2Real Bussiness Cycle and Credit Market

2.1.Introduction

Credit market has long been recognized as playing a key role in economic cycles (Bernanke and Gertler (1989)) The pro-cyclical effect is also pointed out by Kiyotaki and Moore (1997) when analyzing the mortgage market. Using a dataset covering a period of seven years, we are able to investigate how business affects the credit market. Our set of results indicates that business cycles have a significant effect on contract terms and the pool of borrowers, as well as on borrower's performance.

Brazil offers a unique environment to assess this issue. From 2003 to 2010, the economy witnessed several economic cycles. For instance, the economy grew 5.7% in 2004, followed by a growth of 3.2% in 2005. The financial crisis of 2008 provides a liquidity shock to the bank system allowing us to go a step further. The total supplied credit for the car modality more than doubled during the sample period, as well as the total car production.

Better economic performance is associated with a lower expected delinquency rate, which in turn deems the loans less risky. Banks anticipates these movements and charge contract terms accordingly. Likewise, given a lower probability of default, low-income borrowers turn to be eligible for a loan. Thus, borrower's performance is a key variable linking between business cycles and the credit environment.

The total effect of business cycles on the credit market could be ambiguous. On the one hand, a positive economic outlook induces banks to offer larger loans with lower spread and down payment, and longer maturity. Expecting a good economic performance, banks project a lower level of default, which means a less risky loan. Thus, according to this view, contract

terms vary em pari-passu with economic cycles.

On the other hand, some factors might induce a different behavior. Brazilian credit market is characterized by a strong presence of state-owned banks. Representing 40% of market share, they play a significant role. Instead of charge contract terms accordingly with economic outlook, state-owned banks might act counter cyclically. Moreover, an economic boom enables riskier borrowers who were rationed out of the market to obtain credit. But banks will offer small loans charging a higher spread and shortened maturity to this newly cohort of borrowers.

The objective of this paper is to document credit conditions in the business cycles. We use a micro-level data during the period from 2003 to 2010 from one of the Brazilian largest banks to provide empirical evidence of how business cycles affect with credit market. We produce a descriptive paper about the relation between credit market and economic cycles.

As proxies for business cycles, we use GDP, expected GDP, stock market index, and CDB preset. The first three measure economic conditions, current and future, and the latter measures banks funds cost.

Consistent with the prediction from the Real Business Cycle literature, we find that business cycle is correlated with contract terms. All variables significantly affect spread. GDP, expected GDP and stock market index are negatively associated with spreads, and CDB preset is positively associated. Furthermore, only expected GDP has a significant and meaningful effect on matu- rity. Even though all economic indicators are correlated with maturity, when we put all variables together, only expected GDP remains statistically significant. For down payment, only GDP is significant, indicating that, during an economic boom, the bank is more aggressive granting credit. Finally, as regards loan size, we have mixed results. While GDP is negatively correlated, stock market index is positively correlated. Then, we focus our attention on the crisis period and inves- tigate how this negative liquidity shock affects credit conditions.

We find that spread increases, maturity shortened, and down payment and loan size decreased, thus worsening contract terms. Then, after the crisis period, the credit returned to previous conditions and this movement was leading by spreads.

Further, we investigate how business cycles affect the composition of borrowers. During an economic boom, the expected delinquency rate decreases. As a result, borrowers with higher probability of default would be expected to be more likely to obtain a car loan. Results confirm this hypothesis. Better economic conditions enables low-income borrowers to obtain loans and purchase new cars. Moreover, the proportion of self-employed and entrepreneurs also increases. This result is in line with Assunção, Benmelech and Silva (2012) who documented that better economic conditions can lead to a "democratization of credit".

Next, we study whether different borrowers are affected differently by the cycles. The business cycle might be more severe for low-income borrowers and for those who buy a less valuable car. Both might be more sensitive to the effects of an economic recession. For all types of borrowers, spread increases during a boom and decreases during a recession. Nevertheless, the amplitude of the "spread cycle" is higher for low-income borrowers or for those who buy a used car. Adding a cross-sectional dimension to the analysis alleviates concerns about our time series empirical strategy.

Finally, we investigate the critical link between economic conditions and borrower's performance. Our results point out to a correlation between economic growth and borrower's performance, con- firming the link. Higher economic growth is associated with a lower probability of default. In addition, the correlation is stronger during the first half of the loan, when the value of the debt is probably higher than the collateral. Under this circumstance, a borrower is more vulnerable to an economic shock. When a he is hit by a negative shock, he is more likely to default.

Our paper has close relation with, at least, three dimensions of economic literature. First, a vast literature relating real business cycles and the credit

market. In particular, the role played by the financial system in amplifying the effects of the shocks comming from real economy. (Bernanke and Gertler (1989), Bernanke, Gertler and Gilchrist (1999), Iacoviello (2005), Jaimovich and Rebelo (2009), Kiyotaki and Moore (1997), and Kwark (2002)). Our paper has close ties with a literature about the relation between credit market and economic growth and development (Banerjee, Duflo, Glennerster and Kinnan (2010), Banerjee and Newman (1993), Beck Levine and Loyaza (1999), and King and Levine (1993)). We present the conversion, the economic growth affecting credit conditions. Finally, we also have relation with a literature regarding the financial crisis (Brunner- meier (2009), Campello, Giambona, Graham and Harvey (2011), Krishnamurthy (2010), Ivashina and Scharfstein (2010), Mian and Sufi (2009) and Santos (2010)).

The road map of the article is the following: Section II describes the economic background; Section III describes our data sources as well as summary statistics; Section IV shows empirical results; and Section V conclude.

2.2.Economic Background

In this section, we briefly describe the economic environment during the sample period. Our goal is to familiarize the reader with economic trends, the vehicle market, and the interaction between them. We start by looking at the economic activity, then having a glance at the 2008 global financial crisis and, finally, the evolving of the auto industry.

2.2.1.Economic Activity

Brazilian economy witnessed a yearly average economic growth of 4.5% during the sample period. This level of growth is remarkably different from the previous seven years, when the economy grew at an average pace of only 2.5%. Reflecting this higher economic activity, unemployment sharply dropped from 10.9% to 5.3%. This growth was not smoothly spread along the years. The economy has never experienced three years in a row

with growth higher than 4.0%. On the other hand, after the recession of 2009 (-0.2% growth), Brazil experienced a growth of 7.5%. The services sector led this growth with a yearly average of 4.7%. Industrial and agricultural sectors struggled a bit, showing a lower growth of 3.7% and 3.1% respectively.

The macroeconomic framework beyond this growth was a combination of three policies: fiscal responsibility, inflation target, and fluctuating exchange rate. The immediate consequence of the first policy was a sharp drop in the national net debt from 50.0% of the GDP to 39.1%. In addition, the Central Bank adopted an inflation target system. In a few words, it means that the Central Bank calibrates the interest rate in order to keep inflation inside the interval and close to the target, both previously determined by the authorities. It succeeded in this task, inflation has kept inside the interval and usually close to the target.

The last policy regards the external sector. Several reasons contributed to an appreciation of 59% of the Real (Brazilian currency) during the sample period, and we will underscore two of them. On the capital account side, Brazil had a high national interest rate, notably higher than other emerging markets, and attacked foreign capital. On the current account side, commodities prices went up reaching a historical peak. Brazil is a net exporter of commodities, they represented US$29 billions in exports (or 30% of the total) in 2004. These prices movements brought considerable extra dollars. The combination of both effects created a buffer zone in the external side allowing the Central Bank to accumulate external reserves. Indeed, the total foreign reserve increased from US$52 billion to US$289 billion. The favorable scenario allowed Brazil to switch its position with IMF from debtor to creditor. Thus, the fluctuating exchange rate regime combined with favorable economic conditions ended up appreciating the Real. Altogether, this framework lent more stability and previsibility to the economy.

Moreover, the credit market gave its contribution to the acceleration

of growth. The credit market was stuck in a lower level. Chief among the reasons for that were institutional barriers, such as judicial inefficiency and weak creditor rights. With a view to fixing these and improving the environment, the government undertook a broad credit reform. They improved the bankruptcy code (2005) and personal credit rules (2004). In addition, the advent of the "fiduciary law" (August 2004) worked as an earthquake for the mortgage, and car loan modalities. Assuncão, Benmelech, and Silva (2012) documented the effects of the law and found that it boosted the vehicle credit market. In particular, contract terms (spread, maturity and loan size) improved and the law led to a "democratization of cred it" – the average of borrower's income decreased, and the proportion of high-risk borrowers increased. According to the Central Bank, the total credit supplied more than doubled during the sample period. Therefore the total credit in the economy increased from a modest 24% to 45% of the GDP at the end of the sample period.

