and are taken by smaller firms which usually access to more expensive credits at shorter terms than

[2]There are additional requirements to have access to these loans. For further details see the website of the Chilean Financial Markets Commission.

large firms. The mean and median number of loans per firm are 4 and 3. However, the mean and median number of loans per firm, and number of lenders per firm, are respectively 1.6 and 1. This implies that most of the firms in our sample have a relationship with just one bank.

Regarding the COVID-FOGAPE loans, described in the lower panel of Table 1, the mean loan amount is now 36 millions of CLP, and the median is 7.81 millions of CLP. This is due to the fact that most of the firms that borrowed this type of loans are small and medium firms. Both the mean and median real interest rates are 0.9%, which is natural since the nominal interest rate was capped at the monetary policy rate plus 50 basis points (which adds up to 3.5% in our sample).

3.2 Relationship measures

To quantify the state of relationship between a firm and a bank at a given period, we address two dimensions of such relationship: *relationship duration* and *relationship concentration*. The first one relates, in principle, to the strength of a relationship. The second one relates to the concentration of such duration. Thus, for each dimension we build three measures of relationship duration and relationship concentration.

Relationship duration. The first measure of duration between firm i and bank j at time t, is $d1_t^{i,j} = (t - t_1 + 1)/T_t$. Where t is the current period, t_1 is the period of the first meeting, and T_t is the time elapsed since the beginning of the sample.[3] This first measure is the number of periods since the first meeting (rescaled such that the first period is set to one), normalized by the time elapsed since the beginning of the sample. The second measure is $d2_t^{i,j} = n_t^{i,j} d1_t^{i,j}/T_t$, which simply interacts $d1_t^{i,j}$ with the number of meetings between a firm and a bank up to time t, $n^{i,j}$. This measure captures the fact that when for two firms the time since the first encounter with a bank is the same, the firm with more encounters up to that period has a stronger relationship. The last measure of distance is

[3]When there are no loans for a firm-bank pair up to time T_t, all distance measures are set as missing values.

$d3_t^{i,j} = \sum_{k=1}^{n_t^{i,j}+1} \frac{\iota_k^{i,j}}{t-t_k+1}$, where $\iota_k^{i,j}$ takes the value of one when firm j and bank k meet at period k, or missing otherwise. This measure considers the time elapsed since the beginning of the relationship, but it gives higher weight to more recent meetings than to older ones.

Relationship concentration. This dimension considers how concentrated is a relationship along the three measures defined above. Thus, for each of the three distance measures, d_M, $M = \{1, 2, 3\}$, its corresponding distance measure is: $cM_t^{i,j} = \frac{dM_t^{i,j}}{\sum_j dM_t^{i,j}}$. Therefore, capturing how concentrated is the relationship between firm i and bank j at time t.[4]

Table 2: Distance and concentration - Summary statistics

Market loans			
	mean	median	sd
d1	0.36	0.24	0.34
d2	2.52	0.50	6.56
d3	1.25	1.06	0.53
c1	0.66	1.00	0.40
c2	0.70	1.00	0.39
c3	0.89	1.00	0.20
Observations	8,750,462		
FOGAPE loans			
d1	0.31	0.16	0.34
d2	2.29	0.42	5.69
d3	1.19	1.04	0.36
c1	0.69	1.00	0.38
c2	0.73	1.00	0.38
c3	0.89	1.00	0.20
Observations	208,405		

Note: The time period is April 2012 to December 2020. The measures include all types of loans, but exclude financial-intermediation sector and public-administration borrowers.

Table 2 shows the descriptive statistics for the distance and concentration measures. Both type of measures imply that a larger value is an indicator of more distance and concentration, respectively. While distance measures are only bounded below by 0, concentration measures

[4]It is worth to notice that we do not refer to market concentration (e.g. Herfindahl-Hirschman Index), which is another perspective of the market structure that we do not tackle. However, relationship concentration and bank concentration are intrinsically related since a firm with a very concentrated relationship–for instance, a firm that has a relationship with only one bank–means that the bank has a high concentration vis a vis that firm.

are bounded between 0 and 1. When the concentration measure is closer to 0, it means that the relationship of a firm is less concentrated, while when it is closer to 1 it means that it is more concentrated.

4 Empirical facts

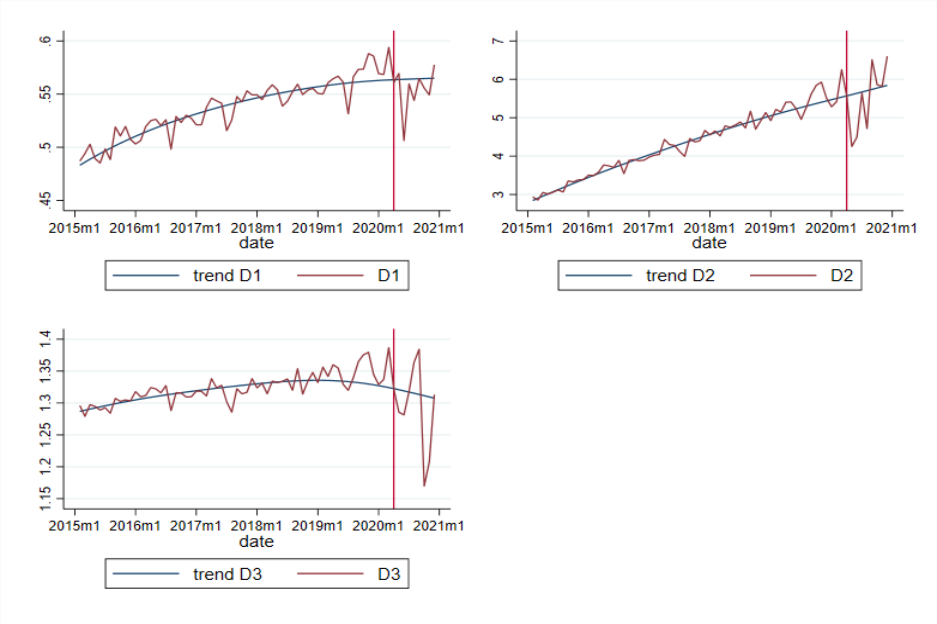
4.1 Fact 1: Aggregate behavior of relationships

We use our distance and concentration measures to document their aggregate behavior over our sample. First, for a given firm i, we aggregate across banks, j, as: $M_t^i = \max_{j \in J_t^i}(m_t^{i,j})$, where m stands for relationship measure (either of duration or concentration). For each firm at time t, M_t^i is the maximum value of the corresponding relationship measure. Then, for each period t, we aggregate across firms by taking the mean, such that $M_t = \mathbb{E}_{i \in I_t}(M_t^i \iota_t^{i,j})$. Where I_t is the subset of firms with loans up to time T_t, and $\iota_t^{i,j}$ takes the value of 1 for an i, j match, and missing otherwise. Thus, for each of our six measures of relationships, we calculate a corresponding M_t representing the country-level time series in our sample.

Figure 1 and Figure 2 summarize the first empirical finding: *aggregate duration (concentration) has increased (decreased) through time, albeit this trend was reversed during the beginning of the pandemic.* This holds regardless of the distance (concentration) measure observed. Both figures have one panel for each of the three measures, where the red line is the aggregate corresponding measure, and the blue line is the trend calculated using the HP filter. The vertical red line depicts the onset of the COVID-19 pandemic crisis in March of 2020.

A result of this analysis is that, relationships between firms and banks in Chile have gotten stronger and less concentrated over our sample period. These results, however, do not imply either lower or higher bank market power. They just illustrate that, on average, firms have been forming stronger ties with banks, while at least some of then have been spreading their options in terms of finding a lender.

