Strategic Default and Personal Credit: The Brazilian Natural Experiment

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Abstract

Brazil provided at 2004 an interesting natural experiment concerning personal credit. The government implemented a new law that allows some financial institutions to offer a specific type of credit. This new law removes a significant share of the moral hazard problem, since the lenders of this type of credit are able to deduct the debt repayment directly from the debtors’ payroll check, eliminating the choice of default when debtors are able to pay their loans with their wage. Taking advantage of this fact, we estimate - using the difference-in-difference procedure - the cost of such type of informational failures. The main result of this paper points that, in general equilibrium, the new law produces a decrease in the interest rate charged to personal loans, while the volume of personal credit increases, improving credit market conditions.

Keywords: Credit Market, default, moral-hazard, difference-in-difference, law.

JEL Codes: E44, D01, C33, K00.

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1 Introduction

At the end of 2003 the Brazilian Congress approved a new law that regulates payroll loans. The payroll loan is a type of personal credit with repayments directly deducted from the borrowers’ payroll check, which, in practice, makes a collateral out of future income.

Before the implementation of the new law, only workers, pensioners and retired workers from the public sector had access to this type of credit. The new law comes to provide such credit to private workers associated to trade unions, pensioners and retired workers from the National Institution of Social Security (INSS). Only some financial institutions (those authorized by the government) are able to provide this loan for the INSS beneficiaries.

The new law provides to creditors the capacity to receive their loans’ repayment immediately, whenever the debtors have enough income to do it. Thus, such type of loan eliminates a significant part of the strategic default, diminishing the informational failure costs, as moral hazard. The reduction of the default probability increases the expected repayment for the lenders, making them more willing to offer credit at better terms.

Taking advantage of this experiment our objective is to identify the average treatment effect of the new law over the amount of new loans and interest rates of personal credit, accounting for general-equilibrium effects. Also, we aim at verifying both the direct and indirect effects of the new law (the partial equilibrium effects). In this paper we call direct effect the impact of the new law over the financial institutions that were authorized by the government to offer the payroll loans and indirect effect the impact over the financial institutions that were not allowed to offer such type of loans.

Despite the fact that the theoretical result is straightforward, the general-equilibrium effect is not trivial in this case. The effect over the financial institutions allowed to offer the payroll loans may affect the institutions that were not authorized to offer such a credit. For example, we expect a reduction on the interest rates charged by the authorized institutions, but for the not authorized ones it may cause either an increase in the interest rate due to the adverse selection problem or its reduction due to a demand reduction shock. The same problem may happen to the amount of new loans, for we expect an increase but it may be just a migration of clients from one group to the other. To

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1 The Brazilian pension system, a pay-as-you-go scheme, is publicly managed by this governmental agency, INSS.
2 See Heckman et al. (1998)
solve this problem, we measure the general-equilibrium effect defining
the treatment group as the financial institutions that offer the personal
credit. Also, we measure the partial equilibrium effect analyzing both
groups separately: the authorized institutions and the non-authorized
institutions.

The econometric method used in this paper is the difference-in-difference
procedure. Our analysis uses the fact that only the personal credit ben-
efited from the new law, making it the treatment group. As the control
group we use the automobile loans since this type of credit has similar
features when compared with personal loans\(^3\), also since the average in-
terest rate charged to automobile is always lower than the one charged
to personal credit, it minimizes the potential migration effect that could
call happen if another type of loan with higher interest rate were used.\(^4\) In
the empirical section we address the test of quality of such a control,
showing that it is a good control. The variation over time and the type
of credit provide a potential instrument to identify the causal effect of
the new law over the personal credit market.

