Research article

Staggered loans: A flexible modality of long-term financing for SMEs in global health emergencies

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Abstract: Context: The context of this paper is the unprecedented global situation which has been and is still experiencing all countries all over the world, due to the pandemic caused by Covid-19 and its variants. Apart from the important problem of health population, all countries are facing a sharp reduction in their main economic indicators: stock indices, GDP (Gross Domestic Product), rates of employment, closing down of businesses, etc. Results: In this paper, we have presented and mathematically analyzed the so-called staggered loans as a useful tool for SMEs to be applied after times of crisis. Moreover, their pros and cons, and the advantages for lenders and borrowers have been highlighted. Specifically, this kind of loan can help solve the problem of the scarce offer of credit due to monetary politics currently addressed to reduce inflation. Policy implications: Taking into account that this economic situation cannot continue for longtime, many countries are thinking about the next stages of the way-out from the crisis in all sectors of affected economies. Purpose: In this research, we seek to provide some information on the characteristics of the so-called staggered loans and the repayment system applied by some microfinance institutions in Latin America. This can help SMEs to obtain the liquidity necessary to reopen and develop their activity. Methods: Methodologically, we have presented risk-based measures able to guarantee the profitability of lenders and control the solvency of lenders and borrowers.

Keywords: staggered loan; economic crisis; SMEs; COVID-19; solvency; risk; Krugman curve

JEL Codes: G21, G32

1. Introduction

Global risks are becoming the major source of uncertainty that the world is facing. The current situation of the world, society and the economies have changed in recent years and continue to do so at an enormous and unprecedented rate in our history by changing the established rules. In this way, unforeseen and unpredictable events have appeared recently as the credit crisis (López Pascual and Sebastián González, 2015) or the coronavirus pandemic whose final implications and real reach are still completely uncertain and very difficult to forecast. Indeed, this is marking a before and an after in the whole world.

Specifically, the coronavirus (COVID-19 and variants) outbreak has caused a global health emergency and a global economic slowdown. Trade, investment, growth, and employment are all affected and the crisis is having an impact on the achievement of the well-known UN Sustainable Development Goals (Gasper, 2019). This crisis led to catastrophic consequences for businesses as well as economic and social disruptions around the world (Giones et al., 2020; Wolfe and Patel, 2021).
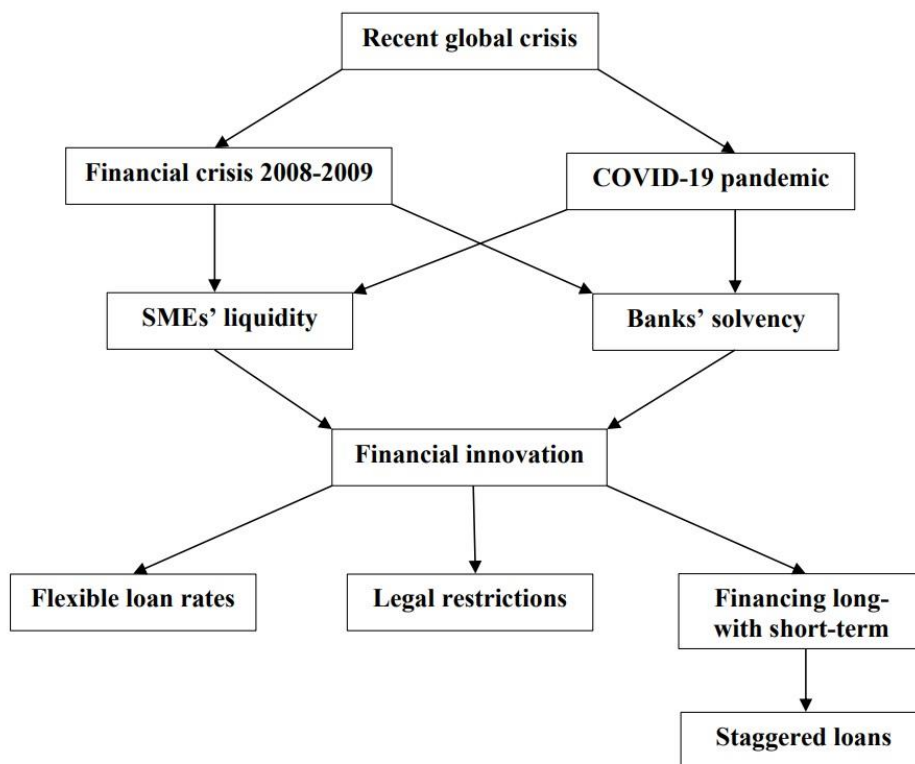
Chart 1. Schedule for developing Section 1.

Indeed, the coronavirus pandemic and its variants are proving to be a disaster for small and medium-sized enterprises (SMEs) across the world, particularly for those undeveloped and developing countries which have not taken any form of measure to protect SMEs from the effects of this crisis because, undoubtedly, these businesses are particularly vulnerable.

