# Adverse Selection and Learning Incentives: Evidence from Canada's Consent for Credit Limit Increase Regulations*

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**Abstract**

This paper documents the impact of regulations that require lenders to garner consent for credit limit increases. Leveraging regulatory changes in the Canadian credit card market, we find that requiring consumer consent prior to a credit limit increase led to more adverse selection as measured by increased late payments, delinquency, and charge-offs. In response to these regulations, lenders decreased the size of credit limits increases, and counterintuitively, increased the frequency of credit limit increases. We develop a precautionary savings model with endogenous credit limits to study the role of learning and adverse selection in markets with incomplete information. We show that learning from acceptance decisions can rationalize our empirical results. Our model suggests that requiring consumer consent reduced lender profits but had negligible effects for consumers. Counterfactuals demonstrate that under higher interest rates, requiring consumer consent would decrease credit provision.

*Keywords* — Adverse Selection, Credit Limits, Bayesian Learning, Credit Card Lending
*JEL Classification Numbers* — D82, G28, G21, D14, D83

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# 1 Introduction

In markets with incomplete information, such as consumer credit markets, consumers select products based on their private information and lenders face adverse selection. Lenders typically offer a combination of interest rates and credit limits that can vary over time depending on repayment behavior. In credit card markets, rates typically remain unchanged throughout the lifespan of an account (Ausubel, 1991; Drechsler et al., 2025; Knittel & Stango, 2003) while credit limits vary substantially across borrowers and within borrower over time (Agarwal et al., 2018; Aydin, 2022; Fulford, 2015).

In this paper, we highlight a trade-off between regulatory safeguards for informed consent and the informational frictions they can amplify. We exploit heterogeneous compliance with Canada's *Credit Business Practices Regulations* (CBP) under the *Consent for increases in credit limits* (CG5) guidelines as a laboratory to study the role of adverse selection and learning in credit markets. We find evidence of greater adverse selection as a result of the policy. Borrowers who received credit limit increases under the express consent provisions of CBP increased utilization and were riskier in the long run, as measured by late payments, delinquency, and charge-offs. Our estimates suggest that borrowers who selected into credit limit increases saw a 4.6 percent increase in the amount of past due payments, a 4.4 percent increase in the amount delinquent, and a 1.7 percent increase in lender charge-offs relative to those for whom credit limit increases were automatically applied.

Despite facing greater adverse selection, we find that CBP-compliant lenders offered more frequent credit limit increases of a smaller size. In total, credit provision weakly decreased by about $54 per account per year. Given that increased adverse selection should lead to markedly less credit provision, the finding that lenders increased the frequency of credit limit increases appears counterintuitive. We develop a model of precautionary savings with adverse selection and learning to rationalize these findings. We calibrate the model to moments in the Canadian data and use it to evaluate how requiring express consent affected consumer and lender surplus. We validate our model by comparing our model's predictions on the frequency and size of credit limit increases to data from the pre- and post-CG5 periods. We find that the policy had little effect on consumer surplus, but decreased lender profits. Running a counterfactual with higher interest rates, we find our results depend on the prevailing monetary policy. With higher interest rates, we find a policy like CG5 would decrease both the frequency and size of credit limit increases.

Following the Great Recession, the Government of Canada implemented CBP to limit business practices deemed not beneficial to consumers (Government of Canada, 2009b). The express consent provisions of these policies, under the CG5 guidelines, required Federally Regulated Financial Institutions (FRFIs) to obtain borrower express consent before increasing a borrower's credit limit (Government of Canada, 2009a). Prior to CBP, Canadian FRFIs could increase borrower credit limits at will, as is still the case in the United States.

The express consent provisions of CBP intended to give borrowers greater control of their finances and prevent lenders from raising limits to levels that do not benefit the consumer. However, these laws may also create a new source of adverse selection in the consumer credit card market. Borrowers who anticipate future financial distress or expect to revolve higher balances may be more likely to accept any offers of an increase, while more stable or risk-averse borrowers may decline. As a result, the pool of borrowers who select into higher credit limits may be riskier, potentially leading to greater delinquency and charge-offs. Depending on the magnitude of the adverse selection, the policy could discourage FRFIs from offering increases in credit limits to their existing borrowers.

We argue that this policy also introduced a new channel for FRFIs to learn about borrowers' riskiness. By offering borrowers credit limit increases, lenders can learn about borrower riskiness based on their decision to accept or not. Because the credit market is built on long-term relationships between lenders and customers, FRFIs may have an incentive to use this new mechanism to learn more about their borrowers. As a result, it is possible that express consent policies, like those in CBP, can lead to greater credit provision, despite the introduction of an additional source of adverse selection.

**Related Literature:** This paper contributes to a large literature on adverse selection. Chiappori and Salanie (2000) test for adverse selection and moral hazard in the insurance market. Einav et al. (2012) test for adverse selection in the consumer credit market. Other papers have used randomized trials of credit card offers (Agarwal et al., 2024) and loan terms (Hertzberg et al., 2018), to measure adverse selection and screening in credit markets. Similar to these papers, we measure adverse selection in credit markets. We contribute by documenting a novel form of adverse selection arising from consumer consent regulations.

A large literature has developed studying the role of information and learning in credit markets. Given the importance of reputation in markets with adverse selection (Diamond, 1989), borrowers have incentives to signal their private information and lenders have

incentives to try to learn about borrowers to overcome these frictions. Athreya et al. (2012), Einav et al. (2013), and Drozd and Serrano-Padial (2017) attribute much of the rise in consumer credit to improvements in lenders' ability to access information about consumers' credit history. Other papers have focused on optimal public information reporting in credit markets, such as Foley et al. (2020) and Blattner et al. (2022). Agarwal et al. (2015) show that the U.S. CARD Act's fee and repricing restrictions reduced borrowing costs by roughly 1.6–1.7 percent of average daily balances, while Keys and Wang (2019) demonstrate that minimum-payment disclosures causally shift repayment behavior and debt paydown, underscoring the importance of disclosure design. Nelson (2025) shows that while the CARD Act's interest-rate constraints exacerbated adverse selection, they benefited consumers by preventing lenders from price discriminating. This paper contributes to this literature by showing that lender learning incentives in credit markets can generate unintended consequences for regulations aiming to limit credit provision.

Our paper also contributes to the literature on credit card credit limits. Early work shows that limits shape spending and delinquency: Gross and Souleles (2002a) find effects for both binding and slack borrowers, consistent with precautionary saving, and Gross and Souleles (2002b) link higher limits to greater risk taking and default. Subsequent studies—including Agarwal et al. (2018) using FICO-score discontinuities, as well as Aydin (2022) and Xu (2023)—corroborate that credit limit increases can lead to increased borrowing and risk. Related, Matcham (2024) analyzes the UK market, where limits are individualized but interest rates are not. This paper documents the effects of consent regulations on consumer credit limits and highlights the endogenous response of lenders.

Closest to our setting, Allen et al. (2024) study a Quebec (Canada) reform that progressively raised minimum payments on credit card balances and document a trade-off between reducing revolving debt and restricting credit access, with potential increases in delinquency.

To rationalize our empirical results and study the conditions under which banks increase lending when facing increasing adverse selection, we expand on the quantitative macro model of Chatterjee et al. (2023). We introduce endogenous credit-limit choice by a monopolist issuer. Market power and long-term relationships interact with the profit motive to generate incentives for the lender to learn about borrower riskiness.

# 2 Institutional Details

## 2.1 Canadian credit card market

The Canadian credit card market is dominated by the "Big Five" banks—The Royal Bank of Canada, Toronto-Dominion Bank, Bank of Montreal, Scotiabank, and Canadian Imperial Bank of Commerce. These banks collectively control the vast majority of banking assets and hold 88 percent of credit card outstanding balances in Canada (Ho et al., 2022). On the network side, most Canadian credit card payments flow through Visa and Mastercard (Welte & Molnar, 2020).

Credit cards are widely held in Canada and central to how Canadians make purchases—during our sample period, 89 percent of adults have at least one credit card, and cards accounted for 56 percent of transaction value and 39 percent of transaction volume at the point of sale (Henry et al., 2018). For context, US consumers made 31 percent of their 2022 payments with credit cards, and 80 percent of families held at least one card (Foster et al., 2023).

Credit limit increases are either offered by lenders or requested by consumers. In Canada, the demand channel is small. According to the Financial Consumer Agency of Canada's (FCAC) *Survey of Canadians' Use of Banking Products and Services*, less than 5 percent of respondents who contacted their bank and received financial help said they obtained a credit limit increase on a credit card or personal line of credit (Government of Canada, 2021). As a result, our results are likely driven by lender initiated credit limit increases.

## 2.2 Credit limits, CBP, and CG5 guidelines

In response to the 2008 global financial crisis and rising credit card debt, the Government of Canada introduced CBP in January 2010 to "enhance the protection of consumer financial products," and "limit financial institutions' business practices that are deemed not to be beneficial to consumers" (Government of Canada, 2010). Following the introduction of these regulations, the government clarified the interpretation of the express consent provisions in CBP and how they should be implemented by banks, and financial institutions, through the CG5 guidelines. CG5 clarified that FRFIs are required to "obtain express consent from consumers prior to increasing the credit limit on their credit card accounts." Regulators argued that these new requirements would allow consumers to be better informed about

their credit. Monitoring and implementation of the CBP is conducted by the FCAC. Failure to comply with the regulation can result in regulatory penalties, reputational damage, and increased scrutiny or supervision by regulators.

On April 28, 2011, the FCAC issued further guidance on compliance with the regulations after discovering that several unnamed institutions implemented a process to obtain a one-time or "evergreen" consent from borrowers. Under an "evergreen" agreement, borrowers provided consent for any and all future credit limit increases, undermining the spirit of the regulation. The FCAC argued that evergreen consent contracts did not meet the standard of express consent that is required under the Credit Business Practices Regulations (Government of Canada, 2010).

Thus, starting on April 28, 2011, CG5 guidelines stated that FRFIs are required to obtain express consent from consumers in *each instance* of a proposed credit limit increase, and obtain such consent *at the time* of the proposed credit limit increase (Government of Canada, 2010). We define the pre-CG5 period as January 1, 2009 to December 31, 2009 and the post-CG5 period as May 1, 2011 to December 31, 2017 in our data. Given that the regulatory guidance was unclear, we drop the period from January 2010 to April 2011.

Figure 1 graphically illustrates the changes in borrower decision nodes after the government publishes the CG5 guidelines. Prior to CG5, if the bank wished to increase a borrower's credit limit, it could simply apply it to the borrower's account. After CG5, the bank must first *offer* the borrower the credit limit increase and then wait for the borrower's consent before applying it to their account. This change effectively created a new point at which the borrower can self-select based on private information. For instance, a borrower who expects future financial distress or expects to revolve higher balances may be more likely to accept the increase, while many other consumers are likely to either decline or ignore the request. As a result, the pool of borrowers who select into higher credit limits could become riskier.

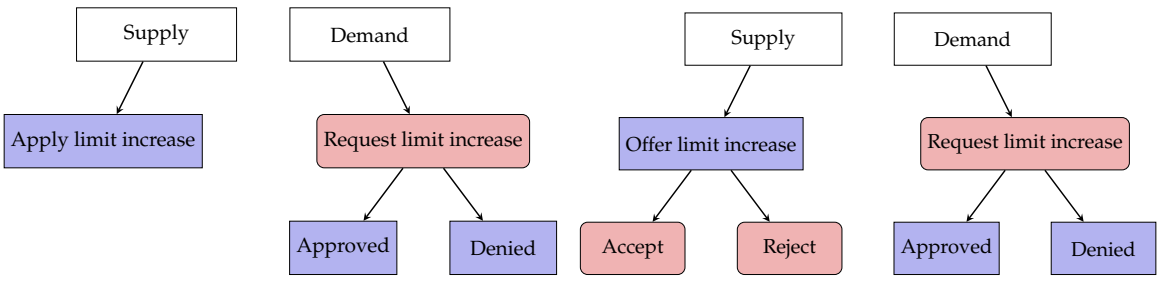
Notably, in the United States, credit card issuers can raise a customer's credit limit without explicit prior consent, as long as they have evaluated the customer's ability to pay under the Credit Card Act's requirements (111th Congress, 2009; Consumer Financial Protection Bureau, 2024). Canadian regulations are thus, stricter—banks must obtain the consumer's express consent each time they offer a credit limit increase. Australia's rules are the most restrictive: banks are prohibited from making unsolicited credit limit increase offers at

all, effectively allowing limit hikes only when initiated or explicitly agreed to by the cardholder (Australia Securities & Investments Commission, 2019; Australian Government, 2009). Canada's consent requirement lies midway between the more permissive U.S. system and Australia's outright ban on unsolicited credit line increases, giving Canadian consumers greater control over limit increases than in the U.S. but with more flexibility than in Australia.

### 2.3 Violations of CBP

By notice of violation issued on May 6, 2019, the FCAC alleged that Canada's largest bank, The Royal Bank of Canada (RBC), committed a violation of the Credit Business Practices in relation to credit card limit increases from February 1, 2015 to March 16, 2017. The Agency reviewed RBC's control framework, including sales procedures, training materials and oversight policies and practices relating to pre-approved credit limit increases. The agency found that "the sales procedures for both in-branch and phone-channel sales did not include scripts to guide the employee on how to present the offer or how to properly obtain the customer's consent." FCAC staff also found that "the procedures did not present the regulatory requirement for express consent and did not capture the expectation that the offer be presented clearly and simply, with a clear explanation and a clear request to either accept or decline the offer." Moreover, "RBC's training manual in place at the time for pre-approved credit limit increases was also inadequate as it contained only one reference to express consent, which related to joint cards," (Financial Consumer Agency of Canada, 2020).

**Figure 1:** CG5 Policy Graphical Representation




**(a)** Pre-CG5 **(b)** Post-CG5

*Notes:* Figure 1 above illustrates the changes in borrower decision nodes pre- and post-CG5 implementation. Panel (a) illustrates the decision nodes of firms and borrowers pre-CG5. Panel (b) illustrates the decision nodes post-CG5. Blue boxes represent firm decision nodes. Red boxes represent borrower decision nodes. Following the introduction of the current version of CG5 in April 2011, borrowers have an additional set of decision nodes under the supply channel of CG5, wherein firms offer credit limit increases to borrowers. Borrowers may now accept or reject any credit limit offer from firms that complied with the policy.

Most notably, in the published decision, it is stated that RBC objected to its name being made public, and that "RBC's view is that the concept of express consent has evolved since the Regulations came into force on January 1, 2010," (Financial Consumer Agency of Canada, 2020). The FCAC explicitly stated that it did not review materials from RBC prior to 2015. In our analysis we assume that RBC only adhered to the full spirit of CG5 starting in 2019, following the FCAC investigation. Whether RBC intended to violate CBP or misunderstood the legislation, is irrelevant for analysis. We simply use the fact that the FCAC found them non-compliant to test the impact of compliance with CBP on borrower outcomes. This gives us a control group for a difference-in-differences research design to evaluate the effects of the policy.

Given the FCAC's published decision on RBC's violations of CBP from February 1, 2015 to March 16, 2017, accounts opened with RBC were effectively operating as if the express consent provisions of CBP were not in place. To study the effects of the express consent provisions of CBP, we compare borrowers with credit card accounts from CBP-compliant Canadian banks to borrowers with accounts from RBC, controlling for demographic differences across the two groups and borrower unobserved heterogeneity. In Appendix B, C and E, we conduct robustness checks by studying effects on different horizons for long-term outcomes, including additional control variables, and reporting our main results on a one-to-one propensity score-matched sample, respectively.

# 3 Data

## 3.1 Canadian Consumer Credit Bureau data

We use anonymized TransUnion credit report data from the universe of Canadians with a credit product. We use the full sample of borrowers with at least one credit card product between January 1, 2009 and December 31, 2017. For every individual, we observe monthly account-level information, even for accounts that are no longer active or have been closed. For each month and card, we observe the issuer of the card, the card's credit limit, current balance, payments, any amount past due, delinquent, or charged-off, and the account age. For the borrower, we observe their credit score, their age, their region of residence, and consumer-level measures of the account-level data.[1]

[1]Borrower information is for the primary card holder. Supplementary cards are not reported in the credit bureau data—all activity is attributed to the primary account holder. In the rare instances where a card is jointly owned, we observe both cardholders.

We focus on active credit card accounts with credit limits between $250 and $50,000. To compare borrower outcomes of RBC versus similar institutions that complied with CG5, we use only accounts from the largest five Canadian banks. To maintain a large enough sample of regional borrowers, we also keep accounts from President's Choice Financial. In total, our sample includes 24,063,547 borrowers and approximately 1.58 billion account-month observations.

### 3.2 Measuring credit limit increases and outcomes

We measure credit limit increases as instances when the credit limit reported on a given borrower's account increases from the value recorded in the previous month. Given that we have account level information, instances when the account credit limit increases are distinct from when the borrower receives a new card. We exclude credit limit increases for the borrower due to new card issuance.

In Table A.3, we report probit regressions for the probability of receiving a credit limit increase in period $t + 1$, estimated separately for the pre- and post-CG5 periods. We present marginal effects evaluated at mean levels of existing credit limits, utilization rates, credit scores, age of the account, and age of consumer. We find that higher existing credit limits and utilization rates increase the probability of receiving credit limits, while age of the account and consumer decreases the likelihood. The magnitudes of the estimated average marginal effects do not differ significantly across the two periods. Banks in our sample give credit limit increases more frequently to active borrowers who are younger.

Our four main outcomes of interest are measured in the credit bureau data, as follows. **Amount past due** is the amount on any missed payment reported to the credit bureau by the lender. Missed payments occur when a borrower fails to pay the minimum payment on a credit card statement by the statement date.[2] **Maxmimum amount delinquent** is the maximum amount of any missed payment appearing in the borrower's credit history that is overdue for 30 days or more. **Amount charged-off** is measured as any unpaid delinquent amount the lender is no longer attempting to collect from the borrower, writing it off their balance sheets as a loss. **Utilization** is measured as the ratio of current balance of the account over the credit limit at the time of reporting.

For robustness checks in Appendix B, we also look at an indicator for late payments, defined

[2]Minimum payments are inclusive of any interest, fees, and repayment of capital (Allen et al., 2024).

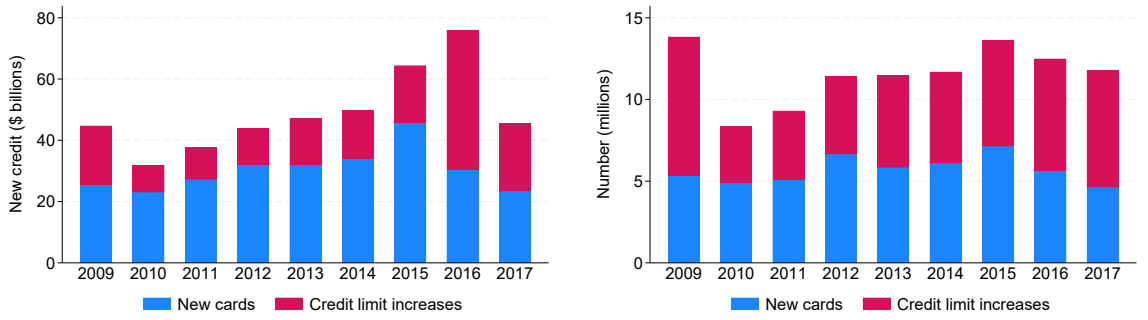
as having positive amount past due value, as an indicator for delinquency, defined as having positive delinquent value, and an indicator of having charge-offs, defined as having positive charge-off value.