Eventually, we find that the general equilibrium effect of the new
law was an increase of the new loans volume and a decrease of the
interest rate charged to the personal credit, what indicates that the costs
generated by information failures are highly significant to the personal
credit market. Since the depth of the credit market boosts the economic
growth, such an institutional reform provides an important instrument
for the development of the economy.\(^5\)

As to the institutions directly affected, the same results are observed,
but stronger. Financial institutions that were not directly affected also
suffered, in some way, an impact with the implementation of the new
law. In this case, however, we notice a reduction in the volume of the
new personal loans, which represents a migration of agents from financial
institutions that are not able to offer payroll loans to institutions that
are allowed to do that. Also, in the same direction of directly affected
financial institutions, a reduction in the interest rate for personal loans
was observed. One possible explanation for this result comes from the
fact that the demand for credit decreases for such institutions due to

\(^3\)The similarity between both types of credit comes from the existence of a col-
lateral. Personal credit owns as collateral the client banking account, i.e, the bank
can deduct the loan repayment direct from the client account. Automobile credit,
instead, owns as collateral the vehicle that was bought with such loan. However, the
fact of the collateral be extremely different between each types of credit points that
the possibility of the control group be affected by the new law is low, which makes
this control group very interesting.

\(^4\)Costa and De Mello (2005) use a similar identification strategy.

the migration of their clients to institutions benefited by the new law.

It is important to notice that the partial-equilibrium effect on financial institutions directly affected by the new law tends to be much deeper than the long-run general-equilibrium effect (almost four times bigger for the new loans), what makes the general-equilibrium analysis more important, since it measures truth of the aggregated effect of the new law.

The remainder of this paper is structured as follows: in section 2 we describe the new law and its particularities; in section 3 we describe the database used and the main descriptive statistics; section 4 presents the empirical results; and section 5 concludes.

2 The New Law

The specific legislation of payroll loans is not new in the Brazilian financial scenario. The Law 8,112 of December 1990 already validated such type of credit, however applied just to workers, retirees and pensioners from the public sector. The private sector has had no specific law so far, what has caused serious difficulties to the development of this type of credit. Private retirees and pensioners haven’t been allowed to perform such an operation and private workers had to create a private instrument comprising three parts: the employee, the employer and the financial institution. The significant change in this legislation occurred in September 2003 when the government sent to the House of Representatives the MP\textsuperscript{6} 130 that subsequently, in December 2003, turned into Law 10,820. The new law created the juridical security of salary consignation through private companies and the National Institution of Social Security (INSS) to the private workers’ formal sector and the retirees respectively.

However, such type of loans has some boundaries related to the agent’s income. Monthly deductions are limited to thirty percent of agents’ disposable wage\textsuperscript{7}; the loans should have a fixed payment during the amortization period; and rescissory earns\textsuperscript{8} can be consigned for the amortization of the remainder debt. Employers have several obligations as to the values and information that are passed to the financial institutions and employees. To make competitive conditions to the employees, the participation of the trade union entities representing the employ-

\textsuperscript{6}MP is the abbreviation of Medida Provisória that is a legislative device in which the executive sends a bill to congress that is effective immediately, pending approval. It has an urgency status that forces the legislator to appreciate its merit. For practical purposes, it is almost equivalent to a full-blown law.

\textsuperscript{7}Wage after the compulsory deductions like taxes, pensions, etc.

\textsuperscript{8}Rescissory earns comprise all rights of the employee for a contractual break.
ees is obligatory, but despite the agreement between the trade unions and a financial institution, the employee is free to choose any financial institution that supplies this type of credit.

Although the law has been in force since September 2003, just in April 2004\(^9\) it really became effective when the government authorized the Caixa Econômica Federal\(^10\) to offer this type of credit to the pensioners and retirees from INSS, supported by the new law. Subsequently, BMG (Bank of Minas Gerais) was the first private bank to grant such an agreement. Today there are forty-four financial institutions authorized by the government to supply this type of credit to pensioners and retirees from INSS\(^11\).

3 Description of the data and Descriptive Statistics

The database comes from Central Bank of Brazil according to a letter n° 2,957 of 12/30/1999 and a communiqué 7,569 of 05/20/2000.

The database contains daily information about new loans and interest rate. All the information is disclosed by the financial institution, type of loan indexation (prefixed, interest rate indexation, exchange rate indexation and price indexation) and the kind of borrower (household or firm).

The article uses information about personal and automobile loans. A personal loans is a credit to households, with a considerable screening by financial institutions. The bank’s client must have an account with the bank and generally the bank deducts the loan payment from this account when it has provisions available. Personal loans are composed by two types of credit: CDC (direct credit to consumer) and payroll loans. The difference between these two kinds of loans is that the first one has no guarantee that the client will not change the bank from where he receives his salary while as to payroll loans the client is not allowed to go to another the bank that he receives his wage once he has singed a loan contract with the bank. These two kinds of loans are not linked with the purchase of a specific good, so the borrower can buy any kind of good or even repay other debts with the loans’ proceeds. We use only the prefixed loans, since it is the most usual type of personal credit.