The crisis clearly met the criteria of a global systemic risk (Centeno et al., 2015) in a global framework where shorter travel times have allowed diseases to be transported and transmitted before their symptoms are recognized (Brockmann and Helbing, 2013). Although COVID-19 started at the beginning of 2020, a multitude of scholarly research has addressed its impact on education, healthcare, economic development, social mobility, etc.

For our approach, the crucial question will be protecting SMEs with a suitable financial assistance in order to save them from collapse. In effect, the way to help SMEs is by providing them with liquidity and sure access to capital. Specifically, small business owners should advocate for efforts to provide immediate liquidity and keep businesses solvency. As the global economy is facing the worst collapse since the Second World War, probably a historic mobilization of resources will be sought in order to reactivate economy and SMEs in an attempt to world's economy recover from the devastating effects of the coronavirus pandemic.

At the same time, the offer of financial products to investors has evolved considerably over the last decades. In effect, the offerings of financial products available in the financial and banking industry are rather diverse and, at the same time, depend either on investors or on the existence of financial innovations able to attract differentiated savings.

In economic contexts of variable interest rates, the financial institutions try to avoid granting long-term credits and loans, specifically when interest rates are expected to increase. Some scholars (e.g., Fujiwara and Teranishi, 2017) have pointed out that, in setting loan interest rates for new lending, private banks can arbitrarily implement any interest rate. In this sense, it could be interpreted that loan rates for new lending are flexible. However, as a result of the credit crisis, huge changes have taken place in the financial markets (Burns et al., 2018). These changes are the result of the economic evolution which created the need for banks to constantly be adapted to new scenarios because of more demanding clients, the search for profitability, and new legal restrictions. The banking industry has been moved by the credit crisis which produced a sharp worsening of credit quality for banks and companies (Demma, 2017) by tightening the conditions to obtain a loan or a line of credit (Berger and Udell, 1992).

Promoting financial products and services means to comply with state and local regulations, and supranational legal requirement frameworks such as the European Union set up, based on the MiFID (Markets in Financial Instruments Directive). As known, this is a regulation which increases the transparency across the European Union's financial markets and standardizes the regulatory disclosures required for particular markets and the different level playing fields (Del Giudice, 2017). On the other hand, MiFID II commands significant changes in business and operating models when adopting European and non-European Union banks' and asset managers' perspectives and, hence, delivers practical implications for risk managers and compliance officers of various financial institutions (Prorokowski, 2015).

Another sphere of the banking practice is financing long-term debts by means of successive short-term loans, in such a way that the borrower has to require a new loan when the former has been completely repaid. This way of financing has a serious concern: There are several time periods (more specifically, the inter-loan periods) in which the borrower has no liquidity to take care of his/her payments. Given the interest in exploring the scarcity of financial resources of SMEs exacerbated for different reasons during the pandemic (Klein & Todesco, 2021), our article aims to analyze a new financial product labeled as "staggered loan".

We consider that staggered loans are appropriate and may be a solution to the potential problems of SMEs because they can offer them a short-term liquidity to guarantee business continuity, thus ensuring the access to capital (Xu et al., 2020; Kurt and Peng, 2021). This research paper attempts to demonstrate the usefulness of staggered loans as means of supporting the economic recovery of SMEs in the post-COVID period. This novel system of credit or loan would be more flexible than other alternative modalities. But, undoubtedly, this new financial product would need an objective way to measure the risk associated to each client for every requested new loan.

Therefore, the first aim of this paper is to analyze a financial product which incorporates a nominal interest rate into a staggered loan granted by a private microlending institution to a microentrepreneur, particularly a small and medium company especially located in the USA. Staggered loans are successive short-term loans whose renewals are linked to the fulfillment of several conditions by the borrower:

- A part of the principal must be repaid without exceeding a certain percentage of days of delay.
- During the repayment period, the financial position of the considered business must be improved or be within certain limits (e.g., higher sales, increased ability to pay and admissible levels of indebtedness).

If such conditions are not satisfied by the client, he/she simply has to wait for the complete amortization of the current microcredit. This kind of loan aims to gradually increase the borrowing capacity of the client when satisfying the certain financial requirements leading to an important reduction of risk which is spread throughout the complete loan term.

This repayment system has been applied successfully by some institutions in Latin America which work with the so-called "Individual Microcredit Methodology" introduced by ACCION International. Staggering is an original way to encourage a prompt repayment of loans and also an important tool in marketing. Therefore, it makes more sense with very short-term credits, i.e., with durations less than or equal to one year. Contrarily, with medium and long-term credits, the incentive is lower because the client must wait a long time to see the results and, consequently, the product loses its attractiveness.

Also, in this research we seek to provide some information on the characteristics of the so-called staggered loans and the repayment system applied by some microfinance institutions in Latin America which may be extended to a more general financial scope.