Figure 1: Aggregated series and trend of distance measures

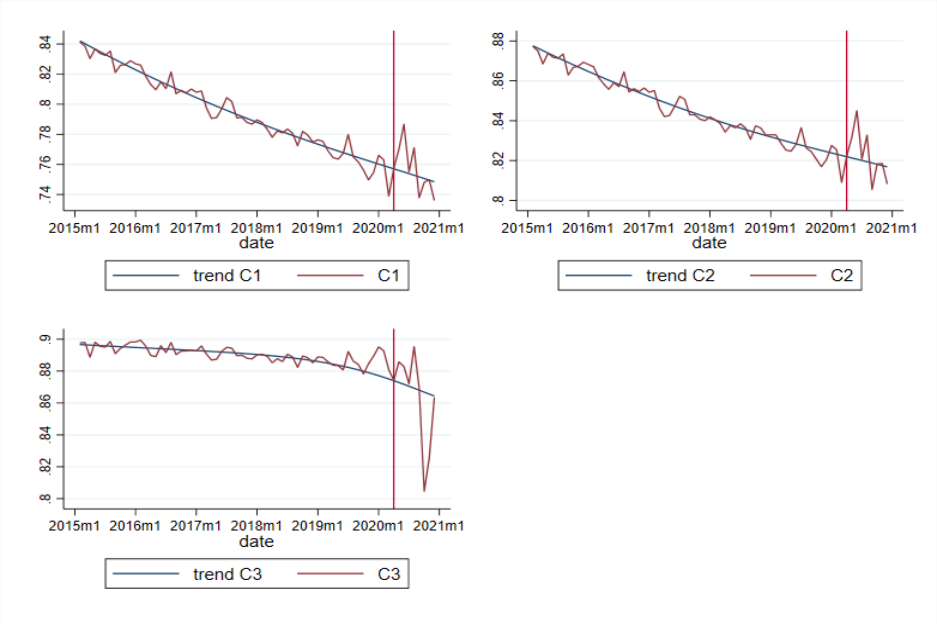


Note: Aggregate distance measures are computed as the time average (across firms) of the maximum (across banks) of each firm's distance measure. The effect of 9 exogenous events ($< 10\%$ of sample) is controlled with a set of dichotomous variables before computing trend and cyclical components. We calculate the trend using the HP filter with parameter $\lambda = 14400$ after dropping the first 12 months.

During the onset of the COVID-19 crisis, aggregate duration falls and aggregate concentration increases. As we show bellow, this occurs mainly due to a considerable number of firms entering to credit markets for the first time, which apparently was fostered by unconventional policies during the crisis. For those newcomers, the duration of the relationship is low (since it is new), and the concentration is high (most of them borrow from only one bank). This drives down the average duration and increases the average concentration, respectively.

Since relationships of newcomers to the credit markets were formed at the begging of the pandemic, we can expect aggregate duration to increase through time along the first two measures, as the latest periods of the first two panels show in Figure 1. However, this expected increasing trend will show up in the third measure as long as firms and banks keep forming new lending matches, otherwise the duration of the relationships will depreciate overtime. Regarding the concentration of relationships after its increase during the pandemic,

Figure 2: Aggregated series and trend of concentration measures



Note: Aggregate concentration measures are computed as the time average (across firms) of the maximum (across banks) of each firm's distance measure. The effect of 9 exogenous events ($< 10\%$ of sample) is controlled with a set of dichotomous variables before computing trend and cyclical components. We calculate the trend using the HP filter with parameter $\lambda = 14400$ after dropping the first 12 months.

if the newcomers do not borrow more credit over time, they will not form more matches in the upcoming periods. Therefore, the aggregate concentration of relationships observed each period will not increase and may even drop if firms that constantly ask for credit keep widening their lending supply pool. This last effect seems to be what drives the decreasing relationship concentration at the end of the sample.

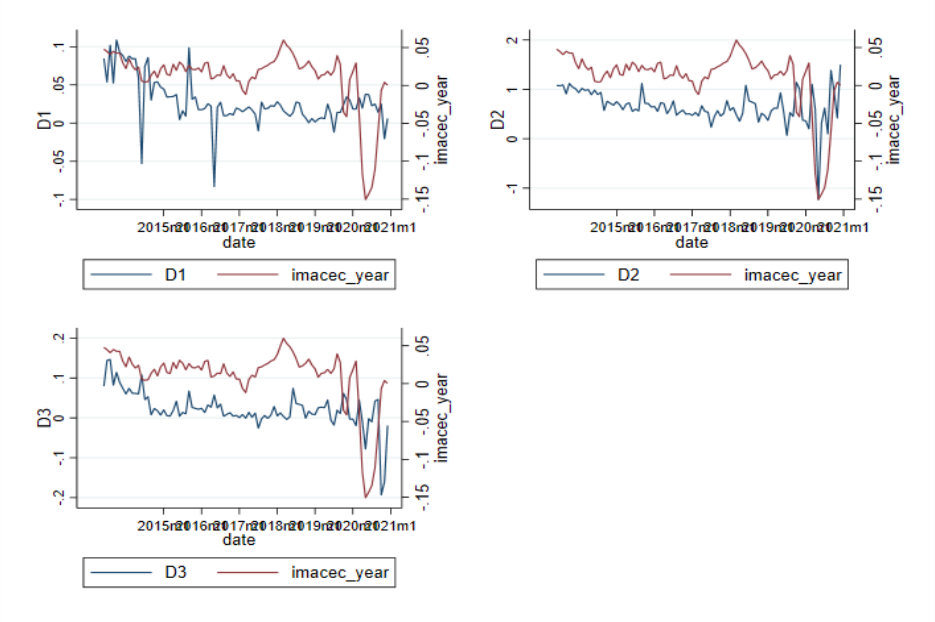
4.2 Fact 2: Cyclical behavior of lending relationships

We turn our focus to the relationship of the cyclical behavior of each measure with the cyclical behavior of the leading indicator of monthly economic activity in Chile, IMACEC. We calculate the year-on-year monthly growth rate of each relationship measure and of the GDP indicator.[5] Figure 3 and Figure 4 show the time-series behavior of the growth rates of

[5]This indicator tracks the unobserved monthly GDP behavior. We indistinctly refer to this indicator as IMACEC or monthly GDP.

the duration and concentration measures, respectively, overlapped with the growth rate of the IMACEC.

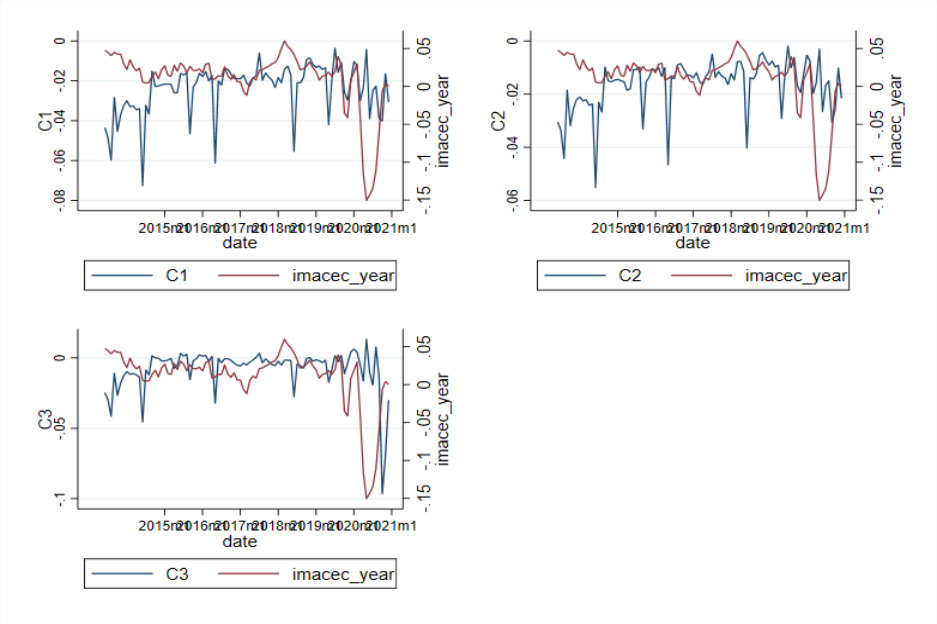
Figure 3: Year-on-year monthly growth rates: Distance measures vs IMACEC



Note: Each panel shows the year-on-year monthly growth rate of the corresponding distance measure overlapped with the one of the monthly GDP index, IMACEC.

We calculate the correlations between the growth rates of the IMACEC and the relationship measures for two different periods, pre-October 2019, and post-October 2019. The reason for this separation is that during November of 2019 Chile experienced a large contraction in output due to unexpected social unrest, which quickly recovered just to be followed by the pandemic crisis. Thus, we refer to the first period as *normal times* and to the second one as *crisis times*. Table 3 shows these results. The first panel shows the normal-times correlation of the growth rates of each distance measure with respect to each other and, in the last row, with the growth rate of the IMACEC. The second panel shows the same estimation for the concentration measures. The third and fourth panels correspond to the same cross-correlations for distance and concentration measures, respectively, during crisis times. Each estimation shows the significance of the corresponding correlation at the three typical standard levels.

Figure 4: Year-on-year monthly growth rates: Concentration measures vs IMACEC



Note: Each panel shows the year-on-year monthly growth rate of the corresponding concentration measure overlapped with the one of the monthly GDP index, IMACEC.

The results obtained in the last row of each panel in Table 3 summarize the second empirical fact: *relationship duration (concentration) has been procyclical (acyclical) during normal times. However, while concentration remains acyclical during crisis times, duration exhibits mixed patterns that vary with each of its measures.* These results suggest that the concentration of relationships does not respond strongly to cyclical patters. However, the duration of relationships turns stronger during a expansive phase of the cycle, as long as there is not a crisis. Since these results hold across all duration measures, this procyclicality obeys to more firm-bank matches occurring during expansions for firms that already had a relationship. During the crisis $d1$ becomes countercyclical because most of the matches are new, hence lowering the mean duration of relationships. However, $d2$ is procyclical mostly due to new matches being formed. $d3$ is acyclical, which suggest that even though new matches are being formed, the average duration falls.