The Brazilian economy undoubtedly shows several signs of improvement. As we previously mentioned, the exchange rate appreciated 42% and the economy grew at a higher pace. Even though the yearly average interest rate was very high during the period, it clearly shows a decline pattern. The rate started at 17.50% and ended at 10.75% and inflation has always been under control. The stock market index grew 238% during the sample period, and the EMBI+ index decreased more than 64%.

2.2.2.2008 Financial Crisis

The main goal of this section is to show we have an interesting and exogenous variation in data inside the sample period. The financial crisis worked as a negative shock, and most of its impact was dissipated a few months later. The Brazilian economy was only affected after the bankruptcy of Lehman Brother. This shock was huge enough and, thus, the economy reverted the previous boom trend – it grew 4.0% and 6.1% in 2006 and 2007, respectively – to a recession in 2009. We take advantage of this exogenous and wide economic shock on business cycles and evaluate the

effect on the credit market.

The immediate effect of the bankruptcy was a depreciation of the Real, a sharp drop in the stock market index (iBovespa), and an abrupt increase in the EMBI+. For example, on October 6, the stock market witnessed two circuit breaks[1] in a row totalizing 15% losses. Inevitably, the economic growth reverted its trend and the GDP fell 16% in the fourth quarter of 2008 compared with the previous one on an annual basis. The government reacted to the hostile environment by loosing both its fiscal and monetary policies and the economy presented a rapid recovery. Determining the exactly period is a challenge. Even though in the Brazilian case it had started right after the Lehman Brothers bankruptcy, it is not clear when it ended. To do so, we use two different measures of country risk and check out when both indicators were exactly at the same pre-crisis level. As measure of country risk, we used the stock market index and EMBI+[2]. As it is shown in Figure 1, both indexes increased a lot right after the beginning of the financial crisis. By May of 2009, both were back to the pre-crisis level. In addition in the second quarter of 2009, the economy was growing at a pace of 8% in annual basis. Thus, by that time, the economy had decoupled from the global financial crisis and was back to the growth path. Therefore, we define the crisis period beginning in October 2008 and ending in May 2009.

2.2.3.Auto Industry

Brazil has always played an important role in the automobile industry and it is currently the fifth manufacture worldwide. Nevertheless, the production only took off recently. For instance, the yearly production was approximately 1.2 million units in 1980 and 1.9 million in 2003. Moreover, the total yearly production had always been under 2.1 million. The yearly total production of 2010 - last year of our sample - was 3.6 million units and total sale was also 3.6 million, representing an huge consumer market. The population to total number of cars ratio was 8.4 in 2000 and decreased to 5.5 in 2010.

Another important feature of the process regards the relation between

credit market and pro- duction. Both were flat for decades before 2004 and then started to increase. Apart from the intrinsic question about the driving force and the causes beyond the movement (whether supply or demand), the most important fact is the straight of the relation. The vehicle credit market business increased in importance for the Banks. Therefore, shocks hitting the Bank's health end up affecting not only vehicle credit but also the automobile industry as a whole. Conversely, shocks hitting the economy have an impact in the Bank's health and, thus, in Bank's policies regarding car loan.

2.3.Data and Summary Statistics

Our proprietary data come from one of the three largest private banks in Brazil. [3] As of December 2010 the combined assets value of these banks – Bradesco, Itau´ Unibanco, and Santander – was R$1.7 trillion (US$1 trillion). According to the Central Bank, Bradesco, Itau´ Unibanco, and San- tander account for 43% of the Brazilian banking system, and their credit portfolio as of December 2010 was R$573 billion (US$345 billion).[4] The bank that provided us with the data plays a significant role in the car loan market, having a market share of more than 15% in 2004, the first year of our data.

We obtained a random yet balanced sample of about 83,000 loan contracts covering the period December 2004 to November 2010. The dataset includes micro-level detailed information for each loan contract on contract terms, borrower's characteristics, and the cars against which the loans were made. The loan contract terms include credit spread (defined as the difference between the monthly interest rate on the loan and federal rate fund), maturity (in months), down payment (payment the borrower made out of pocket when buying the car), and total financed (loan amount).[5]

The data also contain a rich set of borrower's characteristics, including consumer leverage, income, risk, gender, job, residence, and marital status. We also know whether the borrower has been a client of the bank in the past and whether the loan is guaranteed by a third party. Finally, the data

also include information on the underlying car against which the loan was given. In particular, we know the car model, year of manufacture, and whether a priority dealer made the sale. The Appendix provides detailed information on the definitions of the variables used here and their construction.

Our sample has some valuable characteristics. First, it encompasses a long period, allowing us to distinguish short-term fluctuation from long-term trends. Second, we access micro-level detailed information with contract terms as well as on personal and car characteristics. Third, the global financial crisis worked as an exogenous adverse liquidity shock for the financial system, providing us with an additional tool to analyze the cycles. All these features combined creates a unique and ideally opportunity to test the business cycle theory.

Table 1 displays descriptive statistics for the variables used in the analysis. As Panel A shows, the average spread is 0.88% per month with a wide dispersion, it ranges from a 5th percentile of 0.22% to a 95th percentile of 1.84%. Loan maturity is around four years (47.7), with the 5th percentile being 24.0 months and the 95th percentile 60.0 months. Down payments are sizable compared to car value. The average down payment is R$5,782, (US$2,834), while the amount financed average is R$14,188, (US$6,955). Default is a dummy equal to ne if the borrower has been late for over 90 days the loan, and zero otherwise. The average default is 0.09.

Before we continue, it might be helpful to take a quick glance at Figure 2, which exhibits monthly average of financial variables. Charter (a), for spread, presents a slightly downward trend, especially from 2007 on. Charters (b) and (d), for maturity and loan size, respectively, have an upward trend partially reflecting the improvement in the economic environment. In addition, apparently, the financial crisis worsened these contract terms, but they recovered a few months later. The down payment (charter c) has two distinct moments. The pre-crisis period is characterized by a cyclical movement without a clear trend. Right after the Lehman Brothers

bankruptcy, the average down payment increased a lot, probably reflecting a higher requirement by The Bank, in response to an increase in uncertainty. Then, the variable started to decline.

Panel B of Table 1 presents summary statistics of borrower's characteristics. The median borrower's monthly income is R$2,445 (US$1.199) with a standard deviation of 11,289. The Bank's clients represent 27% of the borrowers in the sample, and 11% of the contracts have a third-party guarantor. The Bank classifies borrowers into four categories, "high risk," "medium risk," "low risk," and "very low risk," where three quarters were considered "low" or "very low risk." More than two-thirds of the sample consist of males; 48% are single, and 36% are married. Homeowners represent 81% of the borrowers, and 15% of the borrowers live with their parents. Among the borrowers, 60% are employees of firms, compared to 15% classified as self-employed or entrepreneurs, and 12% identified as retired or as pensioners.

Panel C provides more information on the characteristics of the cars against which the loans are granted. There are two car characteristics. First, we define a dummy variable to indicate whether the car is new. Only 34% of the cars financed by The Bank are new. The average car age is 4.55 years, and it ranges from new (5th percentile) to 13 years old (95th percentile). Second, The Bank classifies car dealers into two categories: priority and not priority. A dealer is considered a priority dealer if a low proportion of borrowers buying a car through the dealer default. In the sample, 73% of the cars were purchased from priority dealers.

Finally, Panel D exemplifies the macro environment in Brazil during the period. The variable "GDP index" is calculated by the Brazilian Central Bank in order to track the economic activity in a monthly basis. [6] The"GDP index" works as proxy for realized GDP. In addition, the Central Bank always update "GDP index" series with data supplied by IBGE (Brazilian Institute of Geography and Statistics) with realized GDP series. [7] The "expected GDP index" is a variable based on the "GDP index" and on financial market

expectation as to future economic growth. The Central Bank reports a weekly survey among financial institutions about future economic conditions. Using the median survey for the economic growth in the current as well as following year, we construct an index for the "expected GDP index." Both variables have an upward trend with low standard deviation reflecting their similarities with GDP. The average of stock market index (from iBovespa) is 54,404, which is high, considering that, at the beginning of the sample, the index was about 25,000. The CDB preset is a proxy for the fund cost for the Banks[8] and its daily average is 0.05% (about 13% yearly). Even though it is a high number, it is in line with the average fed fund rate of 1.00% per month (about 12% yearly). Finally, inflation rate was 4.92% and ranged from 3.02% to 7.27%.

