

Adverse Selection and Learning in Consumer Credit Markets*

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Abstract

This paper highlights a trade-off in credit markets between regulatory safeguards for informed consent and the informational frictions they can amplify. In our empirical setting, we find that requiring lenders to garner explicit consent prior to raising clients' credit limits induces adverse selection. We find disproportionately higher take-up among riskier borrowers, as measured by increased utilization, delinquency, and charge-offs, which worsens the risk profile of accounts that receive a credit limit increase. In response to the policy, we find that lenders decreased the size of credit limit increases, yet simultaneously gave more frequent limit increases. We develop a model of lender credit limit provision to study the role of adverse selection and learning. We show that learning from acceptance decisions can rationalize lenders' increased frequency of credit limit increases, while adverse selection can rationalize the decline in the size of credit limit increases.

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 often 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, 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 borrowers 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 over longer horizons, 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.

In response to the policy, CBP-compliant lenders reduced the size of credit limit increases, consistent with Stiglitz and Weiss (1981). However, they also increased the frequency of credit limit increases by 2.05% per year. The combined effect led to a small decline in total credit limit increases, of \$54 per account per year. We develop a model of credit provision to study the roles of adverse selection and learning. Our model rationalizes the effects of CG5 on the observed size and frequency of credit limit increases post-CG5.

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 were 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 lead to 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 compared to more stable or risk-averse borrowers. As a result, the pool of borrowers who select into higher credit limits may be riskier, potentially leading to greater delinquency and charge-offs.¹ Due to adverse selection, the policy could lead FRFIs to offer credit limit increases less frequently or to reduce the size of offered credit limit increases.

However, we argue that this policy can also introduce a new channel for FRFIs to learn about borrowers' riskiness. By offering borrowers credit limit increases, lenders can learn about borrower riskiness based on whether they accept. Because the consumer credit market is built on long-term relationships between lenders and customers, FRFIs may have an incentive to make offers 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 adverse selection concerns.

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., 2010) and loan terms (Hertzberg et al., 2018), to measure adverse selection and screening in credit markets. We contribute by documenting a novel form of adverse selection arising from consumer consent regulations.

A large literature has developed on 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 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

¹See Appendix A for an illustrative example of how the risk profile for a given lender can worsen following the implementation of express consent credit limit regulations.

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 importance of offered credit limit increases for consumer access to credit. We also measure the effects of consent regulations on credit provision and highlights the endogenous response of lenders.

To rationalize our empirical results, evaluate CG5, and run counterfactuals, we develop a simple three-period model based on the quantitative macro model of Chatterjee et al. (2023). In the model, a lender chooses whether to offer credit limit increases, and if so, how large an increase to offer. To capture selection concerns, the lender faces incomplete information about borrowers' types. To capture the learning channel, if borrower's of different types accept or reject limit increases differently, the lender can learn about the borrower's type from the borrower's decision to accept or reject an offered credit limit increase. Low-type borrowers are more impatient and value credit limits more than high-type borrowers. The lender aims to provide low credit limits to low types and high credit limits to high types. We solve the model under two settings; pre-CG5, where credit limit increases are automatically applied, and post-CG5, where borrowers choose whether to accept or reject any offered credit limit increase. Pre-CG5, because all offered increases are automatically applied, the lender does not face adverse selection. Post-CG5, because low-type borrowers are more impatient, they value an immediate increase in credit limits more than high types. As a result, low types are more likely to accept offered increases. However, because the

two types behave differently, the lender can design offers to learn about borrowers' types and facilitate sorting. As a result, the lender may offer small initial limit increases, to induce low types to accept while high types reject. To study the role of learning, we run a counterfactual removing dynamics, which prevents lenders from exploiting what they learn about borrower's types. We show that the learning mechanism rationalizes our empirical results — the lender offers more frequent, but smaller increases to learn about borrowers' types. Absent learning, the lender does not offer more frequent increases; instead, it simply reduces the size of offered increases due to adverse selection concerns.

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

²Bord et al. (2025) find that 80% of credit card credit limit increases are initiated by the lender in the United States.

2.2 Credit Limit Increases, 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 CBP, regulators clarified how financial institutions should implement the express-consent provisions 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).

Starting on April 28, 2011, the CG5 guidance required FRFIs to obtain express consent in *each instance* of a proposed credit limit increase and to do so at the time the increase is offered (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 points after the government published the CG5 guidelines. Prior to CG5, if a bank wished to increase a borrower’s credit limit, it could simply apply it to the borrower’s account. After CG5, a 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

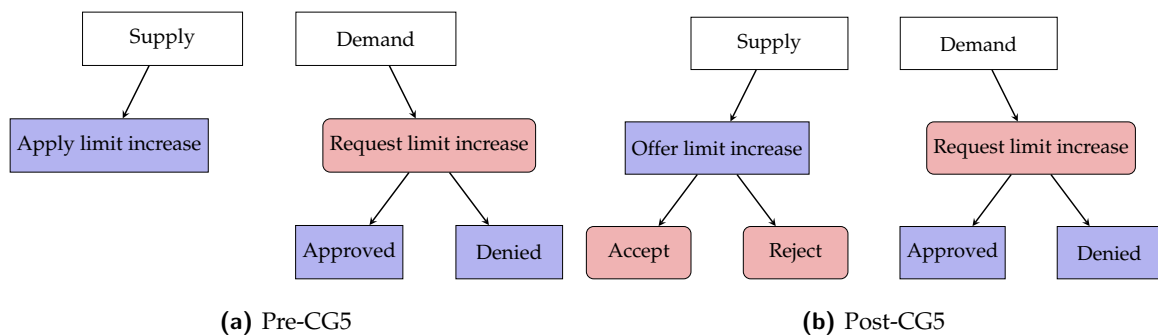
to accept the increase, while many other consumers are likely to either decline or ignore the request. As a result, the pool of borrowers who select into higher credit limits could become riskier.

Notably, in the United States, issuers can raise a customer’s credit limit without explicit prior consent, provided they have assessed the customer’s ability to pay under the Credit Card Act’s requirements (111th Congress, 2009; Consumer Financial Protection Bureau, 2024). Canada’s regime is stricter: banks must obtain express consent each time they offer a credit limit increase. Australia’s rules are the most restrictive, prohibiting unsolicited credit limit increase offers altogether (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. By requiring consent, Canada’s requirement creates selection concerns that are not present in either the U.S. or the Australian system.

2.3 Violations of CBP

By notice of violation issued on May 6, 2019, the FCAC alleged that a large Canadian bank 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 the non-compliant bank’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

Figure 1: CG5 Policy Graphical Representation



Notes: Figure 1 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.

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, "[the non-compliant bank]'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).

Most notably, in the published decision, it is stated that the non-compliant bank objected to its name being made public, and that "[the non-compliant bank]'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 the non-compliant bank prior to 2015. In our analysis, we assume that the non-compliant bank only adhered to the full spirit of CG5 starting in 2019, following the FCAC investigation. Whether the non-compliant bank intended to violate CBP or misunderstood the legislation is irrelevant for our analysis. We simply use the fact that the FCAC found it non-compliant with CBP to test the impact of compliance 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 the non-compliant bank's violations of CBP from February 1, 2015 to March 16, 2017, accounts opened with the non-compliant bank 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 non-compliant banks, controlling for demographic differences across the two groups and borrower unobserved heterogeneity. In Appendices C, D, and F, 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, any delinquent amount, any amount 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.³

We focus on active credit card accounts with credit limits between \$250 and \$50,000. To compare borrowers at compliant and non-compliant banks, we restrict to accounts from the largest five Canadian banks. To maintain a large enough sample of regional borrowers, we also include 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.

In Table B.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 the consumer. We find that higher existing credit limits and utilization rates increase the probability of receiving a credit limit increase, while account age and borrower age decrease it. 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.

³Borrower 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.

Our four main outcomes of interest are measured 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.⁴ **Maximum 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 that the lender writes off as a loss on its balance sheets. **Utilization** is measured as the ratio of current balance of the account to the credit limit at the time of reporting.

For robustness checks in Appendix C, we also consider indicators for late payments (positive past-due amount), delinquency (positive delinquent amount), and charge-offs (positive charge-off amount).

3.3 Summary Statistics

3.3.1 Credit Limits vs. New Cards

We begin by illustrating the importance of credit limit increases for borrowers’ access to credit. In Figure 2, we document the amount of new credit in the Canadian credit market that comes from either new card creation or from credit limit increases on existing cards. From 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 there are new credit cards created. Taken together, it is clear that credit limit increases play an important role in borrowers’ access to credit.

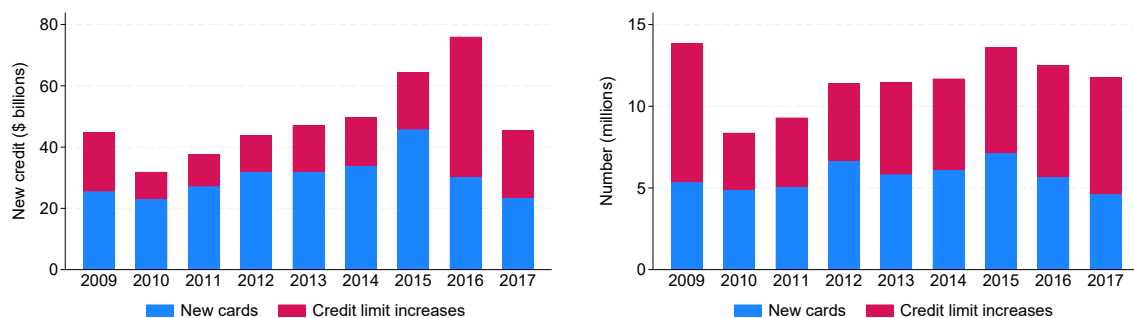
3.3.2 Statistics by Bank Compliance with CG5

Table B.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. Table B.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 a CBP-compliant and a non-compliant bank. Borrowers 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 is similar for both types of institutions, around \$3,000 over the whole

⁴Minimum payments are inclusive of any interest, fees, and repayment of capital (Allen et al., 2024).

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.

sample. Utilization is also similar—27 and 24 percent at the non-compliant and compliant 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 770.⁵

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

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 the non-compliant bank to test for the presence of increased adverse selection. The key to this test lies in the fact that for the lenders who complied, the borrowers *selected* into credit limit increases post-CG5. We regress long-term borrower

⁵Credit scores in Canada typically range from 300 to 900, as opposed to a maximum of 850 in the United States.

outcomes on an indicator of whether the borrower’s credit limit increased using data from the post-CG5 period. We find that borrowers who had credit cards with compliant lenders, on average, had worse outcomes conditional on receiving a credit limit increase compared to borrowers from the non-compliant bank who were given credit limits without express consent. We take these findings as evidence that CG5 guidance increased adverse selection in the Canadian credit market.

