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**Private Credit Bureaus and Positive Information Sharing:  
Effects on credit cost?**

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## Non-Technical Summary

Sharing credit information can reduce information asymmetries between borrowers and lenders, enhance credit risk assessments, restrain banks' ability to extract rents from good borrowers and foster competition among banks. Information may be shared via public credit registries or private credit bureaus. Data on missed payments and defaults are called negative information, whereas data on loan flows and repayments are examples of positive information. We examine whether positive information credit risk scores sold by private credit bureaus affect access to credit, specifically the loan cost. We exploit the implementation of a legal change in 2019 that enabled private credit bureaus to sell new credit risk scores of individuals based on positive information. As a result, at the beginning of 2020, Brazilian lenders were already able to buy new scores (besides the old ones) for some individuals, while only having access to old scores for others. This feature created exogenous variation in the informational landscape accessible to banks.

We find that the new set of positive information shared through the new scores resulted in lower loan cost to borrowers. The results show an average reduction of 3.7% (equivalent to 6.7 p.p annualized) in the interest rates of unsecured personal loans charged to borrowers whose new scores were available for sale, compared to other borrowers. The effects are greater in cases where the borrower credit score improves a lot with the inclusion of positive information, reaching a reduction of 8.7%.

We also examine the effects separately on new and incumbent borrowers to investigate how much of the effects are related to reduced information asymmetries or to increased competition. New scores with positive information should be more valuable for assessing the credit risk of new borrowers, whereas, for incumbent borrowers, effects on interest rates would primarily stem from heightened competition among banks. Our empirical analysis suggests both channels are material. We further find longer term borrower-bank pairs experience greater reductions in rates due to the availability of new positive scores. The length of the banking relationship serves as a proxy for the amount of private information the lender already has on the borrower. Therefore, these results support the predominance of the competition channel for old borrower-bank pairs and suggest positive information sharing lowers the ability of lenders to extract informational rents. Finally, we find that private banks are the most affected by the availability of new scores and appear to drive our results.

## Sumário Não Técnico

O compartilhamento de informações de crédito pode reduzir assimetrias de informação entre tomadores e credores, aprimorar a avaliação de risco de crédito, restringir a capacidade dos bancos de extrair rendas de bons tomadores de crédito e fomentar a competição entre eles. Informações de crédito podem ser compartilhadas por meio de registros públicos de crédito (como o SCR) ou *bureaus* privados de crédito. Dados sobre pagamentos em atraso e inadimplências são chamados de informações negativas, enquanto dados sobre fluxos de empréstimos e pagamentos são exemplos de informações positivas. Examinamos se escores de risco de crédito baseados em informação positiva e vendidos pelos *bureaus* privados de crédito afetam o acesso ao crédito, especificamente o custo dos empréstimos. Exploramos a implementação de uma mudança legal em 2019 que permitiu que os *bureaus* privados de crédito vendessem escores de risco de crédito de indivíduos com base em informações positivas. Como resultado, no início de 2020, os credores brasileiros já podiam comprar os novos escores (além dos antigos) para alguns indivíduos, enquanto tinham acesso apenas aos escores antigos para outros. Essa característica da implementação criou uma variação exógena no cenário informacional acessível aos bancos.

Constatamos que o novo conjunto de informações positivas compartilhadas por meio dos novos escores resultou em menor custo de empréstimos para os tomadores. Os resultados mostram uma redução média de 3,7% (equivalente a 6,7 p.p. anualizados) nas taxas de juros de empréstimos pessoais sem garantias cobradas de tomadores cujos novos escores estavam disponíveis para venda, em comparação com os demais tomadores. Os efeitos são maiores nos casos em que o escore de crédito do tomador melhora bastante com a inclusão de informações positivas, atingindo uma redução de 8,7%.

Também examinamos os efeitos sobre tomadores novos e antigos para investigar quanto dos efeitos está relacionado à redução das assimetrias de informação ou ao aumento da concorrência. Os novos escores, com informações positivas, deveriam ser mais valiosos para avaliar o risco de crédito de novos tomadores, enquanto, para tomadores antigos, os efeitos sobre as taxas de juros adviriam principalmente do aumento da concorrência entre os bancos. Nossa análise empírica sugere que ambos os canais são relevantes. Constatamos ainda que pares de tomadores-bancos com longo relacionamento experimentam maiores reduções nas taxas devido à disponibilidade dos novos escores positivos. A duração do relacionamento bancário serve como um indicador da quantidade de informação privada que o credor já possui sobre o tomador. Portanto, esses resultados corroboram a predominância do canal de competição para os antigos pares tomadores-bancos e sugerem que o compartilhamento positivo de informações reduz a capacidade dos credores de extrair rendas informacionais. Por fim, constatamos que os bancos privados são os mais afetados pela disponibilidade dos novos escores e parecem governar nossos resultados.

# Private Credit Bureaus and Positive Information Sharing: Effects on credit cost?\*

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## **Abstract**

*This study exploits a legal change in Brazil to identify the extent to which new information generated by credit bureaus translates into different loan interest rates. The legal change enabled private credit bureaus (PCBs) to build new credit scores for approximately 100 million individuals, based on a broader scope of positive information, such as loan flow and repayment patterns. We find an average reduction of 3.7% in the interest rates of personal loans to borrowers whose new scores became available for sale by the PCBs. The effects are stronger in the cases where the new score is much higher than the old score, reaching an average reduction of 8.7%. We find stronger results for new clients and for private banks. The mechanisms behind our results include both the reassessment of borrower credit risk and higher competition among lenders coming from the dissemination of new positive information. We also provide empirical evidence consistent with information sharing reducing the ability of lenders to informationally lock-in their borrowers.*

**Key Words:** Credit Bureau; Credit Scores; Positive information sharing; Banking; Relationship Lending.

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## 1. Introduction

Sharing credit information through public registries and private bureaus can enhance access to credit and lower loan costs by reducing information asymmetries between borrowers and lenders (Pagano and Jappelli, 1993; Miller, 2003; Kallberg and Udell, 2003). Information sharing also restrains banks' ability to extract rents from good borrowers and fosters competition among banks (Padilla and Pagano, 1997; Hauswald and Marquez, 2003; Dell'Ariccia and Marquez, 2004).

Private credit bureaus and public registries typically share two types of information: negative (e.g., missed payments, defaults) and positive (e.g., loan flows, repayments). While adding positive information (usually to complement existent negative information) is costly<sup>4</sup>, there is suggestive evidence of significant benefits in studies that exploit quasi-natural experiments, such as Doblas-Madrid and Minetti (2013), Liberti et al. (2021), Bonomo et al. (2021) and Beck et al. (2023), as well as in comparative cross-country studies (Jappelli and Pagano, 2002; Djankov et al., 2007; Brown et al. 2009) and simulation exercises (Miller, 2003; Powell et al., 2004). There is also some evidence that private credit bureau reforms ease access to finance more effectively than public credit registry reforms (e.g. Martinez Peria and Singh, 2014). However, the literature has not studied the interplay of coexisting public credit registries, private credit bureaus, negative and positive information. Specifically, do positive information credit risk scores sold by private bureaus add value to borrowers whose positive credit history is already potentially shared by a public registry?