On one hand, these results suggest that the cyclicality of aggregate distance measures is mainly driven by the extensive margin of loans (i.e. the number of matches), which varies

Table 3: Cross correlations of year-on-year monthly growth rates: Distance measures, concentration measures and economic activity - Normal times v/s crisis times.

Normal times				
	D1	D2	D3	IMACEC
D1	1			
D2	0.658***	1		
D3	0.419***	0.830***	1	
IMACEC	0.256**	0.210*	0.310***	1
	C1	C2	C3	IMACEC
C1	1			
C2	0.997***	1		
C3	0.955***	0.958***	1	
IMACEC	-0.0629	-0.0359	-0.139	1
Crisis times				
	D1	D2	D3	IMACEC
D1	1			
D2	-0.443*	1		
D3	0.141	0.401	1	
IMACEC	-0.644***	0.530**	-0.0437	1
	C1	C2	C3	IMACEC
C1	1			
C2	0.988***	1		
C3	0.326	0.284	1	
IMACEC	0.337	0.381	-0.305	1

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: The cross correlations are calculated with the year-on-year monthly growth rates of each distance and concentration (D and C) measure and, the same growth rate of the monthly economic activity indicator, IMACEC. Normal times refers to the period between the beginning of the sample and October 2019. Crisis times refers to the period between November 2019 and the end of the sample.

with the cycle, and depends on whether it is occurring during normal times or crisis times. On the other hand, the cyclicality of aggregate concentration measures seems to obey to other structural factors. Since these correlations are estimated at the aggregate level, they may hide some heterogeneous patterns that are more accurately explored with the microdata. We follow this avenue in the remaining facts.

4.3 Fact 3: Lending relationships and credit conditions.

Now, we aim to explore how relationship duration and concentration correlate to both the loan amount and the interest rate of each loan. In other words, we analyze how the state of a relationship is related to credit conditions. We explore this relationship for normal times, and crisis times. Then, we explore how the business cycle affects such results by either hindering or exacerbating the effects of relationships over credit conditions.

The results of these exercises yield the third empirical fact: *Relationship duration (concentration) is positively (negatively) correlated with loan amounts, and negatively (positively) correlated with interest rates. However, these effects may be partially hindered (for duration) or exacerbated (for concentration) depending on the phase of the business cycle.* The remaining of this section develops these results.

4.3.1 Distance, concentration, and credit conditions

We start with the following specification:

$$Y_t^{i,j} = \alpha_i + \eta_i + \gamma_j + \lambda_t + \beta_1 log(dA_t^{i,j}) + \beta_2 log(cA_t^{i,j}) + \Gamma_1 D_{fac}^{i,j} + \Gamma_2 D_{repo}^{i,j} + \Gamma_3 D_{first}^{i,j} + \epsilon_t^{i,j} \quad (1)$$

Where $Y^{i,j} = \{log(l^{i,j}), r^{i,j}\}$ and $A = 1, 2, 3$. Thus, the dependent variable is either the log of the loan value between firm i and bank j, $l^{i,j}$, or the real interest rate for such loan $r^{i,j}$.[6] The constants α_i and η_i are, respectively, size-level and sector-level fixed effects, and γ_j are bank-level fixed effects. The dummies $D_{fac}^{i,j}$, $D_{repo}^{i,j}$, and $D_{first}^{i,j}$, take the value of 1 when the type of credit is either factoring, a repurchase operation, or the first loan of firm i in the whole sample. Variable λ_t is a linear time trend, and $\epsilon_t^{i,j}$ is the disturbance.

We are interested in the estimated values of β_1 and β_2, which are informative of how the

[6] Notice that the real interest rate is calculated as the ex-post difference between the nominal interest rate and inflation. However, since we assume the same inflation rate across firms, the cross-sectional variation in $r^{i,j}$ comes from the variation in the nominal interest rate.

state of relationships in both duration and concentration are related to the loan size and to the interest rate of each loan.

Table 4 shows the result of estimating Equation 1 for the normal-times period. The first three regressions have loan amounts as dependent variable. Each column corresponds to including the correspondent concentration and distance measure in the regression. Regressions 4 to 6 show the same estimation but with real interest rates as the dependent variable. We focus on the qualitative interpretation of the result. This is, higher duration (concentration), is correlated with higher (lower) loan amounts, and with lower (higher) interest rates. In other words, this means that stronger relationships in terms of duration are related to better credit conditions, but more concentrated ones are related to worse credit conditions. Table 5 shows that these results hold for the crisis period.[7]

4.3.2 Relationships and credit conditions along the business cycle

The findings from above could be exacerbated, or hindered, by the business cycle. In other words it could be that expansionary times might curb the positive (negative) effects of duration (concentration) over credit conditions. To explore this, we estimate the following regression:

$$Y_t^{i,j} = \alpha_i + \eta_i + \gamma_j + \lambda_t + \beta_1 log(dR_t^{i,j}) + \beta_2 y_t log(dR_t^{i,j}) + \Gamma_1 D_{fac}^{i,j} + \Gamma_2 D_{repo}^{i,j} + \Gamma_3 D_{first}^{i,j} + \epsilon_t^{i,j} \quad (2)$$

Where $R = \{d, c\}$. The variable y_t is the level of the monthly real GDP (IMACEC). We interact this variable with the corresponding relationship measure for either duration or concentration, and focus on the coefficient of such interaction.

For normal times, Table 6 shows the results of estimating Equation 2 for each distance measure using, respectively, loan amounts and interest rates as dependent variables. The first three rows of each panel in the table show that stronger relations (i.e. higher distance)

[7] This result is robust to the whole sample with and without FOGAPE loans. **??** and **??** show this result. The results also hold when we assume that either one of the relationship measures is in the regression and the other one is not.

Table 4: Duration, concentration, and credit conditions for market loans: Normal times.

	Loan Amounts			Dependent variable: Interest Rates		
	(1)	(2)	(3)	(4)	(5)	(6)
c1	-0.424***			0.0144***		
	(-20.55)			(8.63)		
d1	0.379***			-0.0359***		
	(6.86)			(-10.13)		
c2		-0.366***			0.00815***	
		(-15.93)			(5.07)	
d2		0.0219***			-0.00135***	
		(3.74)			(-3.46)	
c3			-0.636***			0.0163***
			(-18.23)			(6.67)
d3			0.0230***			-0.00136***
			(3.58)			(-3.77)
N	7,906,136	7,906,136	7,906,136	7,906136	7,906,136	7,906,136
R^2	0.413	0.412	0.415	0.347	0.340	0.340

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: Each specification includes a set of size (4), sector (11), bank (21), credit-type (factoring, and repo credit),first-loan, and time dummies. Loan amounts are deflated by the ratio of price level in 2020 and the respective date. Standard errors are clustered on 44 groups defined by the combination of size and sector. Normal times refers to the period between the beginning of the sample (April 2012) and the onset of the social crisis (October 2019).

are correlated with larger credit loans and lower interest rates. However, these effects are partially offset by the business cycle, as rows four to six in each panel of the table show. This is, expansive phases of the business cycle lower the additional loan amounts and the reduction in interest rates that firms with strong relationships perceive. Table 7 shows the results for each concentration measure. On one hand, the upper panel in the latter table shows how the effect of concentration over loan amounts is not affected by the business cycle. Notice however that the second panel shows that these results do not hold for $c3$. In this case, more concentrated firms see their penalty over loan amounts reduced when the business cycle expands. In this case, this occurs only for firms with more recently developed relationships,

Table 5: Duration, concentration, and credit conditions for market loans: Crisis times.

	Loan Amounts			Interest Rates		
	(1)	(2)	(3)	(4)	(5)	(6)
c1	-0.309***			0.0174***		
	(-13.13)			(17.09)		
d1	0.305***			-0.0308***		
	(15.35)			(-11.23)		
c2		-0.258***			0.0103***	
		(-10.12)			(10.98)	
d2		0.0142***			-0.000694***	
		(3.62)			(-3.24)	
c3			-0.414***			0.0198***
			(-12.35)			(14.12)
d3			0.0154***			-0.000723***
			(3.68)			(-3.97)
N	1,322,650	1,322,650	1,322,650	1,322,650	1,322,650	1,322,650
R^2	0.436	0.436	0.437	0.290	0.282	0.283

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: Each specification includes a set of size (4), sector (11), bank (21), credit-type (factoring, and repo credit), first-loan, and time dummies. Loan amounts are deflated by the ratio of price level in 2020 and the respective date. Standard errors are clustered on 44 groups defined by the combination of size and sector. Crisis times refers to the period between November 2019 and the end of the sample. FOGAPE-COVID loans are excluded since their regulation and government guarantee makes them not strictly comparable to market loans.

which are those better represented by $d3$ and $c3$. For the loan interest rate, the lower panel shows that the business cycle does not affect the relationship between concentration and interest rates.