4.1 Empirical Approach

We examine whether CG5 increased adverse selection for the lenders that complied. We compare 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 construct forward-looking moving averages over 12, 24, and 36 months of each outcome variable to form \bar{Y} . To retain zeros, we apply the inverse-hyperbolic-sine transformation to variables measured in dollars. We estimate:

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

where $\bar{Y}_{ij,t+k}$ are the forward-looking moving averages from $t + 1$ to $t + k$ of the outcome variables of interest. Additionally, CLIncrease_{ijt} is an indicator variable equal to 1 if borrower i received a credit limit increase on account j at time t and 0 otherwise. CBPCompliant_{ij} is an indicator variable equal to 1 if borrower i 's credit card account j is from a compliant bank and 0 otherwise. \mathbf{X}_{ijt} are borrower- or account-level time-varying characteristics, η_i are borrower fixed effects, $\eta_{r(i)}$ are forward sortation area (FSA) fixed effects, $\eta_{jy(t)}$ are bank-year fixed effects, and ε_{ijt} are error terms.⁶ The key parameter of interest for these regressions is β_3 , the effect of a credit limit increase by a compliant lender on borrower outcomes.

Although (1) resembles a standard difference-in-differences specification, we interpret it as a test for adverse selection rather than as an average treatment effect. A positive and significant β_3 implies that, conditional on receiving a credit limit increase, borrowers at

⁶Forward sortation areas are geographical regions defined by the first three characters of Canadian postal codes.

compliant lenders exhibit worse subsequent outcomes than comparable borrowers at the non-compliant bank. Further, given that we only use post-CG5 data, the parallel trends assumption requires that the outcome variables have the same trends for accounts *before receiving a credit limit increase* for compliant and non-compliant lenders. If outcomes of accounts that receive credit limit increases move in the pre-period toward the post-level, the pre-post gap for compliant lenders shrinks, and our estimates would be biased towards zero. If, however, non-compliant lenders' outcomes trended towards the post-level *faster* in the pre-period than compliant lenders', then the estimates are biased upwards. We provide evidence that the parallel trends assumption holds in Appendix E.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 the non-compliant bank 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 E.1 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. Trends look generally parallel in the 6 months prior to 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 C.

In column (1), the dependent variable is the average amount past due from periods $t + 1$ to $t + 24$. 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 a compliant lender is positive and significant. This result is robust across all horizons and to additional controls in Appendix C. This result is also robust to using a one-to-one propensity score-matched sample in Appendix F. Our estimates suggest that a borrower

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

	(1)	(2)	(3)	(4)
	Amount past due	Amount delinquent	Amount charged off	Utilization
Credit limit increased	-0.0349*** (0.000301)	-0.0453*** (0.000337)	-0.0139*** (0.000196)	0.0120*** (0.0000722)
Credit limit increased \times CBP compliant	0.0461*** (0.000386)	0.0444*** (0.000425)	0.0166*** (0.000256)	0.0108*** (0.0000858)
Credit limit (\$)	0.0727*** (0.0000427)	0.0332*** (0.0000521)	0.0203*** (0.0000298)	0.0189*** (0.00000943)
Credit score	-1.393*** (0.000759)	-2.348*** (0.000849)	-1.009*** (0.000583)	-0.443*** (0.000124)
Age of account	0.0102*** (0.0000264)	0.0555*** (0.0000326)	0.00785*** (0.0000176)	0.00181*** (0.00000631)
Age of consumer	-0.00880*** (0.000345)	0.108*** (0.000400)	0.0311*** (0.000225)	-0.0194*** (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.

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

Similarly, in columns (2) and (3), we see positive and significant estimated coefficients 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 the non-compliant bank. A 4.4 percent increase in the amount delinquent equates to approximately 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 the non-compliant bank. 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 the non-compliant bank. 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 credit limit increase offers made by CBP-compliant lenders were accepted by borrowers with worse ex-post outcomes. Herein lies the trade-off for lenders when offering credit limit increases to clients—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*.⁷ 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 higher card utilization, which can 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 Guidelines on Lender Behavior

In this section, we use a 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. We study how CG5 affected the extensive and intensive margins of credit limit increases using an indicator of whether a borrower received a credit limit increase and a measure of the size of credit limit increases, respectively. We find that compliant lenders decreased the size of credit limit increases post-CG5, but the probability of credit limit increases rose.

⁷A 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).

5.1 Empirical Approach

We examine whether CG5 increased the frequency and magnitude of credit limit increases given by lenders. We compare two outcome variables across compliant and non-compliant lenders: an indicator of a credit limit increase and the size of the credit limit increase, conditional on having received one. All variables in dollar values are transformed with the inverse-hyperbolic-sine function. All outcome variables are taken in period $t + 1$ to account for reporting delays. We estimate equations of the following form, controlling for time-varying borrower characteristics at time t :

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

where $Y_{ij,t+1}$ are the outcome variables of interest, an indicator denoting that a borrower i with credit card account j received a credit limit increase in $t + 1$ and the amount of a credit limit increase, conditional on receiving a credit limit increase in $t + 1$. Moreover, CG5_t is an indicator that equals 1 if t is May 2011 or later and 0 otherwise. CBPCompliant_{ij} is an indicator that equals 1 if borrower i 's credit card account j is from a compliant lender and 0 otherwise. \mathbf{X}_{ijt} are borrower- or account-level time-varying characteristics, η_i are borrower fixed effects, $\eta_{r(i)}$ are FSA fixed effects, $\eta_{y(t)}$ are year fixed effects, and ε_{ijt} are error terms. The key parameter of interest for these regressions is α_3 .

We present our analysis of parallel trends in the unconditional average value of our outcome variables in Appendix E.2. Under additional assumptions of monotonicity and SUTVA, we aim to identify the local average treatment effect.

5.2 Results

Figure E.3 plots the monthly differences of the outcome variables of interest between the two CG5 compliance groups in event time. Time 0 marks the beginning of CG5 guidance. We see that there is evidence that parallel trends generally hold between compliant and non-compliant lenders, although the probability of a credit limit increase shows that the non-compliant lender appeared to preempt April 2011 by significantly raising its rate of credit limit increases in March 2011.

Table 2 reports the coefficients of interest for each outcome variable. Columns (1) and (2)

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*** (0.0000425)	-0.00570*** (0.0000458)	0.0509*** (0.00121)	-0.00663** (0.00251)
CG5 × CBP compliant	0.000433*** (0.0000435)	0.00171*** (0.0000461)	-0.274*** (0.00129)	-0.191*** (0.00238)
Credit limit (\$)	0.000383*** (0.00000380)	-0.00439*** (0.00000665)	0.292*** (0.000291)	0.249*** (0.000599)
Utilization	0.0283*** (0.0000168)	0.0326*** (0.0000230)	-0.382*** (0.000902)	-0.178*** (0.00143)
Credit score	0.0324*** (0.0000449)	0.0516*** (0.0000819)	2.478*** (0.00391)	1.254*** (0.00752)
Age of account	-0.00134*** (0.00000269)	0.000816*** (0.00000364)	-0.0319*** (0.000262)	-0.00681*** (0.000551)
Age of consumer	-0.00759*** (0.0000107)	0.00532*** (0.0000560)	-0.0336*** (0.000689)	0.454*** (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.

report the estimated coefficients of interest using an indicator that a borrower received a credit limit increase 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 D.

Columns (1) and (2) show that, after controlling for observable characteristics 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, compliant lenders increased the rate of credit limit increases by approximately 0.171 percent, per account, per month. Annualized, this aggregates to approximately a 2.05 percent increase in the probability of receiving a credit limit increase every year.

While the probability of a credit limit increase rose for compliant institutions, columns (3) and (4) show that the average size of increases declined. Our estimates suggest that, after controlling for observables and unobserved borrower heterogeneity, the size of a credit

limit increase decreased by around 19.1 percent. These estimates correspond to roughly a \$514 smaller increase, conditional on receiving a credit limit increase.

Combining these results, borrowers who had cards with compliant lenders saw more frequent credit limit increases than borrowers who had cards with the non-compliant bank. 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 Stylized Model

To interpret our results and evaluate the effects of CG5 on CBP-compliant lenders, we develop a model of borrower and lender behavior. There is a single lender that chooses credit limits to maximize profits. The lender faces incomplete information since the type of the borrower — high or low — is private information of the borrower. High-type borrowers are more patient, as reflected by a higher discount factor, and have a lower value of credit limit increases. Due to their higher patience, the lender finds it profitable to give high type borrowers large credit limits and low type borrowers low credit limits. To deal with incomplete information, the lender assigns a type-score (as in Chatterjee et al., 2023), which measures the probability the borrower is a high-type. The model has three periods. In the first period, the lender chooses whether to offer a credit limit increase, and if so, how large an increase to offer. The borrower then decides whether to accept or reject the offered credit limit increase. In the second period, the lender observes the borrower's decision to accept or reject, updates their beliefs about the borrower's type based on their decision, and decides again whether to offer another credit limit increase, and if so, how large an increase to offer. Once again, the borrower decides whether to accept or reject an offered credit limit increase. In the final period, payoffs are realized based on the accumulated credit limit.

To quantify the effects of the policy change, we evaluate the model in two settings: one where credit limit increases are automatically applied to borrowers (pre-CG5) and one where borrowers choose to accept or decline a credit limit increase (post-CG5). Adverse selection arises in the post-CG5 period because borrowers who are most likely to accept a credit limit increase are low types, for whom the lender would prefer to provide the lower (not higher) credit limits. However, this selection is informative for the lender, and so in the second period, the lender can use the information it learned about the borrower's private

type when offering another credit limit increase. In the pre-CG5 setting, since credit limits are applied automatically, the lender faces neither adverse selection nor can they learn about borrower's types.

We use our model to study how CG5 affects the frequency and size of credit limit increases. Our model replicates our empirical findings. We find that, post-CG5, credit limit increases occur more frequently and the average size of credit limit increases declines. Our model suggests that the CG5 guidelines decreased aggregate welfare, driven predominantly by welfare losses among low-type borrowers. We then run counterfactuals to study the role of learning. To do so, we consider a counterfactual model where the lender only has one opportunity to increase the borrower's credit. We find that, absent the ability to use the information from the first period, both lender surplus and borrower surplus decline. Finally, we study the role of the borrower's initial credit limit, the initial type score, and signal informativeness. We find the effects of CG5 are largest when borrowers have small initial credit limits, low initial credit scores, and when the signal is either very precise or very imprecise.