2.4.Empyrical Analysis

In this section, we test empirically how the business cycle ends up affecting a battery of loan terms, borrower's characteristics, and borrower's performance. We started by analyzing the relation between the cycles and contract terms for the whole period. Next, we have a glance at the crisis period. Then, we investigate how the business cycle affects the pool of borrowers. Finally, we test the impact of the cycles on the borrower's delinquency rate.

2.4.1.Business Cycle and Contract Terms

We study the effect of economic environment on spread, maturity (in months), down payment and loan size by estimating the following equation:

$$\text{loan characteristics}_{i,t} = \alpha + \beta_1 \times \text{econ activity}_{i,t} + T_{i,t}\lambda + b_i\psi + c_{i,t}\theta + m_{i,t}\xi + e_{i,t}\gamma + \varepsilon_{i,t} \quad (1)$$

Where T is a vector of contract terms that includes spread, maturity, and down payment; b is a vector of borrower's characteristics that includes income, risk, gender, a dummy equal to one if the borrower has a guarantor, type of job, type of

residence, marital status, and whether the borrower is a bank client; c is a vector of car characteristics and includes a dummy variable equal to one if the car is new, a dummy indicating whether the borrower took the loan from a priority dealership, and the year in which the car was made; m is a vector of car model fixed-effects as well as car model fixed-effect interacting with year fixed-effect; and e is a vector of macro controls that includes the federal fund rate, inflation and state fixed-effect.

The coefficient of interest is β_1, which measures the effect of business cycles on contract characteristics. As proxy for economic activity, we used GDP, expected GDP, stock market index, and CDB preset. At first, we use each indicator separately and, in the last column, we put all together.

Table 2 reports the results from estimating the effect of the economic activity on spread. In the first column, we begin using GDP. Controlling for contract, borrower, and car characteristics as well as macro variables, we find a negative relation between GDP and spreads. An increase in 10% in the GDP is associated with a spread 22 points lower per month. During an economic boom, the credit market experienced lower spreads. On the other hand, during a recession, spreads are higher. Results are very similar for expected GDP, but the coefficient is higher. Thus, when The Bank expects better economic conditions, spreads are lower.

Next, we investigate the effect of stock market index on spread. This variable might reflect economic conditions – current and future. If the outlook for the economy is good, instead of bad, public companies might expect higher profits and the stock market index is higher. In column three, we have the results. Even thought the coefficient is significant and has the expect sign, the effect is very small. A possible explanation is the fact that Brazilian stock market is quite exposed to commodities companies – for instance, Petrobras and Vale. The market value of these companies is highly influenced by CRB (commodities price index), which in turn is affected by the external sector. On the other hand, car loans are affected by the domestic market and internal conditions. This might be a possible

explanation for why the correlation by stock market index and spread is weak.

The last economic indicator is CDB preset, which is a proxy for banks fund cost. The significant and positive relation means that a higher cost is associated with higher spread. One possible interpretation is the following. CDB preset is also a proxy for the opportunity cost of money. Thus, to compensate the effects of a higher CDB preset – which means higher opportunity cost of money – The Bank incrases its margin (spread).

Finally, we put all independent variables in the same regression. Thus, in terms of equation 1, econ activity$_{i,t}$ turns to be a vector containing GDP, expected GDP, stock market index, and CDB preset. The idea is to test the effect of an economic indicator conditional on the others. Indeed, all variables still affect the spread in the same direction as previously. All coefficients decreased in magnitude, but remained significant. Thus, in the case of spreads, all variables have a direct effect on spreads. This result is in line with Kwark (2002), who relates spread with economic conditions.

Table 3 shows results for maturity. The first column shows that higher GDP is associated with longer maturity. In addition, expected higher GDP has an even stronger effect over maturity. An expected 1% higher GDP is associated with a loan one month longer on average. Stock market index is also positively correlated with maturity, but then again the effect is not sizable. Finally, the coefficient associated with CDB preset is negatively indicating that higher fund cost decreases the average maturity.

The last column, when we add all economic indicators at the same time, presets change in an unpredictable way. The GDP is no longer significant. On the other hand, expected GDP is positive and significant at 1 %. Moreover, stock market index remains significant, but the point of estimation is even lower. CDB preset is no longer significant.

Apparently, all economic variables affect maturity and have the expected sign. Nevertheless, when we take into account all variables at the same time, only expected GDP and stock market index remain significant,

only the former has an economic sizable effect. keeping constant expected GDP, current GDP no longer affects loan maturity. We interpret that current GDP has no direct effect on maturity, it has an indirect effect through expected GDP. The same goes for CDB preset.

Moreover, the maturity of a loan determines how long a bank would be exposed to a specific borrower. If the financial system expects a high economic performance –everything else constant– the probability that a borrower suffer a negative (liquidity) shock is lower. Thus, higher expected GDP is associated with longer maturity because banks seem more comfortable in grating longer loans.

Results for down payment are shown in Table 4. The only economic indicator that is significant is the current GDP. The effect is negative and significant, indicating that an economic growth is associated with lower down payment. Expected GDP, stock market index, and CDB preset are not significant. The last column, which has all economic indicators as regressors, confirms these results. Down payment is a barrier to entry in the credit market. Higher down payment means higher barrier to entry. One interpretation is that, during an economic boom, The Bank is usually more aggressive. In order to attract more borrowers, The Bank diminishes the minimum down payment required. This explains the negative relation between GDP and down payment.

As for loan size, we have mixed results in Table 5. On the one hand, there is a positive relation between GDP and loan size. This is an evidence that richer borrowers took smaller loans. They might prefer to buy a car without financing. On the other hand, there is a negative correlation between the stock market index and loan size. Better economic perspective is associated with anticipation of future consumption trough credit market. Both results are stressed in the last column, when we put all together.

The results in this section are related with previous literature. For example, the fact that credit market amplifies an economic shock was shown

by Bernanke and Gertler (1989) Bernanke, Gertler and Gilchrist (1999), Iacoviello (2005) and Kyotaki and Moore (1997). In addition, table 2, 3, 4 and 5, showing the relation between economic environment and credit market are consistent with Arellano (2008), Gertler and Kiyotaki (2010), Kwark (2002), and Stiglitz (1988).

2.4.2.Crisis Period

As we mention before, the fact that the sample period encompasses the financial crisis of 2008 creates an opportunity. The economy suffered a negative liquidity financial shock right after the Lehman Brothers bankruptcy. In Section III, we documented that the crisis had affected the credit market. In particular, the crisis worsened contracts terms.

A natural difficulty in order to evaluate the impact of the crisis is how to determine the crisis period. We define the time frame in two different ways. First, as we mention in Section II, by May 2009, the economy was growing 8% in annual terms and most of financial indicators were back to previous crisis level. Thus, we define the crisis period starting in October 2008 (when Lehman Brothers went bankrupt) and ending in May 2009. In addition, we add to the sample period one year before the crisis started and one year after the crisis ended. We then call pre-crisis and post- crisis period, respectively. Proceeding in this way, we restrict our sample to October 2007 to May 2010.

Alternatively, we define a more mechanic time frame. The whole period encompasses one year before and one year after the bankruptcy of Lehman Brothers. The first half is the pre-crisis period and the second is the crisis period9.Now, we restrict our attention on the period ranging October 2007 to September 2009. It is a robustness check in order to avoid criticism about the endogenity of our previous time frame.

We analyze empirically the effect of the 2008 financial crisis by estimating the following equation:

$$\text{loan characteristics}_{i,t} = \alpha + \beta_1 \times \text{crisis}_{i,t} + \beta_2 \times \text{post crisis}_{i,t} + T_{i,t}\lambda + b_i\psi +$$

$c_{i,t}\theta + m_{i,t}\xi + e_{i,t}\gamma + \ _{i,t}$ (2)

Where $crisis_{i,t}$ is a dummy indicating that the loan was initiates after the beginning of the financial crisis and post-$crisis_{i,t}$ indicating that the loan was initiated after May of 2009. The vectors T, b, c, m, and e are defined as before. The coefficient β_1 captures the effect of the financial crisis on terms and the sum $\beta_1 + \beta_2$ captures the effect after the crisis period (crisis + post crisis).