## 3.3 Summary Statistics

### 3.3.1 Credit limits vs. new cards

We begin by illustrating the importance of credit limits to borrowers' access to credit. In Figure 2, we document the amount of new credit in the Canadian credit market from either new cards or credit limit increases on existing cards over time. Over 2009 to 2017, the share of credit derived from credit limit increases is between 30-50 percent of the total new credit added to the market each year, as seen in Panel (a). In Panel (b), we see that, in a typical year, there are as many credit limit increases as new credit card issues.

**Figure 2:** Extensive and intensive margins of new credit




**(a)** Credit from new cards vs. credit limit increases

**(b)** Number of new cards vs. number of cards that receive credit limit increases

*Notes:* All graphed series in Figure 2 are computed by the authors using the full TransUnion Canada accounts-level data set. Panel (a) summarizes the total amount of credit added per year from new credit card accounts (blue) and from credit limit increases on existing credit card accounts (red). Panel (b) plots the total number of new credit card accounts added (blue) and the total number of existing credit card accounts that received credit limit increases (red) by year.

### 3.3.2 Statistics by bank compliance with CG5

Table A.1 provides an overview of borrower-account characteristics and outcomes, by bank compliance with the express consent provisions of CBP, over the pre-CG5 period. Panel (a) summarizes key variables of interest for accounts associated with RBC, the institution found by the FCAC to have violated CBP under the CG5 guidelines. Panel (b) summarizes the same variables for CBP-compliant Canadian institutions. Table A.2 summarizes the same variables by CBP compliance over the whole sample period.

In our sample, approximately 21 percent of borrowers have credit cards from both RBC and one of the CBP-compliant banks. Borrowers of both RBC and other institutions have a 1.6-2.1 percent probability of receiving a credit limit increase in any given month pre-CG5. The average size of credit limit increases are similar for both RBC and other institutions, around $3,000 over the whole sample. Utilization is also similar—27 percent on average at RBC and 24 percent at CG5 complying institutions pre-CG5. Accounts from both groups have a 1.6-1.9 percent probability of being past due, a 1.7-2.2 percent probability of being delinquent, and similar average credit scores of approximately 770.[3]

Noticeably, RBC has higher average credit limits during the pre-CG5 period than the other institutions. RBC's average credit limit is around $10,306, whereas other institutions average around $8,113. The median RBC account also has a current balance around, at $2,363, compared to $1,901 at CG5 complying institutions. RBC and other institutions, in general, have similar customers along a number of observable dimensions. In our main empirical test of adverse selection, we control for variables that differ between complying banks and RBC. As robustness checks, we also employ one-to-one propensity-score matching to test on similar accounts from the two compliance groups in Appendix E.

## 4 An Empirical Test for Adverse Selection

In this section, we use a difference-in-differences approach exploiting the FCAC's finding of non-compliance with CG5 by RBC to test for the presence of adverse selection due to this regulation. The key to this test lies in the fact that for the lenders who complied, the borrowers *selected* into a credit limit increase post-CG5. We regress long-term borrower outcomes on an indicator of whether the borrower's credit limit increased using data from the post-CG5 period. We compare accounts of lenders that complied with the law compared to those that did not. We find that borrowers who had credit cards with lenders complying with CG5—those whose borrowers had to explicitly accept credit limit increases—on average, had worse outcomes conditional on receiving a credit limit increase compared to borrowers from RBC who were given credit limits without express consent. We take these findings as evidence that CG5 increased adverse selection in the Canadian credit market.

[3]Credit scores in Canada typically range from 300 to 900, as opposed to a maximum of 850 in the United States.

### 4.1 Empirical Approach

We examine whether CG5 increased adverse selection for the lenders that complied. We compare the difference in several indicators of long-term outcomes: the amount that is past due, the maximum amount that is delinquent, and the amount charged-off by the lender. We compute forward-looking moving average at 12-, 24-, and 36-months, of these variables to construct $\overline{Y}$, the dependent variable. To preserve zeros, all variables in dollar values are transformed with the inverse-hyperbolic-sine function. Then we estimate the difference in outcomes of borrowers with and without credit limit increases for lenders complying with CG5, compared to borrowers from RBC, by running regression specifications of the following form:

$$\begin{aligned}\overline{Y}_{ij,t+k} = \beta_1 \, \text{CLIncrease}_{ijt} + \beta_2 \, \text{CBPCompliant}_{ij} \\ + \beta_3 \, (\text{CLIncrease}_{ijt} \times \text{CBPCompliant}_{ij}) \\ + \mathbf{X}_{ijt} \, \boldsymbol{\gamma}' + \eta_i + \eta_{r(i)} + \eta_{y(t)} + \varepsilon_{ijt},\end{aligned} \tag{1}$$

where $\overline{Y}_{ij,t+k}$ are the forward looking moving averages from $t+1$ to $t+k$ of the outcome variables of interest. Additionally, $\text{CLIncrease}_{ijt} = 1$ if borrower $i$ received a credit limit increase on account $j$ in time $t$, $\text{CBPCompliant}_{ij} = 1$ if borrower $i$'s credit card account $j$ is from a Canadian bank other than RBC, $\mathbf{X}_{ijt}$ are borrower- or account-level time-varying characteristics, $\eta_i$ are borrower fixed effects, $\eta_{r(i)}$ are forward sortation area (FSA) fixed effects, $\eta_{y(t)}$ are year fixed effects, and $\nu_{ijt}$ are error terms.[4] The key parameter of interest for these regressions is $\beta_3$, the effect of a credit limit increase done by a complier on borrower outcomes.

Although equation (1) looks like a standard difference-in-differences with treatment and control groups, our estimates should not be interpreted as an average treatment effect. Instead, we interpret this regression as a test of adverse selection. A positive and significant $\beta_3$ coefficient implies that credit limits increases on accounts from lenders that complied with CG5 lead to a higher level of negative borrower outcomes than accounts from RBC. This suggests that borrowers who accepted credit limit increases from complying lenders *selected* into higher credit limits than the borrowers who had automatic credit limit increases applied at RBC. Further, we note that if treated outcomes move in the pre-period toward

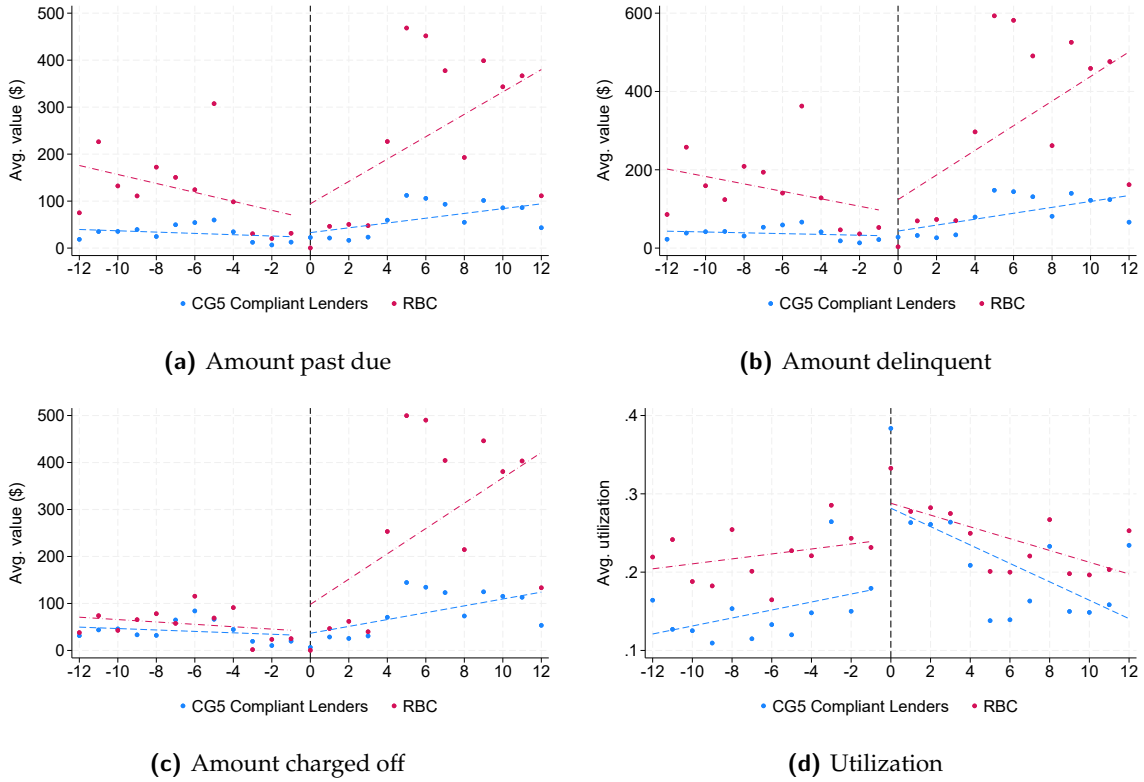
[4] Forward sortation areas are geographical regions defined by the first three characters of Canadian postal codes.

the post-level, the pre-post gap for non-RBC institutions shrinks, which would bias our estimates towards zero. The biggest challenge for our test to overcome is a violation of parallel trends: if RBC outcomes of trended towards the post-level *faster* in the pre-period than other institutions, then the estimates are biased upwards. We provide evidence that the parallel trends assumption holds in the section below using unconditional month-year averages, as well as using estimated month-year fixed-effects in Appendix D.1. To account for compositional changes and spillovers to controls, we control for borrower fixed-effects in some specifications. Under additional assumptions of noncompliance from RBC throughout May 2011 to March 2017, monotonicity, and SUTVA, our estimates can also be interpreted as a local average treatment effect (Goodman-Bacon, 2021).

### 4.2 Results

We focus on borrower outcomes over a 24-month horizon. The results for other horizons are similar. Figure 3 plots the time trends in our outcome variables before and after a credit limit increase during the post-CG5 period. Panel (a) plots the time trends of the amount past due, Panel (b) plots the amount delinquent, Panel (c) plots the amount charged off by the lender, and Panel (d) plots the utilization rate. The x-axis of each subplot is the event time where 0 marks the month an account receives a credit limit increase. The plots does not show evidence that prior to credit limit increases, RBC-client outcomes trended towards the post-level faster than non-RBC clients. Trends look generally parallel, twelve months prior to a credit limit increase.

**Figure 3:** Trends adverse selection outcomes




**(a)** Amount past due

**(b)** Amount delinquent

**(c)** Amount charged off

**(d)** Utilization

*Notes:* Plotted series in Figure 3 are month-year unconditional averages by CG5 compliance group. The dependent variable in Panel (a) is the amount past due. The dependent variable in Panel (b) is the amount of delinquent. The dependent variable in Panel (c) is the amount charged off. The dependent variable in Panel (d) is the utilization rate. Blue series are the institutions complying with CG5 and red series are RBC, the institution who was found to have violated CG5. All dashes lines plot the average linear trend across time of their respective colored scatter plots. The x-axis is the event time where 0 marks the month an account received a credit limit increase.

Table 1 reports the results of regression (1) using all aforementioned outcome variables of interest over a 24-month horizon. For similar regressions at other horizons, and using other dependent variables and additional controls, see Appendix B.

In column (1), the dependent variable is the average amount past due during periods $t+1$ and $t+24$. We control for time-varying borrower characteristics like credit score and age, as well as borrower unobserved heterogeneity through a borrower fixed-effect. The estimated coefficient on the interaction of receiving a credit limit increase and being an account from an institution other than RBC is positive and significant at the 0.1 percent level. This result is robust to all of our horizons and with additional controls in Appendix B. This result is also robust to using a one-to-one propensity score-matched sample in Appendix E. Our estimates

suggest that a borrower who accepts a credit limit increase from one of the institutions that complied with CG5 sees a 4.6 percent increase of the amount past due compared to a borrower who receives a credit limit increase from RBC. This estimate translates to an average of $6.63 more past due per account, per year, using pre-CG5 statistics.

**Table 1:** Adverse selection test results on various outcomes of interest, 24 months forward

| | (1) Amount past due | (2) Amount delinquent | (3) Amount charged off | (4) Utilization |
|---|---|---|---|---|
| Credit limit increased | -0.0349*** | -0.0453*** | -0.0139*** | 0.0120*** |
| | (0.000301) | (0.000337) | (0.000196) | (0.0000722) |
| Credit limit increased × CBP compliant | 0.0461*** | 0.0444*** | 0.0166*** | 0.0108*** |
| | (0.000386) | (0.000425) | (0.000256) | (0.0000858) |
| Credit limit ($) | 0.0727*** | 0.0332*** | 0.0203*** | 0.0189*** |
| | (0.0000427) | (0.0000521) | (0.0000298) | (0.00000943) |
| Credit score | -1.393*** | -2.348*** | -1.009*** | -0.443*** |
| | (0.000759) | (0.000849) | (0.000583) | (0.000124) |
| Age of account | 0.0102*** | 0.0555*** | 0.00785*** | 0.00181*** |
| | (0.0000264) | (0.0000326) | (0.0000176) | (0.00000631) |
| Age of consumer | -0.00880*** | 0.108*** | 0.0311*** | -0.0194*** |
| | (0.000345) | (0.000400) | (0.000225) | (0.0000754) |
| Bank-Year FE | Yes | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes |
| Borrower FE | Yes | Yes | Yes | Yes |
| R-squared | 0.604 | 0.688 | 0.566 | 0.761 |
| N | 1,181,742,883 | 1,181,742,883 | 1,181,742,883 | 1,181,742,485 |

*Notes:* The dependent variable for each column is the average of the listed variable for periods $t+1$ to $t+24$. The dependent variable in (1) is the amount past due, (2) is the max. amount delinquent, (3) is the amount charged off, and (4) is the utilization. Standard errors in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$. All variables except the probability dependent variables are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

Similarly, in columns (2) and (3), we see positive and significant estimated coefficients at the 0.1 percent level for the amount of money delinquent and the amount charged off by the lender, respectively. Controlling for time-varying borrower characteristics and borrower unobserved heterogeneity, a borrower who accepts a credit limit increase from a CBP-compliant institution sees a 4.4 percent increase in the amount delinquent and a 1.7 percent increase in the amount charged off compared to a borrower who receives a credit limit increase from RBC. A 4.4 percent increase in the amount delinquent equates to approximately to an additional $7.27 delinquent per account, per year, and a 1.7 percent increase in the amount charged off is equivalent to approximately an additional $3.28 charged off per account, per year, using pre-CG5 statistics.

Column (4) shows that card utilization also increases more for borrowers receiving credit limit increases at CBP-compliant institutions than RBC. Controlling for time-varying borrower characteristics and borrower unobserved heterogeneity, a borrower who accepts a credit limit increase from a CBP-compliant institution sees a 1.8 percent increase in their card utilization compared to a borrower who receives a credit limit increase from RBC. Higher utilization of cards at CBP-compliant institutions shows that credit limit increases can also serve as a tool to stimulate (or re-stimulate) borrowing activity and compete with other lenders.

These results suggest that CBP-compliant lenders gave credit limit increases to borrowers with worse *ex-post* repayment outcomes and higher future utilization. Given that the borrowers of CBP-compliant institutions had to give express consent to each credit limit increase they received, this suggests that borrowers who *selected* into credit limit increase, are on average riskier for the lender but more active in borrowing. Herein lies the trade-off for lenders when offering credit limit increases to borrowers—while credit limit increases can help identify active borrowers, stimulate borrowing activity, and compete with other lenders, they can also lead to larger losses on lender balance sheets. Higher utilization may lead to high interest payments for lenders if a large share of their borrowers are revolvers and *do not default on their debt*.[5] Thus, we take these results as indicative that CBP-compliant lenders faced increased adverse selection when providing credit limit increases which led to greater losses on their balance sheets. However, identifying which borrowers were active, non-defaulters likely increased interest payments on card utilization which may offset these losses. Financial institutions, therefore, would like to identify which borrowers are profitable (high utilization but with repayment) and which are not (defaulters).

## 5 Effect of CG5 on lender behavior

In this section, we use a similar difference-in-differences approach to study how lenders responded to CG5. Given increased adverse selection, lenders may choose to provide less credit to borrowers post-CG5. To study how CG5 affected the extensive margin, we regress an indicator of whether a borrower received a credit limit increase on an indicator of the post-CG5 period, interacted with an indicator of being a complying lender. To study the

[5] A revolver is a credit card owner who does not pay off their entire monthly balance and is charged interest on borrowing. The share of revolvers in Canada is relatively low compared to the US, at around 27 percent of Canadians during 2013 to 2022 (Henry et al., 2024). The Federal Reserve estimates the share of revolvers in the US to be around 45 percent (Adams et al., 2022).

intensive margin, we regress the size of the credit limit increases when given on an indicator of the post-CG5 period, interacted with an indicator of being a complying lender.

### 5.1 Empirical Approach

We examine whether CG5 increased the frequency and magnitude of credit limit increases given by lenders. We compare the difference between complying lenders and RBC in two outcome variables, pre- and post-CG5: an indicator of a credit limit increase and the amount of credit limit increases. To preserve zeros, all variables in dollar values are transformed with the inverse-hyperbolic-sine function. All outcome variables are value in period $t+1$ to account for reporting delays, controlling for time-varying borrower characteristics in time $t$. We estimate the difference in outcomes pre- and post-CG5 for banks complying with the policy, compared to RBC, by running regression specifications of the following form:

$$\begin{aligned} Y_{ij,t+1} = \alpha_1 \, \text{CG5}_t + \alpha_2 \, \text{CBPCompliant}_{ij} + \alpha_3 \, (\text{CG5}_t \times \text{CBPCompliant}_{ij}) \\ + \mathbf{X}_{ijt} \, \gamma' + \eta_i + \eta_{r(i)} + \eta_{y(t)} + \varepsilon_{ijt}, \end{aligned} \tag{2}$$

where $Y_{ij,t+1}$ are the outcome variables of interest, an indicator denoting a borrower $i$ with credit card account $j$ received a credit limit increase in $t+1$ and the amount of a credit limit increase, conditioning on receiving a credit limit in $t+1$. Moreover, $\text{CG5}_t = 1$ if $t$ is May 2011 or later, $\text{CBPCompliant}_{ij} = 1$ if borrower $i$'s credit card account $j$ is from a Canadian bank other than RBC, $\mathbf{X}_{ijt}$ are borrower- or account-level time-varying characteristics, $\eta_i$ are borrower fixed effects, $\eta_{r(i)}$ are FSA fixed effects, $\eta_{y(t)}$ are year fixed effects, and $\varepsilon_{ijt}$ are error terms. The key parameter of interest for these regressions is $\alpha_3$.

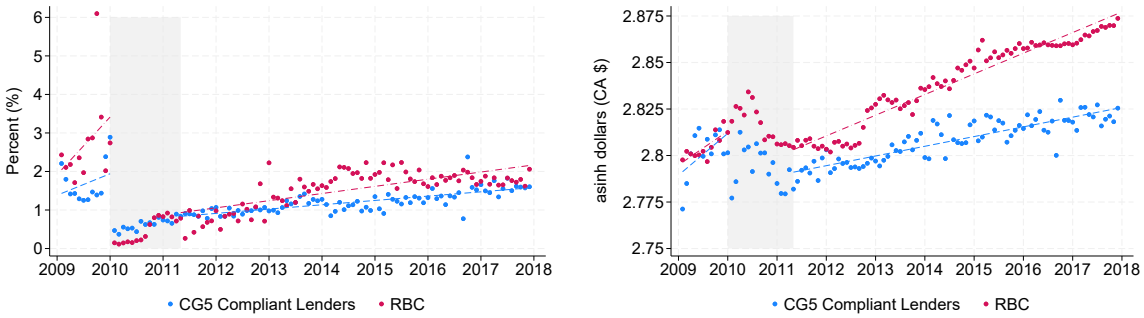
We present our analysis of parallel trends in the unconditional average value of our outcome variables in the following section. Additional parallel trends analysis using estimated month-year fixed-effects is found in Appendix D.2. Under additional assumptions of monotonicity and SUTVA, we aim to identify the local average treatment effect.