We now turn to crisis times. In this case we exclude COVID-FOGAPE loans from it since they exhibit an exogenous interest rate ceiling and have some accessibility conditions. In the next section we explore how COVID-FOGAPE loans affect relationship lending, as well as how the state of relationships relate to the COVID-FOGAPE loan amounts. During crisis times, for the distance measures Table 8 shows that the results above hold for loan

amounts. However, during a bust (expansion) the lower interest rates that firms with stronger relationships face increase (decrease) with output. For concentration, the results in Table 9 are similar to those in normal times. This is, the phase of the cycle does not change the effect of concentration over loan amounts, while it procyclically exacerbates the higher interest rates that more concentrated firms face.

4.4 Fact 4: Lending relationships and monetary policy shocks.

We now explore how the state of relationships affects monetary policy transmission. For this purpose, we estimate the following specification:

$$Y_t^{i,j} = \alpha_i + \eta_i + \gamma_j + \lambda_t + \beta_1 log(dR^{i,j})_t + \beta_2 S_t log(dR^{i,j})_t + \Gamma_1 D_{fac}^{i,j} + \Gamma_2 D_{repo}^{i,j} + \Gamma_3 D_{first}^{i,j} + \epsilon_t^{i,j} \quad (3)$$

We follow Aruoba et al. (2021) and use a monetary surprise measure that is arguably exogenous. The variable S_t is a monetary surprise shock constructed as the difference between the monetary policy rate (MPR) and the expectation of such rate right. The expectation measure comes from the Bloomberg Expectations' survey.[8]. This measure of expectation is the most accurate in terms of the information set that agents have at the moment of responding the survey since it is made right before the Central Bank's Monetary Policy Meeting.A positive value of S_t is a contractionary shock, such that the MPR is greater than expected. The other variables are the same as in Equation 2. We are interested in analyzing the estimates of β_2 in Equation 3. If it takes a positive value, it means that a larger value of the corresponding relationship measure increases the pass-through of MPR shocks to credit conditions, pointing out to a hold-up problem. However, if it takes a negative value, it means that a larger value of the corresponding relationship measure leads to a lower pass-through of MPR shocks to credit conditions. This could be related to the benefit of learning that

[8]We thank the authors of Aruoba et al. (2021) for kindly sharing the data of monetary surprises in Chile with us.

Table 6: Distance, credit conditions and the business cycle: Normal times

	Loan Amounts					
	(1)	(2)	(3)	(4)	(5)	(6)
d1	0.302***			0.416		
	(4.07)			(0.98)		
d2		0.0212***			0.143***	
		(3.49)			(3.15)	
d3			0.0226***			0.160***
			(3.21)			(3.11)
y*d1				-0.108		
				(-0.32)		
y*d2					-0.112***	
					(-3.07)	
y*d3						-0.126***
						(-3.07)
R^2	0.401	0.402	0.402	0.401	0.402	0.402
	Interest Rates					
	(1)	(2)	(3)	(4)	(5)	(6)
d1	-0.0330***			-0.0524		
	(-8.11)			(-1.53)		
d2		-0.00162***			-0.0101***	
		(-3.93)			(-4.77)	
d3			-0.00167***			-0.0104***
			(-4.31)			(-4.70)
y*d1				0.0183		
				(0.59)		
y*d2					0.00781***	
					(4.75)	
y*d3						0.00798***
						(4.58)
R^2	0.335	0.331	0.331	0.335	0.332	0.332
N = 6,583,486						

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The measure of economic activity "y" is the monthly index of economic activity (IMACEC). Each specification includes a set of size (4), sector (11), bank (21), credit-type (factoring, and repo credit), first-loan, and time dummies. Loan amounts are deflated by the ratio of price level in 2020 and the respective date. Standard errors are clustered on 44 groups defined by the combination of size and sector. Normal times refers to the period between the beginning of the sample (April 2012) and the onset of the social crisis (October 2019).

Table 7: Concentration, credit conditions and the business cycle: Normal times

	Loan Amounts					
	(1)	(2)	(3)	(4)	(5)	(6)
c1	-0.378***			-0.685***		
	(-15.49)			(-2.83)		
c2		-0.338***			-0.641***	
		(-11.44)			(-2.85)	
c3			-0.633***			-1.451***
			(-14.57)			(-3.58)
y*c1				0.288		
				(1.20)		
y*c2					0.284	
					(1.23)	
y*c3						0.767*
						(1.93)
R^2	0.404	0.403	0.406	0.404	0.403	0.406
	Interest Rates					
	(1)	(2)	(3)	(4)	(5)	(6)
c1	0.00790***			-0.0205		
	(3.42)			(-0.81)		
c2		0.00522***			-0.0144	
		(2.73)			(-0.65)	
c3			0.0132***			0.00108
			(4.31)			(0.02)
y*c1				0.0266		
				(1.22)		
y*c2					0.0184	
					(0.96)	
y*c3						0.0114
						(0.29)
R^2	0.326	0.326	0.326	0.326	0.326	0.326
N = 6,583,486						

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The measure of economic activity "y" is the monthly index of economic activity (IMACEC). Each specification includes a set of size (4), sector (11), bank (21), credit-type (factoring, and repo credit), first-loan, and time dummies. Loan amounts are deflated by the ratio of price level in 2020 and the respective date. Standard errors are clustered on 44 groups defined by the combination of size and sector. Normal times refers to the period between the beginning of the sample (April 2012) and the onset of the social crisis (October 2019).

Table 8: Distance, credit conditions and the business cycle: Crisis times

	Loan Amounts					
	(1)	(2)	(3)	(4)	(5)	(6)
d1	0.227***			0.443		
	(8.44)			(1.13)		
d2		0.0123***			0.0797***	
		(3.78)			(8.98)	
d3			0.0134***			0.0887***
			(3.60)			(8.21)
y*d1				-0.205		
				(-0.58)		
y*d2					-0.0626***	
					(-10.60)	
y*d3						-0.0699***
						(-9.16)
R^2	0.433	0.434	0.434	0.433	0.434	0.434
	Interest Rates					
	(1)	(2)	(3)	(4)	(5)	(6)
d1	-0.0264***			-0.00741		
	(-10.32)			(-0.35)		
d2		-0.000619***			0.00259***	
		(-3.43)			(5.72)	
d3			-0.000629***			0.00322***
			(-4.26)			(9.82)
y*d1				-0.0179		
				(-0.91)		
y*d2					-0.00298***	
					(-10.10)	
y*d3						-0.00357***
						(-14.65)
R^2	0.286	0.280	0.280	0.286	0.281	0.281
N = 1,322,650						

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The measure of economic activity "y" is the monthly index of economic activity (IMACEC). Each specification includes a set of size (4), sector (11), bank (21), credit-type (factoring, and repo credit), first-loan, and time dummies. Loan amounts are deflated by the ratio of price level in 2020 and the respective date. Standard errors are clustered on 44 groups defined by the combination of size and sector.

lenders have in the process of forming relationships.

Table 10 and Table 11 show the estimations for the normal-times period. The first table

Table 9: Concentration, credit conditions and the business cycle: Crisis times

	Dependent variable: Loan Amounts					
	(1)	(2)	(3)	(4)	(5)	(6)
c1	-0.251***			-0.349		
	(-11.61)			(-1.34)		
c2		-0.218***			-0.214	
		(-7.69)			(-0.94)	
c3			-0.368***			-0.527
			(-9.37)			(-1.07)
y*c1				0.0924		
				(0.36)		
y*c2					-0.00345	
					(-0.02)	
y*c3						0.149
						(0.31)
R^2	0.434	0.433	0.434	0.434	0.433	0.434
	Interest Rates					
	(1)	(2)	(3)	(4)	(5)	(6)
c1	0.0116***			-0.0948***		
	(20.70)			(-4.42)		
c2		0.00834***			-0.0926***	
		(11.63)			(-4.00)	
c3			0.0177***			-0.146***
			(12.89)			(-4.96)
y*c1				0.100***		
				(5.00)		
y*c2					0.0950***	
					(4.35)	
y*c3						0.154***
						(5.52)
R^2	0.280	0.279	0.281	0.281	0.280	0.282
N = 1,322,650						