Panel A of Table 6 reports results from our preferable time frame. As we can see, spread, maturity, and loan size worsened during the financial crisis. We find that loan spreads on car loans increased by 23 basis points per month after the crisis, representing an increase of 32% compared to the unconditional mean spread. Moreover, as the second column shows, the crisis shortened the maturity by 2.7 months, representing a declining of 6% to the unconditional average maturity before the crisis. Column 4 shows that average loan size declined by about 6%.

Finally, for down payment, we have mixed results. On the one hand, the coefficient β_1 is negative, indicating that the required down payment decreased. On the other hand, Figure x shows that the unconditional mean of down payment increased after the bankruptcy of Lehman Brothers. This is evidence that down payment increased possibly reflecting others changes in Banks policy. The Bank could have privileged to finance similar cars, but with higher spreads and shortened maturity. When we take into account contract terms, the average down payment decreased. Thus, in the aftermath of the crisis, The Bank tightened the credit policy. It did so through a higher spread, shorter maturity, and lower loan size. These results are consistent with previous literature about financial crisis (Brunnermeier (2009), Ivashina and Scharfstein (2010), and Santos (2010)).

In the second line, we have the post-crisis dummy. The coefficient β_2, associated with spread, is negative and significant, indicating that almost all effect of the crisis was reverted ($\beta_1 + \beta_2$ is statistically equal to zero in

a t-test). In addition, the maturity remained constant at the crisis level thus shorter than the pre-crisis level. Finally, for both - down payment and size loan - the coefficient is negative and significant reinforcing the previous movement.

Table 6 combined with Figure 2 show a pattern for the bank system during the crisis. Right after the bankruptcy of Lehman Brothers, The Bank became more rigorous in granting credit. In particular, the spread increased, and maturity and loan size decreased. In a post-crisis period, The Bank slowly came back to the previous pattern, starting by spread. By the end of our sample period, Figure 2 shows that the unconditional means of our contract terms were equal or better than those in the pre-crisis period.

In our alternative specification, we have a more mechanic time frame for the crisis period. In terms of Equation 6, we dropped the variable post-crisis and defined the dummy "crisis" in accordance with the mechanic time frame. Panel B presents results, which are very similar to those of Panel A. The financial crisis affected the bank system in such a way that some terms worsened. For instance, spread, maturity, and loan size. In addition, again in line with Panel A, the down payment also declined. Thus, we have a confirmation of our previous estimation.

2.4.3.The Effect of Business Cycles on the Borrower's Characteristics

We next examine the effect of business cycles on the borrower's characteristics. We hypothesize that business cycles affect not only financial contracts but also the population of borrowers. Specifically, we test the effect of business cycles on the following characteristics: (i) income, (ii) whether the borrower is self-employed or an entrepreneur and hence may lack a stable income, and (iii) whether the car against which he did the loan is new. We estimate the following regression:

$$\text{borrower characteristic}_{i,t} = \alpha + \beta_1 \times \log(\text{GDP})_t + T_{i,t}\lambda + b_i\psi + c_{i,t}\theta + m_{i,t}\xi + e_{i,t}\gamma + \varepsilon_{i,t} \quad (3)$$

Where the vectors T, b, c, m, and e are defined as before and the coefficient β_1 captures the effect of business cycles on the borrower's characteristics.

The first column of Table 7 reports the effect of the GDP on the borrower's income. We define the dependent variable as the natural log of monthly income. Given that in Column 1 we estimate a log-log specification, the coefficient β_1 suggest that the monthly income of an average borrower is about 8% lower if the GDP is 10% higher – an effect that is robust to the inclusion of controls that pertain to contract terms as well as car and other personal characteristics, car model fixed- effect, interaction of car model and year fixed-effect, and time-series-based macro controls. That is – consistent with our conjecture – during an economic boom The Bank extends car loans to lower-income borrowers who were otherwise constrained in their ability to borrow.

Next, we test whether business cycles have an effect on the likelihood that a borrower is self-employed or an entrepreneur. We hypothesize that, given a good economic outlook, The Bank will have less need to rely on a stable source of income that is more typical for those employed by firms than for the self-employed. As Table 7 shows, we find that business cycles have a significant effect on the likelihood that someone who is self-employed or an entrepreneur will be able to obtain a car loan from The Bank. The coefficient of GDP β_1=0.243 (significant at the 1% level) means that, during an economic growth period, the proportion of self-employed or entrepreneur increased in the sample.

Finally, we study the effect of business cycles on the car used as a collateral for the loan. We regress a dummy equal to one if the car is new on the GDP and the battery of control variables used before: contract terms, personal characteristics, macro controls and car model fixed-effect alone and interacting with year fixed-effect. As the third column of Table 7 shows, β_1=-0.759, indicating a decrease in the proportion of new cars among the population of cars during an economic boom. The economic magnitude of

this effect is sizable, an increase of 10% of GDP is associate with an increase of more than 8% in the proportion of used car in the total sample. This result is similar to the previous one. As a used car (ceteris paribus) is cheaper than buying a new version of the same car, this result indicates that, during an economic boom, The Bank extends credit to borrowers who are willing to buy a less expansive car. These borrowers are, likely and on average, less rich.

Taken together, our results suggest that, during an economic boom, The Bank expands financial services to lower-income borrowers. Moreover, The Bank was more likely to extend credit to self- employed borrowers. Also, The Bank is more willing to accept a less valuable collateral. Our findings point to the importance of economic cycles in the credit market. At least in one dimension, this paper is in line with Assunçao, Benmelech and Silva (2012), who point out that the economic conditions impact the pool of borrowers. Thus, an economic boom leads to a "democratization of credit." Lower income is granted a loan from The Bank. In addition, The Bank expands credit to self-employed or entrepreneur borrowers and is more willing to accept a less valuable collateral. The evidence shows that an economic boom leads to better and broader access to finance.

2.4.4.The Effect of the Business Cycles Interacting with Borrower's Characteristics on Spread

We have already documented that contract terms fluctuate with business cycles. Moreover, the pool of borrowers is also affected by cycles. As we saw in the previous sections, during a recession, not only spread and down payment increase and maturity shortens, but the average income of borrowers, the proportion of self-employed and entrepreneur and the proportion of new cars decrease. We next study the differential effect of business cycles on credit spreads conditional on borrower's characteristics.

We hypothesize that business cycle's have a different effect on different types of borrowers. All borrowers suffer from economic cycles. Nevertheless, we conjecture that the size of the effect of the business cycle is different for

different types of consumers. For instance, if a borrower is hit by a negative shock, it increases the probability of a default. A low-income borrower is more sensitive to the effects of a negative shock. Thus, for a low-income borrower, the probability of default varies more in accordance with economic cycle than a high-income borrower. Anticipating this scenario, The Bank charges spreads accordingly. Therefore, the impact of the business cycle on spread for a low-income borrower is higher than for a high income borrower.

We are going to test if the amplitude of the "spread cycle" is the same for different categories of borrowers. Given the availability of the data we focus on (i) borrowers' income; (ii) whether the borrower is self-employed or entrepreneur and (iii) borrowers who bought new cars. We estimate the following regression:

$$\text{loan characteristics}_{i,t} = \alpha + \beta_1 \times \text{econ activity}_{i,t} + \beta_2 \times \text{characteristic}_i + \beta_{12} \times \text{characteristic}_i \times \text{econ activity} + T_{i,t}\lambda + b_i\psi + c_{i,t}\theta + m_{i,t}\xi + e_{i,t}\gamma + \varepsilon_{i,t} \quad (4)$$

Where the vectors T, b, c, m, and e are defined as before. The coefficients β_1 captures the effect of business cycles on spreads, and β_2 captures the effect on borrowers' characteristics. We are interested in β_{12}, which captures how the business cycles affect different borrowers in a different way. The joint effect of $\beta_1 + \beta_{12}$ measures the total effect of business cycles on spreads. Table 8 presents the results.