The organization of this paper is as follows. After this Introduction, Section 2 presents a short review of the main contributions to the treatment of staggered loans, basically form a macroeconomic point of view. Additionally, it provides the main figures of the USA market. Section 3 mathematically describes the concept and elements (periodic payment, repaid principal, etc.) of a staggered loan. Moreover, it presents the analysis of several properties exhibited by this novel approach. In Section 4, a novel measure of risk associated to borrowers is introduced, giving rise to a score which will allow us to decide whether granting a new loan. Moreover, the average delay in the loan repayment allows calculating the incremental interest rate to be applied in order to compensate that delay. Section 5 deals with a case of study with staggered loans. Finally, Section 6 discusses the obtained results and Section 7 summarizes and concludes.

2.   The framework

Research in microfinance institutions (MFIs) is usually focused on developing and emerging markets. However, an analysis of developed countries is also important, as evidenced by several studies carried out by Santandreu and López Pascual (2019) and Santandreu et al. (2020), which concluded the presence, in the USA, of an important and unattended market: attractive in size, lacking competition, and one which offers opportunities to microlending.

In particular, we are going to focus on staggered loan contracts as there is a lack of previous specific studies connecting such a kind of financial products with microfinance institutions, particularly in the USA. This overview of the US microfinance industry provides details that are used in this research paper to support why staggered loans would be crucial for the economic recovery compared to their alternatives.

However, the existing literature has been focused on explaining staggered loan contracts, in particular on investigating the implications of financial frictions in the form of staggered loan contracts supplied by monopolistic banks (Teranishi, 2015) and introducing this mechanism into a standard new Keynesian model. Moreover, it considers that staggered loan contracts play an important role in determining both the amplitude and the persistence of economic fluctuations (Fujiwara and Teranishi, 2017) in order to analyze optimal monetary policy in this environment.

The following paragraphs include some information on the USA microfinance market. The best source of information about the microfinance industry in USA is the website Microtracker (2019) from Aspen Institute. For the fiscal year 2017, 56 MFIs nationwide have reported their information as of April 14th, 2020:
- Businesses served: 33,862 (64,817 individuals served).
- Total amount of microloans in the MFIs microcredit portfolio: $158,8 microloans outstanding.
- Loans disbursed: 8,054.
- Median loan amount: $16,534.33.
- Median loan loss rate: 2.54%.
- Women served: 56.54%.
- Ethnic group served:
  - White Caucasian: 33.75%.
  - African American: 30.4%.
  - Latin / Hispanic: 21.99%.
- Income status:
  - Below low income 64.88%.
  - Above low income 32.81%.

It is very important to highlight that there is not any other known source of information about the microfinance market in USA. Moreover, the information above does not include personal or consumer loans which, even when they could be micro by their size, are not considered as microcredits, technically speaking.

3.   A mathematical approach to staggered loans

This paper proposes the use of staggered loans as a financial instrument to allow companies a better access to credit in a period of crisis. Staggered loans work by rewarding borrowers who make

regular payments on time. Once a certain amount of principal has been repaid, borrowers become automatically eligible to receive a new loan –potentially at a larger level than their initial loan.

Some authors (e.g., Diamond, 1991) point out that the debt overhang effect might be reinforced by an increase in rollover risk, depending on the maturity structure of the debt. If the debt accumulated during the boom period is mostly short-term, rollover risk will increase because lenders are often unwilling to renew expiring credit lines during a crisis when collateral values drop (Diamond, 1991; Acharya et al., 2011). We want to highlight that extending the loan long before it is fully due as opposed to allowing rollover very shortly before the loan concludes is relevant.

We propose a contract to bind banks to provide additional funds if the company demonstrates it can repay a smaller debt on time. We argue that this contractual obligation will force banks to provide liquidity to companies in a situation of crisis (provided that the company remains eligible).

Let us consider a loan with the following characteristics:
- Principal: C_0 (in €).
- Duration: n (in years).
- Annual interest rate: i.
- Repayment by the French method.

Assume that lender and borrower agree that, once the repaid principal (denoted by M_1) reaches certain percentage p (in %) of the principal at time s_1, the borrower can obtain a new loan to repay the balance of the former loan, up to a limit qC_0, and according to the following characteristics:
- New principal: αC_0 (in €), where $p < \alpha \leq q$. After repaying pC_0, the net principal would be $(\alpha - p)C_0$.
- Equal duration: n (in years).
- Equal annual interest rate: i.
- Repayment by the French method.