In this article, we investigate the impact of new credit scores from private bureaus, based on positive information, on bank loan interest rates. We study the Brazilian case where increasing scopes of positive information have been shared by the public credit register, owned and managed by Banco Central do Brasil (BCB), since the 2000's. More specifically, we exploit a legal change in Brazil in 2019 that enabled private credit bureaus to sell credit risk scores of individuals based (also) on positive information (hereafter referred to as new scores) and affected approximately 100 million adults.<sup>5</sup>

The new law implied that individuals need to explicit opt-out of the new positive information sharing regime; otherwise, their new scores would be made available. More

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<sup>4</sup> Besides saving costs, privacy concerns are also a possible reason for information sharing agreements based *solely* on negative information.

<sup>5</sup> This figure corresponds to approximately 66% of the adult population, according to estimates from the Brazilian Institute of Geography and Statistics, IBGE.

specifically, the law required that at least one bureau notify individuals of their registration and inform them how to opt-out and cancel the registration. Only 60 days after such notification could an individual's new score be available for sale.<sup>6</sup> As a result, at the beginning of 2020, lenders were already able to buy new scores (besides the old ones) for some individuals, while only having access to old scores for others. This feature creates exogenous variation in the informational landscape accessible to banks, because the availability of new scores for only some individuals operates as a quasi-natural experiment.

Our setting is particularly interesting because, during our sample period, banks were the only sources of positive information gathered by private bureaus to build the new credit scores. In other words, this positive information was basically of the same type that had been feeding the public credit registry<sup>7</sup>. Therefore, at first glance, it might seem the new scores would have minimal or insignificant effects on banks' loan interest rates. However, there are at least three reasons why significant material effects could occur. First, private bureaus receive more detailed and timely positive information than what banks can access through the central bank's credit registry. Second, while banks need explicit consent to access an individual's public credit registry data, the new law allows private bureaus to compute and sell scores of any individual, provided they notify the individual of their inclusion in the positive credit information setup, and the individual does not explicitly opt out. Finally, banks may integrate the new credit scores in their loan pricing models in a more straightforward manner than raw credit registry positive data and, therefore, benefit from the credit modelling technology already developed by the bureaus based on inputs of frequent data from a vast pool of individuals (Einav et al., 2013).

Our baseline specification uses the interest rate of unsecured personal loans as the dependent variable and the new score availability or their relative magnitudes as the main independent variables.<sup>8</sup> The results show an average reduction of 3.7% in the interest rates

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<sup>6</sup> The four private credit bureaus active at the time put together a task force to notify as many individuals as possible in the shortest amount of time. In conversations with the BCB, the bureaus informed the notifications were made in no specific order, in a seemingly random manner. See Doblaz-Madrid and Minetti (2023) for a similar phased implementation of a new information sharing regime.

<sup>7</sup> During the sample period, other sources of positive credit information, such as telecom and other utilities companies, were not available to be incorporated into the new scores.

<sup>8</sup> We focus on personal loans because the assessment of borrower credit risk should be of primary importance for setting the interest rates as they generally do not embed collateral. Also, they are widespread

charged to borrowers who had new scores available for sale, compared to borrowers who had only old credit scores. This drop is equivalent to 6.7 p.p. when considering the 182% per year average interest rate of unsecured personal loans observed in our sample. Importantly, the effects are greater in cases where the new scores are much higher than the old scores<sup>9</sup> (fourth quartile of the score difference), reaching an average reduction of 8.7%. Additionally, we find a statistically significant increase of 1.4% in loan interest rates for borrowers whose new scores are lower than the old scores (first quartile of the score difference). Finally, we find that private banks are the most affected by the availability of new scores and appear to be driving our baseline results.

Our results are consistent with a better assessment of borrower credit risk by banks, prompted by the use of new scores in their credit analyses. They are also consistent with increased bank competition for good borrowers, fostered by the availability of the new scores to every potential lender. To measure the relative strengths of these two channels (risk reassessment vs. competition), we compare the effects on new vs. incumbent borrowers. The rationale is that the new scores with positive information should be more valuable for assessing the credit risk of new borrowers, as banks already possess information on incumbent borrowers through their existing relationships. Additionally, for incumbent borrowers, effects on the interest rates would primarily stem from heightened competition among banks. Our empirical analysis indicates the loan interest rate reduction for new borrowers is approximately 5.8%, whereas for incumbent borrowers the reduction is approximately 2.5%. This suggests both channels are material in our case.

To further investigate the relevance of the competition and the risk assessment channels for the case of incumbent borrowers, we examine whether interest rates on loans taken by borrowers with long-lasting relationships with banks are differentially affected by the availability of the new scores. The length of the banking relationship serves as a proxy for the amount of private information the lender already has on the borrower. Our findings indicate that long-term borrower-bank pairs experience greater reductions in the interest rates due to the availability of new scores. Borrowers without available new scores do not benefit from such reductions in rates in longer relationships, suggesting incumbent lenders lock-in their borrowers as the relationship evolves in a context with

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among individuals and the PCBs had not fully yet developed new credit scores for firms at the time of this study.

<sup>9</sup> Higher scores mean lower credit risk. Both the old and the new scores vary on a scale from 0 to 1,000.

limited information sharing (Petersen and Rajan, 1994 and 1995; Ioannidou and Ongena, 2010; Ornelas et. al., 2022). These results support the predominance of the competition channel for old borrower-bank pairs, as the new scores limit the (greater) market power of incumbent banks over their long-term borrowers (Bank et al., 2023). Conversely, if the risk reassessment channel were more relevant, we would likely have observed the opposite effect, because longer relationships imply lower informational utility of the new scores for the incumbent bank.

The primary threat to our identification strategy is the potential presence of omitted variables. In other words, factors other than the control variables and credit scores might influence loan interest rates and be correlated with the scores. To address this concern, we conduct placebo checks using counterfactual new scores generated by the private bureaus upon our request. Specifically, we asked the private credit bureaus to retroactively compute the new scores for August 2019 for a sample of individuals, using the positive credit information history that became available to them around the end of 2019 or beginning of 2020.<sup>10</sup> For each such individual, we have then both the new scores and the old scores, but the new scores were neither available for sale nor actually calculated at that time. We test whether these new counterfactual scores affected the interest rates of loans granted in August 2019 and find no statistically significant effect.

We contribute to the literature that investigates the value of positive information sharing using quasi-natural experiments. Bonomo et al. (2021) and Beck et al. (2023) examine reporting eligibility changes in the Brazilian public credit registry, in 2016 and 2012, and find positive causal effects of positive information sharing in access to finance for individuals and very small firms exposed to the changes, respectively. Liberti et al. (2011) find similar effects on (good) exposed borrowers after the expansion of the public credit registry in Argentina. Bank et al. (2023) study the introduction of a consumer credit register, together with credit scores, in Israel. Exploiting the staggered entry of lenders into a US bureau, Doblaz-Madrid and Minetti (2013) find information sharing reduces delinquencies among equipment finance contracts. Foley et al. (2020) investigate the consequences of a private market transaction in Chile that changes the positive information-sharing environment of a credit card portfolio and find effects mainly on credit card limits. In particular, we are able to show the incremental value of positive

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<sup>10</sup> Those counterfactual new scores concern individuals whose data series were sent soon enough to PCBs following the new law, which then allowed such retroactive calculation. We thank the private credit bureaus that kindly performed this calculation.

information sharing by private credit bureaus on loan rates in a context where similar information was already shared *ex-ante* by the country's public credit registry.