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The measure of economic activity "y" is the monthly index of economic activity (IMACEC). Each specification includes a set of size (4), sector (11), bank (21), credit-type (factoring, and repo credit),first-loan, and time dummies. Loan amounts are deflated by the ratio of price level in 2020 and the respective date. Standard errors are clustered on 44 groups defined by the combination of size and sector.

corresponds to distance measures, for loan amounts and interest rates respectively, and the second to concentration measures. The estimates of the coefficients of each relationship

measure show that the results of the previous fact hold. This is, better relationships in terms of distance are related to better credit terms, but higher concentration is related to worse credit conditions. The tables show interactions of the relationship measures with S_t. Such interaction with $d1$ yields a negative pass through (PT) of MP shocks over loan values, while this PT is positive for $d2$ and $d3$. Considering that a large $d1$ could mean a solid relationship when distance is large and there are many meetings between a firm and a bank, or a weak one for relationships with large distance but a few meetings a long time ago (implying a likely depreciation or break up of relationships), we interpret these results as showing that contractionary shocks lead banks to supply more credit to borrowers with stronger relationships measured by distance. In light of higher interest rates, banks might want to supply more credit to a borrower from which they have more and better information from. Analogously, Table 10 shows that–for $d2$ and $d3$–the PT of contractionary shocks to credit interest rates is hindered by stronger relationships. Table 11 shows that, higher concentration exacerbates the contractionary effects of MP shocks over interest rates, pointing out to a hold-up problem.

Nonetheless, the results for crisis times shown in Table 12 are different. The sample for this period excludes COVID-FOGAPE loans because those credits had an exogenous interest rate ceiling that in the data is met for virtually all those credits. Table 12 shows that the negative effects of contractionary MP shocks over loan amounts are nil. For interest rates, the second panel of Table 12 shows that higher duration increases the PT of MP shocks. For the concentration measures, Table 13 shows that when there is a contractionary MP shock, higher concentration leads to less credit supply. Likewise, the second panel Table 13 shows that concentration curbs the PT of contractionary shocks to interest rates. These results are not clear to interpret.They say that, during crisis, loan amounts are not affected by the state of relationships when there is a MP shock, and interest rates are affected in the opposite way as the results in normal times: higher distance (concentration) exacerbates (curb) the PT of MP shocks to interest rates. Behind these results might be the fact that during the

COVID-19 crisis, the contraction was so large that the MP response was unconventional. The central bank lowered its interest rate to the effective lower bound (0.5%), credit support policies aimed at growing the supply of credit (named "FCIC" in Chile), and the government opened a special line of government-backed loans–FOGAPE-COVID credit.[9] These policies might distort the usual effect that relationships have over the transmission of MP shocks. For instance, during the crisis firms with stronger relationships might have been the ones with lower interest rates when the MP rate fell just because of a selection issue, such that many firms simply left (at least temporarily) the credit market. Therefore, even though the results of the effects of relationships over the transmission of MP shocks may seem overturned to some extend during crisis times, we interpret them with caution since they are not capturing other policies implemented during the crisis. That is the purpose of the next section, where we focus on relationships and FOGAPE-COVID credits.

Considering the results presented in this section, **we summarize the fourth stylized fact as:** *During normal times, relationship duration leads to a credit expansion (contraction) in response to contractionary (expansionary) monetary shocks, while concentration does not affect the MP transmission over loan amounts. Conversely, MP shocks have lower (higher) PT to interest rates for firms with more duration (concentration). These results reverse during the crisis period, likely due to a set of unprecedented unconventional policies.*

4.5 FACT 5: COVID-FOGAPE loans and relationship lending

Given the unconventional-policy nature of COVID-FOGAPE loans, we give a particular focus to them in this section. The purpose is to untangle how the state of relationships before the policy implementation is related to the loan amounts received. Furthermore, we aim to study how and to what extent this policy fosters borrowing switching from the main bank to others.

Our main findings in this section sum up to the fifth and last stylized fact:

[9] See Costa (2021) for a detailed description of these policies.

Table 10: Monetary policy shocks, distance, and credit conditions: Normal times

	Dependent variable: Loan Amounts					
	(1)	(2)	(3)	(4)	(5)	(6)
d1	0.302***			0.300***		
	(3.86)			(3.79)		
d2		0.0231***			0.0234***	
		(3.50)			(3.50)	
d3			0.0249***			0.0253***
			(3.25)			(3.25)
S*d1				-19.61***		
				(-3.42)		
S*d2					1.408***	
					(2.98)	
S*d3						1.785***
						(3.03)
R^2	0.403	0.404	0.404	0.403	0.404	0.404
	Interest Rates					
	(1)	(2)	(3)	(4)	(5)	(6)
d1	-0.0335***			-0.0335***		
	(-7.96)			(-7.95)		
d2		-0.00175***			-0.00178***	
		(-3.97)			(-4.02)	
d3			-0.00179***			-0.00183***
			(-4.33)			(-4.39)
S*d1				-0.0947		
				(-0.24)		
S*d2					-0.158***	
					(-8.54)	
S*d3						-0.162***
						(-9.30)
N = 5,983,072						
R^2	0.340	0.336	0.336	0.340	0.336	0.336

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: . The measure of monetary surprises S corresponds to the difference between the actual MPR and the expectation from the Bloomberg financial survey. A positive surprise indicates that the MPR was higher than expected.Each specification also contains a set of size (4), sector, bank (21), credit type (one for factoring, other for repo) and time dummies. Loan amounts are deflated by the ratio of price level in 2020 and the respective date. Standard errors are clustered on 44 groups defined by the combination of size and sector. Normal times refers to the period between the beginning of the sample (April 2012) and the onset of the social crisis (October 2019).

Table 11: Monetary policy shocks, concentration, and credit conditions: Normal times

	Loan Amounts					
	(1)	(2)	(3)	(4)	(5)	(6)
c1	-0.377***			-0.377***		
	(-16.25)			(-16.49)		
c2		-0.337***			-0.336***	
		(-12.02)			(-12.23)	
c3			-0.634***			-0.634***
			(-15.81)			(-16.05)
S*c1				11.28		
				(1.53)		
S*c2					9.688	
					(1.31)	
S*c3						8.902
						(0.77)
R^2	0.406	0.404	0.408	0.406	0.404	0.408
	Interest Rates					
	(1)	(2)	(3)	(4)	(5)	(6)
c1	0.00701***			0.00715***		
	(2.81)			(2.91)		
c2		0.00445**			0.00460**	
		(2.15)			(2.26)	
c3			0.0120***			0.0123***
			(3.44)			(3.57)
S*c1				1.263**		
				(2.11)		
S*c2					1.306**	
					(2.23)	
S*c3						1.995**
						(2.68)
N = 5,983,072						
R^2	0.330	0.330	0.331	0.330	0.330	0.331

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: . The measure of monetary surprises S corresponds to the difference between the actual MPR and the expectation from the Bloomberg financial survey. A positive surprise indicates that the MPR was higher than expected.Each specification also contains a set of size (4), sector, bank (21), credit type (one for factoring, other for repo) and time dummies. Loan amounts are deflated by the ratio of price level in 2020 and the respective date. Standard errors are clustered on 44 groups defined by the combination of size and sector. Normal times refers to the period between the beginning of the sample (April 2012) and the onset of the social crisis (October 2019).

Table 12: Monetary policy shocks, distance, and credit conditions: Crisis times (excluding FOGAPE loans)

	Loan Amounts					
	(1)	(2)	(3)	(4)	(5)	(6)
d1	0.196***			0.225***		
	(6.89)			(8.32)		
d2		0.0107***			0.0128***	
		(3.34)			(3.68)	
d3			0.0121***			0.0143***
			(3.15)			(3.54)
S*d1				-2.722		
				(-0.95)		
S*d2					0.132	
					(1.43)	
S*d3						0.156
						(1.55)
R^2	0.443	0.444	0.444	0.443	0.444	0.444
	Interest Rates					
	(1)	(2)	(3)	(4)	(5)	(6)
d1	-0.0269***			-0.0257***		
	(-10.62)			(-9.60)		
d2		-0.000698***			-0.000589***	
		(-3.93)			(-3.14)	
d3			-0.000730***			-0.000601***
			(-4.80)			(-3.83)
S*d1				0.991***		
				(3.44)		
S*d2					0.0549***	
					(19.25)	
S*d3						0.0630***
						(18.63)
N = 1,050,285						
R^2	0.304	0.298	0.298	0.304	0.298	0.298

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: . The measure of monetary surprises S corresponds to the difference between the actual MPR and the expectation from the Bloomberg financial survey. A positive surprise indicates that the MPR was higher than expected.Each specification also contains a set of size (4), sector, bank (21), credit type (one for factoring, other for repo) and time dummies. Loan amounts are deflated by the ratio of price level in 2020 and the respective date. Standard errors are clustered on 44 groups defined by the combination of size and sector.