This process could be iterated, when M_2 equals to $p(\alpha - p)C_0$ at time s_2, giving rise to another loan of principal βC_0, with limit rC_0. Figure 1 schematizes the former situation in case of three staggered loans.
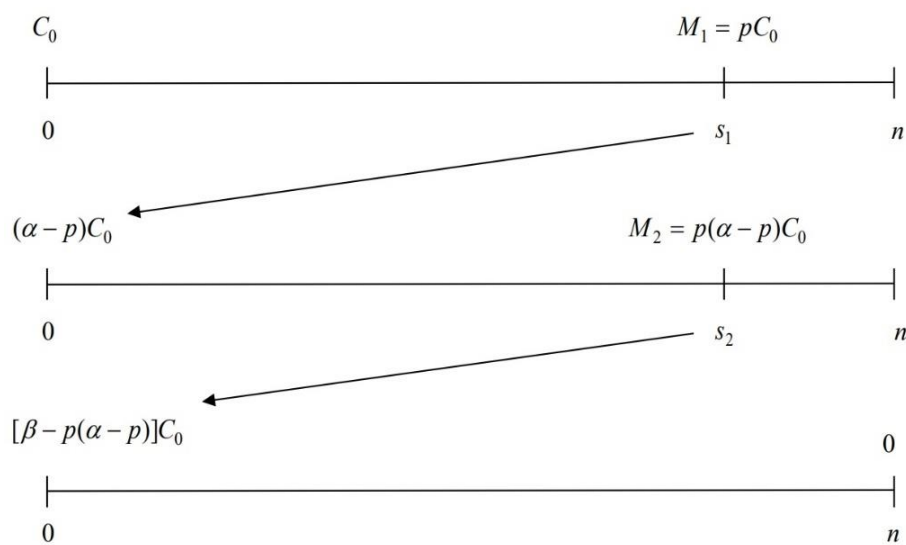

Figure 1. Staggering three loans.

Example 1. If $p = 70\%$, $q = r = \alpha = \beta = 150\%$, and $C_0 = 5{,}000€$, then the successive loan principals would be 7,500€ and 11,250€.

We can highlight the following basic properties of the so-defined staggered loans and their main parameters:

1. In case of k staggered loans, the number of repayment periods is $n + (k-1)s$.
2. Inside each of the k staggered loans, the payments are constant. However, in general, the amount of the payment increases with the new staggered loan.
3. Each of the $k-1$ first staggered loans can be considered as the combination of the payments corresponding to a loan repayable by the French method (principal: pC_0) and the interest quotas of another loan payable by the American method (principal: $(1-p)C_0$).

In effect, the present value of the s first payments (Cruz Rambaud and Valls Martínez, 2014):

$$a \cdot a_{\overline{s}| \, i} = a \frac{1 - (1+i)^{-s}}{i} \tag{1}$$

can be decomposed as follows:

$$a \frac{1 - (1+i)^{-n}}{i} - a \frac{1 - (1+i)^{-(n-s)}}{i} (1+i)^{-s} \tag{2}$$

But the former expression coincides with:

$$C_0 - C_s (1+i)^{-s} \tag{3}$$

Now, this expression can be written in the following way:

$$C_0 - C_s [1 - 1 + (1+i)^{-s}] = C_0 - C_s + C_s i \frac{1 - (1+i)^{-s}}{i} = M_s + C_s i a_{\overline{s}| \, i} \tag{4}$$

4. If the probability distribution corresponding to the loan repayment by a given borrower at time s_j $(j = 1, 2, \ldots, k-1)$ is known, then a family of k staggered loans can be transformed into a unique loan whose duration is random. Thus, the resulting overall loan can be considered as a loan of random duration, payable in s installments per year and usually variable in geometric progression. In this way, it would be interesting to analyze the following characteristics of such loans:

• If the probability of fulfillment of the conditions required to renew a loan is constant and equal to p, and the borrower has planned k staggered loans, the probability of reaching this number of loans is p^k.

• The average number of renewals is kp. Therefore, the average term is kpn.

• If $n = 1$, then the duration of each staggered loan is divided into months and so it would be interesting to determine the factor converting loans payable annually into loans payable monthly. In effect, $i_{12} = i/12$ is the monthly interest rate. Therefore, the converting factor will be the following final value:

$$\frac{1}{s} S_{\overline{s}| \, i_{12}} = \frac{(1 + i_{12})^s - 1}{s i_{12}} := \frac{i_s}{s i_{12}} \tag{5}$$

By comparing staggered loans with other commonly used financing products from the financial industry for SMEs, we can highlight some clear advantages such as the flexibility in terms of amount and duration, leading to short-term liquidity in order to guarantee business continuity.

Moreover, as staggered loans are successive short-term loans whose renewals are linked to the fulfillment of several conditions by the borrower, this product aims to gradually increase the borrowing capacity until satisfying the financial needs of the client with an important reduction of risk.

There are other commonly used financing for SMEs, similar to staggered loans:

1. Solidarity loans are small short-term loans at interest rates which reflect the cost of credit for solidarity purposes. Regarding the mechanics of granting, the recipients request the loan individually and, in case of absence of collateral, they may associate with other applicants to access the modality of "loans to solidarity groups" in which the recipients guarantee each other the credits. After an initial credit, those who make timely repayments will be eligible for larger and larger loans. This progressive lending method is intended to minimize initial risks and allow the growth of microenterprises.