We also contribute by providing empirical evidence that information sharing can lower the ability of lenders to informationally capture their clients and extract rents, so that the competition triggered by information sharing lowers interest rates. Kim et al. (2003) develop a model that estimates the magnitude and significance of switching costs from aggregated data. Ioannidou and Ongena (2010) and Ornelas et al. (2022) show that, in a context of limited information sharing, switching costs may involve initial lower loan rates that subsequently increase as the banking relationship evolves. Cahn et al. (2024) show that refinements in credit rating information on private firms mitigate switching costs. Focusing on consumer credit, Bank et al. (2023) show that, after the introduction of consumer credit scores, information sharing reduces the ability of lenders to informationally lock-in the borrowers, leading to a decrease in loan rates. Our results complement this strand of literature, particularly scarcer for consumer credit.

Finally, we contribute by using a novel identification strategy based on alternative credit scores: a counterfactual new score before the law and an old score after the law. Having an alternative credit score control at the individual-time dimension is a great advantage for identification purposes and represents a refinement over earlier studies.

The remainder of the paper is structured as follows. Section 2 reviews the institutional background and the 2019 legal change in Brazil. Section 3 describes the data and the empirical strategy used. Section 4 presents the results of the four empirical analyses: the baseline specifications, heterogeneity of the results by old/new bank-borrower pairs, heterogeneity by bank ownership type and a banking relationship duration analysis. Section 5 concludes the paper.

## **2. Institutional Background and the Legal Change**

The Brazilian financial system is bank-based and concentrated. Banco Central do Brasil (BCB), the country's central bank, has implemented several policies aimed at increasing competition in the credit market. These measures are intended to reduce in a sustainable way the country's high level of credit interest rates.

Credit information sharing available to financial institutions in Brazil relies on the public credit registry (SCR, the acronym in Portuguese), owned and managed by the (BCB and a few private credit bureaus, PCBs).

The SCR does not produce or divulge any credit score. Beck et al. (2023) describe the information available from SCR to financial institutions: the date that the borrower opened its first credit account in the financial system, the number of outstanding loans, the number of lenders, the number of loans with disagreements or under justice, coobligations, and the amounts due, in arrears and in losses by time buckets, loan types and currency denominations. Banks can access that information upon explicit consent from the borrower, generally obtained at the onset of borrower-bank interaction. Although the need for borrower consent possibly restrains the information sharing effectively conducted by the SCR and the information therein that is made available to banks is somewhat aggregated, the benefits of (positive) information sharing through the SCR are material according to Bonomo et al. (2021) and Beck et al. (2023). In fact, these studies find positive causal effects of positive information sharing on access to finance for individuals and very small firms, respectively.

Private credit bureaus would sell (*old*) credit scores based essentially on negative information, such as missed payments, defaults, and amounts past due, until the first quarter of 2020. In fact, until mid-2011, the legal framework did not allow the collection and sale of information regarding the (positive) performance of individuals and firms to build a credit history record. The Law 12,414 of June 9, 2011 started changing this framework but determined that firms and individuals had to contact each bureau and agree to have their performance and other types of credit information available to each one of them. As a result, a very limited number of individuals<sup>11</sup> opted in to allow their information to be shared with the bureaus. The lack of a critical data mass on borrowers across different risk profiles hindered the development and sale of scores based on positive information.

However, in April 2019 Complementary Law 166 changed Law 12,414 and introduced an opt-out approach. A new regulatory framework followed suit, with executive acts and regulations issued by the BCB. The opt-out regime implies all individuals are eligible to have their (positive) performance available to all credit bureaus. The actual use of the credit information can only happen 60 days after at least one bureau sends a message to the person informing her registration and the possible channels she can use to opt-out and cancel the registration.

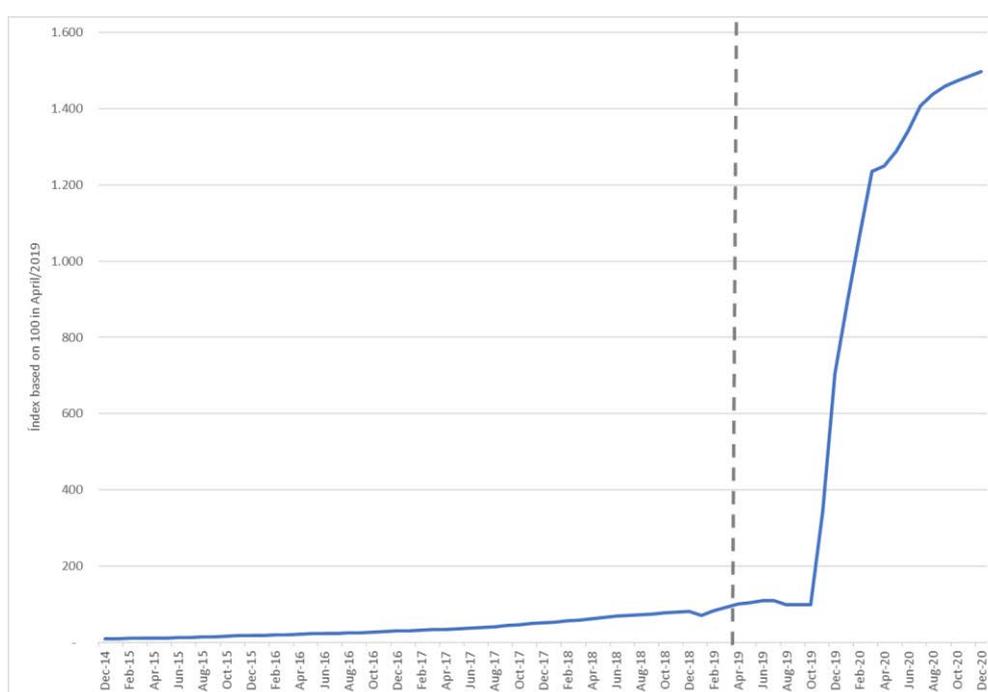
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<sup>11</sup> Most of the ones that did, were in fact only answering an invitation by a bureau, that occurred when they approached the bureau to clear their names after a debt had been settled.

Figure 1 shows the evolution of the number of registered individuals in the credit bureaus. There is a spike after the shift from a regime in which individuals had to opt in to the new regime in which they could opt-out if they chose not to be registered. By the end of 2020, just under 330 thousand individuals had opted out. In contrast, at least 100 million individuals had an active record, which represents approximately 66% of the population aged over 19 years<sup>12</sup>. Both the small number of registered individuals during the opt-in regime and the large number after the regulatory change can be explained by human inertia. Inertia is called *status quo* bias by the behavior economics literature and can explain why it is hard for someone to get around doing something different, even if they would like to (Oliver, 2019).

Despite the sharp increase in the number of registered individuals in November 2019, the process is continuous. In other words, the bureaus process and register new individuals daily. This feature is key to our empirical strategy detailed in Section 3.