The coefficient of β_1 is always negative and significant at 1% level, confirming our previous results that business cycles affect the spread. Furthermore, as the first column shows, β_2 is negative. We interpret this result in a standard way, richer borrowers, who offer less risk, are eligible to receive lower spreads. The most interestingly result comes from β_{12}, which is positive and significant at 1 1% level. As β_{12} has the opposite sign of β_1, the "total effect" of business cycles on spreads is lower for high-income borrowers. Though they experiment a business cycle ($\beta_1 + \beta_{12}$ is negative and significant), the amplitude of the cycle is lower vis-à-vis a low-

income borrower. Thus, as richer borrowers are abler to handle a negative liquidity shock coming from economic conditions, the effect of the business cycles for this category is less severe.

We also find that the self-employed and entrepreneur experimented a business cycle with higher amplitude. As this category usually has a more volatile income, this result was expected. The next column repeats the analysis using as a car characteristic a dummy variable that takes the value of one if the car against which the loan is drawn is new, and zero, otherwise. The coefficient β_2 implies that a new car is associated with a lower spread, reflecting the fact that new cars make better collateral. Column 3 also shows that the effect of business cycles is less severe for a better collateral, β_{12} =-2.138 (significant at the 1% level). Moreover, if buying a new car is correlated with income, this result is in line with column one.

The result contained in Table 8 is consistent with our hypothesis that the amplitude of the effect of business cycles varies in accordance with the borrower's characteristics. One concern when granting credit regards the borrower's performance. Borrowers for whom the capacity to honor their payment is more susceptible to economic conditions suffer more from business cycles.

2.4.5.The Effect of the Business Cycle on Delinquency and Default

The critical link between business cycles and the credit conditions is through delinquency rate.10

As demonstrated in Tables 2, 3, 4, and 5, contract terms vary according to economic conditions. If banks expect an economic boom, the probability of a default for the same borrower is lower and, consequently, this loan is less risky. Anticipating this scenario, banks charge better contract terms. Does a better economic environment lead to better borrower's performance?

We estimate the following equation using a linear probability model:

$$default_{i,t} = \alpha + \beta_1 \times growth_{i,t} + T_{i,t}\lambda + b_i\psi + c_{i,t}\theta + m_{i,t}\xi + e_{i,t}\gamma + \varepsilon_{i,t} \quad (5)$$

where default is a dummy variable equal to one if the borrower was late for more than 90 days on at least one monthly installment. Growth is a variable equal to the realized economic growth during the loan period in an annual basis. For instance, if the loan maturity is 48 months, starting in May 2004, growth is the economic growth between Jun 2004 and May 2008. Vectors T, b, c, m, and e are defined as before, and the coefficient β_1 captures the effect of the business cycles on borrowers' performance. As sample period, we used December 2003 through December 2005. Some contracts signed after January of 2006 might not have ended and, thus, we do not have complete information about borrower performance. That is why we dropped all observations after that date. Results are presented in Table 9.

The first column of the table reports the results from a linear probability regression in which the dependent variable is a default. We find that after controlling for contract terms, personal and car characteristics, macro controls, car model, and car model interacting with year fixed-effect, the likelihood of a late default is lower during an economic boom. An economic growth 10% higher is associated with a probability of default 9% lower.

The effect of the business cycles might not be uniform. At the beginning of the loan, the debt to equity ratio is higher than at the end. Moreover, at the very beginning it is also possible that this ratio is higher than one – indicating that the borrower is under water. We hypothesize that, in this situation, borrowers are more vulnerable to an economic shock. Especially if he is under water. For instance, if he losses his job, he would not be able to honor more 20 installments. On the other hand, at the end of the loan, economic conditions might not have an impact on borrower's performance. In the same situation, if few installments are missing, and the borrower loses his job, he can sell his car, pay the debt, and have some money left. Doing so, he avoids the repossession of his car and, thus, does not incur in the dead-weight losses involving this operation.

In order to test the previous hypothesis, we split the default variable into two. A dummy equal to one if the borrower defaults in the first half of the loan

and zero, otherwise. The other variable is a dummy equal to one if the borrower defaults in the second half of the loan and zero, otherwise. Columns 2 and 3 present the results for both variables respectively. As we can see, business cycles affect borrower's performance only in the first half of the loan. The coefficient associated with growth is negative, and significant when the dependent variable is default in the first half and insignificant for default in the second half. This set of results confirms our previous hypothesis.

To alleviate concerns about a potential endogeneity in determining the first half of the loan, we conduct a similar exercise, but using a different threshold for the default variable. We use default in the first two years of the loan, and default in the rest of the loan. We drop all loans with a maturity equal to or shorter than 24 months. Columns 4 and 5 show the results. Again we see that the channel through which economic conditions affect the borrower's performance is at the beginning of the loan.

Taken together, the results in Table 9 demonstrate that economic cycles affect borrower per- formance. Furthermore, this effect is stronger in the first half of the loan. We argue that, at the beginning of the loan, the debt to equity ratio is high and sometimes the borrower is under water. In this situation, he is more vulnerable to an economic negative shock. At the end of the loan, economic conditions do not affect the borrower's probability of default. At that moment, it is usually possible for the borrower to sell the car, pay his debt, and even have some money left, thus avoiding incurrence in the dead-weight loss involving the auction of the car by The Bank.

2.5.Conclusion

We empirically investigate the relation between business cycles and the credit market. Using micro- data from a large Brazilian bank in the period ranging from 2003 to 2010, we describe how economic performance affects the credit market. During an economic high-growth period, the delinquency rate decreases reducing risk. Anticipating this environment, banks adjust their credit-granting policy.

Consistent with the above prediction, we show that GDP, expected GDP, stock market index, and CDB preset correlate with spread in the expected sign. Furthermore, only expected GDP affects maturity. During

an economic boom, The Bank requires a lower down payment. For loan size, we have mixed results. Even though this variable is positively associated with GDP, it is negatively associated with the stock market index. Moreover, economic boom enables low-income borrower to obtain loans and purchase a new car. Finally, economic cycles also affect borrower's performance. Higher economic growth decreases the probability that a borrower defaults. In sum, this article points out the importance of the economic environment in determining the behavior of the credit market.

2.6.Variable description and construction

For reference, the following is a list of the variables used, their sources, and a brief description of how each is constructed.

1. Spread : The difference between the monthly interest rate paid by the borrower and the federal fund rate (in percentage points).

2. Maturity : Loan maturity (in months).

3. Down payment : The amount paid by the buyer that was not financed (in R$).

4. Loan size : The total amount financed by The Bank (in R$).

5. Income : The borrower's (estimated) monthly income calculated by The Bank (in R$).

6. Client dummy : A dummy variable that takes the value of one if the borrower is a client of The Bank, and zero otherwise.

7. High risk dummy : A dummy variable that takes the value of one if the borrower is classified as a high risk, and zero otherwise.

8. Guarantor dummy : A dummy variable that takes the value of one if the loan has a guarantor, and zero otherwise.

9. Gender dummy : A dummy variable that takes the value of one if the borrower is a male, and zero otherwise.

10. Type of job : A five-category variable: employee, retired/pensioner, self-employed, entrepreneur, and other.

11. Type of residence : A four-category variable: homeowner, lives with parents, renter, and other.

12. Marital status : A five-category variable: single, married, divorced, widower, and other.

13. New car : A dummy variable that takes the value of one if the car is new, and zero otherwise.

14. Car value : Car value (in R$).

15. Model : Car model.

16. Car age : The difference (in years) between the date that the loan was signed and the date that the car was manufactured.

17. Dealer priority dummy : A dummy variable that takes the value of one if the consumer bought the car from a priority dealer, and zero otherwise.

18. Federal fund rate : The federal fund interest rate.

19. Inflation : The inflation rate over the last 12 months.

20. GDP growth : Quarterly GDP growth.

21. Default : A dummy variable that takes the value of one if the borrower was at least 90 days late, and zero otherwise. (This the criteria used by the Central bank).

Table 10

Table 1:
Summary Statistics

This table provides descriptive statistics for the variables used in the empirical analysis.