### 5.2 Results

Figure 4 plots the time trends of the outcome variables of interest, pre- and post-CG5. Panel (a) plots the trends of the probability of giving a credit limit increase and Panel (b) plots the amount of the credit limit increases. We drop the period between January 2010 to May 2011 to avoid the period of incomplete enforcement. We see that, in 2009, there is evidence that

parallel trends holds between the lenders who complied and RBC. Amounts in credit limit increases appear to be increasing for RBC faster compared to the other institutions during the pre-CG5 period, but this trend is not statistically significant.

**Figure 4:** Trends in credit limit increases




**(a)** Probability of credit limit increase

**(b)** Amount of credit limit increases

*Notes:* Plotted series in Figure 4 are month-year unconditional averages by CG5 compliance group. The dependent variable in Panel (a) is the probability of a credit limit increase. The dependent variable in Panel (b) is the amount of credit limit increases. Blue series are the institutions complying with CG5 and red series are RBC, the institution who was found to have violated CG5. All dashes lines plot the average linear trend across time of their respective colored scatter plots. The gray bars in both panels plot the time from January 2010 to April 2011, the period of the first stage of CG5 implementation when "evergreen" contracts were improperly used by several institutions to comply with the policy.

Table 2 reports the estimated coefficients of interest on our outcomes of interest. Columns (1) and (2) report the estimated coefficients of interest using an indicator that a credit limit increase is applied in period $t+1$ as the outcome variable. Columns (3) and (4) report the estimated coefficients of interest using the amount of a credit limit increase in period $t+1$, conditional on receiving a credit limit increase, as the outcome variable. Tables with additional controls are reported in Appendix C.

Columns (1) and (2), show that, after controlling for the borrower's credit limit on the account, the borrower's credit score, the age of the account, and unobserved borrower heterogeneity, the coefficient of interest on $CG5 \times CBPCompliant$ is around 0.00171. These estimates are both significant at the 0.1 percent level, and suggest that, on average, lenders that complied with CG5 increased the rate of credit limit increases by approximately 0.171 percent, per account, per month. Annualized, this aggregates to approximately 2.05 percent increase in the probability of receiving a credit limit every year.

**Table 2:** Effect of CG5 on credit limit increases given by firms

| | Prob. credit limit increase | | Amt. credit limit increase | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| CBP compliant | -0.00394*** | -0.00570*** | 0.0509*** | -0.00663** |
| | (0.0000425) | (0.0000458) | (0.00121) | (0.00251) |
| CG5 × CBP compliant | 0.000433*** | 0.00171*** | -0.274*** | -0.191*** |
| | (0.0000435) | (0.0000461) | (0.00129) | (0.00238) |
| Credit limit ($) | 0.000383*** | -0.00439*** | 0.292*** | 0.249*** |
| | (0.00000380) | (0.00000665) | (0.000291) | (0.000599) |
| Utilization | 0.0283*** | 0.0326*** | -0.382*** | -0.178*** |
| | (0.0000168) | (0.0000230) | (0.000902) | (0.00143) |
| Credit score | 0.0324*** | 0.0516*** | 2.478*** | 1.254*** |
| | (0.0000449) | (0.0000819) | (0.00391) | (0.00752) |
| Age of account | -0.00134*** | 0.000816*** | -0.0319*** | -0.00681*** |
| | (0.00000269) | (0.00000364) | (0.000262) | (0.000551) |
| Age of consumer | -0.00759*** | 0.00532*** | -0.0336*** | 0.454*** |
| | (0.0000107) | (0.0000560) | (0.000689) | (0.00843) |
| Year FE | Yes | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes |
| Borrower FE | No | Yes | No | Yes |
| R-squared | 0.00630 | 0.0409 | 0.246 | 0.731 |
| N | 1,088,293,769 | 1,087,956,877 | 14,644,854 | 10,114,430 |

*Notes:* The dependent variable for columns (1)-(2) is the probability of credit limit increase in $t+1$. The dependent variable for regressions (3)-(4) is the amount of credit limit increases in $t+1$, conditional on a credit limit increase. Standard errors in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$. All non-indicator variables are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

While the probability of credit limit increased for complying institutions, columns (3) and (4) demonstrate that the size of credit limit increases declined. Our estimates suggest that, after controlling for the borrower's credit limit on the account, the borrower's credit score, the age of the account, and unobserved borrower heterogeneity, the size of a credit limit increase decreased by around 19.1 percent. These estimates are equivalent to a $514 decrease, per account, per month.

Combining these results, borrowers who had cards with lenders that complied with CG5 saw more frequent credit limit increases than borrowers who had cards with RBC. The average size of credit limit increase offers, however, decreased as a result of CG5. The overall effect of increasing frequency and decreasing sizes is an average decrease of $54 per year, per account.

# 6 Model Environment

To interpret our results and evaluate the effects of CBP with CG5 guidelines, we develop a model of consumer and lender behavior. We base our model on Chatterjee et al. (2023), but innovation by adding a consumer's credit limit as an endogenous state variable. We allow the lender to update a consumer's credit limit in response to new information. To quantify the effects of the policy change, we evaluate the model in two settings; one where credit limit increases are automatically applied to consumers (pre-CG5) and one where consumers choose to accept or a decline a credit limit increase (post-CG5). Adverse selection arises post-CG5 because consumers who are most likely to accept a credit limit increase are those who are most likely to default. However, this selection allows the lender to learn about a consumer's private type based on their actions.

We validate our model by studying how implementing CG5 in our model affects the frequency and size of credit limit increases. We find little change to the frequency of credit limit increases and we match the decline in the average size size of credit limit increases. We then use the model to evaluate the total effects of CG5 on surplus. We find that consumer surplus is unaffected, while lender surplus declines. Finally, we use the model to run counterfactuals to study how policies like CG5 would affect credit provision, consumer defaults, and consumer and lender surplus in counterfactual settings. We find that in a higher interest rate environment, CG5 would lead to a more dramatic reduction in credit provision, driven by both less frequent and smaller sized credit limit increases.

## 6.1 Consumer's Problem (Pre-CG5)

Time is discrete and infinite horizon with periods denoted by $t \in \{1, 2, \dots\}$. Consumer are differentiated by their age, $a \in \{1, 2, \dots, A\}$, and their type, $i \in \{H, L\}$. Type $H$ consumers have a higher discount factor than type $L$ (i.e. $\beta_H > \beta_L$). The lender assigns a "type score" given by $s = Pr(\beta = \beta_H)$. The lender updates a consumer's type score via Bayes' rule using observable actions — whether the consumer defaults or not and how much the consumer chooses to save or borrow. Post-CG5, the lender can also update the consumer's type score based on whether they accept or reject a credit limit increase. These observable actions, denoted $(d\prime, w', A')$, determine the lender's posterior beliefs, $s' = Pr(\beta = \beta_H | d', w', A')$.

A consumer's income is composed of two sources – a persistence component $e$ and an idiosyncratic component $z$. At the beginning of each period, the consumer observes their

income. If they borrowed the previous period ($w < 0$), they decide whether to default or not. If they default, they lose $1 - \kappa_1$ percentage of their income for that period. They are also excluded from the credit market in the following period. To capture the slow removal of defaults from a consumer's credit history, each period after default the consumer has a $\delta$ probability of rejoining the credit market. To capture the long term effects of delinquency, we let $1 - \kappa_2$ be the fraction of income lost per period that they are excluded from the credit market.[6] If a consumer does not default, they choose their wealth for the next period $w'$ and their consumption $c$ subject to their credit limit $l$.

Having observed the consumer's default and savings decisions, the lender decides whether to offer a new credit limit, $l'$. Pre-CG5, this credit limit increase is automatically applied. Post-CG5, the consumer decides whether to accept or reject the credit limit increase.

Finally, at the end of each period, the consumer's type can change from $\beta$ to $\beta'$. We denote by $Q^{\beta}(\beta'|\beta)$ the transition matrix. The persistent component of income can also change. We denote by $Q^{e}(e'|e)$ the transition matrix for the persistent income process. The consumer's age, $a$ increases by one. If the consumer has reached the maximum age, $\bar{A}$, their future utility is given based on the size of their bequest.

Let the state variable be denoted by: $\Omega = \{l, w, e, s, \beta, a\}$.The problem for a consumer with credit limit $l$, wealth $w$, persistent income $e$, idiosyncratic income $z$, type score $s$, type $\beta$, and age, $a < \bar{A}$ is given by:

$$V_c(\Omega) = \max_{d} \Bigg\{ 1_{\{d' \neq 1\}} \underbrace{\left( \max_{a'} u(c) + \epsilon_{w'} + \sum_{\beta', e'} Q^{\beta}(\beta'|\beta) Q^{e}(e'|e)\, \beta'\, V_c\big(l'(w', s'), w', e', s'(w'), \beta', a+1\big) \right)}_{\text{value not defaulting}}$$
$$+ 1_{\{d'=1\}} \underbrace{\left( u(\kappa_1(z+e)) + \epsilon_{d'} + \sum_{\beta', e'} Q^{\beta}(\beta'|\beta) Q^{e}(e'|e)\, \beta'\, V_d(w=0, e', s'(d'=1), \beta', a+1) \right)}_{\text{value defaulting}} \Bigg\} \tag{3}$$

where

[6] This is standard in the literature (see Livshits et al. (2007) and Chatterjee et al. (2023)) and is meant to capture the fact that bankruptcy stays on a person's credit report for up to ten years.

$$c = \begin{cases} z + e - w' + (1 + r_{borrow})w & \text{if } w < 0 \\ z + e - w' + (1 + r_{save})w & w \geq 0 \end{cases} \tag{4}$$

and

$$|w'| \leq l \text{ if } w' < 0 \tag{5}$$

The first term in Equation 3 captures the value of not defaulting and the second term captures the value of defaulting. Possible asset choices are put on a grid and consumers receive type-1 Extreme Value shocks for both their default decision and their asset choice decision conditional on not defaulting. Equation 4 defines consumption conditional on not defaulting, which involves repaying previous debt at interest rate $r_{borrow}$ or earning interest rate $r_{save}$ on previously held assets. Equation 5 is the consumer's credit constraint. They cannot borrow more than $l$.

The value function of a consumer who has defaulted is given by:

$$\begin{aligned} V_d(\Omega) = \max_{w'} u(c) + \epsilon_{w'} + \delta \underbrace{\sum_{\beta',e'} Q^{\beta}(\beta'|\beta) Q^{e}(e'|e)\, \beta'\, V_c\big(l'(w',s'), w', e', s'(w'), \beta', a+1\big)}_{\text{value regain credit market access}} \\ + \underbrace{(1-\delta) \sum_{\beta',e'} Q^{\beta}(\beta'|\beta) Q^{e}(e'|e)\, \beta'\, V_d(w', e', s'(w'), \beta', a+1)}_{\text{value do not regain access}} \end{aligned} \tag{6}$$

where

$$c = \kappa_2(z + e) - w' + (1 + r_{save})w \tag{7}$$

and

$$w' \geq 0 \tag{8}$$

The first term in equation 6 captures the value for the consumer of rejoining the credit market, which happens with probability $\delta$, while the second term captures the value of remaining in the default state. Consumption is defined in equation 7 and equation 8 captures the consumers inability to access credit.

In the final period of a consumer's life, $a = \bar{A}$, the consumer's problem is given by:

$$V_c(\Omega) = \max_d \Bigg\{ 1_{\{d=0\}} \Big( \max_{w'} u(c) + \epsilon_{w'} + \beta B \mathbb{E}[V(l_0, w', e_0, s_0, \beta_0, 1)] \Big) + 1_{\{d=1\}} \Big( u(\kappa_1(z+e)) + \epsilon_d + \beta B \mathbb{E}[V(l_0, 0, e_0, s_0, \beta_0, 1)] \Big) \Bigg\} \tag{9}$$

where the consumer is subject to the same constraints in equations 4 and 5. $B$ captures the consumer's bequest motive and ensures that all consumers do not choose to default at the end of their lives. $l_0$, $e_0$, $s_0$, and $\beta_0$ capture the initial values for consumer's who newly enter the credit market – their credit limit, persistent earnings, firm beliefs, and consumer discount rate.

A consumer's credit score matters because the lender uses it to inform their credit limit decision. In the model, consumers benefit from higher credit limits for two reasons. First, with a high credit limit, consumers can smooth consumption through shocks to income. High credit limits allow consumers to borrow more during times of low persistent income and when they face negative idiosyncratic shocks to their income. Second, consumers with high credit limits also get more type-1 Extreme Value shocks, which has a small effect on their value.

### 6.2 Consumer's Problem (Post-CG5)

To capture the introduction of the CG5 guidelines, we allow consumer's to accept or reject an offered credit limit increase.

If a lender offers a credit limit of $l'$, the value of accepting for a consumer with credit limit $l$, assets $w$, income $e$, type score $s$, type $\beta$, and age $a$ is given by:

$$V(A, l', \Omega) = V_c(l', w, e, s'(A), \beta, a+1) + \epsilon_R. \tag{10}$$

The value of rejecting it is given by:

$$V(R, l', \Omega) = V_c(l, w, e, s'(R), \beta, a+1). \tag{11}$$

Given the type-1 Extreme Value shock, the probability of choosing to accept the offer is given by:

$$pr(A) = \frac{exp(V_c(A, l', \Omega))}{exp(V_c(R, l', \Omega)) + exp(V_c(A, l', \Omega))}. \tag{12}$$

with the probability of rejecting $pr(R)$ being defined analogously.

The problem for a consumer is given by:

$$\begin{aligned} V_c(\Omega) = \max_d \Bigg\{ & 1_{\{d \neq 1\}} \left( \max_{a'} u(c) + \epsilon_{w'} + \sum_{\beta', e'} Q^{\beta}(\beta'|\beta)\, Q^{e}(e'|e)\, \beta' \sum_{i' \in \{A,R\}} pr(i')\, V_c(\Omega'') \right) \\ & + 1_{\{d=1\}} \left( u\big(\kappa_1(z+e)\big) + \epsilon_d + \sum_{\beta', e'} Q^{\beta}(\beta'|\beta)\, Q^{e}(e'|e)\, \beta'\, V_d(\Omega') \right) \Bigg\} \end{aligned} \tag{13}$$

where

$$c = \begin{cases} z + e - w' + (1 + r_{borrow})w & \text{if } w < 0 \\ z + e - w' + (1 + r_{save})w & w \geq 0 \end{cases} \tag{14}$$

and

$$|w'| \leq l \text{ if } w' < 0 \tag{15}$$

Based on the consumer's default and savings decisions, we go from $\Omega$ to $\Omega' = \{l, w', e, s'(d', w'), \beta, a + 1\}$ just as in Equation 3. The key difference now is that the consumer now also chooses to accept or reject a credit limit increase, in which case we go from $\Omega'$ to $\Omega'' = \{l'(i'), w', e, s''(d', w', i'), \beta, a + 1\}$ . The equations for a consumer in default or for a consumer in with age $a = A$ are unchanged.

### 6.3 Lender's Problem

For simplicity, we assume that there is a single monopolist lender. Interest rates are exogenously given, so the only choice is the consumer's credit limit.[7] A lender's profit for

[7] Interest rates typically remain unchanged throughout the lifespan of an account (Ausubel, 1991; Drechsler et al., 2025; Knittel & Stango, 2003) while credit limits vary substantially across borrowers and within borrower over time (Agarwal et al., 2018; Aydin, 2022; Fulford, 2015).

a consumer with credit limit $l$, wealth $w$, who chooses to default or not, $d'$ and chooses to hold wealth $w'$ the next period is given by:

$$\pi(l, w, w', d') = \begin{cases} R \cdot c + (1 + r) \cdot 1_{w \leq 0}|w| - 1_{w \leq 0}|w'| & \text{if } d' = 0 \\ 0 & \text{if } d' = 1 \end{cases}. \tag{16}$$

If the consumer defaults, the lender is not paid back on previous borrowing and receives nothing. If the consumer does not default, the lender's profit is given by net merchant fees, $R$, times consumption plus the repayment of previous borrowing with interest $r$ less any new borrowing.

The lender chooses individualized credit limits to maximize their value function subject to imperfect information. The lender observes the persistent component of income $e$ and wealth $w$, as well as the consumers credit market decisions each period—whether they default, $d'$, and how much they save or borrow, $w'$. However, the lender cannot observe the consumer's type $\beta$, the idiosyncratic income shocks $z$, or the type-1 Extreme Value shocks. Since $\beta$ is persistent, actions can signal type.

The lender's value function, pre-CG5, is given by:

$$\begin{aligned} V_f^{\text{pre}}(l, w, e, s, a) = \max_{l' \geq l} \; & \mathbb{E}[\pi(l, e, w, w', d')] - C\{l' \neq l\} \\ & + 1_{\{d' \neq 1\}} \beta_f V_f(l', w', e, s'(d', w'), a + 1), \end{aligned} \tag{17}$$

where $C$ captures the cost of adjusting a consumer's credit limit.

The lender's value function, post-CG5, is given by:

$$\begin{aligned} V_f^{\text{post}}(l, w, e, s, a) = \max_{l' \geq l} \; & \mathbb{E}[\pi(l, e, w, w', d')] - C\{l' \neq l\} \\ & + 1_{\{d' \neq 1\}} \beta_f \sum_{i' \in \{A, R\}} pr(i') V_f(l'(i'), w', e, s''(d', w', i'), a + 1), \end{aligned} \tag{18}$$

where $C$ captures the cost of adjusting a consumer's credit limit. The lender faces this cost regardless of whether the consumer accepts the credit limit increase.

### 6.4 Timing

Timing is as follows:

1. At the beginning of each period:
   (a) Consumers observe their income
   (b) Consumers who are borrowers (i.e. $w < 0$) choose whether to default or not ($d' \in \{0, 1\}$.
   (c) Consumers who do not default repay any previous borrowing and choose assets and consumption for next period $(w', c)$ subject to their credit limit $l$
2. At the middle of each period:
   (a) The lender updates their credit score $s'(s, d', w')$ based on consumers' actions.
   (b) The lender offers credit limit increases $l' \geq l$
3. At the end of each period
   (a) Case 1 (Pre CG5): The lender's credit limits are automatically applied.
   (b) Case 2 (Post CG5): The consumer decides whether to accept the new credit limit $l'$ or reject it and keep their current credit limit $l$. The lender then updates their beliefs about the consumer's type $s''(s', A')$.
   (c) Consumer's income $e$ and type $\beta$ evolve subject to the transition matrices $Q^e$ and $Q^\beta$ respectively.
   (d) Consumers age $a' = a + 1$, consumers with $a = \bar{A}$ exit, and a new set of consumers enter at age $a = 1$.