**Figure 1. Evolution of the number of registered individuals**



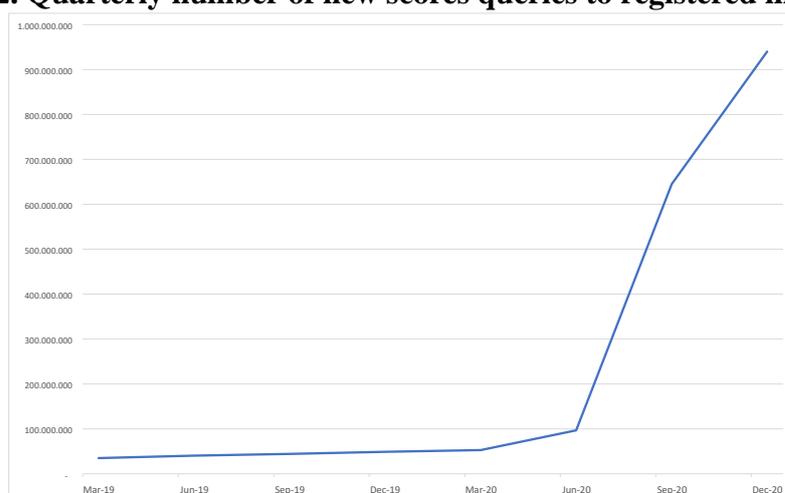
The law determines which types of entities are required to send credit data to the bureaus. However, the coordination between the sources of data (financial institutions, utilities, mobile service providers and others) and the bureaus is a major challenge because

<sup>12</sup> According to IBGE’s projections for the period 2010-2060

sending information is costly to these entities, and the law does not impose punishment for those that do not comply. Throughout the sample period, the bureaus relied on data sent by financial institutions, of the same type that is sent to the SCR, to estimate the new scores<sup>13</sup>.

The bureaus started selling the new scores of individuals in the first quarter of 2020. Figure 2 shows a takeoff in the number of new scores queries in the third quarter. According to a survey conducted by the BCB in 2021, the largest lenders started incorporating the new scores in their credit assessment procedures for consumer loans in the third quarter of 2020 (BCB, 2021)<sup>14</sup>. The ones that did generally reported an increase in the discriminatory power of their internal credit risk models and in the approval rates of new borrowers. The BCB also surveyed all the bureaus and heard that most individuals were migrated to other ranges of credit risk when the bureaus included positive information to estimate new scores<sup>15</sup>.

**Figure 2. Quarterly number of new scores queries to registered individuals**



<sup>13</sup> After the end of our sample, the scope of positive information sources has enlarged. Information from telecommunication services was added starting in 2021, while information from other utilities has been included since 2022.

<sup>14</sup> In February 2021, the BCB surveyed banks, credit unions and fintechs regarding the purchase, use and their first impressions of the new scores in their credit analyses (BCB, 2021).

<sup>15</sup> On average, approximately 41% of individuals migrated to lower risk ranges, 33% remained in the same range and 26% migrated to higher risk ranges.

### 3. Data and Empirical Strategy

#### 3.1. Data

Two main sources of data used are loan-level information from the SCR credit registry, managed by the BCB, and credit scores calculated by the private credit bureaus. Our dataset was built by first randomly<sup>16</sup> sampling 100 thousand individuals who got nonpayroll personal credit from August to December 2020 – our main analysis period – and other same (monthly average) number of individuals who got that type of credit in August 2019 – our placebo period. After that, we extracted from the credit registry all nonpayroll unsecured personal loans at origination from the sampled individuals. Very few individuals have more than one personal loan in the period. The final sample is further restricted to individuals over 18 years old.

The credit bureaus provided two types of scores in each month during the sample period. As mentioned previously, the old score is mainly based on negative information, whereas the new score also includes positive information. The old score remained available to all sampled individuals during the sample period while the new score became available only to a fraction of them. The bureaus serially received individuals' positive data and proceeded to compute their new scores. The bureaus reported this sequential process led to the availability of new scores for certain individuals ahead of others in a seemingly random manner.

For the placebo month of August 2019, the credit bureaus computed retroactively new scores for the purpose of this study, although such scores were not being commercialized at that time. This retroactive calculation was carried out only for individuals whose positive data series had been received soon after the new law. The positive data series received by bureaus had a length of 13 months so that there was enough mass of observable information in the period before August 2019 to allow such calculation.

The new score is in general higher than the old score, meaning the new information benefited the clients on average. When we group borrowers into quartiles based on the (new score – old score) difference, it is worth noting that clients on the first quartile have

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<sup>16</sup> We performed a geographic stratified sampling to assure a minimum number of observations in each Brazilian region.

the new score lower than the old score, but in all other quartiles the new score is higher than the old one<sup>17</sup>. Therefore, the default risk estimated by the scores increased with the new information on the first quartile, but decreased on the 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quartiles.

Our empirical analysis focuses on unsecured personal loans. Personal loans are widespread among individuals and, because they do not embed collateral, the assessment of borrower credit risk should be of primary importance for setting their interest rates. From the credit registry we obtain information about the loan characteristics (interest rate, maturity, amount, regulatory rating<sup>18</sup>), borrower's information (gender, age, geographic location, occupation, and income) and the lender's identification. We winsorize interest rates and other continuous control variables at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. We also have information about the credit relationship duration of the borrower with the financial institution, and, in some exercises, we focus on those individuals who get their first loan from that financial institution (i.e., new borrowers) whereas, in other exercises, the focus is on old borrower-bank pairs.

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<sup>17</sup> PCBs have suggested there is comparability between the scales of the new and old scores, so that subtracting them is a meaningful operation.

<sup>18</sup> Assigned by the financial institution to the loan according to the scale of the BCB Resolution 2682, from December 22, 1999.

**Table 1 – Summary Statistics**  
**Panel A – All Clients - Period Aug-Dec 2020**

	All Clients		
	Mean	Median	Standard Deviation
Int. Rate (% p.y.)	180	138	181
Loan Amount (R\$)	3,388	1,190	7,227
Loan Maturity (days)	463	267	554
New Score Available (0/1)	0.91	1	0.28
Old Score	581	575	111
New Score	644	645	128
Monthly Income (R\$)	6,069	3,552	8,035
Female (0/1)	0.499	0	0.500
Age	47.27	45.68	15.54
# Observations	73,097		

**Panel B – Old and New Clients - Period Aug-Dec 2020**

	New Clients			Old Clients		
	Mean	Median	S.D.	Mean	Median	S.D.
Int. Rate (% p.y.)	283.8	173.6	313.4	169.9	134	159.4
Loan Amount (R\$)	2,581	1,501	3,555	3,465	1,137	7,480
Loan Maturity (days)	495.3	381	396.4	460.1	239	566.7
New Score Available (0/1)	0.6731	1	0.4691	0.9362	1	0.2443
Old Score	538.1	534	111.8	585.1	578.7	110
New Score	599.5	604.7	129	647.7	648.7	126.6
Monthly Income (R\$)	4,344	2,300	10,971	6,234	3,782	7,675
Female (0/1)	0.4785	0	0.4996	0.5004	1	0.5
Age	43.86	40.9	15.84	47.59	46.15	15.47
# Observations	6,387			66,710		