Panel A: Contract characteristics

	Mean	5th Percentile	Median	95th Percentile	Standard Deviation
Spread	0.88	0.22	0.78	1.84	0.52
Maturity	47.7	24.0	48.0	60.0	14.1
Down payment	5,782	0,0	3,951	17,282	5,786
Total financed (R$)	14,188	4,341	12,997	27,317	7,753
Car value (R$)	19,971	8,207	19,004	35,752	8,999
Consumer leverage	28.5	10.0	26.0	53.0	19.4
Default	0.09	0.0	0.0	1.0	0.28

Panel B: Borrower characteristics

	Mean	5th Percentile	Median	95th Percentile	Standard Deviation
Income (R$)	2,445	882	1,784	5,672	11,289
Client of the bank	0.27	0.0	0.0	1.0	0.45
Guarantor	0.11	0.0	0.0	1.0	0.31
High risk	0.03	0.0	0.0	0.0	0.17
Medium risk	0.20	0.0	0.0	1.0	0.40
Low risk	0.41	0.0	0.0	1.0	0.48
Very low risk	0.36	0.0	0.0	1.0	0.48
Male	0.64	0.0	1.0	1.0	0.48
Single	0.48	0.0	0.0	1.0	0.50
Married	0.36	0.0	0.0	1.0	0.48
Homeowner	0.81	0.0	1.0	1.0	0.39
Lives with parents	0.15	0.0	0.0	1.0	0.36
Employee	0.60	0.0	1.0	1.0	0.49
Retired/pensioner	0.10	0.0	0.0	1.0	0.30
Self-	0.28	0.0	0.0	1.0	0.45

Panel C: Car characteristics

	Mean	5th Percentile	Median	95th Percentile	Standard Deviation
New	0.34	0.0		1.0	0.47
Age	4.60	0.0		13.0	4.60
Dealer priority	0.73	0.0	1.0	1.0	0.44

Table 1 - cont'd
Summary Statistics

Panel D: Economic Environment

	Mean	5th Percentile	Median	95th Percentile	Standard Deviation
GDP (index)	124.2	110.3	124.8	137.2	8.30
Expected GDP (index)	134.2	117.9	134.2	154.1	10.8
Stock market index	51,547	25,948	54,404	71,136	14,305
CDB preset (daily)	0.05%	0.03%	0.04%	0.07%	0.01%
Federal fund rate (monthly)	1.00%	0.70%	0.95%	1.50%	0.23%
Inflation rate (12 months)	4.92%	3.02%	4.61%	7.27%	1.20%

Table 11

Table 2:
Real Business Cycles and Spreads

This table reports results from regressing spread on economic activity variables. We use four measures of economic activity: GDP, expected GDP, log(stock market) and CDB preset. All regressions include an intercept. The regressions control for contract terms (spread, maturity, and down payment), borrower characteristics (income, borrower type of risk, gender, presence of a guarantor, type of job, type of residence, marital status, and whether the borrower is a client of The Bank), car characteristics (a dummy for new car, car age, and dealer priority), macro variables (inflation and federal fund rate), car model fixed-effects alone and interacting with year fixed-effect, and state fixed-effects. Standard errors are calculated by clustering at both the state and month levels. Variables definitions are provided in the Appendix. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable=	Spread	spread	spread	spread	spread
log(GDP)	-2.2384***				-1.736***
	(0.188)				(0.220)
Expected log(GDP)		-3.383***			-1.102**
		(0.415)			(0.517)
log(stock market index)			-0.298***		-0.114**
			(0.035)		(0.044)
CDB preset				5.517***	3.448***
				(0.791)	(0.837)
Contract terms	Yes	Yes	Yes	Yes	Yes
Personal characteristics	Yes	Yes	Yes	Yes	Yes
Car characteristics	Yes	Yes	Yes	Yes	Yes
Car model fixed-effects	Yes	Yes	Yes	Yes	Yes
Car model fe *year fe	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes
State fixed-effects	Yes	Yes	Yes	Yes	Yes
Observations	83,761	83,761	83,761	83,761	83,761
Adjusted R^2	0.599	0.598	0.598	0.596	0.600

Table 12

Table 3:

Real Business Cycles and Maturity

This table reports results from regressing maturity on economic activity variables. We use four measures of economic activity: GDP, expected GDP, log(stock market) and CDB preset. All regressions include an intercept. The regressions control for contract terms (spread, maturity, and down payment), borrower characteristics (income, borrower type of risk, gender, presence of a guarantor, type of job, type of residence, marital status, and whether the borrower is a client of The Bank), car characteristics (a dummy for new car, car age, and dealer priority), macro variables (inflation and federal fund rate), car model fixed-effects alone and interacting with year fixed-effect, and state fixed-effects. Standard errors are calculated by clustering at both the state and month levels. Variables definitions are provided in the Appendix. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable=	Maturity	maturity	maturity	maturity	maturity
log(GDP)	26.57***				7.379
	(5.135)				(6.268)
Expected log(GDP)		88.63***			55.07***
		(9.255)			(8.468)
log(stock market index)			5.500***		3.821***
			(0.531)		(0.600)
CDB preset				-62.64***	-26.43
				(17.90)	(16.90)
Contract terms	Yes	Yes	Yes	Yes	Yes
Personal characteristics	Yes	Yes	Yes	Yes	Yes
Car characteristics	Yes	Yes	Yes	Yes	Yes
Car model fixed-effects	Yes	Yes	Yes	Yes	Yes
Car model fe *year fe	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes
State fixed-effects	Yes	Yes	Yes	Yes	Yes
Observations	83,761	83,761	83,761	83,761	83,761
Adjusted R^2	0.410	0.411	0.411	0.410	0.412

Table 13

Table 4:

Real Business Cycles and Down Payment

This table reports results from regressing down payment on economic activity variables. We use four measures of economic activity: GDP, expected GDP, log(stock market) and CDB preset. All regressions include an intercept. The regressions control for contract terms (spread, maturity, and down payment), borrower characteristics (income, borrower type of risk, gender, presence of a guarantor, type of job, type of residence, marital status, and whether the borrower is a client of The Bank), car characteristics (a dummy for new car, car age, and dealer priority), macro variables (inflation and federal fund rate), car model fixed-effects alone and interacting with year fixed-effect, and state fixed-effects. Standard errors are calculated by clustering at both the state and month levels. Variables definitions are provided in the Appendix. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable=	log(down payment)	log(down payment)	log(down payment)	log(down payment)	log(down payment)
log(GDP)	-0.515***				-0.286*
	(0.196)				(0.280)
Expected log(GDP)		-0.555			0.058
		(0.378)			(0.459)
log(stock market index)			-0.043		-0.005
			(0.032)		(0.043)
CDB preset				0.990	0.674
				(0.972)	(0.913)
Contract terms	Yes	Yes	Yes	Yes	Yes
Personal characteristics	Yes	Yes	Yes	Yes	Yes
Car characteristics	Yes	Yes	Yes	Yes	Yes
Car model fixed-effects	Yes	Yes	Yes	Yes	Yes
Car model fe *year fe	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes
State fixed-effects	Yes	Yes	Yes	Yes	Yes
Observations	83,761	83,761	83,761	83,761	83,761
Adjusted R^2	0.420	0.420	0.420	0.420	0.420

Table 14

Table 5:

Real Business Cycles and Loan Size

This table reports results from regressing loan size on economic activity variables. We use four measures of economic activity: GDP, expected GDP, log(stock market) and CDB preset. All regressions include an intercept. The regressions control for contract terms (spread, maturity, and down payment), borrower characteristics (income, borrower type of risk, gender, presence of a guarantor, type of job, type of residence, marital status, and whether the borrower is a client of The Bank), car characteristics (a dummy for new car, car age, and dealer priority), macro variables (inflation and federal fund rate), car model fixed-effects alone and interacting with year fixed-effect, and state fixed-effects. Standard errors are calculated by clustering at both the state and month levels. Variables definitions are provided in the Appendix. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable=	log(loan size)	log(loan size)	log(loan size)	log(loan size)	log(loan size)
log(GDP)	-0.304***				-0.597***
	(0.310)				(0.179)
Expected log(GDP)		-0.066			-0.177
		(0.320)			(0.160)
log(stock market index)			0.051***		0.099***
			(0.011)		(0.020)
CDB preset				0.033	0.232
				(0.324)	(0.336)
Contract terms	Yes	Yes	Yes	Yes	Yes
Personal characteristics	Yes	Yes	Yes	Yes	Yes
Car characteristics	Yes	Yes	Yes	Yes	Yes
Car model fixed-effects	Yes	Yes	Yes	Yes	Yes
Car model fe *year fe	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes
State fixed-effects	Yes	Yes	Yes	Yes	Yes
Observations	83,761	83,761	83,761	83,761	83,761
Adjusted R^2	0.798	0.798	0.798	0.798	0.799