2. Credit lines with increasing principals.

3. Conditioned loans are a flexible credit line (FCL), proposed by the International Monetary Fund (IMF), with some innovative elements which aim to correct the most discussed aspects of the stand-by credit lines. However, the FCL was not designed to completely replace stand-by arrangements (SBA). Access to this new line is very restrictive. The FCL, according to the IMF, was specifically designed to provide larger, freely available financing only to countries with sound macroeconomic fundamentals. Therefore, the FCL aims to improve confidence in countries with policies considered sound by the IMF, but which are circumstantially experiencing macroeconomic problems. Differently, SBAs imply a critical evaluation of the macroeconomic policies carried out by the requesting country, which generally translates into the demand for structural reforms and the implementation of adjustment policies.

4. Linked loans consist in refinancing the debt, which can lead to the bankruptcy of the borrower.

5. The novation of a loan is any change which occurs in the conditions of the loan at a time after the agreement. In other words, it is the renegotiation of the loan conditions with the bank with which it has been contracted.

6. "Bridge" loans are a special type of loan when there is an immediate need for financing. It is provisional, specifically until a target loan is obtained, as long as the debtor ensures future incomes. It is considered as a financing method of "short" duration (less than 5 years) before obtaining the long-term credit. In other words, it serves to cover a deficit of capital in a given period of time.

Table 1. The general pros and cons of these financial products.

Loan type	Agreement	Principal	Term	Rate	Guarantees
Staggered	Several	Increasing	Short	High	Moderate
Solidarity	Several	Increasing	Short	Very low	No
Credit lines	Several	Increasing	Short/Medium	Very high	Many
Conditioned	Several	Variable	Medium	Low	Many
Linked	Several	Increasing	Short/Medium	High	Many
Novation	One	Increasing	Long/Medium	Low	Many
Bridge	One	Small	Short/Medium	High	Many

Staggered loans imply benefits and costs for financiers and SMEs:

1. For financiers, these loans undoubtedly reduce the risk: In the first place, the local risk with

the client and, secondly, because it can diversify more. The incentive system contributes to customer loyalty so that it continues. In addition, the business is increasingly consolidated.

2. For SMEs, these loans encourage amortization by getting better and better conditions. The amortization of the loan is in line with the size reached by the business.

The volatility of financial markets and interest rates make the staggered loans a suitable solution to the potential problems of SMEs because they can offer a short-term liquidity in favorable financial conditions and the possibility of renegotiating future loans based on the interest rate curve, by providing a hedge to face liquidity gaps. Take into account that the liquidity is a key factor to guarantee business continuity, thus ensuring the access to capital.

The staggered loans may reduce the pandemic-induced liquidity gap. This is particularly important in case of large loan guarantee schemes with strict limits on maximum amount per beneficiary. Moreover, the staggered loans make sure that funding is rapidly available for SMES. The liquidity and access to funding are vital for SMEs during pandemic due to the financial fragility of many small businesses, and the significant impact of COVID-19 on these businesses in the weeks after the COVID-19–related disruptions began, as stated by Bartik et al. (2020).

4. Searching a novel measure of risk

If one of the conditions to obtain a new loan is the repayment of a percentage p of the principal, one can think that this fact occurs at time $p \cdot n$, which is the result of applying the given percentage p to the entire loan term n. However, we have to take into account that, in the French method, the repayment is not uniform and most of it is concentrated near the loan conclusion. That is to say, the exact time s at which the amount pC_0 has been repaid must satisfy $s > p \cdot n$. In order to find such date, we have to propose the following equation:

$$M_s = C_0 - m a_{\overline{n-s}|\,i} = C_0 - m \frac{1 - (1 + i)^{-(n-s)}}{i} \qquad (6)$$

where

$$m = \frac{C_0}{a_{\overline{n}|\,i}} = \frac{C_0 i}{1 - (1 + i)^{-n}} \qquad (7)$$

Therefore, as $M_s = pC_0$, one has:

$$p = 1 - \frac{1 - (1 + i)^{-(n-s)}}{1 - (1 + i)^{-n}} \qquad (8)$$

from where:

$$s = \frac{ln(1 + p[(1 + i)^n - 1])}{ln(1 + i)} \qquad (9)$$

Example 2. With the information of Example 1, if $i = 0.5\%$ and $n = 24$ months, then $s = 17.1$, that is to say, 70% of the principal will be repaid at the end of the third day in the 18-th month, whilst $p \cdot n = 16.8$.

4.1. Proposing a measure of risk

Now, we are in conditions to define a *score* for the borrower repaying one of the staggered loans. This measure could be defined as:

$$\text{score} = \frac{s}{t} \tag{10}$$

where t is the real instant at which the borrower has repaid pC_0. Observe that this score varies from s (in case of the total repayment at time 1) to s/n (in case of repayment at time n). Obviously, for a loan whose repaid principal evolves as initially expected, the score is 1. Moreover, among a set of borrowers, we will choose the one with the highest score.