### 3.2. Empirical Strategy

We compare the loan interest rates of borrowers with and without the new score, controlling for several characteristics, including the old score. The rationale is that borrowers with similar old scores and other characteristics would be *ex-ante* informationally homogenous for financial institutions. This strategy allows us to conceive a counterfactual on how interest rates would have behaved if the change to the opt-out regime had not occurred, and no positive information were added to the estimation of the scores. The difference in rates between similar borrowers with and without new scores available is then attributed to the inclusion of positive information in the new score.<sup>19</sup>

Our most saturated specification incorporates the elements highlighted above, and is represented by the following loan-level equation:

$$\ln(r_{libt}) = \alpha + \beta \mathbf{1}[NSA_i] + \gamma \text{old\_score}_{it} + \theta_{bt} + \pi_{mt} + \mathbf{X}_{it}\boldsymbol{\lambda} + \mathbf{L}_l\boldsymbol{\Lambda} + \varepsilon_{libt} \quad (1)$$

where  $l$  denotes the loan,  $i$  is the individual borrower,  $b$  the creditor financial institution and  $t$  the period (month) when the loan was granted. The variable  $\ln(r_{libt})$  represents the logarithm of the nominal interest rate. The function  $\mathbf{1}[NSA_i]$  assumes the value 1 if there is a new score available by all credit bureaus for individual  $i$  in the sample period and 0 otherwise<sup>20</sup>. The variable  $\text{old\_score}_{it}$  represents the average of the old scores calculated by credit bureaus for individual  $i$  in period  $t$ .

The set of borrower controls  $\mathbf{X}_{it}$  includes gender (assuming the value 1 for female and 0 otherwise), age in years and personal income (categorized in ten buckets), professional occupation and borrower's municipality. Loan controls ( $\mathbf{L}_l$ ) include loan rating, the amount granted (in logarithm of Brazilian Reais) and loan maturity as of its origination. The latter is interacted with monthly dummies in more saturated specifications to account for time-varying term structure of the funding cost associated with the specific loan.

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<sup>19</sup> For example, we compare the loan interest rates of two borrowers that have old scores of 650 points, but one of them has a new score of 700 points, whereas the other one does not yet have a new score available for sale.

<sup>20</sup> Purposefully, this dummy does not have a subscript  $t$ , as no borrower in the sample had his new score made available during our short sample period. Therefore, admittedly our specification is not a differences-in-differences model. Nevertheless, PCBs reported to us that the selection of which borrowers would acquire new scores was quite random and any left systematic difference between the borrowers is likely to be controlled to a great extent by the old score variable and other controls.

The term  $\theta_{bt}$  represents the fixed effect of financial institution  $b$  in period  $t$ , which captures unobservable effects related to the credit supply, including bank specific funding costs. Similarly,  $\pi_{mt}$  represents the fixed effect of municipality  $m$  in period  $t$  and controls for local demand conditions, including greater or lesser need for credit due to restrictions on mobility and economic activity during the pandemic. In equation (1), the coefficient of interest is  $\beta$ , which captures the average effect of access to new positive scores on loan spreads. More specifically, it should be interpreted as the average percentual difference on the loan interest rate between similar borrowers with and without new scores.

What is the expected signal of  $\beta$ ? Since new scores encompass more information about the (positive) behavior of borrowers, they are likely to reduce information asymmetry for banks because they are more accurate than the old scores<sup>21</sup>, and this would then lead to a negative coefficient  $\beta$ . Furthermore, Table 1 shows that the inclusion of positive information leads to new scores that are generally higher than the old ones. This could indicate the new information added to the old score generally increases the predicted creditworthiness of the borrower<sup>22</sup>, prompting again a negative expected  $\beta$ .

Another mechanism that influences  $\beta$  is related to the increased competition environment that the enhanced information sharing fosters, as all banks gain equal access to the new scores. Because of the fear of losing their current borrowers or targeted new ones to outside potential lenders that are now knowledgeable of the borrowers' new scores, banks would also likely decrease loan rates, regardless of any updated assessment of the borrowers' creditworthiness. That leads similarly to a negative expectation for  $\beta$ .

A way to gauge the relative strength of the competition channel is to examine the change in loan rates for *existing* borrower-bank pairs with and without new scores available. For those borrowers, the informational gain to banks from the new scores is likely less material, because banks have already gained knowledge about them from their relationships (and even more so the longer the relationship). Therefore, observable reactions from incumbent banks to the new scores are more likely derived from the fear of losing their borrowers to competitors than from a reassessment of risk.

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<sup>21</sup> Recall the bias-variance trade-off in statistics, where more complex models with more explanatory variables (e.g., new scores) usually display lower bias (higher accuracy). The premium charged for the bias would then be lower under the new scores.

<sup>22</sup> That is, the bias of the old score in predicting creditworthiness was probably negative. Notice too that PCBs have suggested there is comparability between the scales of the new and old scores, which implies subtracting them is a meaningful operation.

We also investigate whether the effects on interest rates depend on the relative magnitudes of the new scores. If there is a large (small) difference between the new and the old score, we could expect a large (small) difference in the interest rates. We calculate the average difference between the new score and the old score for each client across credit bureaus.

We group borrowers into quartiles based on this (new score – old score) difference. For each quartile  $d$  of the difference in scores, we create a dummy variable  $d_{qi}$  and estimate a coefficient  $\beta_q$ , analogous to  $\beta$  in equation (1), allowing the assessment of heterogeneous effects across those groups, measured against the reference group of borrowers with no new scores available. The specification is the following:

$$\ln(r_{libt}) = \alpha + \sum_{q=1}^4 \beta_q d_{qi} + \gamma * old_{score_{it}} + \theta_{bt} + \pi_{mt} + \mathbf{X}_{it}\boldsymbol{\lambda} + \mathbf{L}_1\boldsymbol{\Lambda} + \varepsilon_{libt} \quad (2)$$

where  $d_{qi}$  assumes the value of 1 when individual  $i$  belongs to quartile  $q$  of the distribution of the score difference, and zero otherwise.

Our coefficients of interest in equation (2) are the  $\beta_q$ 's, and they should be interpreted as the average percentual difference of loan rates between borrowers with, not only new scores available, but also located in the quartile  $q$  of the score difference, and similar borrowers lacking the new scores. In this way, if the relative magnitudes of the new scores are effective in predicting creditworthiness, reducing asymmetries and potentially fostering competition, these coefficients should be decreasing on  $q$  – besides being negative, as in (1), for the most part.<sup>23</sup> Moreover, we also apply specification (2) on existing borrower-bank pairs to investigate the strength of the competition channel.

We also investigate the role of bank ownership type – either private or public – on our results, re-estimating specifications (1) and (2) for separate samples of public and private banks. Finally, we add to specification (1) the relationship duration of the borrower-lender pair and its interaction with  $\mathbf{1}[NSA_i]$  to analyze the effects of information sharing on relationship lending.

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<sup>23</sup> On the other hand, clients in the first quartile of the score differences, which generally experience a decrease in scores, may suffer an increase in interest rates (i.e.,  $\beta_1$  positive).

## 4. Empirical Analyses

### 4.1. Baseline results

Our first baseline results unveil the average effect of borrowers having new scores based also on positive information. They are based on specification (1). Columns 1 and 2 of Table 2 show the effect of the availability of new scores on interest rates paid by borrowers in non-payroll personal loans.