### 6.5 Learning and Adverse Selection

In the model, lenders learn about a consumer's type from their actions. They learn based on whether a consumer defaults or not, i.e. $d' \in \{0, 1\}$, and how much a consumer saves or borrowers, $w'$. Post-CG5, lenders also learn from whether consumers accept or reject a credit limit increase $i' \in \{A, R\}$.

If a consumer defaults:

$$s' = P(\beta = \beta_H | s, d' = 1) = \frac{P(d' = 1 | \beta = \beta_H) \cdot P(\beta = \beta_H)}{P(d' = 1)} = \frac{p_D(\beta_H) \cdot s}{p_D(\beta_H) \cdot s + p_D(\beta_L) \cdot (1 - s)}. \tag{19}$$

If a consumer does not default and chooses wealth $w'$, then

$$s' = P(\beta = \beta_H | s, d' = 0, w = w') = \frac{P(d' = 0 \ \& \ w = w' | \beta = \beta_H) \cdot P(\beta = \beta_H)}{P(d' = 0 \ \& \ w = w')} = \frac{p_w(w', \beta_H) \cdot s}{p_w(w', \beta_H) \cdot s + p_w(w', \beta_L) \cdot (1 - s)}. \tag{20}$$

If a consumer chooses to accept a credit limit increase, then

$$s'' = P(\beta = \beta_H | s', A) = \frac{P(A | \beta = \beta_H) \cdot P(\beta = \beta_H)}{P(A)} = \frac{p_A(\beta_H) \cdot s'}{p_A(\beta_H) \cdot s' + p_A(\beta_L) \cdot (1 - s')}. \tag{21}$$

As a result, if high and low type consumers make different decisions, the lender will, over time, learn about their type. Post-CG5, the lender can also learn about consumers based on whether they accept or reject credit limit increases. Given that $L$ types are more likely to borrow and, hence, value credit limits more, in equilibrium $L$ types are more likely to accept than $H$ types. Because of this, the lender recognizes that low type consumers are more likely to accept credit limit increases. This is the additional source of adverse selection in our model under CG5. However, given type persistence and the long-term relationships between the lender and consumers, the lender may value learning about a consumer's type.

### 6.6 Parameterization, Calibration, and Validation

In Table 3, we present the parameter values and the calibration targets. About half of the parameters are calibrated outside the model and the other half inside the model. We calibrate merchant fees and interest rates to match the data from Welte and Molnar (2021) and Ho et al. (2022), respectively. We select the savings rate and the lender discount factor to match the average target overnight rate. We normalize the low type income to 10 (unemployment) and set the employed income rate to twice that of unemployed. We choose income transitions to match average unemployment rates. We choose the probability of returning to credit markets to reflect the length of time a default stays on a consumer's

credit history. We choose a maximum age of 20 to focus on the initial period in a consumer's lifetime where learning is particularly important.

The remaining parameters are chosen to match data from the Canadian credit card market in the pre-CG5 period. We calibrate discount factors and discount factor transition probabilities to match the probability of borrowing and the share of consumers who switch from high to low FICO scores. Our estimated discount factors and discount factor transition probabilities are similar to those in Chatterjee et al. (2023). We calibrate the income shock size to match the variance of monthly spending. We calibrate the income lost in default parameters $\kappa_1$ and $\kappa_2$ to match the probability of default in the data. We calibrate the cost of altering credit limits to match the frequency of credit limit increases. We calibrate the type-1 Extreme Value shocks for defaulting and savings decisions to match the variance of utilization rates and default probabilities. The only parameter calibrated using post-CG5 data is the type-1 Extreme Value shock for accepting a credit limit increase. We calibrate it using the variance of the size of credit limit increases.

**Table 3:** Parameters and Targets

| Parameter | Notation | Value | Target |
|---|---|---|---|
| ***Panel A**: Calibration pre-solution* | | | |
| Lender Discount Factor | $\beta_f$ | 0.99 | Average Target Overnight Rate |
| Merchant Fees | $R$ | 0.010 | Average Merchant Fees |
| Borrowing Interest Rate | $r_{borrow}$ | 0.22 | Average Credit Card Interest Rate |
| Savings Rate | $r_{save}$ | 0.01 | Average Target Overnight Rate |
| Probability Remain High Income | $Q^e(e_H\|e_H)$ | 0.90 | Employment to Unemployment Transition Probability |
| Probability Remain Low Income | $Q^e(e_L\|e_L)$ | 0.50 | Unemployment to Employment Transition Probability |
| Probability of Rejoining Credit Market | $\delta$ | 0.125 | Duration a Default Remains on Credit History |
| Risk Aversion | $\gamma$ | 3.0 | Estimates in the Literature |
| Bequest Motive | $B$ | 0.50 | Estimates in the Literature |
| High Income Level | $e_H$ | 20.0 | Normalization |
| Low Income Level | $e_L$ | 10.0 | Normalization |
| Maximum Age | $\bar{A}$ | 20 | Normalization |
| ***Panel B**: Calibration post-solution* | | | |
| High Type Discount Factor | $\beta_H$ | 0.95 | Probability of borrowing for Low FICO |
| Low Type Discount Factor | $\beta_L$ | 0.68 | Probability of borrowing for High FICO |
| Probability Remain High Type | $Q^\beta(\beta_H\|\beta_H)$ | 0.95 | Probability of Remaining in High FICO |
| Probability Remain Low Type | $Q^\beta(\beta_L\|\beta_L)$ | 0.80 | Probability of Remaining in Low FICO |
| Income Shock Size | $z$ | 3.0 | Variance of Annual Spending |
| Percentage of Income Lost on Default (Short-Term) | $1-\kappa_1$ | 0.05 | Probability of Default for High FICO |
| Percentage of Income Lost on Default (Long-Term) | $1-\kappa_2$ | 0.30 | Probability of Default for Low FICO |
| Cost of Changing Credit Limits | $C$ | 0.00025 | Frequency of Credit Limit Increases |
| Variance of Asset Choice Shock | $\epsilon_a$ | 0.0165 | Variance of Utilization Rates |
| Variance of Default Choice Shock | $\epsilon_d$ | 0.0165 | Variance of Default Probability |
| Variance of Credit Limit Choice Shock | $\epsilon_A$ | 0.183 | Variance of Size of Credit Limit Increase |

*Notes:* Table 3 presents the model calibration. Parameters in Panel A are calibrated without solving the model and parameters in Panel B are calibrated after solving the model. We choose credit scores below 670 to correspond to "Low FICO" types and above 740 to correspond to "High FICO" types based on TransUnion's definition of "fair" and "very good" types.

In Table 4, we present the calibration results. We match well the probability of borrowing and the share of consumers who maintain similar credit ratings across time. We slightly overestimate the probability of default and underestimate the frequency of credit limit increases. Our calibration also slightly underestimates the variances of spending, utilization rates, default probability. We substantially underestimate the variance of credit limit increases.

**Table 4:** Calibration Results

| Moment | Data Value | Model Value |
|---|---|---|
| Probability of borrowing for High FICO† | 0.166 | 0.268 |
| Probability of borrowing for Low FICO† | 0.535 | 0.535 |
| Probability of Remaining in High FICO | 0.968 | 0.996 |
| Probability of Remaining in Low FICO | 0.901 | 0.935 |
| Variance of Annual Spending | 1.0 | 0.792 |
| Probability of Default for Low FICO | 0.013 | 0.0346 |
| Probability of Default for High FICO | 0.0002 | 0.0087 |
| Frequency of Credit Limit Increases | 0.016 | 0.006 |
| Variance of Utilization Rates | 0.125 | 0.031 |
| Variance of Default Probability | 0.015 | 0.002 |
| Variance of Size of Credit Limit Increase‡ | 0.799 | 0.002 |

*Notes:* Table 4 presents computed moments in the data and corresponding moments computed in the model. High FICO is defined as having a credit score above 740. Low FICO is defined as having a credit score below 670. All empirical moments are computed on the full pre-CG5 period except the last moment (variance of size of credit limit increase). Given this shocks the choice of accepting credit limit increases for consumers, and consumers could only accept credit limit increase offers, we compute this moment on the post-CG5 sample, excluding RBC accounts. †We define borrowing as having positive spending that is at least 2 standard deviations above the within-borrower median. ‡We compute the within-borrower average of inverse-hyperbolic sine transformed credit limit increases and then take the variance across borrowers to as the variance of size of credit limit increase.

In Table 5, we present our model validation. We compute the frequency of credit limit increases and the average size of credit limit increases in both the pre- and post-CG5 periods. We compute the analogous moments in the model. We match the decline in the average size of credit limit increases. The model predicts little change to the frequency of credit limit increases.

**Table 5:** Model Validation

| Moment | Data Pre-CG5 | Data Post-CG5 | Model Pre-CG5 | Model Post-CG5 |
|---|---|---|---|---|
| Frequency of Credit Limit Increases | 0.0160 | 0.0163 | 0.0059 | 0.0059 |
| Average Size of Credit Limit Increase to Income | 0.06 | 0.05 | 0.016 | 0.014 |

*Notes:* Table 5 presents computed moments in the data and corresponding moments computed in the model pre- and post-CG5. We calibrate the model to match the frequency of credit limit increases pre-CG5, but do not target any of the other moments.

# 7 Model Results

## 7.1 Policy Evaluation

To evaluate express consent in the framework of the model, we solve the model both pre- and post-CG5. Then, we compute key moments in the two settings, including the frequency of credit limit increases, borrowing and default, the average size of credit limit increases, the average credit limit, and measures of surplus. Table 6 presents the results.

Comparing the pre- and post-CG5 results, we find a slight decline in credit provision overall. This is accompanied by an increase in credit for low type borrowers - reflecting adverse selection concerns. Borrowing and the probability of default decline, but are particularly driven by declines among high FICO consumers. Overall, consumer surplus is relatively unchanged, but lender surplus declines substantially.

**Table 6:** Policy Evaluation

| Coefficient | (1) Pre CG5 | (2) Post CG5 | (3) % Change |
|---|---|---|---|
| Freq. of Credit Limit Increase (%) | 0.59 | 0.59 | 0.0% |
| Avg. Credit Limit to Income $H$ | 1.20 | 1.157 | -3.58% |
| Avg. Credit Limit to Income $L$ | 1.08 | 1.102 | 2.03% |
| Share Borrowing $H$ (%) | 26.86 | 24.34 | -9.38% |
| Share Borrowing $L$ (%) | 53.56 | 52.67 | -1.66% |
| Prob. of Default $H$ (%) | 0.87 | 0.79 | -9.19% |
| Prob. of Default $L$ (%) | 3.46 | 3.35 | -3.18% |
| Avg. Consumer Surplus $H$ | 6.743 | 6.751 | 0.12% |
| Avg. Consumer Surplus $L$ | 4.177 | 4.181 | 0.09% |
| Lender Surplus | 5.329 | 4.954 | -7.03% |

*Notes:* Table 6 reports and compares the model estimates for credit provision, default rates, borrowing, and measure of surplus in the pre-CG5 and post-CG5 models. Column (1) reports estimated values for the pre-CG5 model, which requires consumers to accept all credit limit increases. Column (2) reports estimated values for the post-CG5 model, which allows consumers to accept or reject any credit limit increase. For each model we compute the long run distribution of consumers and present results in the steady state. Column (3) reports the percent change in the estimated values from the pre-CG5 steady state to the post-CG5 steady state.

### 7.2 Learning and Adverse Selection

We now use the model to study the implications of a policy like CG5 in different settings. To do so, we run counterfactuals in both the pre-CG5 and post-CG5 settings. We then compute the percent change for each moment from the pre-CG5 setting to the post-CG5 setting as we did in the third column of Table 6. We present the results of these three counterfactuals in Table 7. The first column presents percent change from pre- to post-CG5 in our baseline and the final three columns present analogous computations for each of the three counterfactuals.

**Table 7:** Counterfactual Results

| Moment | Baseline | Increase $r_{save}$ | Increase $\beta_L$ | Increase $C$ |
|---|---|---|---|---|
| Freq. of Credit Limit Increase | 0.0 | -5.78 | -8.55 | -8.27 |
| Avg. Credit Limit to Income $H$ | -3.58 | -6.76 | -6.10 | -4.00 |
| Avg. Credit Limit to Income $L$ | 2.03 | -0.86 | -1.27 | -0.33 |
| Share Borrowing $H$ | -9.38 | -10.00 | -9.54 | -9.29 |
| Share Borrowing $L$ | -1.66 | -2.10 | -2.15 | -1.51 |
| Prob. of Default $H$ | -9.19 | -10.01 | -8.79 | -8.89 |
| Prob. of Default $L$ | -3.18 | -4.95 | -4.10 | -1.51 |
| Consumer Surplus $H$ | 0.12 | 0.05 | 0.03 | 0.04 |
| Consumer Surplus $L$ | 0.09 | 0.05 | 0.02 | 0.04 |
| Lender Surplus | -7.03 | -8.83 | -7.89 | -8.05 |

*Notes:* Table 7 presents the percent change in values of interest for a baseline model and three counterfactual scenarios. For each model, we solve for the steady state in both the pre-CG5 and post-CG5 settings and compute the percent change between them. In column (1), we present the estimates of the baseline model. The baseline model presents the same results as the policy evaluation in Table 6. In column (2), we report the results of increasing $r_{size}$, the prevailing savings rate, from 0.01 to 0.03, which also decreases the lender's discount rate. This can be interpreted as an increase in the interbank lending rate. In column (3), we report the results of increasing $\beta_L$, the low types' discount factor, from 0.68 to 0.775. In column (4), we report the results of increasing $C$, the cost of changing credit limits, from 0.00025 to 0.0005.

First, we increase prevailing interest rate from 0.01 to 0.03. This simultaneously decreases the discount factor of the lender, $\beta_f$. This counterfactual can be interpreted as a permanent increase in prevailing interest rates. A decline in the lender's discount rate increases the consequences of adverse selection (as the lender values losses today more) and decreases the benefits of learning (as the lender values future profits less). As a result, we find that credit limits, borrowing, and default frequencies all decline more under CG5 than in the baseline. As a result, a policy like CG5 may have a greater impact under contractionary monetary policy. This suggests that the effectiveness of policies focused on credit limits may depend on the level of interest rates.

Second, we increase $\beta_L$ to 0.775. As a result, the two types of consumers become more similar. This directly decreases the benefit of learning; as the population becomes more homogeneous the optimal credit limits for the two types converge. However, because the two types are more similar, the lender learns less about the consumer's type from their default and savings decisions. Hence, the ability to learn from consumer's decisions to accept or reject a credit limit increase may become more valuable. We find that with more homogeneous borrowers, CG5 leads to a substantial decline in the frequency of credit limit increases but has smaller effects on average credit limits.

Our final counterfactual increases the cost of offering credit limit increase, whether accepted or not. To do this, we increase $C$ from 0.00025 to 0.0005. On one hand, this discourages lenders from making small adjustments to a consumer's credit limit over time, likely leading to less credit provision. However, this encourages lenders to give large one-time credit limit increases to avoid having to incur this cost repeatedly, potentially leading to greater credit provision. We find similar effects to the previous counterfactual. Under CG5, the frequency of credit limit increases declines substantially, while average credit limits declines slightly. Overall, our counterfactuals suggest that the effect of a policy like CG5 depends on the broader environment. Under contractionary monetary policy, more homogeneous consumers, or costlier credit limit updating, our model suggests CG5 would lead to lower overall credit provision.

# 8 Conclusion

Our findings demonstrate that regulatory safeguards aimed at enhancing consumer autonomy can have complex, and sometimes counterintuitive, effects in markets with incomplete information. By requiring express consent for credit limit increases, we find that Canada's CG5 regulation created an additional source of adverse selection. Our estimates suggest that borrowers who opted into higher limits were systematically riskier than those for whom increases were automatically applied — these opt in borrowers faced increased levels of in past due payments, delinquencies, and charge-offs. Yet, rather than contracting the frequency of credit provision, compliant lenders offered more frequent but smaller limit increases. We interpret this as evidence that the informational value of borrower acceptance decisions outweighed the higher default risk, consistent with a model calibrated to match Canadian data in which lenders use choice data to learn about borrower quality. This trade-off between adverse selection and learning has important implications for the design of consumer protection policies. Rules that improve transparency and choice may also reshape the information environment in ways that alter lender incentives and market outcomes. Policymakers should account for these informational channels when evaluating the welfare effects of consent-based regulations in consumer credit markets.

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# Appendix A Summary Statistics Tables

Table A.1 provides an overview of borrower-account characteristics and outcomes, by bank compliance with CG5, over the pre-CG5 period. Panel (a) summarizes key variables of interest for accounts associated with RBC, the institution found by the FCAC to have violated CG5. Panel (b) summarizes the same variables for CBP-compliant institutions.

**Table A.1:** Summary statistics by CG5 compliance, pre-CG5 period

| | Mean | SD | P1 | P25 | P50 | P75 | P99 |
|---|---|---|---|---|---|---|---|
| ***Panel A:*** *RBC* | | | | | | | |
| Probability of credit limit increase | 0.021 | 0.155 | 0 | 0 | 0 | 0 | 1 |
| Amount of credit limit increase ($) | 2193.46 | 1581.79 | 500 | 1500 | 2000 | 2500 | 9000 |
| Probability of credit limit decrease | 0.004 | 0.063 | 0 | 0 | 0 | 0 | 0 |
| Amount of credit limit decrease ($) | 5423.25 | 5063.06 | 100 | 1500 | 4000 | 7500 | 21500 |
| Number of accounts | 1.070 | 0.271 | 1 | 1 | 1 | 1 | 2 |
| Credit limit ($) | 10306.01 | 7830.78 | 1000 | 4000 | 9000 | 15500 | 30000 |
| Current balance ($) | 2363.43 | 4299.38 | 0 | 0 | 515 | 2589 | 20417 |
| Utilization | 0.268 | 0.367 | 0 | 0 | 0.064 | 0.444 | 1.149 |
| Probability past due | 0.019 | 0.138 | 0 | 0 | 0 | 0 | 1 |
| Amount past due ($) | 43.06 | 720.85 | 0 | 0 | 0 | 0 | 263 |
| Probability delinquent | 0.022 | 0.147 | 0 | 0 | 0 | 0 | 1 |
| Max. delinquent amount ($) | 47.55 | 750.86 | 0 | 0 | 0 | 0 | 406 |
| Probability positive charged-off | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Amount charged off ($) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Highest amount borrowed ($) | 6129.22 | 6637.91 | 0 | 1491 | 4135 | 8687 | 28007 |
| Credit score | 773.16 | 100.79 | 450 | 716 | 809 | 851 | 873 |
| Age of account (mo.) | 118.81 | 107.38 | 2 | 35 | 87 | 167 | 409 |
| Age of consumer (mo.) | 557.99 | 211.78 | 0 | 397 | 557 | 705 | 1033 |
| ***Panel B:*** *Other institutions* | | | | | | | |
| Probability of credit limit increase | 0.016 | 0.124 | 0 | 0 | 0 | 0 | 1 |
| Amount of credit limit increase ($) | 2691.28 | 2375.75 | 49 | 1250 | 2000 | 3500 | 12000 |
| Probability of credit limit decrease | 0.011 | 0.106 | 0 | 0 | 0 | 0 | 1 |
| Amount of credit limit decrease ($) | 4303.96 | 4634.67 | 25 | 1000 | 3000 | 5600 | 21500 |
| Number of accounts | 1.588 | 0.838 | 1 | 1 | 1 | 2 | 4 |
| Credit limit ($) | 8112.84 | 7445.90 | 400 | 2550 | 5600 | 11000 | 33500 |
| Current balance ($) | 1900.63 | 4110.74 | 0 | 0 | 220 | 1805 | 20570 |
| Utilization | 0.235 | 0.351 | 0 | 0 | 0.038 | 0.344 | 1.075 |
| Probability past due | 0.016 | 0.126 | 0 | 0 | 0 | 0 | 1 |
| Amount past due ($) | 12.00 | 303.40 | 0 | 0 | 0 | 0 | 93 |
| Probability delinquent | 0.017 | 0.130 | 0 | 0 | 0 | 0 | 1 |
| Max. delinquent amount ($) | 13.77 | 322.76 | 0 | 0 | 0 | 0 | 114 |
| Probability positive charged-off | 0.003 | 0.052 | 0 | 0 | 0 | 0 | 0 |
| Amount charged off ($) | 16.06 | 449.64 | 0 | 0 | 0 | 0 | 0 |
| Highest amount borrowed ($) | 3495.88 | 118103.30 | 0 | 0 | 1075 | 4401 | 29000 |
| Credit score | 776.65 | 98.54 | 458 | 721 | 812 | 852 | 874 |
| Age of account (mo.) | 98.62 | 103.82 | 1 | 24 | 62 | 134 | 435 |
| Age of consumer (mo.) | 581.12 | 206.84 | 0 | 432 | 582 | 724 | 1034 |

*Notes:* Table A.1 summarizes key borrower-account characteristics and outcome variables by firm compliance with CG5 over the pre-CG5 period. All observations are account-month level. Panel A summarizes characteristics of accounts associated with RBC, the bank credibly found by the FCAC to have not complied with CG5. Panel B summarizes characteristics of accounts associated with other, large Canadian institutions.