6.1 Model Environment and Timing

There is one lender and a mass of borrowers. The model lasts three periods, indexed $t \in \{1, 2, 3\}$. Borrowers are defined by a persistent type, $\theta \in \{H, L\}$, their initial credit limit, l , and their credit score, μ . Credit scores denote the probability that a borrower is a high-type (i.e. $\mu = Pr(\theta = H)$). To capture adverse selection concerns, the lender cannot directly observe the borrower's type, but has to learn about this hidden type from the borrower's actions. The lender updates the borrower's type score via Bayes' rule using the borrower's observable actions.

The model proceeds as follows:

Period 1. The borrower begins the game with an initial type score μ_0 , a type θ , and an initial credit limit l_0 . The lender makes a take-it-or-leave-it credit limit increase offer of $\delta_1 \geq 0$. Each borrower privately observes their type $\theta \in \{H, L\}$, their Type I Extreme Value (T1EV) shocks, $\epsilon_{1,A}$ and $\epsilon_{1,R}$, which shock their value of accepting or rejecting the offer, respectively, and then decides whether to accept or reject the offer. The accept or reject decision is denoted by $a_1 \in \{1, 0\}$, where accepting the offer is denoted by $a_1 = 1$.

Period 2. The lender observes the period-1 acceptance decision, and updates the borrower's type score $\mu_0 \rightarrow \mu_1(a_1)$ via Bayes' rule. The lender then decides whether to make a new credit limit increase offer of $\delta_2(a_1) \geq 0$. The lender still cannot directly observe the borrower's type, but can condition the offer on the borrower's previous acceptance decision. Borrowers once again receive T1EV shocks to the value of accepting or rejecting the offer, denoted $\epsilon_{2,A}$ and $\epsilon_{2,R}$, and choose whether to accept or reject the limit increase.

Period 3. Terminal payoffs are realized based on the accumulated credit limit.

We solve the model in two settings. In the pre-CG5 setting, all offered credit limit increases are automatically applied. In the post-CG5 setting, borrowers choose whether to accept or reject any offered credit limit increase.

6.2 Borrower's Problem

A borrower begins the first period with an initial credit limit l_0 , an initial credit score, μ_0 , and a persistent type θ . The per-unit value of a credit limit to a borrower of type θ is derived from a CRRA specification. Let w_θ denote the liquid wealth of type θ , with $w_H > w_L > 0$. The marginal utility of current consumption is given by: $u'(w_\theta) = w_\theta^{-\gamma}$, $\gamma > 0$. For simplicity of notation to follow, define:

$$v_\theta = w_\theta^{-\gamma}. \quad (3)$$

Since $w_H > w_L$ and $u'' < 0$, we have $v_H < v_L$; hence, low types value credit limit increases more.

We can write the borrower's period 1 payoffs as a function of their initial credit limit l_0 , their initial type score μ_0 , an offered increase, $\delta_1(l_0, \mu_0)$, and their type, θ , as:

$$u_1(l_0, \mu_0, \theta, \epsilon_1, \delta_1, a_1) = \begin{cases} v_\theta(l_0 + \delta_1(l_0, \mu_0)) + \epsilon_{1,A} - \kappa_c & \text{if } a_1 = 1 \\ v_\theta l_0 + \epsilon_{1,R} & \text{if } a_1 = 0 \end{cases}, \quad (4)$$

where $\kappa_c > 0$ is the fixed utility cost of accepting the offer and $\epsilon_{1,A}$ and $\epsilon_{1,R}$ are T1EV shocks.

In period 2, payoffs are:

$$u_2(l_1, \mu_1, \theta, \epsilon_2, \delta_2, a_2) = \begin{cases} v_\theta(l_1 + \delta_2(l_1, \mu_1)) + \epsilon_{2,A} - \kappa_c & \text{if } a_2 = 1 \\ v_\theta l_1 + \epsilon_{2,R} & \text{if } a_2 = 0 \end{cases}. \quad (5)$$

In the final period, payoffs are:

$$u_3(l_2, \mu_2, \theta) = v_\theta l_2. \quad (6)$$

For simplicity, we write the borrower's continuation value after accepting the first period offer as:

$$V_{b,2}^A(l_1, \mu_1^A, \theta) = E_{\epsilon_2}[u_2(l_1, \mu_1^A, \theta, \epsilon_2, \delta_2^A, a_2(\epsilon_2))] + \beta_\theta u_3(l_1 + \delta_2^A(a_2), \mu_2, \theta) \quad (7)$$

and we write the borrower's continuation value after rejecting the first period offer as:

$$V_{b,2}^R(\theta) = E_{\epsilon_2}[u_2(l_0, \mu_1^R, \theta, \epsilon_2, \delta_2^R, a_2(\epsilon_2))] + \beta_\theta u_3(l_0 + \delta_2^R(a_2), \mu_2, \theta). \quad (8)$$

In period 2, the borrower decides whether to accept or reject based on which option provides higher utility. However, in period 1, the borrower recognizes that their decision to accept or reject may be informative about their type, so they consider how that decision affects future credit limit offers (whether they are offered $\delta_2^A(l_1, \mu_1^A)$ or $\delta_2^R(l_0, \mu_1^R)$). Taken together, the borrower's value function can be written as:

$$V_b(l_0, \theta) = E_{\epsilon_1} \max \left\{ \underbrace{v_\theta(l_0 + \delta_1) - \kappa_c + \epsilon_1^A + \beta_\theta E_{\epsilon_2} \left[\max \left\{ V_{b,2}^A(\theta, a_2 = 1), V_{b,2}^A(\theta, a_2 = 0) \right\} \right]}_{\text{Accept First Offer}}, \right. \\ \left. \underbrace{v_\theta l_0 + \epsilon_1^R + \beta_\theta E_{\epsilon_2} \left[\max \left\{ V_{b,2}^R(\theta, a_2 = 1), V_{b,2}^R(\theta, a_2 = 0) \right\} \right]}_{\text{Reject First Offer}} \right\}. \quad (9)$$

6.3 Lender's Problem

We assume that there is a single monopolist lender. Interest rates are exogenously given, so the only choice for the lender is the borrower's credit limit.⁸

We assume a simple quadratic function for the lender's terminal profit, given by:

$$\pi(l, \theta) = \pi_{1,\theta} l + \pi_{2,\theta} l^2, \quad (10)$$

with $\pi_{1,\theta} > 0$ and $\pi_{2,\theta} < 0$, so that there is an interior solution. We assume the lender maximizes expected profit. For a known borrower of type θ , the optimal credit limit is given by: $l^*(\theta) = -\frac{\pi_{1,\theta}}{2\pi_{2,\theta}}$. We calibrate so that $l^*(H) > l^*(L)$, so that the lender prefers to provide high limits to high-type borrowers. The lender's profits are realized at the end of the third period.

The lender first chooses δ_1 given prior belief $\mu_0 = \Pr(\theta = H)$ and initial credit limit l_0 . The lender's problem can be written as:

$$\begin{aligned} V_{l,1}(l_0, \mu_0) = \max_{\delta_1 \geq 0} & -\kappa_l \cdot \mathbf{1}[\delta_1 > 0] \\ & + \sum_{\theta} \mu_0(\theta) \left[\alpha_1^*(\theta, \delta_1) V_{l,2}^A(l_0 + \delta_1, \mu_1^A) + (1 - \alpha_1^*(\theta, \delta_1)) V_{l,2}^R(l_0, \mu_1^R) \right]. \end{aligned} \quad (11)$$

where κ_l is the cost of offering a credit limit increase, $\alpha_1^*(\theta, \delta_1)$ denotes the probability a borrower of type θ accepts the offered credit limit increase of size δ_1 , and $V_{l,2}^A(l_0 + \delta_1, \mu_1^A)$ and $V_{l,2}^R(l_0, \mu_1^R)$ denote the value to the lender in period two of a borrower who accepted or rejected a credit limit increase, respectively.

Based on the borrower's decision to accept or reject, the lender's beliefs are updated via Bayes' rule:

⁸Interest rates typically remain unchanged throughout the lifespan of an account (Ausubel, 1991; Drechsler et al., 2025; Knittel & Stango, 2003).

$$\mu_1^A = \Pr(\theta = H \mid a_1 = 1) = \frac{\mu_0 \cdot \alpha_1(H, \delta_1)}{\mu_0 \cdot \alpha_1(H, \delta_1) + (1 - \mu_0) \cdot \alpha_1(L, \delta_1)} \quad (12)$$

and

$$\mu_1^R = \Pr(\theta = H \mid a_1 = 0) = \frac{\mu_0(1 - \alpha_1(H, \delta_1))}{\mu_0(1 - \alpha_1(H, \delta_1)) + (1 - \mu_0)(1 - \alpha_1(L, \delta_1))}. \quad (13)$$

In period 2, after observing a_1 , the lender chooses $\delta_2(a_1)$ given updated belief $\mu_1(a_1)$:

$$V_{l,2}(l_1, \mu_1) = \max_{\delta_2 \geq 0} -\kappa_l \cdot \mathbf{1}[\delta_2 > 0] + \beta_l \sum_{\theta} \mu_1(\theta) \left[\alpha_2^*(\theta) \pi(\theta, l_1 + \delta_2) + (1 - \alpha_2^*(\theta)) \pi(\theta, l_1) \right]. \quad (14)$$

In the pre-CG5 setting, since increases are applied automatically $\alpha_1(H, \delta_1) = \alpha_1(L, \delta_1) = 1$. Hence, the lender cannot learn from borrowers' decisions. In the post-CG5 setting, increases are not automatically applied, so in a semi-separating equilibrium $\alpha_1(H, \delta_1) \neq \alpha_1(L, \delta_1)$. As a result, the lender can offer credit limit increases to sort borrowers and learn about their type. In our calibration, low types are more likely to accept offered increases because they value higher credit limits more and are more impatient; as a result, they are willing to accept credit limit increases today that more patient high types may reject in hopes of higher limits in the future. Low types accepting more frequently generates adverse selection for the lender when offering credit limit increases, as they prefer to give low credit limits to low types. However, given type persistence and the long-term relationships between the lender and the borrower, the lender may value learning about the borrower's type and may offer credit limit increases to learn despite the presence of adverse selection.

6.4 Equilibrium

A Perfect Bayesian Equilibrium is a set of borrower value functions $\{V_b\}$, a set of lender value functions $\{V_l\}$, policy functions, $\{a_1, a_2\}$, lender policy functions, $\{\delta_1, \delta_2^A, \delta_2^R\}$, and type scoring functions, $\{\mu(a_1), \mu(a_2)\}$, such that:

1. The borrower's value function V_b solves (9).
2. The borrower's policy functions $\{a_1, a_2\}$ solve (9).

3. The lender's value function V_l solves (11).
4. The lender's policy functions $\{\delta_1, \delta_2^A, \delta_2^R\}$ solve (11).
5. The type scoring functions $\{\mu(a_1), \mu(a_2)\}$ are consistent with Bayes' rule as outlined in Equations (12) and (13).