As described in the previous section, the specification of column (1) has the logarithm of the loan interest rate as the dependent variable and a dummy for the availability of new scores as the main independent variable. The specification has several control variables, including the old score (statistically negative, as expected) as well as the fixed effects of the municipality, financial institution, and time. The coefficient on the existence of the new score indicates an interest rate 3.5% lower for those clients and statistically significant at 1%.

Column (2) presents a more saturated specification by interacting the loan maturity control and the fixed effects of financial institution and municipality with month. The coefficient for availability of new score indicates an average interest rate reduction of 3.7%, statistically significant at 1%. The decrease is equivalent to rates approximately 6.7 p.p. smaller when considering the average interest rate of 182% per year observed in our sample.

One concern with the specifications employed is that it is not possible to completely rule out the existence of confounding characteristics not captured by the control variables that correlate with the availability of new scores. To tackle this issue, we ran a placebo test using loans granted in August 2019, when the new scores had not yet been marketed. As mentioned previously, these counterfactual scores for 2019 were computed retroactively by PCBs to support our analysis.

Column (3) of Table 2 shows the results of the placebo exercise. The coefficient for the fake availability of new scores is not statistically significant. This provides further confidence that the drop in interest rates observed for borrowers with new scores available stems from the sharing of new positive information contained therein and not from variables omitted from the specification.

**Table 2 – New Score Availability and Interest Rates – All Clients**

	(1)	(2)	(3)
	<b>Aug-Dec 2020 Ln(Int. Rate)</b>	<b>Aug-Dec 2020 Ln(Int. Rate)</b>	<b>Aug 2019 Ln(Int. Rate)</b>
New Score Availability (0/1)	-0.0352*** (0.007)	-0.0369*** (0.007)	0.0040 (0.011)
Old Score	-0.0005*** (0.000)	-0.0005*** (0.000)	-0.0002*** (0.000)
# Observations	72,166	66,018	25,505
R <sup>2</sup>	0.76	0.77	0.74
Loan Controls	y	y	y
Borrower Controls	y	y	y
Municipality FE	y	n/a	y
Financial Institution FE	y	n/a	y
Month x Loan Maturity FE	n	y	n/a
Month x Municipality FE	n	y	n/a
Month x Fin. Inst. FE	n	y	n/a
# Financial Institutions	346	254	177
# Municipalities	3564	2550	2120
# months	5	5	1
% treated	0.91	0.92	0.90
Average Int. Rate (% p.y.)	180	182	197

Standard errors in parentheses

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

The second set of baseline results examines the effect of the magnitudes of the new scores, which go beyond the average availability effect just investigated. Borrowers are grouped into quartiles, according to the difference between their new and old scores. This difference is calculated only for the borrowers that have new scores available for sale. The borrowers for whom the new score increased signaled higher credit risk (new score lower than old lower score) are generally found to be located in the first quartile of the score differences. The estimation of (2) is shown in Table 3. The coefficient of a quartile of the score difference should be interpreted as the percentual interest rate difference of loans in that quartile and the control group of loans to borrowers with no new scores available.

Column (1) shows a statistically significant reduction in interest rates, of 8.5%, for borrowers in the fourth quartile. We also find statistically significant, but lower interest rate reductions, for borrowers in the second and third quartiles – when compared to the control group. In the first quartile, where the new scores are in general lower than the old scores, coefficients are positive.

Indeed, the point estimates of the quartile coefficients monotonically decrease the higher the quartile, as expected. Those estimates suggest the higher the relative improvement in predicted creditworthiness coming from the new score, the lower the interest rate.

The more saturated specification in column (2) has similar results, both in terms of statistical significance and magnitudes. Thus, the fourth quartile, with the highest score differences, reaches an average interest rate reduction of 8.9% (or approximately 16,2 p.p. when considering the average rate of 182% for the underlying sample).

The last lines of Table 3 show the results of equality tests between the coefficients of different quartiles. The tests corroborate the monotonic decrease of the coefficients as the quartile increases. Those results confirm that the relative magnitudes of the score differences improve the identification of borrowers' risk profiles, reducing informational asymmetries and potentially increasing competition relatively more for reassessed lower-risk borrowers. Column (3) of Table 3 shows the results of a placebo test using data from August 2019, before the implementation of the positive information sharing. Similarly to the results of Table 2, we do not find statistically significant effects in the placebo period, reducing the concern of omitted variables in our models<sup>24</sup>.

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<sup>24</sup> Despite the promising results on the effects of positive information sharing that we find on tables 2 and 3, generalizing the magnitude of our findings might be a problem because our sample period comprises the period between the first and the second waves of the Covid-19 pandemic in Brazil.

**Table 3 – Score Difference Quartiles and Interest Rates – All Clients**

	(1)	(2)	(3)
	<b>Aug-Dec 2020</b>	<b>Aug-Dec 2020</b>	<b>Aug 2019</b>
	<b>Ln(Int. Rate)</b>	<b>Ln(Int. Rate)</b>	<b>Ln(Int. Rate)</b>
Quartile 1	0.0148** (0.007)	0.0141* (0.008)	0.0067 (0.012)
Quartile 2	-0.0199*** (0.007)	-0.0217*** (0.008)	-0.0022 (0.012)
Quartile 3	-0.0458*** (0.007)	-0.0492*** (0.008)	0.0092 (0.012)
Quartile 4	-0.0836*** (0.007)	-0.0872*** (0.008)	0.0025 (0.012)
Old Score	-0.0005*** (0.000)	-0.0005*** (0.000)	-0.0002*** (0.000)
# Observations	72,166	66,018	25,505
R <sup>2</sup>	0.76	0.77	0.74
Loan Controls	y	y	y
Borrower Controls	y	y	y
Municipality FE	y	n/a	y
Financial Institution FE	y	n/a	y
Month x Loan Maturity FE	n	y	n/a
Month x Municipality FE	n	y	n/a
Month x Fin. Inst. FE	n	y	n/a
# Financial Institutions	346	254	177
# Municipalities	3,564	2,550	2,120
# months	5	5	1
% treated	0.91	0.92	0.90
Average Int. Rate (% p.y.)	180	182	197
p-value Q2=Q1	0.0000	0.0000	0.3316
p-value Q3=Q1	0.0000	0.0000	0.7887
p-value Q4=Q1	0.0000	0.0000	0.6419
p-value Q4=Q3	0.0000	0.0000	0.4378
p-value Q3=Q2	0.0000	0.0000	0.2028
p-value Q4=Q2	0.0000	0.0000	0.5997

Standard errors in parentheses.