\(^9\)To define the exact month that an institution becomes able to give payroll loans we used the following criteria: when the date of the deal signature was in the first half of the month we considered the same month, otherwise we considered the next month. For example, Caixa Econômica signed the deal on 04/19/2004, so we considered May as the date in which it became able.

\(^10\)The Caixa Econômica Federal is the second biggest public bank.

\(^11\)For more details about the date of authorization see Appendix.
Automobile loans are credit to households that are used to buy automobiles. In this kind of credit the automobile itself is the collateral of the transaction. Like in the previous case we use only prefixed loans since they are the most usual in this market.

The sample consists of a group of 112 financial institutions offering personal loans and 57 offering automobile loans. From the 112 institutions of personal loans market there is a sub sample of 40 financial institutions that are able to give payroll loans according to the new law.

We run our empirical tests using monthly data generated through the daily data. The new loans variable is constructed by the summing of daily values over the whole month. For the interest rates variable, we use the monthly average, weighting up by the respective new loan volume. The sample period is from January 2003 to October 2005, so our sample consists of 34 months and 57 and 112 cross sections units of automobile and personal loans respectively (5,746 observations).

Figure 1: Mean of new loans before and after the new law

![Figure 1: Mean of new loans before and after the new law](image)

Now we present some descriptive statistics concerning personal and automobile loans before and after the new law of payroll loans became effective. Figure 1 illustrates a strong increase of the new loans volume for personal and automobile loans in the period after the new law was in effect. The monthly average of personal credit new loans increased from R$35.4 million to R$68.7 million, i.e., a rise of R$33.3 million. The monthly average of automobile new loans increased from R$38.5 million to R$60.5 million, i.e., a rise of R$22 million.
The monthly average interest rate (% per month) for personal loans decreased from 5.04% per month before the new law to 4.15% later, i.e., a reduction of 0.89% per month, which annualized means a fall of 11.22% per year. For automobile loans, the monthly average interest rate decreased from 2.55% to 2.41%, i.e., a reduction of 0.14% per month, which annualized means a fall of 1.69% per year. Thus, the interest rate declines was almost seven times bigger for personal loans in annual terms. Even though there were timing factors that decreased the interest rates for both personal and automobile loans, the reduction for the personal loans was much deeper.

**Figure 2:** Mean of interest rate before and after the new law
Analyzing the above information as growth rate, we notice that the new law strongly affects the personal loans in both considered variables (see Figure 3). The personal new loans suffered a much higher increase than the automobile new loans, 94% against 57%. Also, the reduction of the interest rate was much bigger for personal loans, 17% against 5%.

To sum up, the descriptive statistics show that at the time in which new law was implemented, there was a generalized downward trend in the interest rate and an upward trend in the new loans volume, but these trends were much stronger for personal loans.

Figure 3: Growth Rates - personal loans x automobile loans

4 Empirical Tests

In this paper, our objective is to identify the average effect of the new law on personal credit, i.e., the average impact of treatment on the treated. Specifically, we are interested in comparing personal loans when payroll loans are allowed to the counterfactual, that is, personal loans when payroll loans are not allowed for the treatment group at the same point in time. Since the counterfactual is never observed, we must estimate it.

At first, we would like to randomly assign the type of credit benefitted and non-benefitted with the new law and compare the average outcomes of the two groups. In the absence of a controlled randomized trial, we are forced to turn to nonexperimental methods that mimic it under reasonable conditions. A major concern is that the personal credit could be significantly different from the type of credit that is not affected by the new law and that these differences may be correlated
with our independent variables. In fact, many of the types of (unobservable) characteristics that may confound identification are those that vary across types of credit but are fixed in the course of time. A common method of controlling for time-invariant unobserved heterogeneity is to use difference-in-difference models with fixed effects.