Table A.2 summarizes these borrower-account characteristics and outcomes, by bank compliance with CG5, over the whole sample period. Similarly to Table A.1, Panel (a) summarizes key variables of interest for accounts associated with RBC, the institution found by the

FCAC to have violated CG5. Panel (b) summarizes the same variables for CBP-compliant institutions.

**Table A.2:** Summary statistics by CG5 compliance

| | Mean | SD | P1 | P25 | P50 | P75 | P99 |
|---|---|---|---|---|---|---|---|
| ***Panel A:*** *RBC* | | | | | | | |
| Probability of credit limit increase | 0.016 | 0.124 | 0 | 0 | 0 | 0 | 1 |
| Amount of credit limit increase ($) | 3157.88 | 2265.72 | 500 | 2000 | 3000 | 4000 | 10500 |
| Probability of credit limit decrease | 0.002 | 0.048 | 0 | 0 | 0 | 0 | 0 |
| Amount of credit limit decrease ($) | 6158.69 | 5915.67 | 100 | 1500 | 4500 | 9000 | 25000 |
| Number of accounts | 1.087 | 0.302 | 1 | 1 | 1 | 1 | 2 |
| Credit limit ($) | 10652.39 | 8435.88 | 1000 | 4000 | 9000 | 15900 | 35000 |
| Current balance ($) | 2549.13 | 4571.36 | 0 | 5 | 644 | 2858 | 21909 |
| Utilization | 0.277 | 0.364 | 0 | 0.001 | 0.080 | 0.466 | 1.132 |
| Probability past due | 0.017 | 0.131 | 0 | 0 | 0 | 0 | 1 |
| Amount past due ($) | 46.51 | 780.25 | 0 | 0 | 0 | 0 | 161 |
| Probability delinquent | 0.038 | 0.191 | 0 | 0 | 0 | 0 | 1 |
| Max. delinquent amount ($) | 66.39 | 920.17 | 0 | 0 | 0 | 0 | 608 |
| Probability positive charged-off | 0.004 | 0.062 | 0 | 0 | 0 | 0 | 0 |
| Amount charged off ($) | 36.13 | 747.03 | 0 | 0 | 0 | 0 | 0 |
| Highest amount borrowed ($) | 7092.03 | 7474.41 | 0 | 1835 | 4868 | 10053 | 32154 |
| Credit score | 773.12 | 80.53 | 536 | 725 | 789 | 836 | 898 |
| Age of account (mo.) | 132.92 | 117.75 | 2 | 41 | 98 | 191 | 475 |
| Age of consumer (mo.) | 579.41 | 209.61 | 0 | 415 | 577 | 730 | 1049 |
| ***Panel B:*** *Other institutions* | | | | | | | |
| Probability of credit limit increase | 0.012 | 0.108 | 0 | 0 | 0 | 0 | 1 |
| Amount of credit limit increase ($) | 3012.52 | 2813.31 | 20 | 1200 | 2500 | 4000 | 15000 |
| Probability of credit limit decrease | 0.005 | 0.073 | 0 | 0 | 0 | 0 | 0 |
| Amount of credit limit decrease ($) | 3846.84 | 4972.64 | 9 | 500 | 2000 | 5000 | 23000 |
| Number of accounts | 1.54 | 0.82 | 1 | 1 | 1 | 2 | 4 |
| Credit limit ($) | 8306.47 | 7672.97 | 500 | 2500 | 5600 | 11500 | 35000 |
| Current balance ($) | 2000.71 | 4150.61 | 0 | 0 | 327 | 1983 | 20789 |
| Utilization | 0.258 | 0.360 | 0 | 0 | 0.058 | 0.422 | 1.082 |
| Probability past due | 0.017 | 0.128 | 0 | 0 | 0 | 0 | 1 |
| Amount past due ($) | 18.77 | 435.95 | 0 | 0 | 0 | 0 | 99 |
| Probability delinquent | 0.032 | 0.175 | 0 | 0 | 0 | 0 | 1 |
| Max. delinquent amount ($) | 27.59 | 497.38 | 0 | 0 | 0 | 0 | 360 |
| Probability positive charged-off | 0.004 | 0.061 | 0 | 0 | 0 | 0 | 0 |
| Amount charged off ($) | 26.16 | 612.49 | 0 | 0 | 0 | 0 | 0 |
| Highest amount borrowed ($) | 4625.94 | 106313.95 | 0 | 167 | 2076 | 6150 | 30992 |
| Credit score | 770.62 | 80.34 | 536 | 721 | 785 | 834 | 895 |
| Age of account (mo.) | 100.33 | 104.05 | 1 | 25 | 65 | 138 | 462 |
| Age of consumer (mo.) | 590.21 | 207.13 | 227 | 428 | 593 | 740 | 1044 |

*Notes:* Table A.2 summarizes key borrower-account characteristics and outcome variables by firm compliance with CG5 over the sample period of 2009 to 2017. All observations are account-month level. Panel A summarizes characteristics of accounts associated with RBC, the bank credibly found by the FCAC to have not complied with CG5. Panel B summarizes characteristics of accounts associated with other, large Canadian institutions.

In Table A.3, we report probit regressions for the probability of receiving a credit limit

increase in period $t+1$, estimated separately for the pre- and post-CG5 periods. We present average marginal effects, controlling for existing credit limits, utilization rates, credit scores, age of the account, and age of consumer. We find that higher existing credit limits and utilization rates increase the probability of receiving credit limits, while age of the account and consumer decreases the likelihood. The magnitudes of the estimated average marginal effects do not differ significantly across the two periods. Banks in our sample give credit limit increases more frequently to active borrowers who are younger.

**Table A.3:** Average marginal effects of factors on the probability of receiving a credit limit increase

| | Pre-CG5 | Post-CG5 |
|---|---|---|
| | (1) | (2) |
| Credit limit ($) | 0.000000898*** | 0.000000835*** |
| | (1.62e-09) | (4.53e-10) |
| Utilization | 0.0168*** | 0.00669*** |
| | (0.0000429) | (0.0000114) |
| Credit score | 0.0000490*** | -0.0000146*** |
| | (0.000000179) | (5.79e-08) |
| Age of account | -0.0000220*** | -0.0000551*** |
| | (0.000000147) | (4.65e-08) |
| Age of consumer | -0.0000352*** | -0.0000197*** |
| | (7.46e-08) | (1.94e-08) |
| N | 115,463,829 | 1,214,426,330 |

*Notes:* Table A.3 reports the estimated average marginal effects using a probit model for the probability of receiving a credit limit increase. The dependent variable for both columns is an indicator variable of whether the account received a credit limit increase in period $t+1$. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. All independent variables are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table A.4:** Average marginal effects of factors on the probability of receiving a credit limit increase, pre-CG5

| | RBC | | CBP-compliant | |
|---|---|---|---|---|
| | Pre-CG5 | | Pre-CG5 | |
| | (1) | (2) | (3) | (4) |
| Credit limit ($) | 0.000000957*** | 0.000000961*** | 0.000000837*** | 0.000000837*** |
| | (5.05e-09) | (5.04e-09) | (1.67e-09) | (1.67e-09) |
| Utilization | 0.0127*** | 0.0128*** | 0.0174*** | 0.0174*** |
| | (0.000128) | (0.000127) | (0.0000447) | (0.0000446) |
| Credit score | 0.0000844*** | 0.0000693*** | 0.0000428*** | 0.0000414*** |
| | (0.000000548) | (0.000000556) | (0.000000184) | (0.000000189) |
| Age of account | -0.0000405*** | -0.0000389*** | -0.0000216*** | -0.0000215*** |
| | (0.000000407) | (0.000000407) | (0.000000159) | (0.000000159) |
| Age of consumer | -0.0000400*** | -0.0000395*** | -0.0000325*** | -0.0000324*** |
| | (0.000000211) | (0.000000211) | (7.85e-08) | (7.85e-08) |
| Amount past due ($) | | -0.00107*** | | -0.0000379*** |
| | | (0.0000382) | | (0.00000148) |
| Max. delinquent amount ($) | | -0.000198*** | | 0.000000570 |
| | | (0.00000569) | | (0.000000480) |
| N | 20,028,407 | 20,028,407 | 95,435,422 | 95,435,422 |

*Notes:* Table A.4 reports the estimated average marginal effects using data from the pre-CG5 period and probit models for the probability of receiving a credit limit increase. We report results for CBP-compliant and non-compliant banks separately. Columns (1)-(2) reports results for RBC (non-compliant). Columns (3)-(4) reports results for CBP-compliant banks. The dependent variable for all columns is an indicator variable of whether the account received a credit limit increase in period $t+1$. Standard errors in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$. All independent variables are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

# Appendix B Additional adverse selection results

In the following sections, we present results from Table 1 at different horizons, for different and related outcome variables, and with additional controls. These tables demonstrate that our main adverse selection results are robust to a variety of different measures of outcomes of interest, and when looking at different horizons for our long-term forward looking moving averages.

## B.1 12-month

**Table B.1:** Effects of credit limit increase on avg. probability of being past due, 12 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | -0.00699*** | -0.00480*** | -0.00531*** | -0.00701*** | -0.00491*** | -0.00545*** |
| | (0.0000260) | (0.0000258) | (0.0000258) | (0.0000260) | (0.0000258) | (0.0000258) |
| CBP compliant | 0.00144*** | 0.00235*** | 0.00271*** | | | |
| | (0.0000120) | (0.0000119) | (0.0000119) | | | |
| Credit limit increased × CBP compliant | 0.00802*** | 0.00685*** | 0.00667*** | 0.00813*** | 0.00704*** | 0.00688*** |
| | (0.0000379) | (0.0000372) | (0.0000373) | (0.0000379) | (0.0000373) | (0.0000373) |
| Credit limit ($) | 0.00336*** | 0.00377*** | 0.00212*** | 0.00344*** | 0.00403*** | 0.00236*** |
| | (0.00000452) | (0.00000456) | (0.00000472) | (0.00000468) | (0.00000470) | (0.00000487) |
| Credit score | | -0.285*** | -0.275*** | | -0.286*** | -0.275*** |
| | | (0.000103) | (0.000103) | | (0.000103) | (0.000103) |
| Age of account | | 0.00234*** | 0.00198*** | | 0.00243*** | 0.00202*** |
| | | (0.00000271) | (0.00000287) | | (0.00000277) | (0.00000304) |
| Age of consumer | | 0.0104*** | 0.0107*** | | 0.0101*** | 0.0104*** |
| | | (0.0000372) | (0.0000372) | | (0.0000372) | (0.0000372) |
| Current balance ($) | | | 0.00111*** | | | 0.00112*** |
| | | | (0.000000767) | | | (0.000000782) |
| Highest amount borrowed ($) | | | 0.0000720*** | | | 0.000152*** |
| | | | (0.000000994) | | | (0.00000119) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Borrower FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.487 | 0.500 | 0.501 | 0.487 | 0.501 | 0.501 |
| N | 1,180,656,090 | 1,180,655,658 | 1,180,649,173 | 1,180,656,090 | 1,180,655,658 | 1,180,649,173 |

*Notes:* Dependent variable for all columns (1)-(6) is the average probability of the consumer having positive amount past due value during periods $t+1$ to $t+12$. Standard errors in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table B.2:** Effects of credit limit increase on avg. amount past due, 12 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | -0.0595*** | -0.0439*** | -0.0503*** | -0.0584*** | -0.0435*** | -0.0502*** |
| | (0.000287) | (0.000285) | (0.000285) | (0.000287) | (0.000285) | (0.000285) |
| CBP compliant | 0.0274*** | 0.0337*** | 0.0376*** | | | |
| | (0.000101) | (0.0000997) | (0.0000996) | | | |
| Credit limit increased × CBP compliant | 0.0608*** | 0.0525*** | 0.0502*** | 0.0603*** | 0.0526*** | 0.0505*** |
| | (0.000378) | (0.000374) | (0.000374) | (0.000378) | (0.000374) | (0.000374) |
| Credit limit ($) | 0.0524*** | 0.0555*** | 0.0354*** | 0.0532*** | 0.0575*** | 0.0371*** |
| | (0.0000390) | (0.0000396) | (0.0000407) | (0.0000403) | (0.0000405) | (0.0000418) |
| Credit score | | -2.022*** | -1.890*** | | -2.026*** | -1.891*** |
| | | (0.000770) | (0.000772) | | (0.000771) | (0.000773) |
| Age of account | | 0.0162*** | 0.0124*** | | 0.0169*** | 0.0123*** |
| | | (0.0000244) | (0.0000258) | | (0.0000249) | (0.0000272) |
| Age of consumer | | 0.0352*** | 0.0395*** | | 0.0363*** | 0.0398*** |
| | | (0.000335) | (0.000335) | | (0.000336) | (0.000335) |
| Current balance ($) | | | 0.0139*** | | | 0.0141*** |
| | | | (0.00000726) | | | (0.00000737) |
| Highest amount borrowed ($) | | | 0.0000293** | | | 0.00112*** |
| | | | (0.00000917) | | | (0.0000108) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.489 | 0.498 | 0.499 | 0.489 | 0.498 | 0.499 |
| N | 1,180,656,090 | 1,180,655,658 | 1,180,649,173 | 1,180,656,090 | 1,180,655,658 | 1,180,649,173 |

*Notes:* Dependent variable for all columns (1)-(6) is the average amount past due during periods $t+1$ to $t+12$. Standard errors in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table B.3:** Effects of credit limit increase on avg. probability of being delinquent, 12 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | -0.00969*** | -0.00595*** | -0.00534*** | -0.00954*** | -0.00604*** | -0.00549*** |
| | (0.0000451) | (0.0000448) | (0.0000448) | (0.0000452) | (0.0000449) | (0.0000449) |
| CBP compliant | -0.00165*** | 0.00191*** | 0.00213*** | | | |
| | (0.0000196) | (0.0000193) | (0.0000193) | | | |
| Credit limit increased × CBP compliant | 0.00846*** | 0.00730*** | 0.00746*** | 0.00880*** | 0.00776*** | 0.00800*** |
| | (0.0000587) | (0.0000577) | (0.0000577) | (0.0000587) | (0.0000578) | (0.0000578) |
| Credit limit ($) | -0.00146*** | -0.00243*** | -0.00101*** | -0.00210*** | -0.00236*** | -0.00132*** |
| | (0.00000777) | (0.00000784) | (0.00000819) | (0.00000795) | (0.00000796) | (0.00000835) |
| Credit score | | -0.466*** | -0.476*** | | -0.467*** | -0.478*** |
| | | (0.000134) | (0.000135) | | (0.000134) | (0.000135) |
| Age of account | | 0.0111*** | 0.0109*** | | 0.0110*** | 0.0104*** |
| | | (0.00000474) | (0.00000492) | | (0.00000481) | (0.00000512) |
| Age of consumer | | 0.0276*** | 0.0273*** | | 0.0272*** | 0.0267*** |
| | | (0.0000619) | (0.0000619) | | (0.0000619) | (0.0000618) |
| Current balance ($) | | | -0.00134*** | | | -0.00138*** |
| | | | (0.00000148) | | | (0.00000150) |
| Highest amount borrowed ($) | | | 0.000782*** | | | 0.00121*** |
| | | | (0.00000160) | | | (0.00000197) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.611 | 0.624 | 0.624 | 0.611 | 0.624 | 0.625 |
| N | 1,180,656,090 | 1,180,655,658 | 1,180,649,173 | 1,180,656,090 | 1,180,655,658 | 1,180,649,173 |

*Notes:* Dependent variable for all columns (1)-(6) is the average probability of the consumer being delinquent during periods $t+1$ to $t+12$. Standard errors in parentheses. $^{*}$ $p<0.05$, $^{**}$ $p<0.01$, $^{***}$ $p<0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table B.4:** Effects of credit limit increase on avg. amount delinquent, 12 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | -0.0751*** | -0.0511*** | -0.0479*** | -0.0747*** | -0.0522*** | -0.0493*** |
| | (0.000319) | (0.000316) | (0.000316) | (0.000320) | (0.000317) | (0.000317) |
| CBP compliant | -0.00275*** | 0.0180*** | 0.0195*** | | | |
| | (0.000128) | (0.000126) | (0.000126) | | | |
| Credit limit increased × CBP compliant | 0.0595*** | 0.0512*** | 0.0520*** | 0.0620*** | 0.0546*** | 0.0558*** |
| | (0.000415) | (0.000409) | (0.000409) | (0.000416) | (0.000409) | (0.000409) |
| Credit limit ($) | 0.0213*** | 0.0168*** | 0.0241*** | 0.0191*** | 0.0186*** | 0.0236*** |
| | (0.0000492) | (0.0000495) | (0.0000515) | (0.0000504) | (0.0000504) | (0.0000527) |
| Credit score | | -3.011*** | -3.067*** | | -3.019*** | -3.073*** |
| | | (0.000881) | (0.000890) | | (0.000882) | (0.000890) |
| Age of account | | 0.0641*** | 0.0626*** | | 0.0644*** | 0.0606*** |
| | | (0.0000306) | (0.0000320) | | (0.0000311) | (0.0000335) |
| Age of consumer | | 0.158*** | 0.156*** | | 0.155*** | 0.152*** |
| | | (0.000397) | (0.000396) | | (0.000397) | (0.000396) |
| Current balance ($) | | | -0.00707*** | | | -0.00716*** |
| | | | (0.00000930) | | | (0.00000944) |
| Highest amount borrowed ($) | | | 0.00446*** | | | 0.00682*** |
| | | | (0.0000106) | | | (0.0000130) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Borrower FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.618 | 0.630 | 0.630 | 0.618 | 0.630 | 0.630 |
| N | 1,180,656,090 | 1,180,655,658 | 1,180,649,173 | 1,180,656,090 | 1,180,655,658 | 1,180,649,173 |