Table 15

Table 6:

Real Business Cycles and Contract Terms - Crisis Period

This table reports results from regressing loan characteristics on economic activity variables. We use four measures of loan characteristics: spread, maturity, down payment and loansize. We use four measures of economic activity: GDP, expected GDP, log(stock market) and CDB preset. We restrict ou attention to crisis period. All regressions include an intercept. The regressions control for contract terms (spread, maturity, and down payment), borrower characteristics (income, borrower type of risk, gender, presence of a guarantor, type of job, type of residence, marital status, and whether the borrower is a client of The Bank), car characteristics (a dummy for new car, car age, and dealer priority), macro variables (inflation and federal fund rate), car model fixed-effects alone and interacting with year fixed-effect, and state fixed-effects. Standard errors are calculated by clustering at both the state and month levels. Variables definitions are provided in the Appendix.***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Crisis and After Crisis Period (October 2007 - May 2010)

Dependent Variable=	spread	maturity	log(down payment)	log(loan size)
Crisis	0.225***	-2.736***	-0.024*	-0.056***
	(0.010)	(0.480)	(0.013)	(0.005)
After crisis	-0.185***	-0.517	-0.072***	-0.066***
	(0.008)	(0.389)	(0.012)	(0.007)
Contract terms	Yes	Yes	Yes	Yes
Personal characteristics	Yes	Yes	Yes	Yes
Car characteristics	Yes	Yes	Yes	Yes
Car model fixed-effects	Yes	Yes	Yes	Yes
Car model fe *year fe	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes
State fixed-effects	Yes	Yes	Yes	Yes
Observations	26,934	26,934	26,934	26,934
Adjusted R^2	0.547	0.390	0.458	0.786

Panel B: Crisis Period (October 2007 - September 2009)

Dependent Variable=	spread	maturity	log(down payment)	log(loan size)
Crisis	0.166***	-2.764***	-0.041***	-0.077***
	(0.011)	(0.368)	(0.013)	(0.003)
Contract terms	Yes	Yes	Yes	Yes
Personal characteristics	Yes	Yes	Yes	Yes
Car characteristics	Yes	Yes	Yes	Yes
Car model fixed-effects	Yes	Yes	Yes	Yes
Car model fe *year fe	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes
State fixed-effects	Yes	Yes	Yes	Yes
Observations	26,934	26,934	26,934	26,934
Adjusted R^2	0.553	0.391	0.786	0.458

Table 16

Table 7:

The Effect of Business Cycles on Borrower Characteristics

This table reports results from regressing borrower characteristics on GDP. We use three borrower characteristics as dependent variables: income, borrower risk, and whether the borrower is self- employed/entrepreneur. All regressions include an intercept. The regressions control for contract terms (spread, maturity, and down payment), borrower characteristics (income, borrower type of risk, gender, presence of a guarantor, type of job, type of residence, marital status, and whether the borrower is a client of The Bank), car characteristics (a dummy for new car, car age, and dealer priority), macro variables (inflation and federal fund rate), car model fixed-effects alone and interacting with year fixed effect, and state fixed-effects. Standard errors are calculated by clustering at both the state and month levels. Variables definitions are provided in the Appendix. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable=	log(income)	self-employed entrepreneur	new
log(GDP)	-0.784**	0.243***	-0.759***
	(0.103)	(0.110)	(0.104)
Contract terms	Yes	Yes	Yes
Personal	Yes	Yes	Yes
Car characteristics	Yes	Yes	Yes
Car model fixed-	Yes	Yes	Yes
Car model fe *year	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes
State fixed-effects	Yes	Yes	Yes
Observations	83,761	83,761	83,761
Adjusted R^2	0.404	0.078	0.572

Table 17

Table 8:
The Effect of the Business Cycles and Borrower Characteristics on Spreads

This table reports results from regressing spread on GDP, borrower characteristics and the inter- action of both. We use three borrower characteristics : income, whether the borrower is self- employed/entrepreneur, and whether the car is new. All regressions include an intercept. The re- gressions control for contract terms (spread, maturity, and down payment), borrower characteristics (income, borrower type of risk, gender, presence of a guarantor, type of job, type of residence, marital status, and whether the borrower is a client of The Bank), car characteristics (a dummy for new car, car age, and dealer priority), macro variables (inflation and federal fund rate), car model fixed-effects alone and interacting with year fixed effect, and state fixed-effects. Standard errors are calculated by clustering at both the state and month levels. Variables definitions are provided in the Appendix.

***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable=	spread	spread	Spread
log(GDP)	-4.622***	-1.700***	-2.138***
	(0.373)	(0.222)	(0.278)
log(income)×log(GDP)	0.383***		
	(0.045)		
log(income)	-1.822***		
	(0.218)		
Se/En×log(GDP)		-0.166***	
		(0.062)	
Self-employed/		0.827***	
Entrepreneur		(0.297)	
New×log(GDP)			1.557***
			(0.070)
New			-7.537***
			(0.337)
Contract terms	Yes	Yes	Yes
Personal characteristics	Yes	Yes	Yes
Car characteristics	Yes	Yes	Yes
Car model fixed-effects	Yes	Yes	Yes
Car model fe *year fe	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes
State fixed-effects	Yes	Yes	Yes
Observations	83,761	83,761	83,761
Adjusted R^2	0.601	0.600	0.606

Table 18

Table 9:

Real Business Cycles and Borrower Performance

This table reports results from regressing borrower's performance on realized growth during the loan period. We use one measures of borrower's performance: default. All regressions include an intercept. The regressions control for contract terms (spread, maturity, and down payment), borrower characteristics (income, borrower type of risk, gender, presence of a guarantor, type of job, type of residence, marital status, and whether the borrower is a client of The Bank), car characteristics (a dummy for new car, car age, and dealer priority), macro variables (inflation, and federal fund rate), car model fixed-effects alone nad interacting with year fixed effect, and state fixed-effects. Standard errors are calculated by clustering at both the state and month levels. Variables definitions are provided in the Appendix. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable=	default	default first half	default second half	default within 2 years	default after 2 years
Realized economic growth (annual terms)	-0.908*** (0.278)	-0.776*** (0.228)	-0.061 (0.108)	-1.484*** (0.425)	0.134 (0.115)
Contract terms	Yes	Yes	Yes	Yes	Yes
Personal characteristics	Yes	Yes	Yes	Yes	Yes
Car characteristics	Yes	Yes	Yes	Yes	Yes
Car model fixed-effects	Yes	Yes	Yes	Yes	Yes
Car model fe *year fe	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes
State fixed-effects	Yes	Yes	Yes	Yes	Yes
Observations	12,936	12,936	12,936	10,165	10,165
Adjusted R^2	0.115	0.099	0.065	0.114	0.065