However, a more sophisticated score could be given by the following geometric mean:

$$\text{Geometric average score} = \left(\frac{1 \cdot 2 \cdots s}{t_1 \cdot t_2 \cdots t_s}\right)^{1/s} \tag{11}$$

where $t_1, t_2, \ldots, t_s$ are the instants at which the initially expected repaid principal at 1, 2, …, s are actually amortized. Usually, the lender applies a lower bound to this score, of course greater than its maximum value s/n. Recall that, apart from this score, the borrower must show "good" values for other mandatory ratios (see Introduction). In this way, we have to take into account the main performance ratios for both lender and borrower (see Subsection 4.3).

An empirical application. A sample composed by 519 microcredits in the microfinance industry in the USA (2019) shows the results displayed in Table 2. In this analysis, a collection of 1,048,575 (N) microloans has been extracted from the website of Kiva (https://www.kiva.org/build/data-snapshots). The time period of disbursement of the microloans analyzed in this paragraph was July 25, 2007 to June 30, 2020. Considering the huge number of cases thus identified, a smaller quantity composed of 385 microloans has been selected by using simple random sampling, more specifically the following formula:

$$n = \frac{\dfrac{z^2 p(1-p)}{e^2}}{1 + \dfrac{z^2 p(1-p)}{e^2 N}} \tag{12}$$

where n is the size of the sample to be determined, z is the standard score corresponding to a 5% significance level (that is, 1.96), p is the population proportion (taken here as 50%), and e is the margin of error (in this case, 5%). To do this, 385 random numbers were generated between 1 and 1,048,575 and the corresponding microloans were granted to borrowers located in 56 countries.

Table 2. Percentage of microcredits by sex. **Source**: Own elaboration.

Sex	Frequency	Percentage	Delinquent loans	Defaulted loans
Male	372	71.68%	31 (8.33%)	30 (8.06%)
Female	147	28.32%	8 (5.44%)	16 (10.88%)
Total	519	100%	39	46

The percentage of men who applied for loans was 71.68% and that of women was 28.32%. Moreover, the percentage of men who were delayed or failed in their loan repayment was 16.39%,

very similar to the figure corresponding to women (16.32%). On the other hand, the average time interval to repay the loan principal was 14.41 months whilst the average delay was 23.29 days. Therefore, the average score of microcredit clients is:

$$\text{Average score} = \frac{14.41}{14.41 + 23.29/30} = 94.89\% \tag{13}$$

Which could be an appropriate benchmark to classify clients into "good" and "in arrears".

4.2. Including the delinquent risk in the interest rate

Cruz Rambaud and Sánchez Pérez (2018) presented a model based on Krugman's curve (Flores et al., 2007), where the increase in the debt expected values (concave line):

$$E(t) = b\, ln(1 + ct) \tag{14}$$

where b and c are positive constants, is lower than the corresponding one to the real debt (supposed a straight line):

$$D(t) = at \tag{15}$$

where $0 < a < bc$ (see Figure 2). Under these conditions, the expectation of payments follows an increasing trend, but its increase is slower than the increase in the real debt. As shown in Figure 2, for every agreed maturity date of a debt, say t, there exists an expected later payment date, denoted by s, given by the following expression (Cruz Rambaud and Sánchez Pérez, 2018):

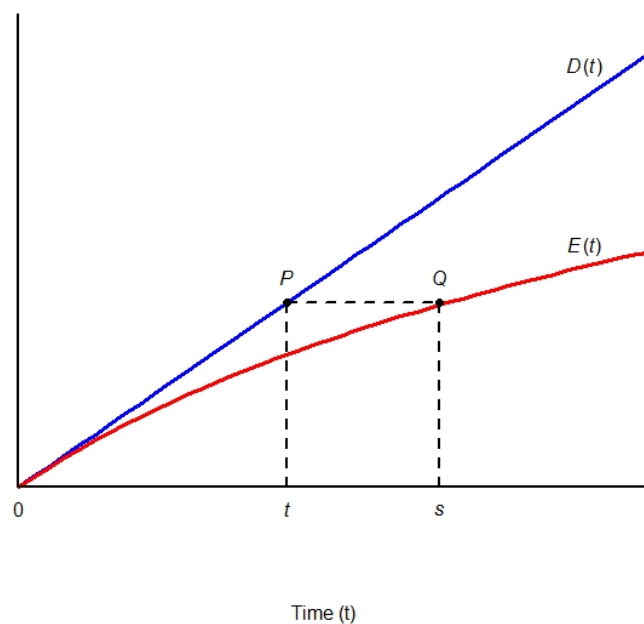$$s = \frac{exp\{ct\} - 1}{c} \tag{16}$$

Figure 2. An adaptation of Krugman's curve.
Source: Cruz Rambaud and Sánchez Pérez (2018).