If there are multiple equilibria, we select the lender-preferred equilibrium.

6.5 Model Solution: Period Two

Solving the model via backward induction, we first characterize the optimal borrower and lender choices in the second period.

In the second period, the borrower with an initial limit l_1 decides to accept an offer of δ_2 if

$$(1 + \beta_\theta)v_\theta(l_1 + \delta_2) + \epsilon_{2,A} - \kappa_c \geq (1 + \beta_\theta)v_\theta l_1 + \epsilon_{2,R}, \quad (15)$$

which simplifies to

$$(1 + \beta_\theta)v_{2,\theta}\delta_2 + \epsilon_{2,A} \geq \kappa_c + \epsilon_{2,R}. \quad (16)$$

Low types have a higher v_θ , while high types have a higher discount factor β_θ , so it is unclear which type is more likely to accept increases in the second period. Based on the T1EV shocks, the second-period acceptance rate of type θ is given by:

$$\alpha_2(\theta, \delta_2) = \frac{e^{\Delta(\theta)/\beta_s}}{1 + e^{\Delta(\theta)/\beta_s}}, \quad \Delta_2(\theta) \equiv (1 + \beta_\theta)v_{2,\theta}\delta_2 - \kappa_c, \quad (17)$$

where $\beta_s = \sigma\sqrt{6}/\pi$ and σ is the variance of the T1EV shocks.

The lender solves two separate optimization problems — one for each possible period-1 outcome — taking the borrower's probability of acceptance as given. If the borrower accepted in the previous period, $a_1 = 1$, the lender faces belief μ_1^A and a borrower with credit limit $l_1 = l_0 + \delta_1$, and chooses:

$$\begin{aligned} \delta_2^A = \arg \max_{\delta_2^A \geq 0} & -\kappa_l \cdot \mathbf{1}[\delta > 0] \\ & + \sum_{\theta} \mu_1^A(\theta)\beta_l \left[\alpha_2^*(\theta, \delta_2^A) \pi(\theta, l_1 + \delta_2) + (1 - \alpha_2^*(\theta, \delta_2^A)) \pi(\theta, l_1) \right]. \end{aligned} \quad (18)$$

Analogously, if the borrower rejected in the previous period, $a_1 = 0$, the lender faces belief μ_1^R and a borrower with credit limit l_0 , and chooses:

$$\begin{aligned} \delta_2^R = \arg \max_{\delta_2^R \geq 0} & -\kappa_l \cdot \mathbf{1}[\delta_2^R > 0] \\ & + \sum_{\theta} \mu_1^R(\theta) \beta_l \left[\alpha_2^*(\theta, \delta_2^R) \pi(\theta, l_0 + \delta_2^R) + (1 - \alpha_2^*(\theta, \delta_2^R)) \pi(\theta, l_0) \right]. \end{aligned} \quad (19)$$

In a pooling equilibrium, $\mu_1^A = \mu_1^R$, and the lender does not learn about borrowers' types. In a semi-separating equilibrium, where types accept with different probabilities, $\mu_1^A \neq \mu_1^R$, and the lender may choose different second-period offers depending on the information it learned in the first period.

In the second period, the lender's optimal credit limit increase solves:

$$\sum_{\theta} \mu_1^{a_1}(\theta) \beta_l \underbrace{[\alpha_2^*(\theta, \delta_2) \frac{\partial \pi(\theta, l_1 + \delta_2)}{\partial \delta_2}]}_{\text{Adverse Selection}} + \underbrace{\frac{\partial \alpha_2^*(\theta, \delta_2)}{\partial \delta_2} [\pi(\theta, l_1 + \delta_2) - \pi(\theta, l_1)]}_{\text{Induce Acceptance}} = 0. \quad (20)$$

In the pre-CG5 case, where consumers always accept credit limit increases, the optimal limit increase is given by:

$$\sum_{\theta} \mu_1^{a_1}(\theta) \beta_l \frac{\partial \pi(\theta, l_1 + \delta_2)}{\partial \delta_2} = 0 \quad (21)$$

Post-CG5, the lender deviates from that benchmark for two important reasons. First, adverse selection arises because $\alpha_2^*(\theta, \delta_2)$ may differ by θ . If so, then the lender has to account for who may accept, which may lead to an undersupply of credit. If $\alpha_2^*(L, \delta_2) > \alpha_2^*(H, \delta_2)$, then uptake will be primarily done by low types, for whom lower credit limits are optimal. Second, the lender wants to induce borrowers to accept the increase, so it considers how offering a larger increase may lead to greater acceptance rates. This effect depends on how much larger its profits are with a higher offered credit limit increase. This may lead to an oversupply of credit relative to the pre-CG5 case.

6.6 Model Solution: Period One

A borrower of type θ accepts the period-1 offer δ_1 if and only if the payoff from accepting — which leads to the acceptance branch of the period-2 subgame — exceeds the payoff from rejecting — which leads to the rejection branch:

$$a_1^*(\theta) = \mathbf{1} \left[u_1(l_0, \delta_1, \theta, \epsilon, 1) + \beta_\theta V_{b,2}^A \geq u_1(l_0, \delta_1, \theta, \epsilon, 0) + \beta_\theta V_{b,2}^R \right], \quad (22)$$

where $V_{b,2}^A$ and $V_{b,2}^R$ are the borrower's continuation values from the period-2 subgame following acceptance and rejection, respectively.

Substituting in the payoff functions, acceptance in period 1 requires:

$$v_\theta(l_0 + \delta_1) + \epsilon_{1,A} - \kappa_c + \beta_\theta V_{b,2}^A(\theta) \geq v_\theta l_0 + \epsilon_{1,R} + \beta_\theta V_{b,2}^R(\theta), \quad (23)$$

which simplifies to:

$$v_\theta \delta_1 + \epsilon_{1,A} - \epsilon_{1,R} - \kappa_c \geq \beta_\theta \left[V_{b,2}^R(\theta) - V_{b,2}^A(\theta) \right]. \quad (24)$$

The left-hand side is the *static gain* from accepting. The right-hand side is the *strategic option value of rejection*. The benefit of rejecting is that the lender may make a different period-2 offer of δ_2^R instead of δ_2^A .

Two main forces determine which type of borrowers are more likely to accept or reject the initial offer. First, v_θ is large for low types, so low types have a larger static gain from accepting any given δ_1 . Second, if $\delta_2^R > \delta_2^A + \delta_1$, the borrower can receive a higher limit at the end of the game by rejecting an offer today. Because low types have a smaller discount factor, they value this future benefit less than high types do. As a result, high types may strategically reject offered increases to signal their type in order to get even larger increases in the future.

Given the T1EV shocks, the first-period acceptance rate of type θ is given by:

$$\alpha_1(\theta, \delta_1) = \frac{e^{\Delta(\theta)/\beta_s}}{1 + e^{\Delta(\theta)/\beta_s}}, \quad \Delta(\theta) \equiv v_\theta \delta_1 - \kappa_c - \beta_\theta \left[V_{b,2}^R(\theta) - V_{b,2}^A(\theta) \right], \quad (25)$$

where $\beta_s = \sigma\sqrt{6}/\pi$. As σ increases, the variance of shocks increases and the borrower's decision becomes less informative of their type. The acceptance decision also depends on δ_1 . Therefore, the posterior beliefs of the lender also depend on δ_1 . Hence, lenders can design the initial offer, δ_1 , to try to separate borrowers by type. The posterior beliefs are given by:

$$\mu_1^A(\delta_1) = \frac{\mu_0 \alpha_1(H, \delta_1)}{\mu_0 \alpha_1(H, \delta_1) + (1 - \mu_0) \alpha_1(L, \delta_1)} \quad (26)$$

and

$$\mu_1^R(\delta_1) = \frac{\mu_0 (1 - \alpha_1(H, \delta_1))}{\mu_0 (1 - \alpha_1(H, \delta_1)) + (1 - \mu_0) (1 - \alpha_1(L, \delta_1))}. \quad (27)$$

The full period-1 objective is therefore:

$$\begin{aligned} \mathcal{L}(\delta_1) \equiv & -\kappa_l \cdot \mathbf{1}[\delta_1 > 0] \\ & + \sum_{\theta} \mu_0(\theta) \alpha_1^*(\theta, \delta_1) V_{l,2}^A(l_0 + \delta_1, \mu_1^A(\delta_1)) \\ & + \sum_{\theta} \mu_0(\theta) (1 - \alpha_1^*(\theta, \delta_1)) V_{l,2}^R(l_0, \mu_1^R(\delta_1)). \end{aligned} \quad (28)$$

Taking the derivative with respect to δ_1 and applying the chain rule:

$$\begin{aligned} \frac{\partial \mathcal{L}}{\partial \delta_1} = & \underbrace{\sum_{\theta} \mu_0(\theta) \frac{\partial \alpha_1^*(\theta, \delta_1)}{\partial \delta_1} \left[V_{l,2}^A(l_0 + \delta_1, \mu_1^A(\delta_1)) - V_{l,2}^R(l_0, \mu_1^R(\delta_1)) \right]}_{\text{(i) Extensive Margin}} \\ & + \underbrace{\sum_{\theta} \mu_0(\theta) \left[\alpha_1^*(\theta, \delta_1) \frac{\partial V_{l,2}^A(l_0 + \delta_1, \mu_1^A(\delta_1))}{\partial \delta_1} + (1 - \alpha_1^*(\theta, \delta_1)) \frac{\partial V_{l,2}^R(l_0, \mu_1^R(\delta_1))}{\partial \delta_1} \right]}_{\text{(ii) Intensive Margin}} = 0. \end{aligned} \quad (29)$$

The first term captures the extensive margin. As the lender increases δ_1 , it induces new borrowers to accept the offered increase. The value of increasing acceptance depends on the gap between the lender's continuation value of acceptance compared to rejection. If the lender's valuation of acceptance is lower, due to adverse selection, then the lender will

undersupply credit.

The second term captures the intensive margin. As the lender increases δ_1 , this alters the continuation value both through how borrowers sort ($\mu_1^{a_1}(\delta_1)$) and the direct effect of a higher credit limit. By designing an offer δ_1 that sorts borrowers by type, the lender can improve separation and thereby offer better credit limit increases in the subsequent period.