*Notes:* Dependent variable for all columns (1)-(6) is the average maximum amount delinquent during periods $t+1$ to $t+12$. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table B.5:** Effects of credit limit increase on avg. probability of charge-offs, 12 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | -0.00314*** | -0.00194*** | -0.00193*** | -0.00334*** | -0.00219*** | -0.00219*** |
| | (0.0000149) | (0.0000148) | (0.0000148) | (0.0000149) | (0.0000148) | (0.0000148) |
| CBP compliant | -0.00117*** | -0.000709*** | -0.000451*** | | | |
| | (0.00000883) | (0.00000874) | (0.00000878) | | | |
| Credit limit increased × CBP compliant | 0.00257*** | 0.00191*** | 0.00189*** | 0.00281*** | 0.00220*** | 0.00222*** |
| | (0.0000227) | (0.0000224) | (0.0000224) | (0.0000227) | (0.0000225) | (0.0000225) |
| Credit limit ($) | 0.000867*** | 0.00112*** | 0.000916*** | 0.000842*** | 0.00118*** | 0.000996*** |
| | (0.00000305) | (0.00000309) | (0.00000321) | (0.00000315) | (0.00000317) | (0.00000329) |
| Credit score | | -0.157*** | -0.156*** | | -0.157*** | -0.157*** |
| | | (0.0000760) | (0.0000762) | | (0.0000761) | (0.0000764) |
| Age of account | | 0.00116*** | 0.000895*** | | 0.00124*** | 0.000966*** |
| | | (0.00000167) | (0.00000176) | | (0.00000172) | (0.00000187) |
| Age of consumer | | 0.00463*** | 0.00468*** | | 0.00438*** | 0.00434*** |
| | | (0.0000235) | (0.0000235) | | (0.0000236) | (0.0000236) |
| Current balance ($) | | | -0.0000152*** | | | -0.0000438*** |
| | | | (0.000000581) | | | (0.000000595) |
| Highest amount borrowed ($) | | | 0.000345*** | | | 0.000343*** |
| | | | (0.000000630) | | | (0.000000743) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Borrower FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.424 | 0.434 | 0.434 | 0.424 | 0.435 | 0.435 |
| N | 1,180,656,090 | 1,180,655,658 | 1,180,649,173 | 1,180,656,090 | 1,180,655,658 | 1,180,649,173 |

*Notes:* Dependent variable for all columns (1)-(6) is the average probability charged-off during periods $t+1$ to $t+12$. Standard errors in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table B.6:** Effects of credit limit increase on avg. amount charged-off, 12 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | -0.384*** | -0.351*** | 1.013*** | -0.134*** | -0.0949*** | 0.690*** |
| | (0.00256) | (0.00305) | (0.0596) | (0.00293) | (0.00282) | (0.0483) |
| CBP compliant | -0.0939*** | -0.0464*** | -0.0103*** | | | |
| | (0.00107) | (0.000930) | (0.000942) | | | |
| Credit limit increased × CBP compliant | 0.294*** | 0.164*** | 0.106*** | 0.0711*** | 0.0547*** | 0.0245*** |
| | (0.00400) | (0.00414) | (0.00392) | (0.00376) | (0.00361) | (0.00342) |
| Credit limit ($) | -0.0735*** | 0.102*** | 0.0775*** | 0.0637*** | 0.0585*** | 0.0277*** |
| | (0.000339) | (0.000375) | (0.000395) | (0.000376) | (0.000377) | (0.000394) |
| Credit score | | -6.371*** | -6.362*** | | -3.325*** | -3.364*** |
| | | (0.00593) | (0.00610) | | (0.00713) | (0.00728) |
| Age of account | | 0.0537*** | 0.0426*** | | 0.0352*** | 0.0201*** |
| | | (0.000233) | (0.000244) | | (0.000231) | (0.000250) |
| Age of borrower | | 0.119*** | 0.128*** | | 0.374*** | 0.389*** |
| | | (0.000895) | (0.000897) | | (0.00205) | (0.00205) |
| Current balance ($) | | | 0.0128*** | | | 0.0123*** |
| | | | (0.0000911) | | | (0.0000762) |
| Highest amount borrowed ($) | | | 0.0274*** | | | 0.0231*** |
| | | | (0.000105) | | | (0.000124) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Borrower FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.424 | 0.434 | 0.434 | 0.424 | 0.434 | 0.435 |
| N | 1,180,656,090 | 1,180,655,658 | 1,180,649,173 | 1,180,656,090 | 1,180,655,658 | 1,180,649,173 |

*Notes:* Dependent variable for all columns (1)-(6) is the average amount charged-off during periods $t+1$ to $t+12$. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table B.7:** Effects of credit limit increase on avg. utilization, 12 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Credit limit increased | 0.00820*** | 0.0132*** | 0.00212*** | 0.00980*** | 0.0145*** | 0.00325*** | | |
| | (0.0000828) | (0.0000809) | (0.0000772) | (0.0000826) | (0.0000807) | (0.0000771) | | |
| CBP compliant | -0.0262*** | -0.0240*** | -0.0164*** | | | | | |
| | (0.0000248) | (0.0000244) | (0.0000216) | | | | | |
| Credit limit increased × CBP compliant | 0.0164*** | 0.0138*** | 0.00973*** | 0.0155*** | 0.0129*** | 0.00936*** | | |
| | (0.0000980) | (0.0000957) | (0.0000913) | (0.0000976) | (0.0000955) | (0.0000912) | | |
| Credit limit ($) | 0.0232*** | 0.0243*** | -0.0111*** | 0.0184*** | 0.0201*** | -0.0138*** | | |
| | (0.00000980) | (0.00000981) | (0.00000911) | (0.0000101) | (0.0000100) | (0.00000938) | | |
| Credit score | | -0.643*** | -0.414*** | | -0.639*** | -0.413*** | | |
| | | (0.000136) | (0.000123) | | (0.000136) | (0.000122) | | |
| Age of account | | 0.00550*** | -0.00212*** | | 0.00378*** | -0.00340*** | | |
| | | (0.00000665) | (0.00000613) | | (0.00000671) | (0.00000639) | | |
| Age of consumer | | -0.0237*** | -0.0161*** | | -0.0170*** | -0.0111*** | | |
| | | (0.0000810) | (0.0000763) | | (0.0000801) | (0.0000759) | | |
| Current balance ($) | | | 0.0239*** | | | 0.0236*** | | |
| | | | (0.00000198) | | | (0.00000200) | | |
| Highest amount borrowed ($) | | | 0.00132*** | | | 0.00136*** | | |
| | | | (0.00000197) | | | (0.00000251) | | |
| Year FE | Yes | Yes | Yes | No | No | No | | |
| Bank-Year FE | No | No | No | Yes | Yes | Yes | | |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes | | |
| Borrower FE | Yes | Yes | Yes | Yes | Yes | Yes | | |
| R-squared | 0.719 | 0.728 | 0.772 | 0.722 | 0.730 | 0.773 | | |
| N | 1,180,655,652 | 1,180,655,220 | 1,180,648,931 | 1,180,655,652 | 1,180,655,220 | 1,180,648,931 | | |

*Notes:* Dependent variable for all columns (1)-(6) is the average utilization during periods $t+1$ to $t+12$. Standard errors in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

## B.2 24-month

**Table B.8:** Effects of credit limit increase on avg. probability of being past due, 24 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | -0.00572*** | -0.00397*** | -0.00444*** | -0.00568*** | -0.00400*** | -0.00450*** |
| | (0.0000242) | (0.0000241) | (0.0000241) | (0.0000243) | (0.0000241) | (0.0000241) |
| CBP compliant | 0.00159*** | 0.00230*** | 0.00264*** | | | |
| | (0.0000112) | (0.0000111) | (0.0000111) | | | |
| Credit limit increased × CBP compliant | 0.00669*** | 0.00575*** | 0.00558*** | 0.00673*** | 0.00586*** | 0.00570*** |
| | (0.0000348) | (0.0000343) | (0.0000344) | (0.0000348) | (0.0000344) | (0.0000344) |
| Credit limit ($) | 0.00370*** | 0.00404*** | 0.00250*** | 0.00374*** | 0.00422*** | 0.00266*** |
| | (0.00000424) | (0.00000430) | (0.00000444) | (0.00000440) | (0.00000442) | (0.00000458) |
| Credit score | | -0.229*** | -0.219*** | | -0.229*** | -0.219*** |
| | | (0.0000944) | (0.0000944) | | (0.0000945) | (0.0000945) |
| Age of account | | 0.00182*** | 0.00149*** | | 0.00188*** | 0.00149*** |
| | | (0.00000255) | (0.00000270) | | (0.00000261) | (0.00000286) |
| Age of consumer | | 0.00839*** | 0.00872*** | | 0.00833*** | 0.00858*** |
| | | (0.0000342) | (0.0000342) | | (0.0000342) | (0.0000342) |
| Current balance ($) | | | 0.00103*** | | | 0.00103*** |
| | | | (0.000000720) | | | (0.000000733) |
| Highest amount borrowed ($) | | | 0.0000695*** | | | 0.000158*** |
| | | | (0.000000924) | | | (0.00000110) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Borrower FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.567 | 0.576 | 0.576 | 0.567 | 0.576 | 0.577 |
| N | 1,181,743,315 | 1,181,742,883 | 1,181,736,265 | 1,181,743,315 | 1,181,742,883 | 1,181,736,265 |

*Notes:* Dependent variable for all columns (1)-(6) is the average probability of the consumer having positive amount past due value during periods $t+1$ to $t+24$. Standard errors in parentheses. $^{*}$ $p<0.05$, $^{**}$ $p<0.01$, $^{***}$ $p<0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table B.9:** Effects of credit limit increase on avg. amount past due, 24 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | -0.0466*** | -0.0359*** | -0.0430*** | -0.0451*** | -0.0349*** | -0.0423*** |
| | (0.000301) | (0.000300) | (0.000300) | (0.000301) | (0.000301) | (0.000301) |
| CBP compliant | 0.0326*** | 0.0367*** | 0.0410*** | | | |
| | (0.000105) | (0.000104) | (0.000104) | | | |
| Credit limit increased × CBP compliant | 0.0524*** | 0.0465*** | 0.0439*** | 0.0516*** | 0.0461*** | 0.0437*** |
| | (0.000388) | (0.000386) | (0.000386) | (0.000388) | (0.000386) | (0.000386) |
| Credit limit ($) | 0.0690*** | 0.0716*** | 0.0493*** | 0.0693*** | 0.0727*** | 0.0501*** |
| | (0.0000411) | (0.0000417) | (0.0000428) | (0.0000423) | (0.0000427) | (0.0000440) |
| Credit score | | -1.389*** | -1.244*** | | -1.393*** | -1.244*** |
| | | (0.000758) | (0.000760) | | (0.000759) | (0.000760) |
| Age of account | | 0.00982*** | 0.00556*** | | 0.0102*** | 0.00532*** |
| | | (0.0000259) | (0.0000272) | | (0.0000264) | (0.0000286) |
| Age of consumer | | -0.0117*** | -0.00692*** | | -0.00880*** | -0.00499*** |
| | | (0.000344) | (0.000344) | | (0.000345) | (0.000344) |
| Current balance ($) | | | 0.0154*** | | | 0.0156*** |
| | | | (0.00000788) | | | (0.00000801) |
| Highest amount borrowed ($) | | | 0.0000343*** | | | 0.00114*** |
| | | | (0.00000957) | | | (0.0000114) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.600 | 0.603 | 0.605 | 0.600 | 0.604 | 0.605 |
| N | 1,181,743,315 | 1,181,742,883 | 1,181,736,265 | 1,181,743,315 | 1,181,742,883 | 1,181,736,265 |

*Notes:* Dependent variable for all columns (1)-(6) is the average amount past due during periods $t+1$ to $t+24$. Standard errors in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table B.10:** Effects of credit limit increase on avg. probability of being delinquent, 24 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | -0.00871*** | -0.00552*** | -0.00508*** | -0.00854*** | -0.00556*** | -0.00518*** |
| | (0.0000433) | (0.0000431) | (0.0000431) | (0.0000433) | (0.0000431) | (0.0000431) |
| CBP compliant | -0.00125*** | 0.00185*** | 0.00212*** | | | |
| | (0.0000190) | (0.0000188) | (0.0000188) | | | |
| Credit limit increased × CBP compliant | 0.00723*** | 0.00626*** | 0.00637*** | 0.00755*** | 0.00668*** | 0.00686*** |
| | (0.0000559) | (0.0000551) | (0.0000551) | (0.0000559) | (0.0000552) | (0.0000552) |
| Credit limit ($) | -0.000387*** | -0.00126*** | -0.000332*** | -0.00101*** | -0.00126*** | -0.000693*** |
| | (0.00000748) | (0.00000757) | (0.00000790) | (0.00000766) | (0.00000769) | (0.00000806) |
| Credit score | | -0.397*** | -0.404*** | | -0.398*** | -0.405*** |
| | | (0.000125) | (0.000127) | | (0.000126) | (0.000127) |
| Age of account | | 0.00972*** | 0.00945*** | | 0.00960*** | 0.00892*** |
| | | (0.00000460) | (0.00000477) | | (0.00000467) | (0.00000497) |
| Age of consumer | | 0.0226*** | 0.0224*** | | 0.0224*** | 0.0221*** |
| | | (0.0000586) | (0.0000586) | | (0.0000586) | (0.0000586) |
| Current balance ($) | | | -0.000962*** | | | -0.000997*** |
| | | | (0.00000141) | | | (0.00000143) |
| Highest amount borrowed ($) | | | 0.000692*** | | | 0.00113*** |
| | | | (0.00000154) | | | (0.00000191) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.656 | 0.666 | 0.666 | 0.656 | 0.666 | 0.666 |
| N | 1,181,743,315 | 1,181,742,883 | 1,181,736,265 | 1,181,743,315 | 1,181,742,883 | 1,181,736,265 |

*Notes:* Dependent variable for all columns (1)-(6) is the average probability of the consumer being delinquent during periods $t+1$ to $t+24$. Standard errors in parentheses. $^{*}$ $p<0.05$, $^{**}$ $p<0.01$, $^{***}$ $p<0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table B.11:** Effects of credit limit increase on avg. amount delinquent, 24 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | -0.0638*** | -0.0450*** | -0.0431*** | -0.0629*** | -0.0453*** | -0.0439*** |
| | (0.000338) | (0.000337) | (0.000337) | (0.000339) | (0.000337) | (0.000337) |
| CBP compliant | 0.00183*** | 0.0196*** | 0.0216*** | | | |
| | (0.000131) | (0.000130) | (0.000130) | | | |
| Credit limit increased × CBP compliant | 0.0475*** | 0.0416*** | 0.0419*** | 0.0496*** | 0.0444*** | 0.0452*** |
| | (0.000429) | (0.000425) | (0.000425) | (0.000429) | (0.000425) | (0.000425) |
| Credit limit ($) | 0.0365*** | 0.0319*** | 0.0351*** | 0.0345*** | 0.0332*** | 0.0341*** |
| | (0.0000507) | (0.0000512) | (0.0000531) | (0.0000519) | (0.0000521) | (0.0000543) |
| Credit score | | -2.341*** | -2.369*** | | -2.348*** | -2.374*** |
| | | (0.000849) | (0.000857) | | (0.000849) | (0.000858) |
| Age of account | | 0.0553*** | 0.0533*** | | 0.0555*** | 0.0510*** |
| | | (0.0000321) | (0.0000335) | | (0.0000326) | (0.0000351) |
| Age of consumer | | 0.109*** | 0.109*** | | 0.108*** | 0.106*** |
| | | (0.000400) | (0.000400) | | (0.000400) | (0.000400) |
| Current balance ($) | | | -0.00406*** | | | -0.00416*** |
| | | | (0.00000946) | | | (0.00000959) |
| Highest amount borrowed ($) | | | 0.00405*** | | | 0.00679*** |
| | | | (0.0000110) | | | (0.0000135) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Borrower FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.681 | 0.688 | 0.688 | 0.681 | 0.688 | 0.688 |
| N | 1,181,743,315 | 1,181,742,883 | 1,181,736,265 | 1,181,743,315 | 1,181,742,883 | 1,181,736,265 |

*Notes:* Dependent variable for all columns (1)-(6) is the average maximum amount delinquent during periods $t+1$ to $t+24$. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table B.12:** Effects of credit limit increase on avg. probability of charge-offs, 24 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | -0.00289*** | -0.00181*** | -0.00184*** | -0.00302*** | -0.00199*** | -0.00203*** |
| | (0.0000150) | (0.0000149) | (0.0000149) | (0.0000150) | (0.0000150) | (0.0000150) |
| CBP compliant | -0.00142*** | -0.00102*** | -0.000762*** | | | |
| | (0.00000849) | (0.00000842) | (0.00000845) | | | |
| Credit limit increased × CBP compliant | 0.00248*** | 0.00189*** | 0.00186*** | 0.00265*** | 0.00211*** | 0.00211*** |
| | (0.0000222) | (0.0000220) | (0.0000220) | (0.0000222) | (0.0000220) | (0.0000220) |
| Credit limit ($) | 0.00116*** | 0.00140*** | 0.00111*** | 0.00112*** | 0.00143*** | 0.00118*** |
| | (0.00000297) | (0.00000301) | (0.00000311) | (0.00000306) | (0.00000308) | (0.00000320) |
| Credit score | | -0.141*** | -0.139*** | | -0.141*** | -0.140*** |
| | | (0.0000715) | (0.0000717) | | (0.0000716) | (0.0000718) |
| Age of account | | 0.00101*** | 0.000747*** | | 0.00108*** | 0.000825*** |
| | | (0.00000164) | (0.00000173) | | (0.00000169) | (0.00000184) |
| Age of consumer | | 0.00425*** | 0.00431*** | | 0.00413*** | 0.00411*** |
| | | (0.0000225) | (0.0000225) | | (0.0000226) | (0.0000226) |
| Current balance ($) | | | 0.0000515*** | | | 0.0000247*** |
| | | | (0.000000554) | | | (0.000000567) |
| Highest amount borrowed ($) | | | 0.000316*** | | | 0.000301*** |
| | | | (0.000000617) | | | (0.000000729) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Borrower FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.501 | 0.509 | 0.509 | 0.501 | 0.510 | 0.510 |
| N | 1,181,743,315 | 1,181,742,883 | 1,181,736,265 | 1,181,743,315 | 1,181,742,883 | 1,181,736,265 |

*Notes:* Dependent variable for all columns (1)-(6) is the average probability charged-off during periods $t+1$ to $t+24$. Standard errors in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table B.13:** Effects of credit limit increase on avg. amount charged-off, 24 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | -0.0210*** | -0.0132*** | -0.0144*** | -0.0213*** | -0.0139*** | -0.0151*** |
| | (0.000197) | (0.000196) | (0.000196) | (0.000197) | (0.000196) | (0.000196) |
| CBP compliant | -0.00859*** | -0.00565*** | -0.00284*** | | | |
| | (0.0000785) | (0.0000782) | (0.0000784) | | | |
| Credit limit increased × CBP compliant | 0.0199*** | 0.0156*** | 0.0150*** | 0.0205*** | 0.0166*** | 0.0163*** |
| | (0.000257) | (0.000256) | (0.000256) | (0.000257) | (0.000256) | (0.000256) |
| Credit limit ($) | 0.0188*** | 0.0205*** | 0.0151*** | 0.0181*** | 0.0203*** | 0.0156*** |
| | (0.0000287) | (0.0000292) | (0.0000300) | (0.0000296) | (0.0000298) | (0.0000309) |
| Credit score | | -1.010*** | -0.980*** | | -1.009*** | -0.984*** |
| | | (0.000582) | (0.000585) | | (0.000583) | (0.000585) |
| Age of account | | 0.00734*** | 0.00449*** | | 0.00785*** | 0.00539*** |
| | | (0.0000172) | (0.0000181) | | (0.0000176) | (0.0000191) |
| Age of consumer | | 0.0302*** | 0.0314*** | | 0.0311*** | 0.0314*** |
| | | (0.000225) | (0.000225) | | (0.000225) | (0.000225) |
| Current balance ($) | | | 0.00240*** | | | 0.00220*** |
| | | | (0.00000540) | | | (0.00000550) |
| Highest amount borrowed ($) | | | 0.00282*** | | | 0.00231*** |
| | | | (0.00000647) | | | (0.00000768) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Borrower FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.562 | 0.566 | 0.566 | 0.562 | 0.566 | 0.566 |
| N | 1,181,743,315 | 1,181,742,883 | 1,181,736,265 | 1,181,743,315 | 1,181,742,883 | 1,181,736,265 |