Table 13: Monetary policy shocks, concentration, and credit conditions: Crisis times (excluding FOGAPE loans)

	Loan Amounts					
	(1)	(2)	(3)	(4)	(5)	(6)
c1	-0.229***			-0.246***		
	(-11.41)			(-11.42)		
c2		-0.194***			-0.208***	
		(-6.96)			(-7.12)	
c3			-0.318***			-0.348***
			(-7.85)			(-8.79)
S*c1				-2.596		
				(-1.19)		
S*c2					-1.168	
					(-0.55)	
S*c3						4.877
						(1.56)
R^2	0.444	0.443	0.444	0.444	0.443	0.444
	Interest Rates					
	(1)	(2)	(3)	(4)	(5)	(6)
c1	0.0154***			0.0106***		
	(20.03)			(16.90)		
c2		0.0119***			0.00749***	
		(13.69)			(9.57)	
c3			0.0228***			0.0161***
			(15.61)			(11.76)
S*c1				-1.257***		
				(-7.56)		
S*c2					-0.991***	
					(-6.61)	
S*c3						-1.757***
						(-7.87)
N = 1,050,285						
R^2	0.299	0.298	0.299	0.298	0.297	0.298

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: . The measure of monetary surprises S corresponds to the difference between the actual MPR and the expectation from the Bloomberg financial survey. A positive surprise indicates that the MPR was higher than expected.Each specification also contains a set of size (4), sector, bank (21), credit type (one for factoring, other for repo) and time dummies. Loan amounts are deflated by the ratio of price level in 2020 and the respective date. Standard errors are clustered on 44 groups defined by the combination of size and sector.

Higher distance is related to more access to COVID-FOGAPE loans, while for concentration it depends on wehter first-time borrowers are considered or not. Firms with more concentrated relationships are more likely to borrow COVID-FOGAPE loans from their main bank, but are also more likely to form a new relationship with a bank they never met before. This is, some banks have incentives to keep firms within a concentrated relationships, while some firms have incentives to look for banks with the least possible amount of information from them.

4.5.1 Decomposition of COVID-FOGAPE lending and relationships

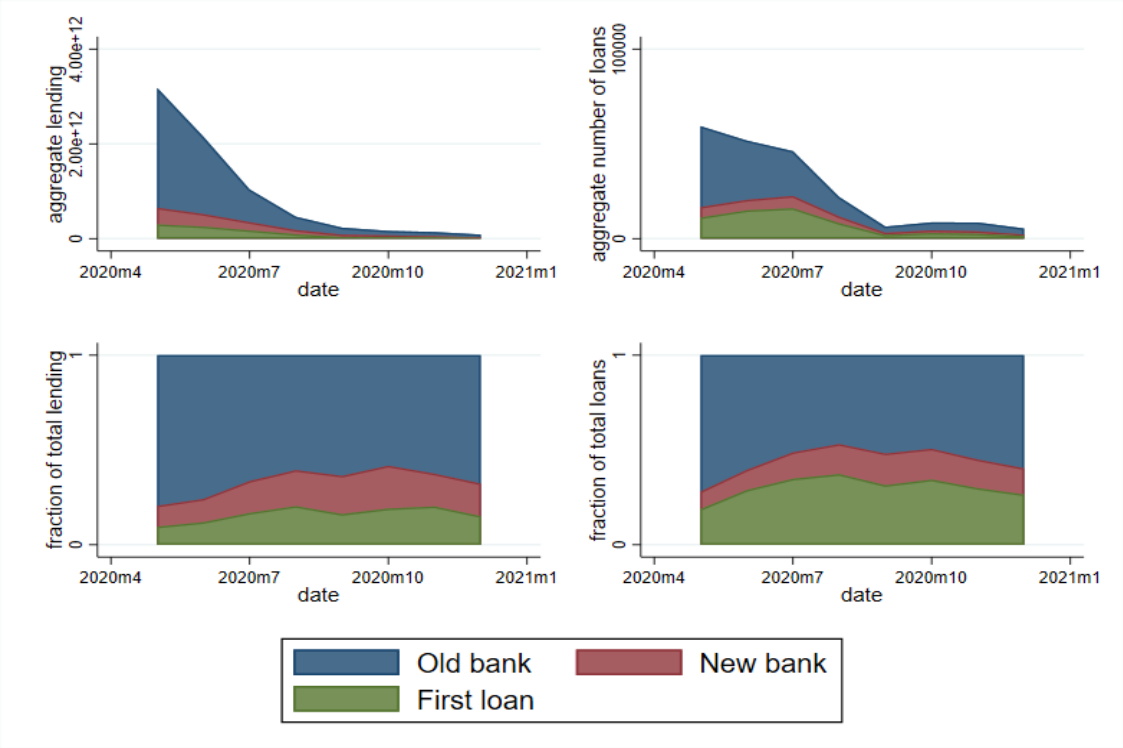
Figure 5 shows that more than 70% of FOGAPE-COVID loans took place inside existing relationships (namely "old bank"), but only 50% approximately was with the bank with the strongest relationship according to d3 (Figure 5). Most of the program was implemented in May 2020, but its allocation across relationships is similar trough the rest of 2020.

4.5.2 State of relationships and COVID-FOGAPE loan amounts

One feature of these loans is that it seems to have fostered new entrants to the credit market. Therefore, for some firms these loans are their first ones. To analyze how relationships affect access to COVID-FOGAPE loans we restrict our sample to those loans, and estimate Equation 1 without the type-of-credit dummies and only with loan amount as dependent variable. The reason to not use interest rates as dependent variable is that these loans had an exogenous ceiling for the interest rate of the MPR plus 3% (in total 3.5% during 2020). Table 1 shows that the standard deviation of these loans is close to zero.

In our estimation, we fixed the values of the distance and concentration measures to the month before the policy implementation, April 2020. Table 14 shows the results. Regressions 1 to 3 on the table correspond to using all COVID-FOGAPE loans, while regressions 4 to 6 exclude those first-time loans which are informative about credit conditions of firms that already had previous relationships. Regardless of whether first-time borrowers are included

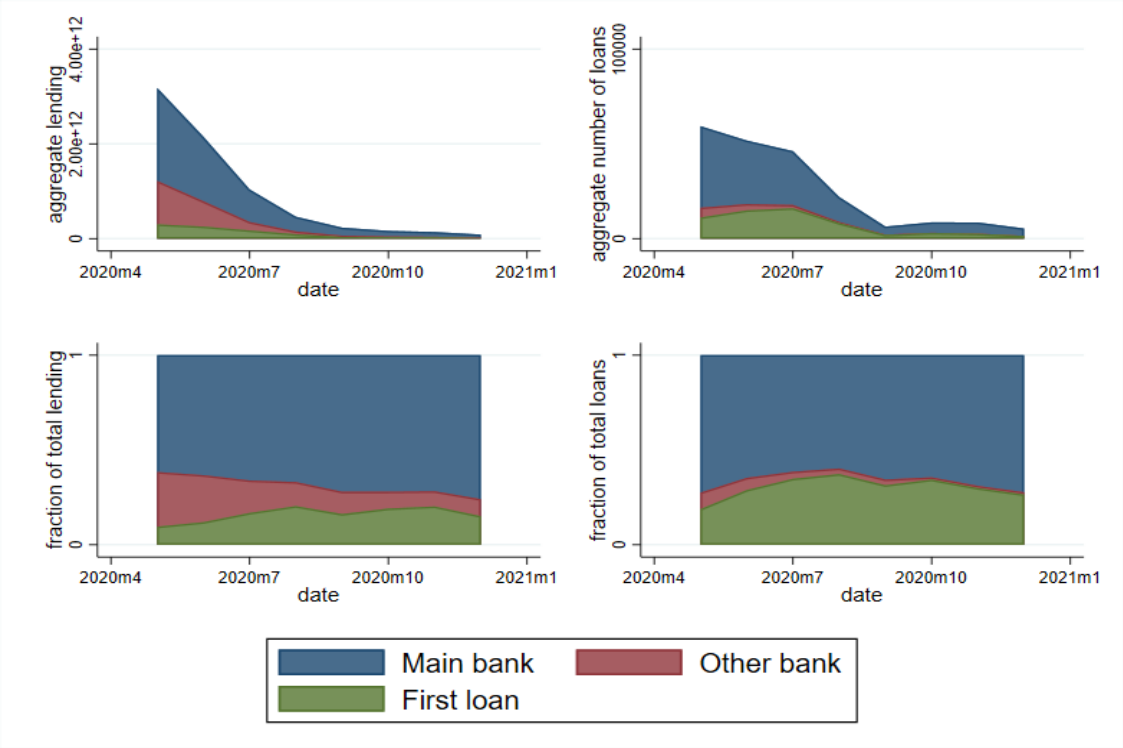
Figure 5: New bank-old bank-first loan decomposition



Note: A loan is categorized as "new bank" if it is the first match of a firm-bank pair on the sample and, as "old bank" if there are previous matches. "First loan", a subcategory of "new bank" means it is the first time the firm is borrowing inside the sample. Notice that the red area is equivalent to observations with $switch1 = 1$.

in the sample, higher distance is related to higher loan values. This hints that lenders are more willing to give these type of loans to borrowers from whom they have more information about. With respect to concentration, when all loans are included for $c1$ and $c2$, there seems to be no relationship between concentration and loan amounts. For $c3$ this relationship is negative. However, when we remove first-time borrowers from the sample, the relationship between concentration and loan amounts turns out to be positive for $c1$ and $c2$ and nil for $c3$. We interpret these results as evidence that banks may try to keep firms that are concentrated with them. One reason for this could be that banks may want to keep a hold of those firms in the future to be able to charge them higher interest rates later on. Another, could be that banks are interested in providing government-guaranteed loans to those firms that are otherwise likely to go bankrupt and never repay current outstanding loans.