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

## 4.2. Results for Old and New Clients

Next, we investigate what happens to our results when we split our sample into new borrower-bank pairs and existing old ones. The former includes borrowers most likely to be affected by an updated assessment of their creditworthiness revealed by the new scores to their new lenders that do not know them so well. The latter include borrowers affected mainly by the fear from their incumbent lenders of increasing competition from potential outside lenders that are now knowledgeable of their new scores. For the sample of old borrower-bank pairs, we only include borrowers that have multiple bank credit relationships, in order to make this sample more comparable to the sample of new borrower-bank pairs, where almost all borrowers have existing relationships with other banks.<sup>25</sup>

Table 4 shows the results about score availability using specification (1). The new score availability coefficient for new borrower-bank pairs indicates a drop above 5% in the interest rates charged to individuals with new scores available and a drop around 2.2% for old borrower-bank pairs. Therefore, the rate drop for old borrower bank pairs is around 43% of the variation realized for new ones. If the whole rate reduction of the former were due to the competition channel, this might suggest that at most the same 43% fraction of the observed decrease in rates for new borrower-bank pairs would also be driven by underlying competition (between the new lender and others)<sup>26</sup>. In that case, more than half of that variation would then be attributed to the mechanism of risk reassessment.

Table 5 shows that the reductions in loan rates increase with the quartile of the score differences<sup>27</sup> for both new and old borrower-bank pairs, although for the former the monotonic pattern is less strong<sup>28</sup>. For example, quartiles 2 and 3 for new clients have very similar coefficients, which are statistically indistinguishable. Furthermore, the reductions seem to be larger in all quartiles for new borrower-bank pairs, consistent with Table 4 and with the view that both the risk reassessment and the competition channels are quite active for those pairs.

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<sup>25</sup> See, for example, Degryse et al. (2016) for the impact of outside loans.

<sup>26</sup> The others include incumbent lenders of that borrower as well as potential new lenders too.

<sup>27</sup> We build distinct quartile score difference distributions for the new and old client samples.

<sup>28</sup> For example, quartiles 2 and 3 for new clients have very similar coefficients, which are statistically indistinguishable

**Table 4 – New Score Availability and Interest Rates – New and Old Clients**

	(1)	(2)
<b>Dependent Variable:</b>		
<b>Ln(Int. Rate)</b>	<b>New Clients</b>	<b>Old Clients</b>
New Score Available (0/1)	-0.0585*** (0.021)	-0.0223*** (0.009)
# Observations	3,926	59,721
R <sup>2</sup>	0.85	0.77
Loan Controls	y	y
Borrower Controls	y	y
Month x Loan Maturity FE	y	y
Month x Municipality FE	y	y
Month x Fin. Inst. FE	y	y
# Financial Institutions	54	224
# Municipalities	457	2,386
# months	5	5
% treated	0.71	0.94
Average Int. Rate (% p.y.)	300	172

Standard errors in parentheses.

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

**Table 5 – Score Difference Quartiles and Interest Rates – New and Old Clients**

<b>Dependent Variable: Ln(Int. Rate)</b>	(1)	(2)
	<b>New Clients</b>	<b>Old Clients</b>
Quartile 1	-0.0142 (0.027)	0.0293*** (0.009)
Quartile 2	-0.0518* (0.028)	-0.0081 (0.009)
Quartile 3	-0.0583** (0.027)	-0.0336*** (0.009)
Quartile 4	-0.1200*** (0.029)	-0.0730*** (0.009)
# Observations	3,904	65,784
R <sup>2</sup>	0.85	0.75
Loan Controls	y	y
Borrower Controls	y	y
Month x Loan Maturity FE	y	y
Month x Municipality FE	y	y
Month x Fin. Inst. FE	y	y
# Financial Institutions	54	224
# Municipalities	457	2386
# months	5	5
% treated	0.71	0.94
Average Int. Rate (% p.y.)	300	172
p-value Q2=Q1	0.1824	0.0000
p-value Q3=Q1	0.1137	0.0000
p-value Q4=Q1	0.0005	0.0000
p-value Q4=Q3	0.0361	0.0000
p-value Q3=Q2	0.8183	0.0000
p-value Q4=Q2	0.0206	0.0000

Standard errors in parentheses

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

### 4.3. Results for Private and Public Financial Institutions

An important feature of the Brazilian financial system is the presence of both private and public banks, which may have distinct roles and behaviors. While private banks are primary profit-driven, public banks have also other public policy goals like increasing competition (see Schmitz, 2020 and Joaquim et. al., 2023), or even political considerations (Carvalho, 2014), so that profitability is important but not the sole objective. Moreover, public banks face bureaucratic hurdles<sup>29</sup> which can slow down decision-making processes and reduce operational efficiency.

Given these differences, we investigate the heterogeneity of our results, analyzing the effects on the subsamples of private and public financial institutions. Table 6 shows the availability of new scores significantly lowers the interest rate of loans granted by private institutions, not by public ones. Although negative, coefficients for public banks are not statistically significant.

**Table 6 – New Score Availability and Interest Rates –  
Public and Private Financial Institutions**

	(1)	(2)	(3)	(4)
	<b>Private Fin. Inst.</b>		<b>Public Fin. Inst.</b>	
<b>Dependent Variable: Ln(Int. Rate)</b>	<b>New Clients</b>	<b>Old Clients</b>	<b>New Clients</b>	<b>Old Clients</b>
New Score Available (0/1)	-0.0617** (0.027)	-0.0265** (0.011)	-0.0333 (0.037)	-0.0099 (0.014)
# Observations	3,057	39,429	436	16,902
R <sup>2</sup>	0.84	0.74	0.62	0.46
Loan Controls	y	y	y	y
Borrower Controls	y	y	y	y
Month x Loan Maturity FE	y	y	y	y
Month x Municipality FE	y	y	y	y
Month x Fin. Inst. FE	y	y	y	y
# Financial Institutions	47	206	4	9
# Municipalities	370	1,809	69	1,010
# months	5	5	5	5
% treated	0.74	0.95	0.62	0.91
Average Int. Rate (% p.y.)	347	221	83	69

Standard errors in parentheses

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

<sup>29</sup> Because of the legal framework in Brazil, public banks must follow a complex process in order to hire staff and services.

We also compare the results with the quartile differences using specification (2). Table 7 shows public banks lower the interest rate of loans only to individuals located in the 4<sup>th</sup> quartile of the score difference, whereas private banks reduce rates for individuals across quartiles 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> (but increase for individuals in the 1<sup>st</sup> quartile).

Those results indicate that the empirical results of the previous sections are largely driven by the behavior of private banks. Since the availability of new scores was a quite recent phenomenon during our sample period, the results of Tables 6 and 7 are consistent with private banks being quicker towards incorporating the new scores into their risk assessment models and pricing strategies. On the other hand, the new scores seem to have mattered so far for public banks only when they were much larger than the old scores (4<sup>th</sup> quartile of the score difference) and for old clients. The fourth quartile for public banks is not statistically significant for new borrowers, where the risk reassessment would be the main channel. Therefore, public and private banks differ more in that channel, consistent with a quicker adjustment of risk assessment procedures by private banks.