*Notes:* Dependent variable for all columns (1)-(6) is the average amount charged-off during periods $t+1$ to $t+24$. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table B.14:** Effects of credit limit increase on avg. utilization, 24 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | 0.00717*** | 0.0106*** | 0.00155*** | 0.00872*** | 0.0120*** | 0.00274*** |
| | (0.0000735) | (0.0000724) | (0.0000699) | (0.0000732) | (0.0000722) | (0.0000698) |
| CBP compliant | -0.0244*** | -0.0230*** | -0.0165*** | | | |
| | (0.0000232) | (0.0000230) | (0.0000208) | | | |
| Credit limit increased × CBP compliant | 0.0136*** | 0.0117*** | 0.00837*** | 0.0127*** | 0.0108*** | 0.00788*** |
| | (0.0000873) | (0.0000861) | (0.0000830) | (0.0000870) | (0.0000858) | (0.0000829) |
| Credit limit ($) | 0.0220*** | 0.0229*** | -0.00635*** | 0.0175*** | 0.0189*** | -0.00915*** |
| | (0.00000917) | (0.00000924) | (0.00000875) | (0.00000942) | (0.00000943) | (0.00000901) |
| Credit score | | -0.448*** | -0.259*** | | -0.443*** | -0.258*** |
| | | (0.000125) | (0.000115) | | (0.000124) | (0.000115) |
| Age of account | | 0.00341*** | -0.00309*** | | 0.00181*** | -0.00446*** |
| | | (0.00000625) | (0.00000589) | | (0.00000631) | (0.00000614) |
| Age of consumer | | -0.0261*** | -0.0198*** | | -0.0194*** | -0.0147*** |
| | | (0.0000763) | (0.0000728) | | (0.0000754) | (0.0000722) |
| Current balance ($) | | | 0.0196*** | | | 0.0193*** |
| | | | (0.00000187) | | | (0.00000189) |
| Highest amount borrowed ($) | | | 0.00143*** | | | 0.00162*** |
| | | | (0.00000188) | | | (0.00000241) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Borrower FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.755 | 0.759 | 0.790 | 0.757 | 0.761 | 0.791 |
| N | 1,181,742,917 | 1,181,742,485 | 1,181,736,054 | 1,181,742,917 | 1,181,742,485 | 1,181,736,054 |

*Notes:* Dependent variable for all columns (1)-(6) is the average utilization during periods $t+1$ to $t+24$. Standard errors in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

## B.3 36-month

**Table B.15:** Effects of credit limit increase on avg. probability of being past due, 36 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | -0.00501*** | -0.00349*** | -0.00394*** | -0.00494*** | -0.00348*** | -0.00395*** |
| | (0.0000224) | (0.0000223) | (0.0000223) | (0.0000224) | (0.0000223) | (0.0000223) |
| CBP compliant | 0.00148*** | 0.00209*** | 0.00240*** | | | |
| | (0.0000107) | (0.0000106) | (0.0000106) | | | |
| Credit limit increased × CBP compliant | 0.00602*** | 0.00520*** | 0.00503*** | 0.00603*** | 0.00526*** | 0.00511*** |
| | (0.0000324) | (0.0000320) | (0.0000321) | (0.0000324) | (0.0000321) | (0.0000321) |
| Credit limit ($) | 0.00371*** | 0.00401*** | 0.00255*** | 0.00371*** | 0.00413*** | 0.00265*** |
| | (0.00000408) | (0.00000414) | (0.00000427) | (0.00000422) | (0.00000425) | (0.00000440) |
| Credit score | | -0.198*** | -0.189*** | | -0.199*** | -0.189*** |
| | | (0.0000896) | (0.0000897) | | (0.0000897) | (0.0000898) |
| Age of account | | 0.00156*** | 0.00125*** | | 0.00160*** | 0.00123*** |
| | | (0.00000245) | (0.00000258) | | (0.00000250) | (0.00000273) |
| Age of consumer | | 0.00731*** | 0.00762*** | | 0.00735*** | 0.00759*** |
| | | (0.0000324) | (0.0000324) | | (0.0000324) | (0.0000324) |
| Current balance ($) | | | 0.000983*** | | | 0.000983*** |
| | | | (0.000000688) | | | (0.000000699) |
| Highest amount borrowed ($) | | | 0.0000496*** | | | 0.000146*** |
| | | | (0.000000873) | | | (0.00000104) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Borrower FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.610 | 0.617 | 0.618 | 0.611 | 0.617 | 0.618 |
| N | 1,182,267,376 | 1,182,266,944 | 1,182,260,240 | 1,182,267,376 | 1,182,266,944 | 1,182,260,240 |

*Notes:* Dependent variable for all columns (1)-(6) is the average probability of the consumer having positive amount past due value during periods $t+1$ to $t+36$. Standard errors in parentheses. $^{*}$ $p<0.05$, $^{**}$ $p<0.01$, $^{***}$ $p<0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table B.16:** Effects of credit limit increase on avg. amount past due, 36 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | -0.0361*** | -0.0293*** | -0.0366*** | -0.0348*** | -0.0282*** | -0.0358*** |
| | (0.000288) | (0.000288) | (0.000288) | (0.000289) | (0.000288) | (0.000289) |
| CBP compliant | 0.0310*** | 0.0335*** | 0.0376*** | | | |
| | (0.000106) | (0.000105) | (0.000105) | | | |
| Credit limit increased × CBP compliant | 0.0451*** | 0.0412*** | 0.0386*** | 0.0447*** | 0.0411*** | 0.0386*** |
| | (0.000371) | (0.000370) | (0.000370) | (0.000371) | (0.000370) | (0.000370) |
| Credit limit ($) | 0.0742*** | 0.0762*** | 0.0535*** | 0.0738*** | 0.0763*** | 0.0535*** |
| | (0.0000416) | (0.0000423) | (0.0000433) | (0.0000427) | (0.0000432) | (0.0000445) |
| Credit score | | -0.890*** | -0.741*** | | -0.892*** | -0.740*** |
| | | (0.000731) | (0.000733) | | (0.000731) | (0.000733) |
| Age of account | | 0.00540*** | 0.00133*** | | 0.00557*** | 0.000942*** |
| | | (0.0000261) | (0.0000274) | | (0.0000266) | (0.0000288) |
| Age of consumer | | -0.0471*** | -0.0422*** | | -0.0435*** | -0.0395*** |
| | | (0.000344) | (0.000343) | | (0.000344) | (0.000343) |
| Current balance ($) | | | 0.0158*** | | | 0.0160*** |
| | | | (0.00000807) | | | (0.00000819) |
| Highest amount borrowed ($) | | | -0.000362*** | | | 0.000684*** |
| | | | (0.00000955) | | | (0.0000114) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.666 | 0.667 | 0.668 | 0.666 | 0.667 | 0.668 |
| N | 1,182,267,376 | 1,182,266,944 | 1,182,260,240 | 1,182,267,376 | 1,182,266,944 | 1,182,260,240 |

*Notes:* Dependent variable for all columns (1)-(6) is the average amount past due during periods $t+1$ to $t+36$. Standard errors in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table B.17:** Effects of credit limit increase on avg. probability of being delinquent, 36 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | -0.00785*** | -0.00503*** | -0.00467*** | -0.00768*** | -0.00505*** | -0.00473*** |
| | (0.0000410) | (0.0000408) | (0.0000408) | (0.0000410) | (0.0000409) | (0.0000409) |
| CBP compliant | -0.00129*** | 0.00150*** | 0.00177*** | | | |
| | (0.0000185) | (0.0000183) | (0.0000183) | | | |
| Credit limit increased × CBP compliant | 0.00642*** | 0.00559*** | 0.00567*** | 0.00672*** | 0.00598*** | 0.00613*** |
| | (0.0000529) | (0.0000524) | (0.0000524) | (0.0000529) | (0.0000524) | (0.0000524) |
| Credit limit ($) | 0.000123*** | -0.000690*** | 0.0000432*** | -0.000513*** | -0.000763*** | -0.000377*** |
| | (0.00000726) | (0.00000736) | (0.00000767) | (0.00000743) | (0.00000747) | (0.00000782) |
| Credit score | | -0.349*** | -0.355*** | | -0.350*** | -0.356*** |
| | | (0.000119) | (0.000121) | | (0.000120) | (0.000121) |
| Age of account | | 0.00878*** | 0.00851*** | | 0.00863*** | 0.00796*** |
| | | (0.00000447) | (0.00000463) | | (0.00000453) | (0.00000482) |
| Age of consumer | | 0.0188*** | 0.0186*** | | 0.0187*** | 0.0184*** |
| | | (0.0000556) | (0.0000555) | | (0.0000556) | (0.0000556) |
| Current balance ($) | | | -0.000798*** | | | -0.000837*** |
| | | | (0.00000136) | | | (0.00000138) |
| Highest amount borrowed ($) | | | 0.000631*** | | | 0.00108*** |
| | | | (0.00000148) | | | (0.00000184) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.689 | 0.696 | 0.696 | 0.689 | 0.696 | 0.697 |
| N | 1,182,267,376 | 1,182,266,944 | 1,182,260,240 | 1,182,267,376 | 1,182,266,944 | 1,182,260,240 |

*Notes:* Dependent variable for all columns (1)-(6) is the average probability of the consumer being delinquent during periods $t+1$ to $t+36$. Standard errors in parentheses. $^{*}$ $p<0.05$, $^{**}$ $p<0.01$, $^{***}$ $p<0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table B.18:** Effects of credit limit increase on avg. amount delinquent, 36 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | -0.0526*** | -0.0383*** | -0.0373*** | -0.0517*** | -0.0385*** | -0.0378*** |
| | (0.000328) | (0.000328) | (0.000328) | (0.000328) | (0.000328) | (0.000328) |
| CBP compliant | 0.000954*** | 0.0163*** | 0.0183*** | | | |
| | (0.000131) | (0.000130) | (0.000130) | | | |
| Credit limit increased × CBP compliant | 0.0377*** | 0.0339*** | 0.0341*** | 0.0399*** | 0.0367*** | 0.0372*** |
| | (0.000414) | (0.000412) | (0.000412) | (0.000414) | (0.000412) | (0.000412) |
| Credit limit ($) | 0.0436*** | 0.0387*** | 0.0398*** | 0.0412*** | 0.0392*** | 0.0381*** |
| | (0.0000509) | (0.0000515) | (0.0000534) | (0.0000521) | (0.0000524) | (0.0000546) |
| Credit score | | -1.752*** | -1.766*** | | -1.758*** | -1.769*** |
| | | (0.000809) | (0.000817) | | (0.000809) | (0.000817) |
| Age of account | | 0.0485*** | 0.0465*** | | 0.0484*** | 0.0439*** |
| | | (0.0000324) | (0.0000338) | | (0.0000329) | (0.0000354) |
| Age of consumer | | 0.0612*** | 0.0610*** | | 0.0610*** | 0.0598*** |
| | | (0.000393) | (0.000393) | | (0.000394) | (0.000394) |
| Current balance ($) | | | -0.00235*** | | | -0.00249*** |
| | | | (0.00000942) | | | (0.00000954) |
| Highest amount borrowed ($) | | | 0.00338*** | | | 0.00631*** |
| | | | (0.0000110) | | | (0.0000136) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Borrower FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.728 | 0.731 | 0.731 | 0.728 | 0.731 | 0.731 |
| N | 1,182,267,376 | 1,182,266,944 | 1,182,260,240 | 1,182,267,376 | 1,182,266,944 | 1,182,260,240 |

*Notes:* Dependent variable for all columns (1)-(6) is the average maximum amount delinquent during periods $t+1$ to $t+36$. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table B.19:** Effects of credit limit increase on avg. probability of charge-offs, 36 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | -0.00263*** | -0.00166*** | -0.00170*** | -0.00272*** | -0.00179*** | -0.00184*** |
| | (0.0000140) | (0.0000140) | (0.0000140) | (0.0000141) | (0.0000140) | (0.0000140) |
| CBP compliant | -0.00168*** | -0.00132*** | -0.00109*** | | | |
| | (0.00000823) | (0.00000817) | (0.00000820) | | | |
| Credit limit increased × CBP compliant | 0.00237*** | 0.00183*** | 0.00180*** | 0.00250*** | 0.00200*** | 0.00200*** |
| | (0.0000210) | (0.0000208) | (0.0000208) | (0.0000210) | (0.0000209) | (0.0000209) |
| Credit limit ($) | 0.00129*** | 0.00151*** | 0.00121*** | 0.00125*** | 0.00153*** | 0.00127*** |
| | (0.00000289) | (0.00000293) | (0.00000303) | (0.00000298) | (0.00000300) | (0.00000311) |
| Credit score | | -0.127*** | -0.125*** | | -0.127*** | -0.126*** |
| | | (0.0000684) | (0.0000686) | | (0.0000685) | (0.0000688) |
| Age of account | | 0.000882*** | 0.000650*** | | 0.000951*** | 0.000725*** |
| | | (0.00000160) | (0.00000169) | | (0.00000164) | (0.00000179) |
| Age of consumer | | 0.00384*** | 0.00391*** | | 0.00379*** | 0.00378*** |
| | | (0.0000215) | (0.0000215) | | (0.0000216) | (0.0000216) |
| Current balance ($) | | | 0.0000796*** | | | 0.0000535*** |
| | | | (0.000000533) | | | (0.000000545) |
| Highest amount borrowed ($) | | | 0.000271*** | | | 0.000258*** |
| | | | (0.000000594) | | | (0.000000698) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Borrower FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.553 | 0.560 | 0.560 | 0.553 | 0.560 | 0.560 |
| N | 1,182,267,376 | 1,182,266,944 | 1,182,260,240 | 1,182,267,376 | 1,182,266,944 | 1,182,260,240 |

*Notes:* Dependent variable for all columns (1)-(6) is the average probability charged-off during periods $t+1$ to $t+36$. Standard errors in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table B.20:** Effects of credit limit increase on avg. amount charged-off, 36 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | -0.0171*** | -0.0111*** | -0.0128*** | -0.0172*** | -0.0115*** | -0.0132*** |
| | (0.000216) | (0.000216) | (0.000216) | (0.000216) | (0.000216) | (0.000216) |
| CBP compliant | -0.0121*** | -0.00983*** | -0.00708*** | | | |
| | (0.0000873) | (0.0000872) | (0.0000873) | | | |
| Credit limit increased × CBP compliant | 0.0171*** | 0.0138*** | 0.0130*** | 0.0175*** | 0.0145*** | 0.0141*** |
| | (0.000279) | (0.000278) | (0.000278) | (0.000279) | (0.000278) | (0.000278) |
| Credit limit ($) | 0.0262*** | 0.0275*** | 0.0208*** | 0.0251*** | 0.0268*** | 0.0210*** |
| | (0.0000324) | (0.0000329) | (0.0000338) | (0.0000332) | (0.0000336) | (0.0000347) |
| Credit score | | -0.778*** | -0.739*** | | -0.776*** | -0.742*** |
| | | (0.000613) | (0.000615) | | (0.000613) | (0.000616) |
| Age of account | | 0.00565*** | 0.00286*** | | 0.00610*** | 0.00385*** |
| | | (0.0000195) | (0.0000205) | | (0.0000199) | (0.0000217) |
| Age of consumer | | 0.0211*** | 0.0226*** | | 0.0227*** | 0.0234*** |
| | | (0.000250) | (0.000250) | | (0.000251) | (0.000251) |
| Current balance ($) | | | 0.00352*** | | | 0.00330*** |
| | | | (0.00000611) | | | (0.00000621) |
| Highest amount borrowed ($) | | | 0.00234*** | | | 0.00172*** |
| | | | (0.00000730) | | | (0.00000862) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Borrower FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.642 | 0.644 | 0.644 | 0.643 | 0.644 | 0.644 |
| N | 1,182,267,376 | 1,182,266,944 | 1,182,260,240 | 1,182,267,376 | 1,182,266,944 | 1,182,260,240 |

*Notes:* Dependent variable for all columns (1)-(6) is the average amount charged-off during periods $t+1$ to $t+36$. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table B.21:** Effects of credit limit increase on avg. utilization, 36 months forward

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Credit limit increased | 0.00669*** | 0.00945*** | 0.00130*** | 0.00819*** | 0.0108*** | 0.00247*** |
| | (0.0000678) | (0.0000671) | (0.0000649) | (0.0000675) | (0.0000669) | (0.0000648) |
| CBP compliant | -0.0229*** | -0.0218*** | -0.0158*** | | | |
| | (0.0000223) | (0.0000222) | (0.0000202) | | | |
| Credit limit increased × CBP compliant | 0.0123*** | 0.0108*** | 0.00778*** | 0.0114*** | 0.00983*** | 0.00724*** |
| | (0.0000808) | (0.0000800) | (0.0000774) | (0.0000805) | (0.0000797) | (0.0000772) |
| Credit limit ($) | 0.0213*** | 0.0220*** | -0.00443*** | 0.0170*** | 0.0182*** | -0.00729*** |
| | (0.00000880) | (0.00000889) | (0.00000848) | (0.00000902) | (0.00000906) | (0.00000872) |
| Credit score | | -0.357*** | -0.187*** | | -0.353*** | -0.186*** |
| | | (0.000117) | (0.000108) | | (0.000116) | (0.000108) |
| Age of account | | 0.00281*** | -0.00321*** | | 0.00128*** | -0.00469*** |
| | | (0.00000600) | (0.00000570) | | (0.00000606) | (0.00000593) |
| Age of consumer | | -0.0247*** | -0.0190*** | | -0.0182*** | -0.0141*** |
| | | (0.0000721) | (0.0000692) | | (0.0000713) | (0.0000687) |
| Current balance ($) | | | 0.0176*** | | | 0.0173*** |
| | | | (0.00000180) | | | (0.00000181) |
| Highest amount borrowed ($) | | | 0.00153*** | | | 0.00189*** |
| | | | (0.00000180) | | | (0.00000231) |
| Year FE | Yes | Yes | Yes | No | No | No |
| Bank-Year FE | No | No | No | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.778 | 0.781 | 0.807 | 0.780 | 0.783 | 0.808 |
| N | 1,182,267,011 | 1,182,266,579 | 1,182,260,050 | 1,182,267,011 | 1,182,266,579 | 1,182,260,050 |

*Notes:* Dependent variable for all columns (1)-(6) is the average utilization during periods $t+1$ to $t+36$. Standard errors in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$. All variables except the dependent variable are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

# Appendix C Additional lender response results

Tables C.1 and C.2 present estimated results of the implementation of CG5 on the lender credit limit increases, with additional controls. In each table, columns (1)-(4) control for year fixed effects, and columns (5)-(8) control for both year fixed effects and borrower fixed effects. In columns (3)-(4) and (7)-(8), we control for credit limit utilization to show that the estimates on our key parameter of interest do not qualitatively change.