Therefore, without the benefit of a controlled randomized trial, we turn to a difference-in-difference approach, which compares the change in outcomes in the treatment group before and after the intervention to the change in outcomes in the control group controlling for non-observables that are time invariant. By comparing changes, we control for observed and unobserved time-invariant characteristics to the pair type of credit-financial institution that might be correlated with the government authorization as well as with personal loans. The change in the control group is an estimate of the true counterfactual, that is, what would have happened to the treatment group if there had been no intervention. In this paper we use automobile loans for we believe that they fulfill the characteristics of a good control. Another way to state this is that the change in outcomes in treatment group controls for fixed characteristics and the change in outcomes in the control group controls for time-varying factors that are common to both control and treatment groups.

The difference-in-difference model\textsuperscript{12} can be specified as a two-way fixed-effect linear regression model:

\[ y_{it} = c_i + \varphi_t + \beta \cdot dI_i \cdot dT_{it} + \varepsilon_{it}. \] (1)

The right-hand side of the equation includes fixed effects to the pair type of credit-financial institution to control for specific factors that are fixed over time, the monthly fixed effects to control for factors that vary over time but are common across the cross-section and the coefficient \( \beta \) that is the difference-in-difference estimator of the impact of new law on payroll loans.

We define the diff-in-diff dummy variable as \( dI_i \cdot dT_{it} \), where:

- \( dI_i \): is a dummy variable that assumes 1 when the cross section unit \( i \) belongs to the treatment group (the financial institutions that provide personal loans) and 0 otherwise;

- \( dT_{it} \): is a dummy variable that assumes 1 if the observed period is after the regulation of the payroll loans concession according to the new law and 0 otherwise. For the institutions that are able to give payroll loans this dummy variable is 1 after the date that the institution signed the contract with the INSS, that made it able to

\textsuperscript{12}See Meyer (1995).
give payroll loans for retirees and pensioners and 0 otherwise. For the institutions that are not able, such date is arbitrary, so we will estimate some models varying the threshold point.

In this model, $\beta$ is the difference-in-difference estimate of the (average) effect of new law of payroll loans on personal loans. The key identifying assumption for this interpretation is that the change in loans variables in control group is an unbiased estimate of the counterfactual. As we cannot test directly this assumption, we can test whether the secular time trends in credit variables were the same for treatment and control groups in the preintervention period. If the secular trends are the same in the preintervention periods, then it is likely that they would have been the same in the postintervention period if the treated type of loan had not suffered influence of the new law.

**Figure 4: Evolution of the New loans**
Figures 4 and 5 already suggest that the growth in interest rates and new loans in treatment (personal loans) and control (automobile loans) groups were the same before the new law was in effect. Notice that for the period before the new law the path of both variables for the control group is similar to the treatment group, occurring a detachment only after the new law implementation. This feature would indicate that the variable automobile loans could be a good control for the personal loans treatment group.

We formally test the pre-intervention time trends for the treatment and control groups. We do this by testing the hypothesis that the trend in new loans and interest rates for both groups was the same in the pre-new law period. To conduct the test we regress changes in new loans and interest rates over the period January 2003–March 2004 against an indicator of the type of loan and dummies of the month. As we are testing the general-equilibrium effects, the direct effects and the indirect effects, we run the tests for the whole sample (columns 1 and 2), just for the institutions allowed to offer personal credit (columns 3 and 4) and for the not allowed institutions (columns 5 and 6) respectively. The hypothesis is rejected if the coefficient on the dummy type of loans is significantly different from zero. We cannot reject the hypothesis that the trend in both variables was the same in both control and treatment groups in the pre–new law period.

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13 See Banerjee, Gertler and Ghatak (2002).
4.1 Direct Effects

In this subsection we analyze the direct effect of the new law. This effect is defined as the impact of the new law over the financial institutions that were authorized by the government to offer the payroll loans. In this case all the financial institutions of the sample became able to offer payroll credit at different points of time (the month that the institution signed the contract with INSS).