6.7 Parameterization

Table 3 displays the parameterization. We choose γ to match estimates in the literature. We select discount factors so that $\beta_H > \beta_L$ as in Chatterjee et al., 2023. We initialize high types with greater wealth (which is intuitive given their higher discount factors). We include costs of offering and accepting credit limit increases, κ_l and κ_c , respectively, to capture both the infrequency of credit limit increases and borrowers' decisions to reject offered increases. We choose $\pi_{2,H} > \pi_{2,L}$ to capture higher average credit limits for high-type borrowers. The greater the gap between these two, the greater the gap in optimal credit limits by type, which increases the lender's incentive to learn. We choose the variance of T1EV shocks to be relatively large, $\sigma = 1.0$, to capture that borrowers may accept or reject offered increases for a variety of reasons not captured by the model. Finally, we focus on a setting with low initial credit limits and a low initial type score, because this is an environment where credit limit increases and lender learning are particularly important.

7 Model Results

7.1 Effects of CG5

To evaluate express consent in the framework of the model, we solve the model both pre- and post-CG5. In the pre-CG5 setting, credit limit increases are applied automatically, whereas in the post-CG5 setting, borrowers can choose whether to accept or reject offers. Table 4 presents the results.

This table demonstrates both that lenders face adverse selection post-CG5 and that they use offers to learn about borrower types. Pre-CG5, since credit limit increases are automatically applied, the lender does not update its beliefs, $\mu_1^A = \mu_1^R = \mu_0$. As a result, it offers limit increases only at the beginning of period 1. In the post-CG5 case, lenders offer a much smaller initial credit limit increase, as δ_1 declines from 2.20 to 1.90. As a result, this offer sorts

Table 3: Model Parameters

Parameter	Notation	Value
<i>Panel A: Calibration pre-solution</i>		
Risk Aversion	γ	3.0
High Type Annual Discount Factor	β_H	0.95
Low Type Annual Discount Factor	β_L	0.80
Liquid wealth of high types	w_H	2.0
Liquid wealth of low types	w_L	1.5
Cost of Changing Credit Limits (Firm)	κ_l	0.01
Cost of Changing Credit Limits (Borrower)	κ_c	0.30
Firm Profit Linear Term (High Types)	$\pi_{1,H}$	2.50
Firm Profit Linear Term (Low Types)	$\pi_{1,L}$	2.50
Firm Profit Quadratic Term (High Types)	$\pi_{2,H}$	-0.05
Firm Profit Quadratic Term (Low Types)	$\pi_{2,L}$	-0.50
Signal Quality	σ	1.0
<i>Panel B: Initial Conditions</i>		
Initial Credit Score	μ_0	0.10
Initial Credit Limit	l_0	0.50

Notes: This table presents the model calibration. Parameters in Panel A are the calibrated parameters. Parameters in Panel B are the initial condition for which we present model results.

borrowers so that low types accept the offer more frequently. This implies that $\mu_1^A = 0.0848$ and $\mu_1^R = 0.1257 > 0.10 = \mu_0$. The lender, having learned more about borrowers' types, then offers a small increase to borrowers who accepted (as those are disproportionately low types) and a much larger increase to those who rejected (as those are disproportionately high types). This leads to more frequent credit limit increases — from an average of 1 credit limit increase per borrower pre-CG5 to 1.20 on average post-CG5. However, the credit limit increases are smaller on average — from an average increase of 2.20 to an average increase of 1.69. On net, we find lower final credit limits for both types of borrowers. Lender surplus declines as the lender has to pay the cost κ_l twice, and some borrowers never accept, leading to lower profits. Borrower surplus inclusive of the T1EV shocks increases due to the variance of the shocks. However, once the shocks are removed, borrower surplus declines because they gain access to credit limits later, face the cost κ_c , and sometimes do not accept when (in absence of the shock) it would be optimal to do so.

Table 4: Equilibrium Outcomes

	Pre-CG5	Post-CG5
<i>Offers</i>		
δ_1	2.2000	1.9000
δ_2^A	0.0000	0.3000
δ_2^R	0.0000	2.6000
<i>Period-1 Acceptance Probabilities</i>		
α_H	1.0000	0.5327
α_L	1.0000	0.6389
<i>Beliefs</i>		
μ_0	0.1000	0.1000
μ_1^A	0.1000	0.0848
μ_1^R	0.1000	0.1257
<i>Expected Number of CLIs</i>		
$\theta = H$	1.0000	1.0435
$\theta = L$	1.0000	1.2191
<i>Overall</i>	1.0000	1.2015
<i>Average CLI Size</i>		
$\theta = H$	2.2000	1.7404
$\theta = L$	2.2000	1.6844
<i>Overall</i>	2.2000	1.6900
<i>Average Final Credit Limit</i>		
$\theta = H$	2.7000	2.3161
$\theta = L$	2.7000	2.5534
<i>Overall</i>	2.7000	2.5296
<i>Surplus</i>		
Lender	3.3887	3.1259
High type (incl. T1EV)	0.6627	1.4603
Low type (incl. T1EV)	1.6520	2.1633
High type (det.)	0.6627	0.4199
Low type (det.)	1.6520	1.2664
Total (ex-ante)	4.9418	5.2189

Notes: This table compares results in the “Pre-CG5” setting with those in the “Post-CG5” setting.

7.2 The Role of Learning and Dynamics

To illustrate the importance of learning and dynamics, we re-solve the model in the post-CG5 setting, without dynamics. Now, the lender can only make one offer to borrowers, rather than making repeated offers. As a result, they cannot use their first offer to learn about borrowers, and then design a second offer based on the borrower's acceptance decision. We present the results of this counterfactual in Table 5.

Removing dynamics increases borrowers' acceptance probabilities because there is no incentive to strategically reject. Adverse selection remains, as low types accept more frequently. Relative to post-CG5 with dynamics, the number of credit limit increases declines, but total credit provision increases slightly due to higher take-up. The lender is worse off because adverse selection cannot be offset by learning: low types end up with higher average credit limits than high types. Interestingly, we find the lender offers a higher initial limit increase than in the pre-CG5 setting, due to its incentive to induce acceptance.

7.3 Borrower Heterogeneity

In this section, we study how the policy effects of CG5 differ based on the borrower's initial credit limit, l_0 , credit score, μ_0 , and signal informativeness σ . The results are presented in Tables 6, 7, and 8.

The tables demonstrate that CG5 may have different effects on different borrowers. First, we see that the effect of CG5 guidelines is heterogeneous across initial credit limits. For borrowers at or above the optimal initial credit limit, the policy had no effect. For those just below the optimum, the policy may lead to a reduction in credit provision due to adverse selection concerns. For borrowers well below the optimum, the policy generally leads to a larger number of credit limit increases, but a reduction in the size of offers and lower final credit limits.

Second, varying the initial credit score demonstrates another important force of heterogeneity. For borrowers with high average credit scores, the policy had little effect on the number of credit limit increases. However, due to improved sorting, average credit limits increase, as the lender is able to identify high-type borrowers and give them larger credit limits. At the top of the credit score distribution, lender surplus actually increases as the benefit of increased information outweighs adverse selection concerns. For borrowers with lower initial credit scores, we find an increase in the frequency of credit limit increases,

Table 5: Equilibrium Outcomes (No Learning)

	Post-CG5	Post-CG5 (Static)
<i>Offers</i>		
δ_1	1.9000	2.5000
δ_2^A	0.3000	0.0000
δ_2^R	2.6000	0.0000
<i>Period-1 Acceptance Probabilities</i>		
α_H	0.5327	0.6810
α_L	0.6389	0.8736
<i>Beliefs</i>		
μ_0	0.1000	0.1000
μ_1^A	0.0848	0.0797
μ_1^R	0.1257	0.2190
<i>Expected Number of CLIs</i>		
$\theta = H$	1.0435	0.6810
$\theta = L$	1.2191	0.8736
<i>Overall</i>	1.2015	0.8544
<i>Average CLI Size</i>		
$\theta = H$	1.7404	2.5000
$\theta = L$	1.6844	2.5000
<i>Overall</i>	1.6900	2.5000
<i>Average Final Credit Limit</i>		
$\theta = H$	2.3161	2.2026
$\theta = L$	2.5534	2.6840
<i>Overall</i>	2.5296	2.6359
<i>Surplus</i>		
Lender	3.1259	2.9663
High type (incl. T1EV)	1.4603	1.0692
Low type (incl. T1EV)	2.1633	1.9742
High type (det.)	0.4199	0.5810
Low type (det.)	1.2664	1.6784
Total (ex-ante)	5.2189	4.8500

Notes: This table compares results in the “Post-CG5” setting to a counterfactual where the model is static, “Post-CG5 (Static).”

Table 6: Varying Initial Credit Limit

l_0	# CLIs		Avg CLI Size		Final CL		Lender Surplus	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
0.0000	1.000	1.251	2.700	2.031	2.700	2.540	3.389	3.123
0.5000	1.000	1.201	2.200	1.689	2.700	2.530	3.389	3.126
1.0000	1.000	1.140	1.700	1.303	2.700	2.485	3.389	3.158
1.5000	1.000	0.808	1.200	1.339	2.700	2.582	3.389	3.219
2.0000	1.000	0.731	0.700	0.800	2.700	2.585	3.389	3.302
2.5000	1.000	0.437	0.200	0.200	2.700	2.587	3.389	3.373
3.0000	0.000	0.000	0.000	0.000	3.000	3.000	3.371	3.371
3.5000	0.000	0.000	0.000	0.000	3.500	3.500	3.144	3.144
4.0000	0.000	0.000	0.000	0.000	4.000	4.000	2.693	2.693
4.5000	0.000	0.000	0.000	0.000	4.500	4.500	2.016	2.016
5.0000	0.000	0.000	0.000	0.000	5.000	5.000	1.114	1.114

Notes: This table compares results in the “Pre-CG5” and “Post-CG5” models varying the initial credit limit l_0 .

Table 7: Varying Credit Score

μ_0	# CLIs		Avg CLI Size		Final CL		Lender Surplus	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
0.0000	1.000	0.911	2.000	2.232	2.500	2.534	3.084	2.879
0.1000	1.000	1.201	2.200	1.689	2.700	2.530	3.389	3.126
0.2000	1.000	1.201	2.500	1.897	3.000	2.779	3.762	3.452
0.3000	1.000	1.206	2.900	2.156	3.400	3.101	4.228	3.829
0.4000	1.000	1.214	3.400	2.514	3.900	3.552	4.824	4.363
0.5000	1.000	0.942	4.000	4.573	4.500	4.809	5.614	5.091
0.6000	1.000	0.956	4.900	5.684	5.400	5.932	6.715	6.222
0.7000	1.000	0.974	6.300	7.419	6.800	7.723	8.351	8.035
0.8000	1.000	0.989	8.400	9.978	8.900	10.366	11.039	11.142
0.9000	1.000	0.998	12.700	14.517	13.200	14.987	16.273	16.947
1.0000	1.000	1.000	24.500	24.502	25.000	25.002	30.927	30.927

Notes: This table compares results in the “Pre-CG5” and “Post-CG5” models varying the initial share of borrowers who are of type H , by varying μ_0 .