With the information provided in Subsection 4.1, $t = 432.41$ days and $s = 455.70$ days. Therefore, $c = 0.000240557451664169$. This means that, in average terms, the lender has to wait about 376.05 days to receive the amount due by the borrower in a year. Thus, if the agreed interest rate is 6% (see Section 5), the interest rate to be applied in order to compensate the delay in payments is:

$$i^* = (1 + 0.06)^{\frac{376.05}{360}} - 1 = 0.062757 \tag{17}$$

Which supposes an increase of 27.57 basis points in the initial interest rate.

4.3. Other involved ratios

The credit transmission to the real sector of the economy is one of the basic functions of the financial industry, especially banking. However, its volume depends on the economic cycle and the strength of the balance sheet, both of non-financial companies and of the banks themselves. Over the years, the analysis of the growth of bank credit has revealed a positive relationship with the economic activity, as well as a negative relationship between the latter and non-performing loans (López Pascual and Sebastián González, 2015).

One may agree that access of companies to credit for liquidity management is vital to meet operating expenses, and that in a crisis such credit may be rationed or eliminated. Nor can we ignore the existence of instruments to provide companies with liquidity management already exist: the well-known credit lines. These are financial instruments where companies can demand credit at any point at a specific rate of interest. In fact, these tools have been showed to help companies in periods of crisis (Greenwald et al., 2020). These scholars show that in the 2008–2009 financial crisis and in COVID-19, companies in large numbers tapped out their credit lines. Also, in both crises, total credit extended to companies increased. In both crises, banks responded by tightening new credit issued to companies, by suggesting that credit contractions affect companies through other types of lending than liquidity support.

However, Almeida (2021) points out that the COVID-19 and variants shock highlighted the key role of credit line liquidity insurance for corporate finance. Comparing staggered loans to credit lines, we can observe that usually liquidity insurance for those products is not necessary which, in fact, is a clear advantage. Hence, there is a lack of and a need for further exploration of the staggered loans as a tool would be helpful to companies under COVID-19 and variants.

In this research paper we attempt to show that staggered loans are even needed to solve the issue of liquidity management for SMEs. In good times, financial institutions relax their risk systems. At the same time, individuals and companies are more inclined to undertake investment projects because they trust that they will not have difficulties to return them. However, in times of recession, the high volume of unpaid debts, the need to make more allocations for provisions and the lower levels of capital, demand a greater prudence when granting credits (López Pascual and Sebastián González, 2015). In this context, a set of appropriate ratios, complementary to the score defined in Subsection 4.1, can be of help for banking decision-makers.

5. A case of study

This section describes the case of ITD, an independent truck driver, who needs to change the tires of his truck and make minor maintenance. He is asking for $5,000. After the analysis of the case

and given that he could show a sufficient ability to pay the loan, the credit committee of a MFI approves a loan under the following conditions:

- Application of 1.5% and processing fees on the amount to be disbursed.
- Interest rate: 6% per year.
- Lien on the truck as collateral (cost $117.5).
- Truck must have installed a GPS (cost $305).
- The MFI will include all expenses in the principal of the loan so the borrower receives the amount he is asking.

As a result of the aforementioned conditions, the total disbursement of the MFI will be $5,000 for the loan, plus $117.5 for the lien and $305 for the GPS for a total of $5,482.50. Given that the fees (1.5%) are calculated on the amount to be disbursed by the MFI, the total amount of the loan will be $5,482.50/.985 = $5,566.00. Consequently, this will be the amount of the promissory note to be signed by the borrower.

The loan will be paid in 10 monthly installments of $572.02 which will include principal and interest on the principal balance owed after each payment. After seven payments (70% of the term of the loan), the principal owed by ITD will be $1,699.05 (see Table 3). On the other hand, we can calculate the effective annual interest rate, by solving the following equation:

$$5,482.50 = 572.02a_{\overline{7}| \, i_{12}} + 1,699.05(1 + i_{12})^{-10} \tag{18}$$

from where $i_{12} = 0.006884554$. Consequently, $i = 8.58\%$.

Table 3. Table of amortization corresponding to the case of ITD. **Source**: Own elaboration.

Installment	Principal	Installment	Interest	Principal	New principal
1	5,566.00	572.02	27.83	544.19	5,021.81
2	5,021.81	572.02	25.11	546.91	4,474.90
3	4,474.90	572.02	22.37	549.65	3,925.25
4	3,925.25	572.02	19.63	552.39	3,372.86
5	3,372.86	572.02	16.86	555.16	2,817.70
6	2,817.70	572.02	14.09	557.93	2,259.77
7	2,259.77	572.02	11.30	560.72	1,699.05

Since the client paid in due time and form his installments, the MFI offers staggering the loan in 150% of the first loan, a 2% fee and 6% interest, and a new term of 12 months. The amount of the new loan will be $7,500 plus the fees, because the lien is valid during the time it is maintained and the GPS is already installed in the truck. Then it will be $7,500/.98 = $7,653.06. The monthly installments on the staggered loan will be $658.67. The net amount of money to be received by ITD will be $7,653.06 − $153.0.6 (fees) − $1,699.05 (outstanding balance of the first loan) = $5,800.95.