Table 4 presents the estimation results of the equation (1) for both the dependent variables: new loans (R$ millions) and interest rate (% per month). Column 1 reports the direct effect of the law on new loans volume. It is associated with an increase of R$ 46.6 million in the personal credit negotiated by the financial institutions allowed to offer the payroll loans. The average of new loans for this group before the new law was R$57 million, occurring an increase of R$70 million after the new law. Thus, approximately 67% of such increase was caused by the new law. Column 2 that presents the direct effect over the interest rate points to a decrease of 0.62% per month, which means a decrease of 7.4% per year. Comparing to the levels of interest rate for the this group before treatment period we can say that the new law brought a reduction of approximately 11% in the rate (44% of the post-treatment total fall). Both estimations are statistically significant at 1% level.

Both effects are according to our expectations. The new law reduces the moral hazard problem, what increases the expected return of lenders due to the reduction of debtors’ default probability. It induces the lenders to expand the supply of credit at better terms. In response to this improvement in the personal credit, debtors tend to demand such a type of loans.
Table 4: Difference-in-Difference Models for the direct effect*

<table>
<thead>
<tr>
<th></th>
<th>New Loans (R$ millions)</th>
<th>Interest Rate (% per month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Loans (=1)</td>
<td>46.6</td>
<td>-0.62%</td>
</tr>
<tr>
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<td>(&lt;0.01)</td>
<td>(&lt;0.01)</td>
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<tr>
<td>fixed effects</td>
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<td>Yes</td>
</tr>
<tr>
<td>R²</td>
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<td>0.93</td>
</tr>
<tr>
<td>Number of obs</td>
<td>1850</td>
<td>1627</td>
</tr>
</tbody>
</table>

* p-value in parentheses
Robust standard errors

4.2 Indirect Effects

In this subsection we analyze the indirect effect of the new law. This effect is defined as the impact of the new law on financial institutions that were not allowed to offer the payroll loans. Since the procedure of making financial institutions able to offer payroll loans is continuous through time,\(^\text{14}\) we use the different dates as a threshold point to capture the new law’s effect.

Tables 5 and 6 present the estimation results of the equation (1) for both dependent variables: interest rate (% per month) and new loans (R$millions) respectively. Columns 1 to 4 of table 5 report the results for interest rate varying the threshold point that defines the pre- and post-treatment period to the financial institutions that are not able to offer payroll loans. The indirect effect of the new law is associated with a decrease in the interest rate of personal loans varying from 0.41% to 0.43%. Comparing to the levels of interest rate for this group before the treatment period (5.5%) we can say that the new law produced, at most, a reduction of 7.8% in the rate (61% of the total fall, since the post-treatment interest rate is 4.8%). Also, columns 1 to 4 of table 6 show that the new law is associated with a reduction in the new personal loans, which increases — together with the number of financial institutions that provide payroll loans — from R$ 14.1 million to R$19 million. All the results are highly significant.

\(^{14}\)See Table A1 at Appendix A.
### Table 5: Difference-in-Difference Models for the indirect effect

**Interest Rate (% per month)**

<table>
<thead>
<tr>
<th></th>
<th>OLS (1)</th>
<th>OLS (2)</th>
<th>OLS (3)</th>
<th>OLS (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Loans (=1)</td>
<td>-0.41%</td>
<td>-0.40%</td>
<td>-0.43%</td>
<td>-0.43%</td>
</tr>
<tr>
<td></td>
<td>(&lt;0.01)</td>
<td>(&lt;0.01)</td>
<td>(&lt;0.01)</td>
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<tr>
<td><strong>fixed effects</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Threshold Point</strong></td>
<td>May 2004</td>
<td>September 2004</td>
<td>January 2005</td>
<td>May 2005</td>
</tr>
<tr>
<td><strong>R²</strong></td>
<td>0.88</td>
<td>0.88</td>
<td>0.88</td>
<td>0.88</td>
</tr>
<tr>
<td><strong>Number of obs</strong></td>
<td>3313</td>
<td>3313</td>
<td>3313</td>
<td>3313</td>
</tr>
</tbody>
</table>