Table 8: Varying Signal Informativeness

σ	# CLIs		Avg CLI Size		Final CL		Lender Surplus	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
0.0500	1.000	1.000	2.200	2.301	2.700	2.801	3.389	3.388
0.5500	1.000	0.970	2.200	2.403	2.700	2.832	3.389	3.266
1.0500	1.000	1.196	2.200	1.689	2.700	2.520	3.389	3.116
1.5500	1.000	1.154	2.200	1.654	2.700	2.409	3.389	3.042

Notes: This table compares results in the “Pre-CG5” and “Post-CG5” models varying the signal informativeness σ .

but a decline in total credit. For these borrowers, lender surplus declines because adverse selection outweighs the benefits of learning.

Finally, we study how policy outcomes depend on the informativeness of the signal. Lower values of σ indicate a more informative signal. We find that the frequency of credit limit increases is non-monotonic in the signal quality. More informative signals amplify the adverse selection problem, but make information more valuable. With very precise signals, the lender can perfectly sort borrowers through its offers, leading to higher lender surplus but only one credit limit increase per borrower. With imprecise signals, the lender has to make multiple offers to learn about borrower types. We find that lender value is increasing in signal informativeness.

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. Canada's CG5 guidelines created selection by requiring express consent for credit limit increases. We find the selection was adverse — borrowers who opted into higher limits were riskier than those for whom increases were automatically applied, as measured by higher subsequent past-due amounts, delinquencies, and charge-offs. Yet, compliant lenders offered more frequent credit limit increases, albeit of a smaller average size. We interpret this as evidence that the informational value of acceptance decisions partially offsets the higher default risk, consistent with lender learning in our model. These results highlight an important trade-off: policies that promote consumer choice and increase transparency can also reshape the information environment in ways that alter lender incentives and market outcomes. Policymakers should account for these informational channels when evaluating consent-based regulations in consumer credit markets.

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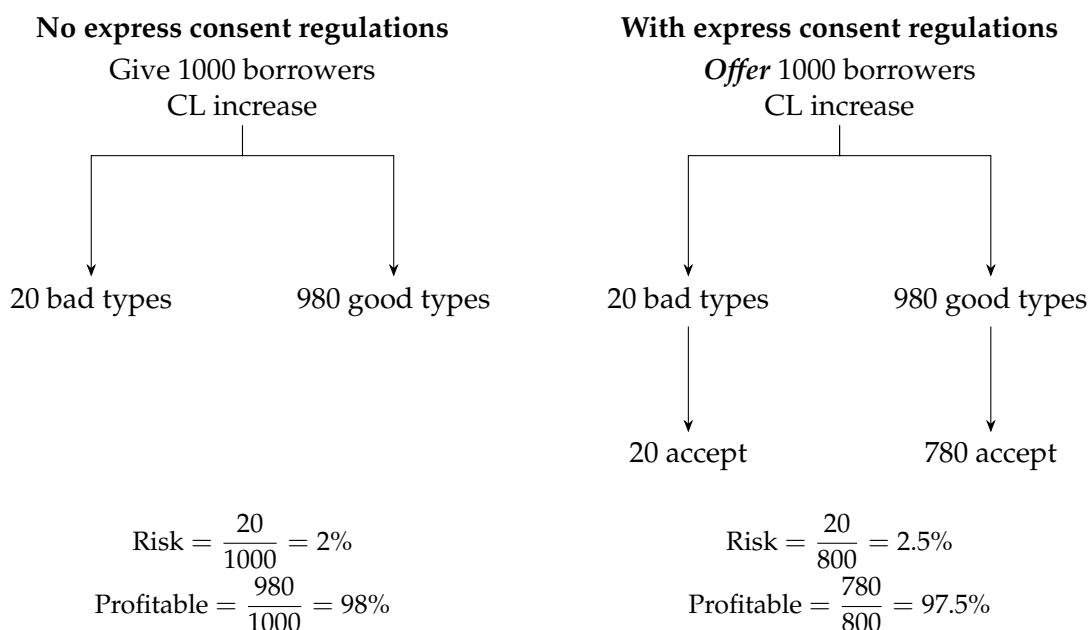
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Appendix A Example of Worsening Risk Profile

Figure A.1: Example of worsening risk profile induced by requiring lenders to ask for express consent before raising customer credit limits



Notes: Figure A.1 illustrates an example of how the risk profile of the pool of consumers at a given lender can increase after implementing regulations that require lenders to obtain express consent for any future credit limit increases. The left decision tree denotes an environment where lenders can grant credit limit increases without obtaining consumer consent. Since all consumers who are given credit limit increases have them automatically applied to their accounts, the share of the pool with higher credit limits that is a bad type is 2 percent. The right decision tree denotes an environment where lenders can offer consumers credit limit increases, but they must provide express consent for it to be applied to their accounts. In this scenario, since all bad types select into the higher credit limit while some of the good types do not, the share of the pool with higher credit limits that is a bad type becomes 2.5 percent.

Appendix B Summary Statistics Tables

Table B.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 the non-compliant bank, the institution found by the FCAC to have violated CG5. Panel (b) summarizes the same variables for CBP-compliant institutions.

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

	Mean	SD	P1	P25	P50	P75	P99
<i>Panel A: Non-Compliant Bank</i>							
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
<i>Panel B: Compliant Banks</i>							
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 B.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 B.2 summarizes these borrower-account characteristics and outcomes, by bank compliance with CG5, over the whole sample period. Similarly to Table B.1, Panel (a) summarizes key variables of interest for accounts associated with the non-compliant bank, the institution found by the FCAC to have violated CG5. Panel (b) summarizes the same variables for CBP-compliant institutions.

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

Table B.2: Summary statistics by CG5 compliance

	Mean	SD	P1	P25	P50	P75	P99
<i>Panel A: Non-Compliant Bank</i>							
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
<i>Panel B: Compliant Banks</i>							
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 B.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.

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 the consumer. We find that higher existing credit limits and utilization rates increase the probability of receiving credit limit increases, while account age and consumer age decrease 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 B.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*** (1.62e-09)	0.000000835*** (4.53e-10)
Utilization	0.0168*** (0.0000429)	0.00669*** (0.0000114)
Credit score	0.0000490*** (0.000000179)	-0.0000146*** (5.79e-08)
Age of account	-0.0000220*** (0.000000147)	-0.0000551*** (4.65e-08)
Age of consumer	-0.0000352*** (7.46e-08)	-0.0000197*** (1.94e-08)
N	115,463,829	1,214,426,330

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

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

Notes: Table B.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 C 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.

C.1 12-month

Table C.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*** (0.0000260)	-0.00480*** (0.0000258)	-0.00531*** (0.0000258)	-0.00701*** (0.0000260)	-0.00491*** (0.0000258)	-0.00545*** (0.0000258)
CBP compliant	0.00144*** (0.0000120)	0.00235*** (0.0000119)	0.00271*** (0.0000119)			
Credit limit increased × CBP compliant	0.00802*** (0.0000379)	0.00685*** (0.0000372)	0.00667*** (0.0000373)	0.00813*** (0.0000379)	0.00704*** (0.0000373)	0.00688*** (0.0000373)
Credit limit (\$)	0.00336*** (0.00000452)	0.00377*** (0.00000456)	0.00212*** (0.00000472)	0.00344*** (0.00000468)	0.00403*** (0.00000470)	0.00236*** (0.00000487)
Credit score		-0.285*** (0.000103)	-0.275*** (0.000103)		-0.286*** (0.000103)	-0.275*** (0.000103)
Age of account		0.00234*** (0.00000271)	0.00198*** (0.00000287)		0.00243*** (0.00000277)	0.00202*** (0.00000304)
Age of consumer		0.0104*** (0.0000372)	0.0107*** (0.0000372)		0.0101*** (0.0000372)	0.0104*** (0.0000372)
Current balance (\$)			0.00111*** (0.000000767)			0.00112*** (0.000000782)
Highest amount borrowed (\$)			0.0000720*** (0.000000994)			0.000152*** (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 C.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*** (0.000287)	-0.0439*** (0.000285)	-0.0503*** (0.000285)	-0.0584*** (0.000287)	-0.0435*** (0.000285)	-0.0502*** (0.000285)
CBP compliant	0.0274*** (0.000101)	0.0337*** (0.0000997)	0.0376*** (0.0000996)			
Credit limit increased × CBP compliant	0.0608*** (0.000378)	0.0525*** (0.000374)	0.0502*** (0.000374)	0.0603*** (0.000378)	0.0526*** (0.000374)	0.0505*** (0.000374)
Credit limit (\$)	0.0524*** (0.0000390)	0.0555*** (0.0000396)	0.0354*** (0.0000407)	0.0532*** (0.0000403)	0.0575*** (0.0000405)	0.0371*** (0.0000418)
Credit score		-2.022*** (0.000770)	-1.890*** (0.000772)		-2.026*** (0.000771)	-1.891*** (0.000773)
Age of account		0.0162*** (0.0000244)	0.0124*** (0.0000258)		0.0169*** (0.0000249)	0.0123*** (0.0000272)
Age of consumer		0.0352*** (0.000335)	0.0395*** (0.000335)		0.0363*** (0.000336)	0.0398*** (0.000335)
Current balance (\$)			0.0139*** (0.00000726)			0.0141*** (0.00000737)
Highest amount borrowed (\$)			0.0000293** (0.00000917)			0.00112*** (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 C.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*** (0.0000451)	-0.00595*** (0.0000448)	-0.00534*** (0.0000448)	-0.00954*** (0.0000452)	-0.00604*** (0.0000449)	-0.00549*** (0.0000449)
CBP compliant	-0.00165*** (0.0000196)	0.00191*** (0.0000193)	0.00213*** (0.0000193)			
Credit limit increased × CBP compliant	0.00846*** (0.0000587)	0.00730*** (0.0000577)	0.00746*** (0.0000577)	0.00880*** (0.0000587)	0.00776*** (0.0000578)	0.00800*** (0.0000578)
Credit limit (\$)	-0.00146*** (0.00000777)	-0.00243*** (0.00000784)	-0.00101*** (0.00000819)	-0.00210*** (0.00000795)	-0.00236*** (0.00000796)	-0.00132*** (0.00000835)
Credit score		-0.466*** (0.000134)	-0.476*** (0.000135)		-0.467*** (0.000134)	-0.478*** (0.000135)
Age of account		0.0111*** (0.00000474)	0.0109*** (0.00000492)		0.0110*** (0.00000481)	0.0104*** (0.00000512)
Age of consumer		0.0276*** (0.0000619)	0.0273*** (0.0000619)		0.0272*** (0.0000619)	0.0267*** (0.0000618)
Current balance (\$)			-0.00134*** (0.00000148)			-0.00138*** (0.00000150)
Highest amount borrowed (\$)			0.000782*** (0.00000160)			0.00121*** (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 C.4: Effects of credit limit increase on avg. amount delinquent, 12 months forward