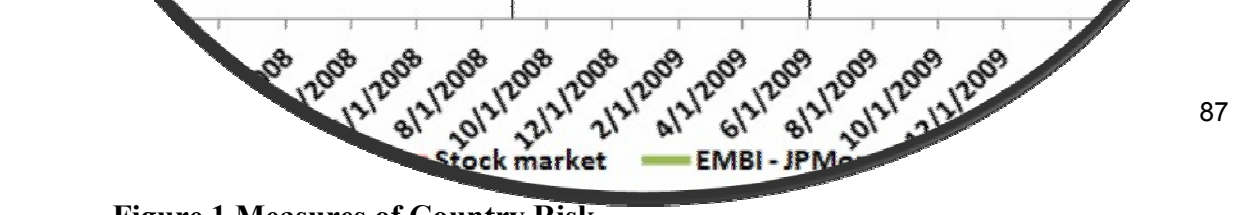
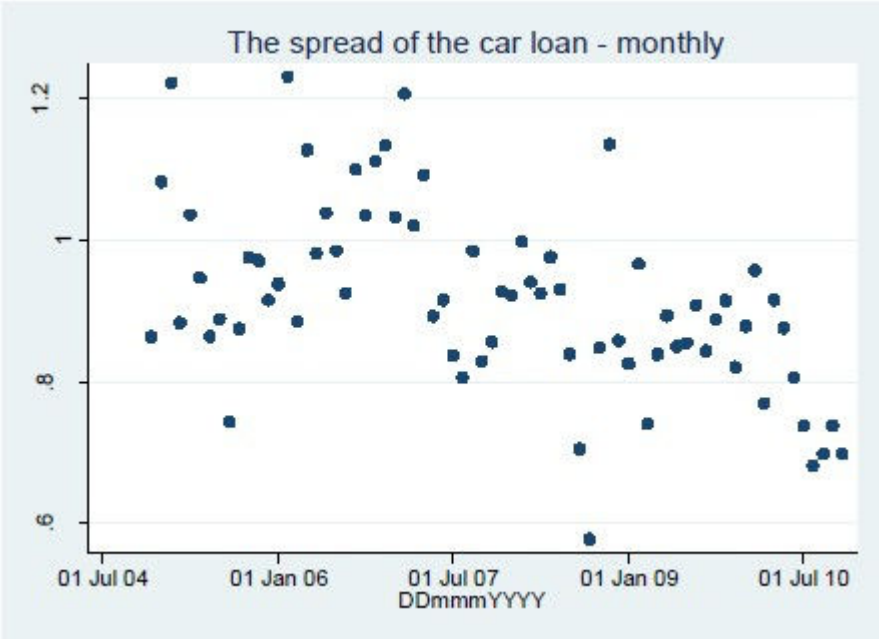


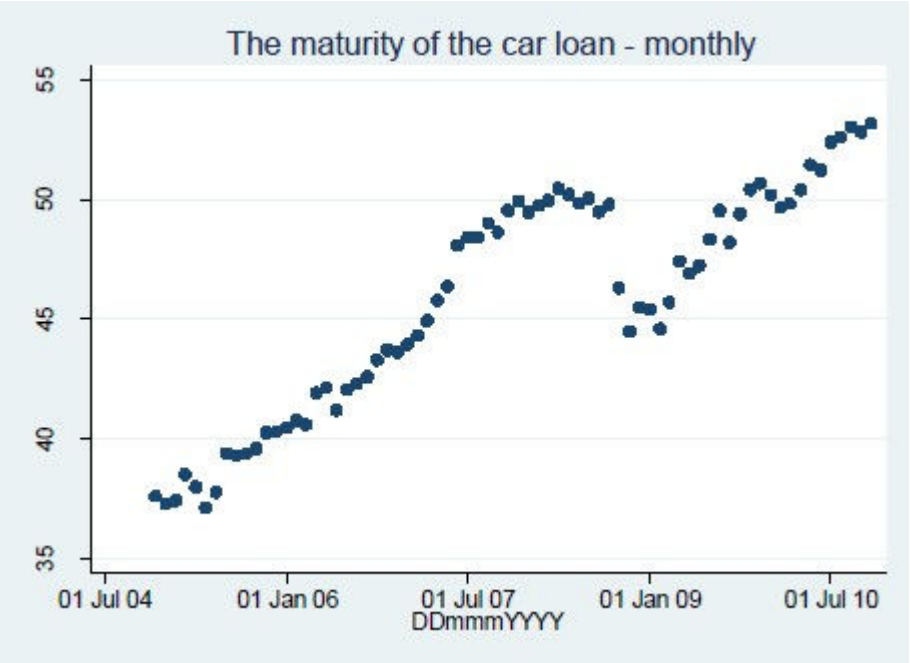
Figure 1 Measures of Country Risk

Figure 2

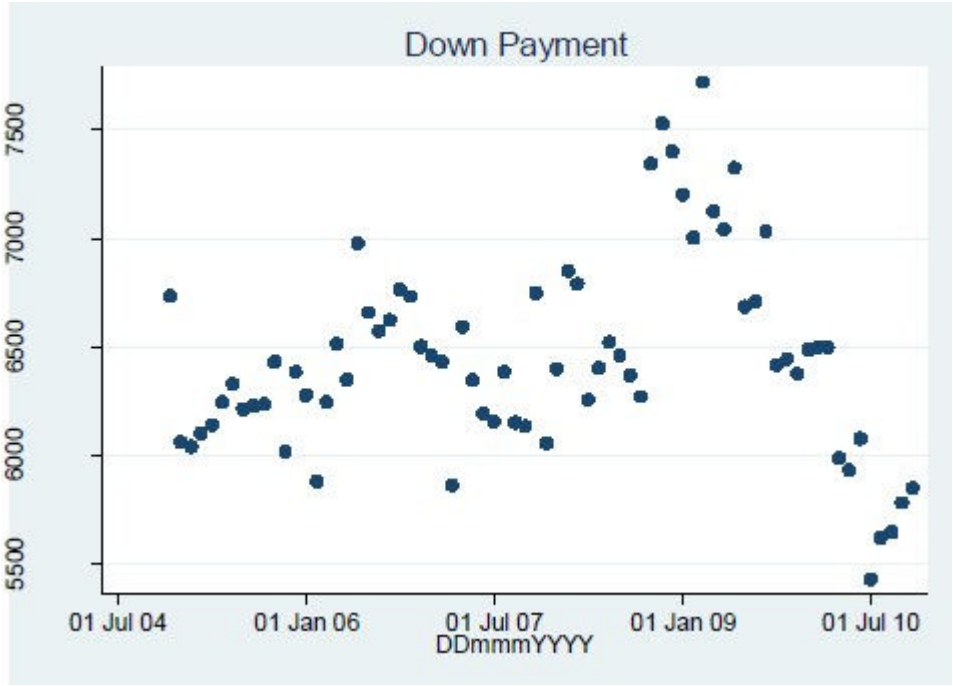
Chater (a)



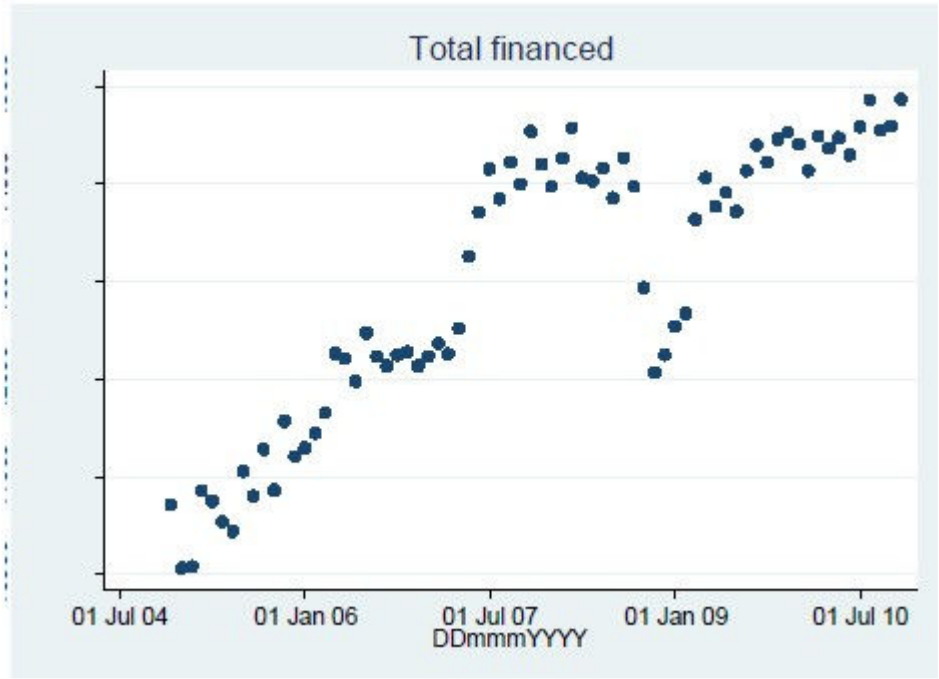
Chater (b)


The maturity of the car loan - monthly
55
50
45
40
35
01 Jul 04
01 Jan 06
01 Jul 07
01 Jan 09
01 Jul 10
DDmmmYYYY

Chater (c)


Down Payment
7500
7000
6500
6000
5500
01 Jul 04
01 Jan 06
01 Jul 07
01 Jan 09
01 Jul 10
DDmmmYYYY

Chater (d)


Total financed
01 Jul 04
01 Jan 06
01 Jul 07
01 Jan 09
01 Jul 10
DDmmmYYYY