**Table C.1:** Effects of CG5 on probability of credit limit increase

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| CBP compliant | -0.00498*** | -0.00391*** | -0.00425*** | -0.00394*** | -0.00634*** | -0.00547*** | -0.00509*** | -0.00570*** |
| | (0.0000425) | (0.0000426) | (0.0000425) | (0.0000425) | (0.0000458) | (0.0000460) | (0.0000460) | (0.0000458) |
| CG5 × CBP compliant | 0.000968*** | 0.000667*** | 0.000743*** | 0.000433*** | 0.00127*** | 0.00137*** | 0.00122*** | 0.00171*** |
| | (0.0000435) | (0.0000437) | (0.0000435) | (0.0000435) | (0.0000461) | (0.0000463) | (0.0000463) | (0.0000461) |
| Credit limit ($) | -0.00105*** | -0.00317*** | -0.000928*** | 0.000383*** | -0.00316*** | -0.00644*** | -0.00450*** | -0.00439*** |
| | (0.00000334) | (0.00000354) | (0.00000362) | (0.00000380) | (0.00000654) | (0.00000706) | (0.00000677) | (0.00000665) |
| Current balance ($) | | 0.00215*** | | | | 0.00211*** | | |
| | | (0.000000935) | | | | (0.00000128) | | |
| Highest amount borrowed ($) | | 0.000125*** | | | | 0.000206*** | 0.000386*** | |
| | | (0.000000965) | | | | (0.00000129) | (0.00000128) | |
| Utilization | | | 0.0285*** | 0.0283*** | | | 0.0322*** | 0.0326*** |
| | | | (0.0000166) | (0.0000168) | | | (0.0000231) | (0.0000230) |
| Credit score | | | 0.0264*** | 0.0324*** | | | 0.0521*** | 0.0516*** |
| | | | (0.0000441) | (0.0000449) | | | (0.0000821) | (0.0000819) |
| Age of account | | | | -0.00134*** | | | | 0.000816*** |
| | | | | (0.00000269) | | | | (0.00000364) |
| Age of consumer | | | | -0.00759*** | | | | 0.00532*** |
| | | | | (0.0000107) | | | | (0.0000560) |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Borrower FE | No | No | No | No | Yes | Yes | Yes | Yes |
| R-squared | 0.00114 | 0.00574 | 0.00548 | 0.00630 | 0.0379 | 0.0404 | 0.0409 | 0.0409 |
| N | 1,088,294,675 | 1,087,327,939 | 1,088,294,154 | 1,088,293,769 | 1,087,957,781 | 1,087,004,052 | 1,087,004,052 | 1,087,956,877 |

*Notes:* Dependent variable for all columns (1)-(8) is an indicator variable for whether the consumer's credit card account receives a credit limit increase at time $t+1$. All independent variables are values at time $t$. Standard errors in parentheses. $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$. All non-indicator variables are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

**Table C.2:** Effects of CG5 on amount of credit limit increase

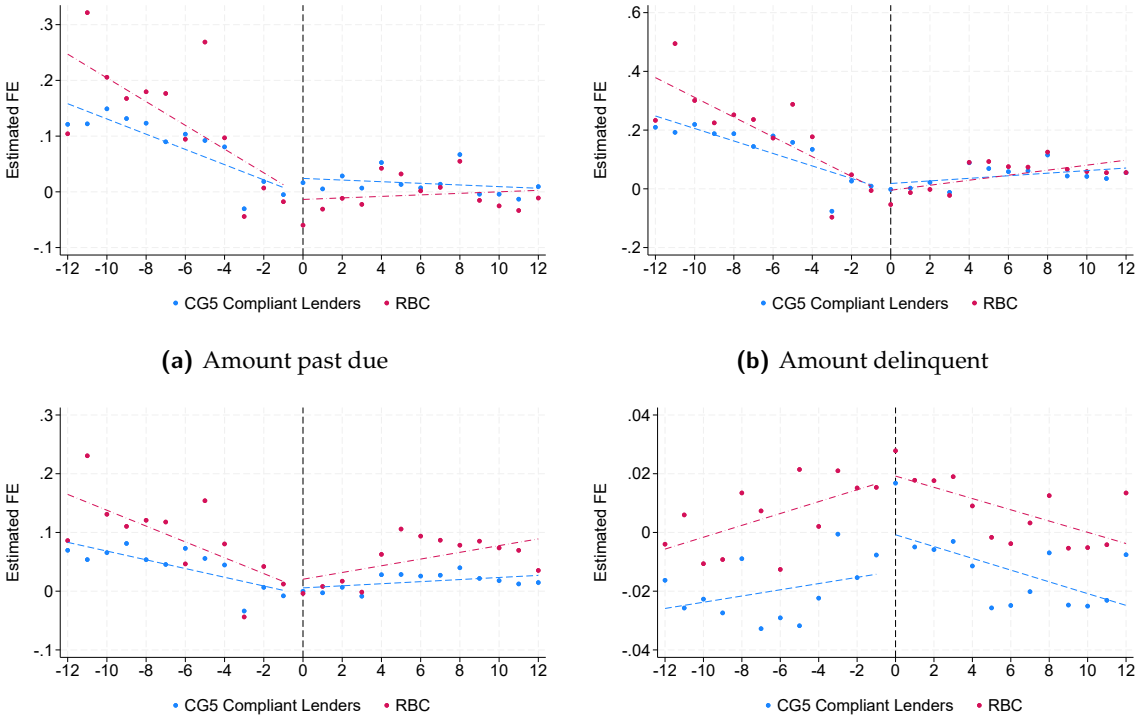
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| CBP compliant | 0.0159*** | 0.102*** | 0.0560*** | 0.0509*** | -0.0133*** | -0.00129 | 0.00472 | -0.00663** |
| | (0.00106) | (0.00112) | (0.00121) | (0.00121) | (0.00251) | (0.00253) | (0.00253) | (0.00251) |
| CG5 × CBP compliant | -0.276*** | -0.347*** | -0.276*** | -0.274*** | -0.188*** | -0.200*** | -0.197*** | -0.191*** |
| | (0.00115) | (0.00120) | (0.00129) | (0.00129) | (0.00237) | (0.00238) | (0.00238) | (0.00238) |
| Credit limit ($) | 0.334*** | 0.384*** | 0.277*** | 0.292*** | 0.258*** | 0.277*** | 0.249*** | 0.249*** |
| | (0.000254) | (0.000259) | (0.000253) | (0.000291) | (0.000565) | (0.000588) | (0.000568) | (0.000599) |
| Current balance ($) | | -0.0666*** | | | | -0.0179*** | | |
| | | (0.000102) | | | | (0.000149) | | |
| Highest amount borrowed ($) | | 0.0173*** | | | | 0.00165*** | 0.00265*** | |
| | | (0.000119) | | | | (0.000184) | (0.000181) | |
| Utilization | | | -0.392*** | -0.382*** | | | -0.181*** | -0.178*** |
| | | | (0.000899) | (0.000902) | | | (0.00145) | (0.00143) |
| Credit score | | | 2.419*** | 2.478*** | | | 1.260*** | 1.254*** |
| | | | (0.00386) | (0.00391) | | | (0.00752) | (0.00752) |
| Age of account | | | | -0.0319*** | | | | -0.00681*** |
| | | | | (0.000262) | | | | (0.000551) |
| Age of consumer | | | | -0.0336*** | | | | 0.454*** |
| | | | | (0.000689) | | | | (0.00843) |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Borrower FE | No | No | No | No | Yes | Yes | Yes | Yes |
| R-squared | 0.147 | 0.172 | 0.245 | 0.246 | 0.727 | 0.727 | 0.731 | 0.731 |
| N | 14,644,858 | 14,640,587 | 14,644,856 | 14,644,854 | 10,114,430 | 10,111,949 | 10,111,949 | 10,114,430 |

*Notes:* Dependent variable for all columns (1)-(8) is the amount a consumer receives in a credit limit increase at time $t+1$. All independent variables are values at time $t$. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. All non-indicator variables are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables.

# Appendix D Additional parallel trends analysis

## D.1 Adverse selection variables

**Figure D.1:** Trends adverse selection outcomes, 24 months forward




**(a)** Amount past due

**(b)** Amount delinquent

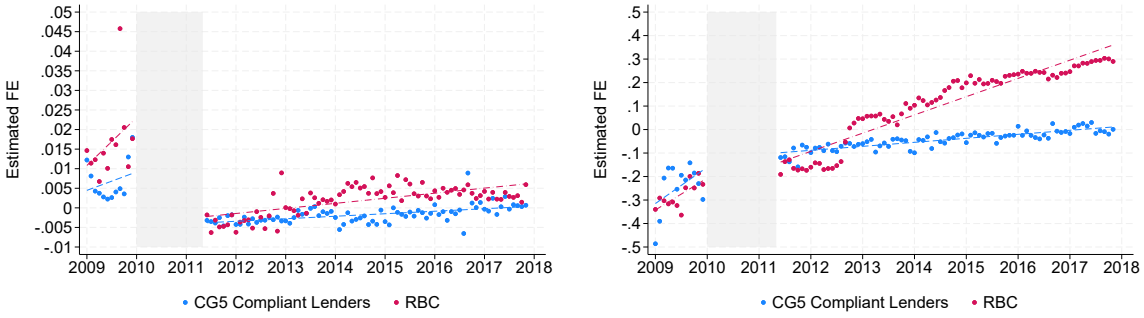
**(c)** Amount delinquent

**(d)** Utilization

*Notes:* Plotted series in Figure D.1 above are estimated month-year fixed-effects by CG5 compliance group, controlling for the credit limit in month $t$, the credit score, the account age, and the borrower age. The dependent variable in Panel (a) is the amount past due. The dependent variable in Panel (b) is the amount of delinquent. The dependent variable in Panel (c) is the amount charged off. The dependent variable in Panel (d) is the utilization rate. Blue series are the institutions complying with CG5 and red series are RBC, the institution who was found to have violated CG5. All dashes lines plot the average linear trend across time of their respective colored scatter plots. The x-axis is the event time where 0 marks the month an account received a credit limit increase.

## D.2 Lender response variables

**Figure D.2:** Trends in credit limit increases




**(a)** Probability of credit limit increase

**(b)** Amount of credit limit increases

*Notes:* Plotted series in Figure D.2 are estimated month-year fixed-effects by CG5 compliance group, controlling for the credit limit in month $t$, the current balance in $t$, the credit score, the account age, and the borrower age. The dependent variable in Panel (a) is the probability of a credit limit increase. The dependent variable in Panel (b) is the amount of credit limit increases. Blue series are the institutions complying with CG5 and red series are RBC, the institution who was found to have violated CG5. All dashes lines plot the average linear trend across time of their respective colored scatter plots. The gray bars in both panels plot the time from January 2010 to April 2011, the period of the first stage of CG5 implementation when "evergreen" contracts were improperly used by several institutions to comply with the policy.

# Appendix E Propensity score-matched sample results

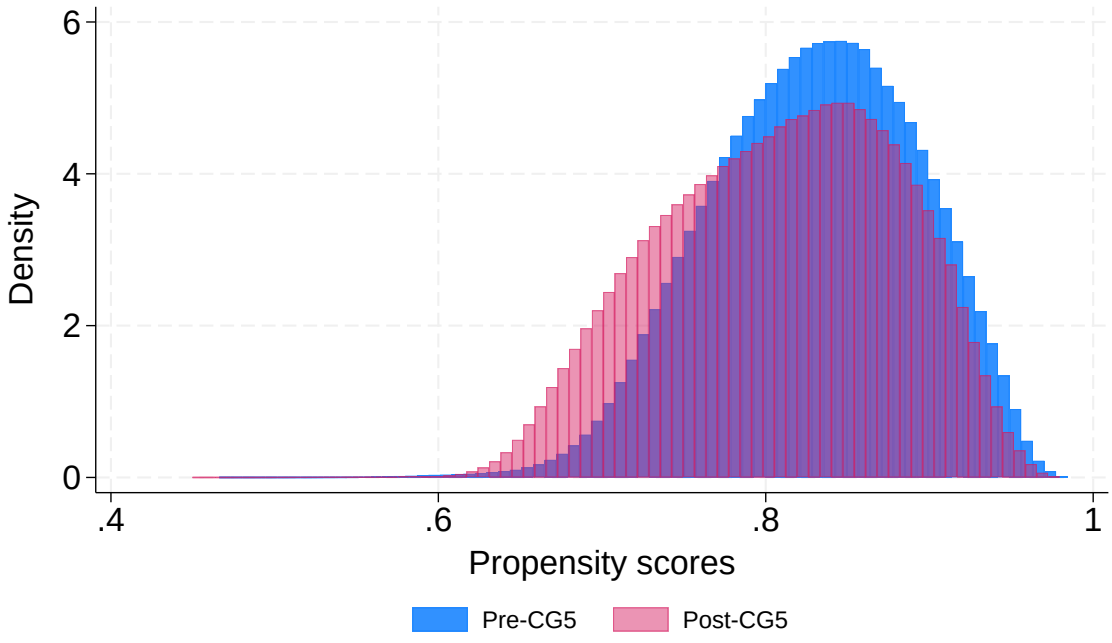
## E.1 Matching Methodology

We employ one-to-one propensity score-matching with replacement using a probit model. We match similar RBC accounts to similar accounts from CG5-complying banks based on existing credit limit, utilization rate, credit score, account age, and consumer age.

For the adverse selection test, given our main results only use post-CG5 data, we estimate the propensity score on the same sample. For lender response regressions, due to the fact that CG5 can change the nature of which types of accounts receive credit limits, we estimate propensity scores for the pre- and post-CG5 periods separately. In essence, we treat receiving a credit limit increase as a Markov process in the matching process and abstract away from the ability of credit limit increases to endogenously change an account's characteristics.

Figure E.1 plots the distribution of the estimated propensity scores for the pre- and post-CG5 periods. We see that the two series have significant overlap.

**Figure E.1:** Distribution of estimated propensity scores




*Notes:* Figure E.1 plots the distribution of the estimated propensity scores for the pre- and post-CG5 periods. The blue series plots the pre-CG5 estimates and the red series plots the post-CG5 estimates.

## E.2 Adverse selection results using matched sample

Table E.1 reports the adverse selection test results using a one-to-one propensity score-matched sample to adjust for imbalances in the controls across CG5-complying and non-complying banks. The dependent variable for each column is the average of the listed variable for periods $t+1$ to $t+24$. The dependent variable in (1) is the amount past due, (2) is the maximum amount delinquent, (3) is the amount charged off, and (4) is the utilization. In these regressions, we do not control for borrower fixed effects because matching occurs on account-month level data and does not guarantee repeated observations of any one borrower. The coefficient on Credit limit increased $\times$ CBP-compliant is consistent with our main findings that CBP-compliant banks faced greater adverse selection as a result of the policy.

**Table E.1:** Adverse selection test results on various outcomes of interest, 24-months forward, propensity score-matched sample

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Amount past due | Amount delinquent | Amount charged off | Utilization |
| Credit limit increased | -0.0281*** | -0.0350*** | -0.0114*** | 0.00763*** |
| | (0.000167) | (0.000180) | (0.000107) | (0.0000400) |
| Credit limit increased × CBP compliant | 0.0409*** | 0.0348*** | 0.0144*** | 0.0169*** |
| | (0.000301) | (0.000326) | (0.000202) | (0.0000625) |
| Credit limit ($) | 0.0695*** | 0.0302*** | 0.0191*** | 0.0170*** |
| | (0.0000380) | (0.0000469) | (0.0000268) | (0.00000851) |
| Credit score | -1.369*** | -2.299*** | -1.004*** | -0.437*** |
| | (0.000637) | (0.000716) | (0.000495) | (0.000104) |
| Age of account | 0.00989*** | 0.0563*** | 0.00789*** | 0.00151*** |
| | (0.0000234) | (0.0000294) | (0.0000157) | (0.00000564) |
| Age of consumer | -0.0141*** | 0.123*** | 0.0329*** | -0.0220*** |
| | (0.000309) | (0.000360) | (0.000203) | (0.0000681) |
| Bank-Year FE | Yes | Yes | Yes | Yes |
| FSA FE | Yes | Yes | Yes | Yes |
| Borrower FE | Yes | Yes | Yes | Yes |
| R-squared | 0.668 | 0.752 | 0.647 | 0.807 |
| N | 1,863,010,000 | 1,863,010,000 | 1,863,010,000 | 1,863,009,790 |

*Notes:* Table E.1 reports the adverse selection test results using a one-to-one propensity score-matched sample to adjust for imbalances in the controls across CG5-complying and non-complying banks. The dependent variable for each column is the average of the listed variable for periods $t+1$ to $t+24$. The dependent variable in (1) is the amount past due, (2) is the max. amount delinquent, (3) is the amount charged off, and (4) is the utilization. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. All variables except the probability dependent variables are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables. Reported number of observations are the effective number of observations due to frequency weighting.

## E.3 Lender response results using matched sample

Table E.2 reports estimates of the effect of CG5 on the probability and amount of credit limit increases using a propensity score-matched sample to adjust for imbalances in the controls across CG5-complying and non-complying banks. In these regressions, we do not control for borrower fixed effects because matching occurs on account-month level data and does not guarantee repeated observations of any one borrower. The coefficient on CG5 × CBP-compliant is consistent with our main findings that banks complying with CG5 surprisingly gave more frequent credit limit increases albeit at small sizes as a result of the

policy.

**Table E.2:** Effects of CG5 on probability and amount of credit limit increases, propensity score-matched sample

| | (1) | (2) |
|---|---|---|
| | Prob. credit limit increase | Amt. credit limit increase |
| CBP compliant | -0.00452*** | -0.0346*** |
| | (0.0000276) | (0.00268) |
| CG5 × CBP compliant | 0.00102*** | -0.236*** |
| | (0.0000274) | (0.00215) |
| Credit limit ($) | -0.00555*** | 0.231*** |
| | (0.00000593) | (0.000592) |
| Utilization | 0.0324*** | -0.196*** |
| | (0.0000196) | (0.00141) |
| Credit score | 0.0584*** | 1.257*** |
| | (0.0000694) | (0.00711) |
| Age of account | 0.00151*** | -0.00612*** |
| | (0.00000328) | (0.000555) |
| Age of consumer | 0.00709*** | 0.446*** |
| | (0.0000514) | (0.00852) |
| Year FE | Yes | Yes |
| FSA FE | Yes | Yes |
| R-squared | 0.195 | 0.826 |
| N | 1,732,536,987 | 22,128,485 |

*Notes:* Table E.2 reports estimates of the effect of CG5 on the probability and amount of credit limit increases using a one-to-one propensity score-matched sample to adjust for imbalances in the controls across CG5-complying and non-complying banks. The dependent variable for regressions (1) is the probability of credit limit increase in $t+1$. The dependent variable for regressions (2) is the amount of credit limit increases in $t+1$, conditional on a credit limit increase. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. All non-indicator variables are inverse-hyperbolic-sine-transformed, which preserves all 0 values in dollar variables. Reported number of observations are the effective number of observations due to frequency weighting.