	(1)	(2)	(3)	(4)	(5)	(6)
Credit limit increased	-0.0751*** (0.000319)	-0.0511*** (0.000316)	-0.0479*** (0.000316)	-0.0747*** (0.000320)	-0.0522*** (0.000317)	-0.0493*** (0.000317)
CBP compliant	-0.00275*** (0.000128)	0.0180*** (0.000126)	0.0195*** (0.000126)			
Credit limit increased × CBP compliant	0.0595*** (0.000415)	0.0512*** (0.000409)	0.0520*** (0.000409)	0.0620*** (0.000416)	0.0546*** (0.000409)	0.0558*** (0.000409)
Credit limit (\$)	0.0213*** (0.0000492)	0.0168*** (0.0000495)	0.0241*** (0.0000515)	0.0191*** (0.0000504)	0.0186*** (0.0000504)	0.0236*** (0.0000527)
Credit score		-3.011*** (0.000881)	-3.067*** (0.000890)		-3.019*** (0.000882)	-3.073*** (0.000890)
Age of account		0.0641*** (0.0000306)	0.0626*** (0.0000320)		0.0644*** (0.0000311)	0.0606*** (0.0000335)
Age of consumer		0.158*** (0.000397)	0.156*** (0.000396)		0.155*** (0.000397)	0.152*** (0.000396)
Current balance (\$)			-0.00707*** (0.00000930)			-0.00716*** (0.00000944)
Highest amount borrowed (\$)			0.00446*** (0.0000106)			0.00682*** (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 C.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*** (0.0000149)	-0.00194*** (0.0000148)	-0.00193*** (0.0000148)	-0.00334*** (0.0000149)	-0.00219*** (0.0000148)	-0.00219*** (0.0000148)
CBP compliant	-0.00117*** (0.00000883)	-0.000709*** (0.00000874)	-0.000451*** (0.00000878)			
Credit limit increased × CBP compliant	0.00257*** (0.0000227)	0.00191*** (0.0000224)	0.00189*** (0.0000224)	0.00281*** (0.0000227)	0.00220*** (0.0000225)	0.00222*** (0.0000225)
Credit limit (\$)	0.000867*** (0.00000305)	0.00112*** (0.00000309)	0.000916*** (0.00000321)	0.000842*** (0.00000315)	0.00118*** (0.00000317)	0.000996*** (0.00000329)
Credit score		-0.157*** (0.0000760)	-0.156*** (0.0000762)		-0.157*** (0.0000761)	-0.157*** (0.0000764)
Age of account		0.00116*** (0.00000167)	0.000895*** (0.00000176)		0.00124*** (0.00000172)	0.000966*** (0.00000187)
Age of consumer		0.00463*** (0.0000235)	0.00468*** (0.0000235)		0.00438*** (0.0000236)	0.00434*** (0.0000236)
Current balance (\$)			-0.0000152*** (0.000000581)			-0.0000438*** (0.000000595)
Highest amount borrowed (\$)			0.000345*** (0.000000630)			0.000343*** (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 C.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*** (0.00256)	-0.351*** (0.00305)	1.013*** (0.0596)	-0.134*** (0.00293)	-0.0949*** (0.00282)	0.690*** (0.0483)
CBP compliant	-0.0939*** (0.00107)	-0.0464*** (0.000930)	-0.0103*** (0.000942)			
Credit limit increased × CBP compliant	0.294*** (0.00400)	0.164*** (0.00414)	0.106*** (0.00392)	0.0711*** (0.00376)	0.0547*** (0.00361)	0.0245*** (0.00342)
Credit limit (\$)	-0.0735*** (0.000339)	0.102*** (0.000375)	0.0775*** (0.000395)	0.0637*** (0.000376)	0.0585*** (0.000377)	0.0277*** (0.000394)
Credit score		-6.371*** (0.00593)	-6.362*** (0.00610)		-3.325*** (0.00713)	-3.364*** (0.00728)
Age of account		0.0537*** (0.000233)	0.0426*** (0.000244)		0.0352*** (0.000231)	0.0201*** (0.000250)
Age of borrower		0.119*** (0.000895)	0.128*** (0.000897)		0.374*** (0.00205)	0.389*** (0.00205)
Current balance (\$)			0.0128*** (0.0000911)			0.0123*** (0.0000762)
Highest amount borrowed (\$)			0.0274*** (0.000105)			0.0231*** (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 C.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*** (0.0000828)	0.0132*** (0.0000809)	0.00212*** (0.0000772)	0.00980*** (0.0000826)	0.0145*** (0.0000807)	0.00325*** (0.0000771)		
CBP compliant	-0.0262*** (0.0000248)	-0.0240*** (0.0000244)	-0.0164*** (0.0000216)					
Credit limit increased × CBP compliant	0.0164*** (0.0000980)	0.0138*** (0.0000957)	0.00973*** (0.0000913)	0.0155*** (0.0000976)	0.0129*** (0.0000955)	0.00936*** (0.0000912)		
Credit limit (\$)	0.0232*** (0.0000980)	0.0243*** (0.0000981)	-0.0111*** (0.0000911)	0.0184*** (0.0000101)	0.0201*** (0.0000100)	-0.0138*** (0.0000938)		
Credit score		-0.643*** (0.000136)	-0.414*** (0.000123)		-0.639*** (0.000136)	-0.413*** (0.000122)		
Age of account		0.00550*** (0.0000665)	-0.00212*** (0.0000613)		0.00378*** (0.0000671)	-0.00340*** (0.0000639)		
Age of consumer		-0.0237*** (0.0000810)	-0.0161*** (0.0000763)		-0.0170*** (0.0000801)	-0.0111*** (0.0000759)		
Current balance (\$)			0.0239*** (0.00000198)			0.0236*** (0.00000200)		
Highest amount borrowed (\$)			0.00132*** (0.00000197)			0.00136*** (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.

C.2 24-month

Table C.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*** (0.0000242)	-0.00397*** (0.0000241)	-0.00444*** (0.0000241)	-0.00568*** (0.0000243)	-0.00400*** (0.0000241)	-0.00450*** (0.0000241)
CBP compliant	0.00159*** (0.0000112)	0.00230*** (0.0000111)	0.00264*** (0.0000111)			
Credit limit increased × CBP compliant	0.00669*** (0.0000348)	0.00575*** (0.0000343)	0.00558*** (0.0000344)	0.00673*** (0.0000348)	0.00586*** (0.0000344)	0.00570*** (0.0000344)
Credit limit (\$)	0.00370*** (0.00000424)	0.00404*** (0.00000430)	0.00250*** (0.00000444)	0.00374*** (0.00000440)	0.00422*** (0.00000442)	0.00266*** (0.00000458)
Credit score		-0.229*** (0.0000944)	-0.219*** (0.0000944)		-0.229*** (0.0000945)	-0.219*** (0.0000945)
Age of account		0.00182*** (0.00000255)	0.00149*** (0.00000270)		0.00188*** (0.00000261)	0.00149*** (0.00000286)
Age of consumer		0.00839*** (0.0000342)	0.00872*** (0.0000342)		0.00833*** (0.0000342)	0.00858*** (0.0000342)
Current balance (\$)			0.00103*** (0.000000720)			0.00103*** (0.000000733)
Highest amount borrowed (\$)			0.0000695*** (0.000000924)			0.000158*** (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 C.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*** (0.000301)	-0.0359*** (0.000300)	-0.0430*** (0.000300)	-0.0451*** (0.000301)	-0.0349*** (0.000301)	-0.0423*** (0.000301)
CBP compliant	0.0326*** (0.000105)	0.0367*** (0.000104)	0.0410*** (0.000104)			
Credit limit increased × CBP compliant	0.0524*** (0.000388)	0.0465*** (0.000386)	0.0439*** (0.000386)	0.0516*** (0.000388)	0.0461*** (0.000386)	0.0437*** (0.000386)
Credit limit (\$)	0.0690*** (0.0000411)	0.0716*** (0.0000417)	0.0493*** (0.0000428)	0.0693*** (0.0000423)	0.0727*** (0.0000427)	0.0501*** (0.0000440)
Credit score		-1.389*** (0.000758)	-1.244*** (0.000760)		-1.393*** (0.000759)	-1.244*** (0.000760)
Age of account		0.00982*** (0.0000259)	0.00556*** (0.0000272)		0.0102*** (0.0000264)	0.00532*** (0.0000286)
Age of consumer		-0.0117*** (0.000344)	-0.00692*** (0.000344)		-0.00880*** (0.000345)	-0.00499*** (0.000344)
Current balance (\$)			0.0154*** (0.00000788)			0.0156*** (0.00000801)
Highest amount borrowed (\$)			0.0000343*** (0.00000957)			0.00114*** (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 C.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*** (0.0000433)	-0.00552*** (0.0000431)	-0.00508*** (0.0000431)	-0.00854*** (0.0000433)	-0.00556*** (0.0000431)	-0.00518*** (0.0000431)
CBP compliant	-0.00125*** (0.0000190)	0.00185*** (0.0000188)	0.00212*** (0.0000188)			
Credit limit increased × CBP compliant	0.00723*** (0.0000559)	0.00626*** (0.0000551)	0.00637*** (0.0000551)	0.00755*** (0.0000559)	0.00668*** (0.0000552)	0.00686*** (0.0000552)
Credit limit (\$)	-0.000387*** (0.00000748)	-0.00126*** (0.00000757)	-0.000332*** (0.00000790)	-0.00101*** (0.00000766)	-0.00126*** (0.00000769)	-0.000693*** (0.00000806)
Credit score		-0.397*** (0.000125)	-0.404*** (0.000127)		-0.398*** (0.000126)	-0.405*** (0.000127)
Age of account		0.00972*** (0.00000460)	0.00945*** (0.00000477)		0.00960*** (0.00000467)	0.00892*** (0.00000497)
Age of consumer		0.0226*** (0.0000586)	0.0224*** (0.0000586)		0.0224*** (0.0000586)	0.0221*** (0.0000586)
Current balance (\$)			-0.000962*** (0.00000141)			-0.000997*** (0.00000143)
Highest amount borrowed (\$)			0.000692*** (0.00000154)			0.00113*** (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 C.11: Effects of credit limit increase on avg. amount delinquent, 24 months forward