**Table 7 – Score Difference Quartiles and Interest Rates –  
Public and Private Financial Institutions**

	(1)	(2)	(3)	(4)
	<b>Private Fin. Inst.</b>		<b>Public Fin. Inst.</b>	
<b>Dependent Variable: Ln(Int. Rate)</b>	<b>New Clients</b>	<b>Old Clients</b>	<b>New Clients</b>	<b>Old Clients</b>
Quartile 1	-0.0007 (0.033)	0.0267** (0.012)	-0.0086 (0.045)	0.0221 (0.015)
Quartile 2	-0.0530 (0.034)	-0.0138 (0.012)	0.0310 (0.046)	-0.0002 (0.015)
Quartile 3	-0.0799** (0.033)	-0.0407*** (0.012)	-0.0930 (0.060)	-0.0100 (0.015)
Quartile 4	-0.1225*** (0.036)	-0.0734*** (0.012)	-0.0657 (0.055)	-0.0498*** (0.015)
# Observations	3,057	39,429	436	16,902
R <sup>2</sup>	0.84	0.74	0.62	0.46
Loan Controls	y	y	y	y
Borrower Controls	y	y	y	y
Month x Loan Maturity FE	y	y	y	y
Month x Municipality FE	y	y	y	y
Month x Fin. Inst. FE	y	y	y	y
# Financial Institutions	47	206	4	9
# Municipalities	370	1,809	69	1,010
# months	5	5	5	5
% treated	0.74	0.95	0.62	0.91
Average Int. Rate (% p.y.)	347	221	83	69
p-value Q2=Q1	0.1139	0.0000	0.4020	0.0179
p-value Q3=Q1	0.0160	0.0000	0.1952	0.0008
p-value Q4=Q1	0.0007	0.0000	0.2993	0.0000
p-value Q4=Q3	0.2214	0.0000	0.6939	0.0000
p-value Q3=Q2	0.4195	0.0002	0.0494	0.2965
p-value Q4=Q2	0.0499	0.0000	0.0756	0.0000

Standard errors in parentheses

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

#### 4.4. Relationship duration and information sharing

The next set of exercises investigates deeper the interest rate reductions observed for old borrower-bank pairs that we previously claimed to come mainly from the competition mechanism (with other potential and active lenders). For that purpose, we follow a novel strategy and interact, in specification (1), the dummy of new score availability with the length of the borrower-bank credit relationship, the latter either in a (log) continuous version – in column (1) – or in a discrete mode, as indicators of length greater than one or two years – columns (2) and (3). We focus here on the sample of private banks, given the results of the previous section.

The availability of the new score allows stronger competition forces among the lenders to take place, reducing the informational monopoly power of the incumbent banks (e.g., Petersen and Rajan, 1994; Petersen and Rajan, 1995). Longer-term clients may benefit relatively more (from lower rates) because they were facing greater informational monopoly *ex-ante*. The length of the relationship between the client and its current lender may be a proxy for the amount of *private* information an institution has, and its ability to lock-in the client. Table 8 shows a negative sign for the interaction *New Score Available x Relationship Length*, which is consistent with that channel of stronger competition.

The result above is important because another channel could also be at play with varying relationship durations. Indeed, the longer is the relationship, the lower the informational utility of the new score for the incumbent bank and, consequently, the lower the potential for change in rates charged by that bank due to variations in risk assessment brought about by the new scores. Therefore, Table 8 reveals that old borrower-bank pairs with longer relationships are relatively more affected (i.e., greater reductions in rates) by the availability of the new scores mainly because of the competition channel, instead of by a risk reassessment channel<sup>30</sup>.

The negative *New Score Available x Relationship Length* coefficients indicate the availability of the new scores has beneficial effects for borrowers in reducing their charged interest rates in new personal loans as the relationship length increases. The coefficient on column (2) implies loan rates around 7% lower for borrowers with new

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<sup>30</sup> That is not to say the latter is not present but only that it is not the main channel for old borrower-bank pairs.

scores and relationship duration over one year. The information sharing through the new scores reduces a wider room of informational rent extraction by incumbent banks, the longer is the relationship. As a result, the ability of lenders to informationally lock-in long-term relationship borrowers is restricted.

The above contrasts with the situation before the new law, where the hold-up problem and switching costs possibly did not decrease with longer borrower-bank relationships. In that regard, notice importantly the statistically not significant coefficient on the variable length of relationship alone. Borrowers without new scores, therefore under limited competition forces, do not benefit from the potential cost reductions from more accurate assessments of credit risk due to longer relationships, possibly due to existent informational monopoly. In other words, that evidence is consistent with private lenders locking-in those borrowers. That result is also in line with what Ornelas et. al. (2022) find for the Brazilian private corporate loan market.

At the end of Table 8, we show the sum of the *Relationship Length* coefficient with the *New Score Available* x *Relationship Length* coefficient. The value of this sum represents the total effect of relationship duration on interest rates for borrowers with new scores, and it is significantly negative in all columns, consistent with reduced hold-up problems in the context of information sharing. Therefore, those borrowers experience interest rate reductions as relationship duration increases.<sup>31</sup>

Overall, the results of this section suggest information sharing may be creating hurdles for lenders to lock-in their clients, since they no longer have the informational monopoly on the latter. While private lenders can lock-in clients still not affected by the new law, the lower information asymmetry is transmitted into lower rates for those individuals with the new scores available.

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<sup>31</sup> The non-significance of the variable *New Score Available* alone suggests our previous results on old clients are largely driven by long-term borrower-bank relationships.

**Table 8 – Relationship Duration, New Score Availability, and Interest Rates**

	(1)	(2)	(3)
<b>Dependent Variable: Ln(Int. Rate)</b>	<b>Logarithm of relationship duration</b>	<b>Dummy for relationship over 1 year</b>	<b>Dummy for relationship over 2 years</b>
New Score Available (0/1)	-0.0119 (0.0128)	0.0305 (0.0245)	0.0048 (0.0209)
Relationship Length	0.0042 (0.0054)	0.0077 (0.0274)	-0.0024 (0.0243)
Relationship Length x New Score Available	-0.0121** (0.0050)	-0.0698** (0.0273)	-0.0416* (0.0245)
Relationship Length + Relationship Length x New Score Available	-0.0079*** (0.0030)	-0.0621*** (0.0143)	-0.0439*** (0.0104)
# Observations	39,429	39,429	39,429
R <sup>2</sup>	0.74	0.74	0.74
Loan Controls	y	y	y
Borrower Controls	y	y	y
Month x Loan Maturity FE	y	y	y
Month x Municipality FE	y	y	y
Month x Fin. Inst. FE	y	y	y
# Financial Institutions	206	206	206
# Municipalities	1,809	1,809	1,809
# Months	5	5	5
Average Int. Rate (% p.y.)	221	39,429	221

Standard errors in parentheses

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

## 5. Final Remarks

This paper investigates how new credit scores from private bureaus, based on positive information, affect bank loan interest rates in a context where the banks already had access to some positive information through the public credit registry. We exploit the initial effects of a legal change in Brazil that allowed private credit bureaus to develop and sell these new credit scores of approximately 100 million individuals.

We find evidence of lower interest rates associated with the new positive information-sharing mechanism conducted by private credit bureaus. Our results show an average reduction of 3.7% in the interest rates of personal loans to borrowers that had new scores available for sale, compared to borrowers who remained only with old credit scores.

The effects are stronger when the new scores are much higher than the old ones, reaching an average reduction of 8.7% in that case. Furthermore, the reductions in rates are higher for new borrower-bank pairs, where both a risk reassessment and a competition channel are possibly at play than for old ones, where possibly the competition channel is the main driver. Indeed, results modulated by the length of the borrower-bank relationship show evidence consistent with the existence of a competition channel for old borrower-bank pairs. Finally, the results are overall driven by the behavior of private banks.

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