The process begins again and, if the borrower pays his loan punctually, a third loan will be offered after the payment of the eighth installment (70% of the loan) if, and only if, his ability to pay this third loan is sufficient. If the ability to pay is not enough for the new amount, the borrower could receive a loan that is adequately suited to his ability to pay.

Some lessons have first been fully explored during the previous credit crunch crisis which could be implemented for the time in order to avoid high loan interest rates.

Central Banks became lenders of last resort (LOLR) supporting facility loans or credit stand facility which in fact could drop interest rate to a lower level more attractive for SMEs. The lender of last resort could provide the financial institution liquidity in exchange for illiquid assets, by increasing its liquidity without altering its balance sheet. Emergency lending may also occur in the form of risk capital support for insolvent institutions (Drechsler et al., 2016).

This mechanism could reduce the incentive for financial entities to protect themselves against risky outcomes by assuming that the central banks would provide liquidity support in times of financial stress.

6. Discussion

Echoing extensive literature focused on how SMEs have been affected and the huge amount of liquidity they require as a result of the COVID-19 and variants (Harel, 2021; Cao and Leung, 2020), we attempt to promote staggered loans as relieving liquidity problems of the company during the crisis.

The global financial crisis has been one of the generators of change and financial innovation because clients have lost their confidence in the traditional financial sector which has proved to generate high operating costs (Fabris, 2022). Moreover, the changing nature of pandemic requires financial innovation in order to help SMEs to obtain the liquidity necessary to reopen and develop their activity (Tang et al., 2021).

Our paper may eventually contribute to a better general understanding of staggered loans as a flexible modality of long-term SMEs financing product in global health emergencies. Also our research raises awareness of some successful financing products coming from the microfinance industry which could be implemented during and after the pandemic.

Finally, we would like to highlight the connections to the literature and data on ability of the company to borrow in crises. Fundamentally, staggered loans are a solution to rollover risk which companies face. As we know, roll over credit means a medium- or long-term bank loan in which the rate of interest varies with short-term money-market rates (such as LIBOR or EURIBOR) because the bank has raised the loan by short-term money-market or interbank market borrowing. Many companies do borrow with the expectation of being able to rollover their short-term debt and, in normal times, banks often do rollover such debt provided the company makes their interest payments. This arrangement is similar to staggered loans with two differences: staggered loans are extended before the loan is due, and rollover the loan is required provided the company meets certain repayment conditions. These are potentially important differences contrasting the large literature showing that stressed banks do cut existing lending facilities to companies when they themselves are stressed (Jasova et al., 2018).

These scholars show that a reduction in lender of last resort (LOLR) policy uncertainty positively affects bank lending and propagates to investment and employment. By using micro-level data on banks, companies and loans in Portugal, they generate cross-sectional variation in banks' exposure to uncertainty and find that the size of the haircut subsidy –the gap between private market and central bank security valuations– plays a key role in the propagation of the shock to lending and the real economy.

7. Conclusions

In this paper, we have presented the so-called staggered loans as a useful tool to be applied after times of crisis. In effect, a post-crisis period is characterized by an increasing need of financing and a scarce offer of credit. This economic situation leads to a reduction of the loan principals (due to the high number of potential borrowers) and to the strengthening of credit access.

These loans have shown their viability in the USA, in the context of businesses in an initial stage of their activity. Moreover, their own characteristics make them very adequate to be applied after an economic crisis as they can be increasing in geometric progression and, moreover, require the fulfillment of certain restrictions which guarantee the future of both borrower and lender.

According to the recent IMF policies (International Monetary Fund, 2020), it is necessary to increase and enhance the available emergency financing tools. In this paper, we propose a staggered loan with a repayment system applied by some institutions in Latin America which may be extended to a more general financial environment. The practice and positive trend of staggered loans in Latin America may be generalized to the rest of the world, especially in developed countries with large presence of Hispanic minority, such as the USA. There is beyond any doubt the increasing importance of Latin American and Hispanic minority in the USA, especially small and medium entrepreneurs. Latinos are also driving new enterprises, owning nearly one in four new businesses (Mills et al., 2018). On the other hand, staggered loans may be extended to other countries, by considering that they should "glocalize", or adapt their policies, to those developed countries, as pointed out by some scholars (Santandreu and López Pascual, 2019). Indeed, this proposal could be part of a broader package to ensure a rapid and decisive fund response to the urgent financing needs of SMEs which are struggling to survive due to the coronavirus shutdown.

Conflict of interest

All authors declare no conflicts of interest in this paper.

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