Figure 6: Main bank-other bank decomposition



Note: A loan is categorized as "main" if it is the bank with the largest d3 at the time of the loan and, as "other bank" if not.

4.5.3 COVID-FOGAPE and relationship switching

Now we study the probability of switching from the main bank when taking a COVID-FOGAPE loan. We define "main bank" in three different ways: 2) the bank with which the firm has the largest cumulative loans. 2) the bank with the largest $d3$. 3) the bank with the oldest relationship with the firm. Using these definitions, we define $switch_{k,t}^{i,j}$ as a dummy variable that takes the value of 1 when firm i takes a COVID-FOGAPE loan from a bank that is not its main one, and 0 otherwise. There are four switching measures, $k = \{1, 2, 3, 4\}$, where for values of k equal to 2, 3 and 4 correspond, respectively, to the three definitions of main bank described above. For $k = 1$, the measure takes the value of 1 when the firm borrows from a bank which it never had met before.

Table 15 shows the summary statistics for the switching measures for firms that had at least one loan before the implementation of COVID-FOGAPE. In sum, 16% of these

Table 14: COVID-FOGAPE loans, relationship strength and concentration

	Loan Amounts			Loan Amounts, without first loans		
	(1)	(2)	(3)	(4)	(5)	(6)
c1	-0.0174			0.114**		
	(-0.49)			(2.51)		
d1	0.253***			0.0864***		
	(8.27)			(4.75)		
c2		0.0112			0.138**	
		(0.29)			(2.55)	
d2		0.0142***			0.00973***	
		(5.03)			(6.32)	
c3			-0.147**			-0.0570
			(-2.49)			(-0.81)
d3			0.298***			0.237***
			(5.85)			(6.50)
N	208,405	208,405	208,405	145,282	145,282	145,282
R^2	0.688	0.687	0.689	0.699	0.701	0.701

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: Each specification also contains a set of size (4), sector (11), bank (21) and time dummies. Regressions (1)-(3) include all firms in the sample while regressions (4)-(6) exclude all observations that are a first loan. Loan amounts are deflated by the ratio of price level in 2020 and the respective date. Standard errors are clustered on 44 groups defined by the combination of size and sector.

loans were with a bank they never met before, 36% outside the largest-cumulative-loans bank relationship, 35% outside the largest-$d3$ relationship, and 42% outside the oldest-bank relationship. For each k, we estimate the following specification :

$$switch_{k,t}^{i,j} = \alpha_i + \eta_i + \gamma_j + \lambda_t + \beta_1 log(dA^{i,j})_t + \beta_2 log(cA^{i,j})_t + \epsilon_t^{i,j} \tag{4}$$

Table 16 to Table 17 show the results of estimating the linear probability model described by Equation 4. The first three columns of Table 17 show that more concentration is related to a lower probability of taking a COVID-FOGAPE loan from a bank different to the one with which the firm has more cumulative loans. This result goes in line with the ones shown

Table 15: Switching measures

	mean	sd
switch 1	0.16	0.37
switch 2	0.36	0.48
switch 3	0.35	0.48
switch 4	0.42	0.49
Observations	146,499	

Note: Switch measures 2-4 equal one if the firm took a FOGAPE loan with a bank that is not the "main bank" of the firm, and switch measure 1 equals 1 if the FOGAPE loan is the first loan with that bank. Main bank for switch 2 is defined as the bank with the largest cumulative loans and, main bank for switch 3 is defined as the bank with the largest d3, and main bank for switch 4 is defined as the oldest bank for each firm.

in Table 14. Banks may want to keep firms with them either to keep a hold-up advantage in the future, or to guarantee that those firms survive and repay them other outstanding loans in the future. With distance the results are ambiguous depending on the measure. While for $d1$ the relationship is positive, for $d2$ it is negative and for $d3$ it is nil. We consider that these point out to a weak relationship between distance and switching from the oldest bank. These results also hold for switching from the bank with the with the largest $d3$, and with the oldest bank as columns 4-6 and 7-9 respectively show.

Notwithstanding these results, that are robust to either "main bank" definition used, the case is different when we define switching as forming a completely new relationship. Table 16 shows that more concentrated firms are more likely to borrow from banks they never met before. This supports the findings of Mullins and Toro (2018), who argue that FOGAPE-type policies foster the formation of new relationships.[10] This is the case for 16% of the COVID-FOGAPE loans. For distance measures, larger values of $d1$ are related to a higher probability of switching. This variable may relate either to good or bad old relationships. If the latter dominate former, it is likely that those firms with bad relationships may look to form completely new ones with banks that have poor (or even none) information about them. For $d2$ and $d3$, the probability of a firm switching to a new bank falls with distance, which

[10]In our case this holds even for firms that already had previous relationships with other banks.

Table 16: Duration, concentration, and bank switching 1 - Switching to a bank with no previous relationship

	(1) sw1	(2) sw1	(3) sw1
C1	0.234***		
	(13.29)		
D1	0.0407**		
	(2.62)		
C2		0.197***	
		(7.94)	
D2		-0.00357***	
		(-6.45)	
C3			0.215***
			(8.86)
D3			-0.0679***
			(-8.27)
Observations	146499	146499	146499
R^2	0.059	0.058	0.067

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: C1, C2 and C3 are the maximum across banks of the concentration measure of d1, d2 and d3, fixed at the last month previous to the FOGAPE program for each firm. Switch measure 1 (sw1) equals 1 if the FOGAPE loan is the first loan with that bank.

is intuitive since a better relationship gives the firm incentives to stay with their current banks.

5 Conclusion

In this paper we use a novel credit registry dataset to uncover five stylized facts of relationship lending in Chile between 2012 and 2020. We show that the state of relationships matters for credit conditions along two dimensions: duration, and concentration. Moreover, such states affect the transmission of monetary policy, as well as access to special credit programs

Table 17: Duration, concentration, and bank switching - 3 definitions

	sw2	sw2	sw2	sw3	sw3	sw3	sw4	sw4	sw4
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
C1	-0.479***			-0.462***			-0.680***		
	(-48.43)			(-37.75)			(-24.63)		
D1	0.0494***			0.0381**			0.116***		
	(2.90)			(2.60)			(5.86)		
C2		-0.631***			-0.586***			-0.972***	
		(-23.96)			(-48.59)			(-18.62)	
D2		0.000263			0.000576			-0.00155***	
		(0.65)			(1.63)			(-2.93)	
C3			-0.714***			-0.737***			-0.810***
			(-25.24)			(-35.21)			(-19.75)
D3			-0.0035			-0.01			0.00866
			(-0.58)			(-1.12)			(1.30)
R^2	0.148	0.147	0.156	0.14	0.137	0.159	0.201	0.207	0.158

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: D1, D2 and D3 are the maximum across banks of the of d1, d2 and d3 and C1, C2 and C3 the corresponding concentration measures. All of them fixed at the last month previous to the FOGAPE program for each firm. Switch measures 2-4 (sw2, sw3 and sw4) equal one if the firm took a FOGAPE loan with a bank that is not the "main bank" of the firm. Main bank for switch 2 is defined as the oldest bank for each firm, main bank for switch 3 is defined as the bank with the largest cumulative loans and, main bank for switch 4 is defined as the bank with the largest d3.

activated during crisis. Such programs foster the formation of new relationships.