* p-value in parentheses
Robust standard errors

### Table 6: Difference-in-Difference Models for the indirect effect

**New Loans (R$ millions)**

<table>
<thead>
<tr>
<th></th>
<th>OLS (1)</th>
<th>OLS (2)</th>
<th>OLS (3)</th>
<th>OLS (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Loans (=1)</td>
<td>-14.1</td>
<td>-15.9</td>
<td>-16.1</td>
<td>-19.0</td>
</tr>
<tr>
<td></td>
<td>(&lt;0.01)</td>
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<td>(&lt;0.01)</td>
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</tr>
<tr>
<td><strong>fixed effects</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Threshold Point</strong></td>
<td>May 2004</td>
<td>September 2004</td>
<td>January 2005</td>
<td>May 2005</td>
</tr>
<tr>
<td><strong>R²</strong></td>
<td>0.90</td>
<td>0.90</td>
<td>0.90</td>
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<td><strong>Number of obs</strong></td>
<td>3709</td>
<td>3709</td>
<td>3709</td>
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</tr>
</tbody>
</table>

* p-value in parentheses
Robust standard errors

Notice that the indirect effect is instantaneous for both variables of personal loans. The intuition behind this result is that the volume of new loans decreases due to the migration of the clients from the financial institutions not authorized to supply payroll loans to institutions able to offer this type of credit, looking to changing from the more expensive credit to the cheaper loan. Such a contraction in the demand for personal loans for this group of financial institutions may be driving the reduction in the interest rates, as the empirical results indicate.

### 4.3 The General-Equilibrium Effects

In this subsection we will present the general-equilibrium effect of the new law. To measure it, we have to consider the direct effect in addition to the indirect effect of the new law, both before being analyzed as a partial-equilibrium. To do this, we consider as treatment group all the financial institutions that offer personal credit because despite some
financial institutions not being directly affected by the new law, they may influence the long-run general-equilibrium effect (we saw in the latter section that such group of financial institutions were, somehow, affected by the new law).

Table 7 presents the estimation results of the equation (1) for the dependent variable interest rate (% per month). Columns 1 to 4 report the results varying the threshold point that defines the pre- and post-treatment period to the financial institutions that are not able to offer payroll loans. The effect of the new law is instantaneous on interest rate. In equilibrium, the new law is associated with a decrease in the interest rate of personal loans varying from 0.34% (threshold in May 2004) to 0.52% (threshold in May 2005), with all cases being statistically significant at 1%. Comparing to the levels of interest rate for the treatment group before the treatment period we can say that the new law produced, at most, a reduction of 10.3% in the rate (58% of the total fall).

Table 8 presents the diff-in-diff coefficient results for new personal loans variable (R$ millions). Columns 1 to 3 report the results for new loans as a dependent variable varying the threshold point that defines the pre- and post-treatment period to the financial institutions that are not able to offer payroll loans. We find that, in equilibrium, the new law is associated with an increase in the new personal loans from January 2005 on, growing through the time from R$ 5.9 million to R$13.8 million. As we showed previously, the average of new loans for the treatment group before the new law was R$35.4 million, occurring an increase of R$33.3 million after the new law. Thus, the new law is responsible for an increase of approximately 42% in the new loans.

Differently from the interest rate, we notice that in this case the impact of the new law has a delay. We can explain this feature coming from three different sources: first, the initial debtors’ behavior could be the migration between both groups of financial institutions, increasing the demand for payroll loans from institutions able to supply it to repay more expensive personal loans to institutions not authorized to offer such credit, which implies that - in the aggregated level - the personal loans do not suffer any change in quantity; second, the number of financial institutions that are allowed to offer payroll loans increases over time\textsuperscript{15}; and finally, the time to spread the information about this new technology of loans may be slow.

Qualitatively, the final effect is according to the expectations. Such law helps to complete the contingent markets once it brings the possibility of people making contracts of future payments conditioned to a

\textsuperscript{15}See Table A at the Appendix A.
future cash flow. It reduces the number of states of nature in which the financial institutions would lose their money due to moral hazard actions, stimulating the supply of credit. All these factors make the volume of new loans increase. Since the new law eliminates a significant part of the default, the financial institutions will be repaid in more states of nature, increasing their expected value to be recovered. Thus, since the creditors will be repaid in a bigger share of states of nature, the cost of credit falls. These results show the potential improvements in social welfare that this law may produce.

However, quantitatively the results change deeply from the direct effects of the partial-equilibrium analysis to the general-equilibrium analysis (mainly for new loans). We find that the new law leads to a response that is approximately four times bigger for the direct effect than the long-run general-equilibrium effect for the new loans variable.