In line with the literature of relationship lending, our findings point out to potential benefits that strong relationships bring about to credit conditions and access to unconventional policies during crisis times. They also warn about potential hold-up problems related to relationships that are very concentrated. In the case of Chile, at least in the aggregate, the strength (or duration) of relationships has increased through time, while concentration has decreased. This is in principle positive towards the access and cost of credits that firms face. The fact that monetary policy transmission, at least contemporary, is distorted by the presence of relationships confirms previous findings on the literature of monetary policy and relationship lending. Therefore, studying further mechanisms by which this result operates in the data is an important avenue of research for central banks and financial regulators.

Our findings, however, should be taken carefully. No causal claims are made in this work. An important limitation is that our dataset is limited to the registry of credits and sector and size information about firms. However, we do not have information about real variables at the firm level, which are time-variant. Enriching our analysis with that type of data is promising and would help to have a more robust set of results. Moreover, being able to merge our data with firm-level data would allow to study how relationship lending, credit allocation, and firm productivity are intertwined. To our knowledge, this last avenue is still unexplored and is a natural step to deepen our understanding of the relevance of relationship lending in the economy

Finally, we also consider that a promising avenue of research is to develop a structural framework that allows to untangle the channels by which relationship lending affects credit conditions, monetary policy transmission, and credit allocation in a dynamic framework. This would allowed not only to perform positive, but also normative analysis, of both conventional and unconventional policies in the presence of relationship lending.

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Appendix

5.1 Data selection

Our dataset is constructed from two databases provided by the Chilean Financial Markets Commission to the Central Bank of Chile. One for market loans (D32 form) and other for COVID-FOGAPE loans (D58 form). The original data is daily and at the firm-bank or individual-bank level (with a unique anonymized id).

We drop firms without economic sector and without size reported to the Chilean tax office (35.7% of all loans and 5.4% of lending). We also drop all loans taken by households. .Financial intermediation firms are also dropped (0.5% of observations and 38% of lending). See Table 18 for additional details on lending by sector, and Table 19 for information on lending by firm size. Further, we only keep loans larger than 10,000 CLP (about 15 USD) and with yearly interest rates smaller than 70%, deleting less than 4,000 monthly observations (0.002% of the sample).

5.2 Sectors

After applying all filters, in our dataset 39.3% of market lending is from other financial activities; 15.7% from commerce, restaurants and hotels; 11.6% from manufacturing; 9.6% from construction and 23.7% from other sectors. For the FOGAPE-COVID loans in the final sample, 38.4% is from commerce, restaurants and hotels; 14.7% from manufacturing; 11.6% from construction; 9.8% business services; 9.2% transport and communication and 16.3% from all other sectors. The difference between market and FOGAPE-COVID shares is in part due to the heterogeneous impact of the pandemic across sectors.

5.3 Firm size

We use the firm-size categorization provided by the Chilean tax office. The threshold of yearly sales for each firm size is approximately 70,000 USD for microenterprises, 1 million USD for small firms, 4 million USD for medium-sized firms (firms with sales over 4 million USD are large firms).

5.3.1 Real interest rate

Figure 7 shows the evolution of the real monetary policy rate (MPR) and (simple) average real interest rates faced by each size category. During normal times (April 2012 to October

Table 18: Share of lending by economic sector

Market loans	Lending	Monthly obs.	Total obs.
Missing	5.4%	47.7%	35.7%
Business services	3.3%	10.4%	9.4%
Financial intermediation	38.0%	0.3%	0.5%
Other financial activities	22.2%	0.6%	1.1%
Real Estate services	1.2%	0.4%	0.4%
Public administration	0.1%	0.0%	0.0%
Agriculture and fishing	1.5%	2.0%	1.9%
Commerce, restaurants and hotels	8.9%	8.9%	18.1%
Construction	5.4%	2.2%	3.1%
Manufacturing	6.5%	2.4%	8.8%
Mining	1.5%	1.3%	1.1%
Personal services	2.9%	20.4%	16.0%
Electricity, gas, water and waste	0.9%	0.1%	0.2%
Transport and comunication	2.1%	3.2%	3.4%
Total	**$ 1,750,434.89**	**17,319,764**	**23,166,797**
FOGAPE-COVID loans			
Missing	4.6%	20.0%	20.0%
Business services	9.3%	7.7%	7.7%
Financial intermediation	0.2%	0.1%	0.1%
Other financial activities	1.4%	0.8%	0.8%
Real Estate services	1.1%	0.7%	0.7%
Public administration	0.0%	0.0%	0.0%
Agriculture and fishing	6.6%	5.8%	5.8%
Commerce, restaurants and hotels	36.6%	32.0%	32.0%
Construction	11.0%	6.6%	6.6%
Manufacturing	14.0%	7.4%	7.4%
Mining	0.6%	0.7%	0.7%
Personal services	5.0%	8.8%	8.8%
Electricity, gas, water and waste	0.8%	0.3%	0.3%
Transport and communication	8.8%	9.1%	9.1%
Total	**$ 7,900.97**	**272,675**	**273,082**

Note: Loan amounts are in 2020 billions of CLP. The difference between total observations and monthly observations (the final sample) is due to multiple loans in one month for a firm-bank pair.

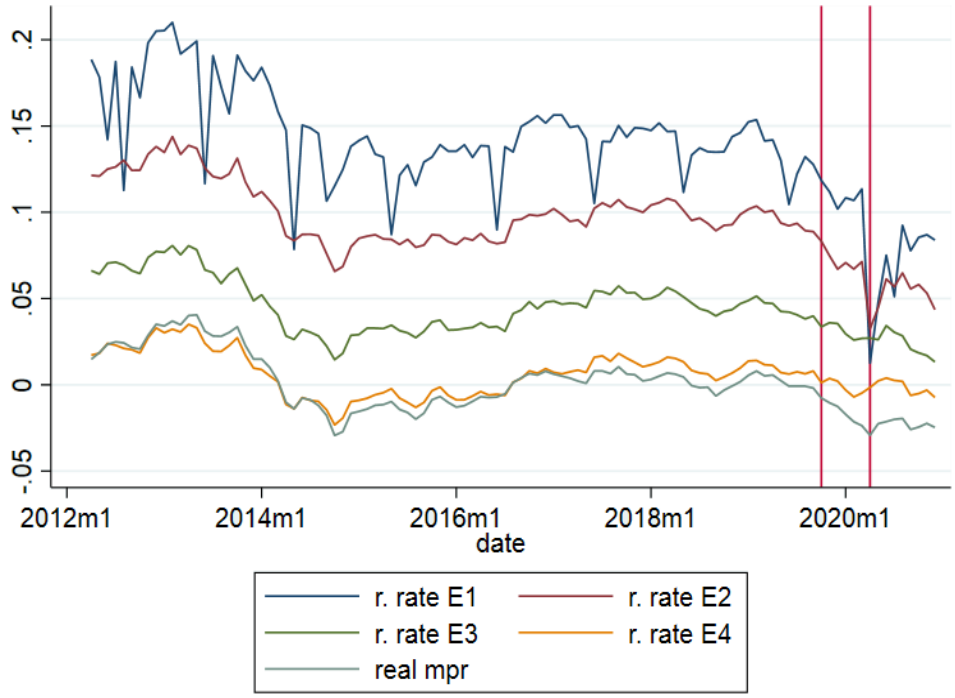
Table 19: Share of lending by firm size

Market loans	Lending	Monthly obs.	Total obs.
Missing	5.4%	47.7%	35.7%
Microenterprises	14.8%	43.7%	34.8%
Small	2.9%	3.9%	4.5%
Medium-Sized	9.7%	1.9%	4.0%
Large	67.1%	2.8%	21.0%
Total	**1,750,434.89**	**17,319,764**	**23,166,797**
FOGAPE-COVID loans			
Missing	4.6%	20.0%	20.0%
Microenterprises	7.6%	43.2%	43.2%
Small	24.7%	28.1%	28.1%
Medium-Sized	23.6%	6.1%	6.1%
Large	39.6%	2.6%	2.6%
Total	**$ 7,900.97**	**272,675**	**273,082**

Note: Loan amounts are in 2020 billions of CLP. The difference between total observations and monthly observations (the final sample) is due to multiple loans in one month for a firm-bank pair. See main text for details on the thresholds for each firm size.

2019), average interest rates are consistently ordered by firm size, with a spread of approximately 12 percentage points between microenterprises and large firms. In the onset of the COVID-19 crisis (March 2020), the real interest rate faced by microenterprises and small firms decreased below 5%, while that of larger firms did not decrease substantially. This obeys to the FOGAPE-COVID loans implemented during the crisis.

Figure 7: Real interest rates by firm size and MPR



Note: E1 corresponds to the microenterprises, E2 to small firms, E3 to medium size firms and E4 to large firms. Simple average for annualized rates is shown, deflated by subtracting past 12 months inflation. Horizontal red lines are in November 2019 (social crisis) and April 2020 (COVID-19 crisis). This sample does not include government-insured and MPR indexed loans (FOGAPE).