**Table 7: Difference-in-Difference Models of Interest Rate (% per month)**

<table>
<thead>
<tr>
<th></th>
<th>OLS (1)</th>
<th>OLS (2)</th>
<th>OLS (3)</th>
<th>OLS (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Loans (=1)</td>
<td>-0.34%</td>
<td>-0.36%</td>
<td>-0.42%</td>
<td>-0.52%</td>
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<td>fixed effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Threshold Point</td>
<td>May 2004</td>
<td>September 2004</td>
<td>January 2005</td>
<td>May 2005</td>
</tr>
<tr>
<td>R²</td>
<td>0.90</td>
<td>0.90</td>
<td>0.90</td>
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*p-value in parentheses
Robust standard errors

**Table 8: Difference-in-Difference Models of New Loans (R$ millions)**

<table>
<thead>
<tr>
<th></th>
<th>OLS (1)</th>
<th>OLS (2)</th>
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<tr>
<td>Personal Loans (=1)</td>
<td>5.9</td>
<td>8.2</td>
<td>13.8</td>
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<td></td>
<td>(&lt;0.05)</td>
<td>(&lt;0.05)</td>
<td>(&lt;0.01)</td>
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<tr>
<td>fixed effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Threshold Point</td>
<td>January 2005</td>
<td>March 2005</td>
<td>May 2005</td>
</tr>
<tr>
<td>R²</td>
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<td>0.90</td>
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*p-value in parentheses
Robust standard errors
Since we are using the difference-in-difference methodology we are able to take out the bias of a "pure estimator". We showed in a latter section that the new loans’ volume increased for both treatment and control group between pre- and post-treatment periods. So it is important to control for this generalized trend of growth in the credit market through the use of this estimator. The results show that even controlling for common temporal trends and for cross-section heterogeneity (the time and cross section fixed effects) the new law’s effect on new loans is economically and statistically significant. It means that the new loan’ growth between pre- and post-treatment periods was much bigger for treatment group than for control group even when we control for these factors.

The economic improvement that the new law brought by the elimination of part of the moral hazard was not only statistical but also economically significant. Thus, these findings allow us to notice how costly are the informational failures and the importance of institutional reforms to the financial markets.

5 Conclusion

The new Brazilian law of payroll loans launched in September 2003, provides a natural experiment on personal credit, since it was an exogenous change that affected only a specific type of loans: the payroll loans. The payroll loan is a type of personal credit with repayments directly deducted from the borrowers’ payroll check, which, in practice, makes a collateral out of the future income.

The new law provides to creditors the capacity to receive their loans’ repayment immediately, whenever the debtors have enough income to do it. Thus, such type of loan eliminates a significant part of the strategic default, diminishing the informational failure costs, as the moral hazard. Theoretically, financial institutions will be more willing to offer credit at better terms since the expected value of the loan repayment increases due to the lower probability of default.

The empirical methodology applied to identify the average effect of the new law on personal credit — accounting for general equilibrium effects — was the difference-in-difference procedure. The results point to an increase in the new loans and to a reduction in the interest rate. In quantitative terms, our estimation indicates an increase of approximately 42% in the new loans and a decrease of 10.3% in the interest rate. Therefore, the main result of this paper shows that the information failures produce a significant economic cost in the personal credit market, pointing to the relevance of institutional reforms that look to mitigate such costs as a way to improve the financial market conditions.
Besides the final impact over personal loans, we estimate both the direct and indirect effects of the new law. For the first we find that the new law caused an increase of R$46 million in new personal loans for institutions that are able to offer the payroll loans, while for institutions not able to give payroll loans the effect on new loans was negative, reducing it in R$19 million mainly due to the migration actions. The interest rate falls for both groups but for different reasons, for the first group the lower probability of default provides a higher expectations about the recovery of the debt, which induces creditors to offer the credit at better terms, while for the second group a reduction in the demand forces the interest rate down.

Finally, this analysis shows that the partial-equilibrium effect on financial institutions that are directly affected by the new law tends to be much deeper for the new loans variable than the final effect, measured by the long-run general-equilibrium.

References


data", Cambridge, Massachusetts: The MIT Press.

A Appendix

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Source: Homepage of national press (diário oficial): http://www.in.gov.br/imprensa/in