	(1)	(2)	(3)	(4)	(5)	(6)
Credit limit increased	-0.0638*** (0.000338)	-0.0450*** (0.000337)	-0.0431*** (0.000337)	-0.0629*** (0.000339)	-0.0453*** (0.000337)	-0.0439*** (0.000337)
CBP compliant	0.00183*** (0.000131)	0.0196*** (0.000130)	0.0216*** (0.000130)			
Credit limit increased × CBP compliant	0.0475*** (0.000429)	0.0416*** (0.000425)	0.0419*** (0.000425)	0.0496*** (0.000429)	0.0444*** (0.000425)	0.0452*** (0.000425)
Credit limit (\$)	0.0365*** (0.0000507)	0.0319*** (0.0000512)	0.0351*** (0.0000531)	0.0345*** (0.0000519)	0.0332*** (0.0000521)	0.0341*** (0.0000543)
Credit score		-2.341*** (0.000849)	-2.369*** (0.000857)		-2.348*** (0.000849)	-2.374*** (0.000858)
Age of account		0.0553*** (0.0000321)	0.0533*** (0.0000335)		0.0555*** (0.0000326)	0.0510*** (0.0000351)
Age of consumer		0.109*** (0.000400)	0.109*** (0.000400)		0.108*** (0.000400)	0.106*** (0.000400)
Current balance (\$)			-0.00406*** (0.00000946)			-0.00416*** (0.00000959)
Highest amount borrowed (\$)			0.00405*** (0.0000110)			0.00679*** (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 C.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*** (0.0000150)	-0.00181*** (0.0000149)	-0.00184*** (0.0000149)	-0.00302*** (0.0000150)	-0.00199*** (0.0000150)	-0.00203*** (0.0000150)
CBP compliant	-0.00142*** (0.00000849)	-0.00102*** (0.00000842)	-0.000762*** (0.00000845)			
Credit limit increased × CBP compliant	0.00248*** (0.0000222)	0.00189*** (0.0000220)	0.00186*** (0.0000220)	0.00265*** (0.0000222)	0.00211*** (0.0000220)	0.00211*** (0.0000220)
Credit limit (\$)	0.00116*** (0.00000297)	0.00140*** (0.00000301)	0.00111*** (0.00000311)	0.00112*** (0.00000306)	0.00143*** (0.00000308)	0.00118*** (0.00000320)
Credit score		-0.141*** (0.0000715)	-0.139*** (0.0000717)		-0.141*** (0.0000716)	-0.140*** (0.0000718)
Age of account		0.00101*** (0.00000164)	0.000747*** (0.00000173)		0.00108*** (0.00000169)	0.000825*** (0.00000184)
Age of consumer		0.00425*** (0.0000225)	0.00431*** (0.0000225)		0.00413*** (0.0000226)	0.00411*** (0.0000226)
Current balance (\$)			0.0000515*** (0.000000554)			0.0000247*** (0.000000567)
Highest amount borrowed (\$)			0.000316*** (0.000000617)			0.000301*** (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 C.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*** (0.000197)	-0.0132*** (0.000196)	-0.0144*** (0.000196)	-0.0213*** (0.000197)	-0.0139*** (0.000196)	-0.0151*** (0.000196)
CBP compliant	-0.00859*** (0.0000785)	-0.00565*** (0.0000782)	-0.00284*** (0.0000784)			
Credit limit increased × CBP compliant	0.0199*** (0.000257)	0.0156*** (0.000256)	0.0150*** (0.000256)	0.0205*** (0.000257)	0.0166*** (0.000256)	0.0163*** (0.000256)
Credit limit (\$)	0.0188*** (0.0000287)	0.0205*** (0.0000292)	0.0151*** (0.0000300)	0.0181*** (0.0000296)	0.0203*** (0.0000298)	0.0156*** (0.0000309)
Credit score		-1.010*** (0.000582)	-0.980*** (0.000585)		-1.009*** (0.000583)	-0.984*** (0.000585)
Age of account		0.00734*** (0.0000172)	0.00449*** (0.0000181)		0.00785*** (0.0000176)	0.00539*** (0.0000191)
Age of consumer		0.0302*** (0.000225)	0.0314*** (0.000225)		0.0311*** (0.000225)	0.0314*** (0.000225)
Current balance (\$)			0.00240*** (0.00000540)			0.00220*** (0.00000550)
Highest amount borrowed (\$)			0.00282*** (0.00000647)			0.00231*** (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 C.14: Effects of credit limit increase on avg. utilization, 24 months forward

	(1)	(2)	(3)	(4)	(5)	(6)
Credit limit increased	0.00717*** (0.0000735)	0.0106*** (0.0000724)	0.00155*** (0.0000699)	0.00872*** (0.0000732)	0.0120*** (0.0000722)	0.00274*** (0.0000698)
CBP compliant	-0.0244*** (0.0000232)	-0.0230*** (0.0000230)	-0.0165*** (0.0000208)			
Credit limit increased × CBP compliant	0.0136*** (0.0000873)	0.0117*** (0.0000861)	0.00837*** (0.0000830)	0.0127*** (0.0000870)	0.0108*** (0.0000858)	0.00788*** (0.0000829)
Credit limit (\$)	0.0220*** (0.00000917)	0.0229*** (0.00000924)	-0.00635*** (0.00000875)	0.0175*** (0.00000942)	0.0189*** (0.00000943)	-0.00915*** (0.00000901)
Credit score		-0.448*** (0.000125)	-0.259*** (0.000115)		-0.443*** (0.000124)	-0.258*** (0.000115)
Age of account		0.00341*** (0.00000625)	-0.00309*** (0.00000589)		0.00181*** (0.00000631)	-0.00446*** (0.00000614)
Age of consumer		-0.0261*** (0.0000763)	-0.0198*** (0.0000728)		-0.0194*** (0.0000754)	-0.0147*** (0.0000722)
Current balance (\$)			0.0196*** (0.00000187)			0.0193*** (0.00000189)
Highest amount borrowed (\$)			0.00143*** (0.00000188)			0.00162*** (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.

C.3 36-month

Table C.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*** (0.0000224)	-0.00349*** (0.0000223)	-0.00394*** (0.0000223)	-0.00494*** (0.0000224)	-0.00348*** (0.0000223)	-0.00395*** (0.0000223)
CBP compliant	0.00148*** (0.0000107)	0.00209*** (0.0000106)	0.00240*** (0.0000106)			
Credit limit increased × CBP compliant	0.00602*** (0.0000324)	0.00520*** (0.0000320)	0.00503*** (0.0000321)	0.00603*** (0.0000324)	0.00526*** (0.0000321)	0.00511*** (0.0000321)
Credit limit (\$)	0.00371*** (0.00000408)	0.00401*** (0.00000414)	0.00255*** (0.00000427)	0.00371*** (0.00000422)	0.00413*** (0.00000425)	0.00265*** (0.00000440)
Credit score		-0.198*** (0.0000896)	-0.189*** (0.0000897)		-0.199*** (0.0000897)	-0.189*** (0.0000898)
Age of account		0.00156*** (0.00000245)	0.00125*** (0.00000258)		0.00160*** (0.00000250)	0.00123*** (0.00000273)
Age of consumer		0.00731*** (0.0000324)	0.00762*** (0.0000324)		0.00735*** (0.0000324)	0.00759*** (0.0000324)
Current balance (\$)			0.000983*** (0.000000688)			0.000983*** (0.000000699)
Highest amount borrowed (\$)			0.0000496*** (0.000000873)			0.000146*** (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 C.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*** (0.000288)	-0.0293*** (0.000288)	-0.0366*** (0.000288)	-0.0348*** (0.000289)	-0.0282*** (0.000288)	-0.0358*** (0.000289)
CBP compliant	0.0310*** (0.000106)	0.0335*** (0.000105)	0.0376*** (0.000105)			
Credit limit increased × CBP compliant	0.0451*** (0.000371)	0.0412*** (0.000370)	0.0386*** (0.000370)	0.0447*** (0.000371)	0.0411*** (0.000370)	0.0386*** (0.000370)
Credit limit (\$)	0.0742*** (0.0000416)	0.0762*** (0.0000423)	0.0535*** (0.0000433)	0.0738*** (0.0000427)	0.0763*** (0.0000432)	0.0535*** (0.0000445)
Credit score		-0.890*** (0.000731)	-0.741*** (0.000733)		-0.892*** (0.000731)	-0.740*** (0.000733)
Age of account		0.00540*** (0.0000261)	0.00133*** (0.0000274)		0.00557*** (0.0000266)	0.000942*** (0.0000288)
Age of consumer		-0.0471*** (0.000344)	-0.0422*** (0.000343)		-0.0435*** (0.000344)	-0.0395*** (0.000343)
Current balance (\$)			0.0158*** (0.00000807)			0.0160*** (0.00000819)
Highest amount borrowed (\$)			-0.000362*** (0.00000955)			0.000684*** (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 C.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*** (0.0000410)	-0.00503*** (0.0000408)	-0.00467*** (0.0000408)	-0.00768*** (0.0000410)	-0.00505*** (0.0000409)	-0.00473*** (0.0000409)
CBP compliant	-0.00129*** (0.0000185)	0.00150*** (0.0000183)	0.00177*** (0.0000183)			
Credit limit increased × CBP compliant	0.00642*** (0.0000529)	0.00559*** (0.0000524)	0.00567*** (0.0000524)	0.00672*** (0.0000529)	0.00598*** (0.0000524)	0.00613*** (0.0000524)
Credit limit (\$)	0.000123*** (0.00000726)	-0.000690*** (0.00000736)	0.0000432*** (0.00000767)	-0.000513*** (0.00000743)	-0.000763*** (0.00000747)	-0.000377*** (0.00000782)
Credit score		-0.349*** (0.000119)	-0.355*** (0.000121)		-0.350*** (0.000120)	-0.356*** (0.000121)
Age of account		0.00878*** (0.00000447)	0.00851*** (0.00000463)		0.00863*** (0.00000453)	0.00796*** (0.00000482)
Age of consumer		0.0188*** (0.0000556)	0.0186*** (0.0000555)		0.0187*** (0.0000556)	0.0184*** (0.0000556)
Current balance (\$)			-0.000798*** (0.00000136)			-0.000837*** (0.00000138)
Highest amount borrowed (\$)			0.000631*** (0.00000148)			0.00108*** (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 C.18: Effects of credit limit increase on avg. amount delinquent, 36 months forward

	(1)	(2)	(3)	(4)	(5)	(6)
Credit limit increased	-0.0526*** (0.000328)	-0.0383*** (0.000328)	-0.0373*** (0.000328)	-0.0517*** (0.000328)	-0.0385*** (0.000328)	-0.0378*** (0.000328)
CBP compliant	0.000954*** (0.000131)	0.0163*** (0.000130)	0.0183*** (0.000130)			
Credit limit increased × CBP compliant	0.0377*** (0.000414)	0.0339*** (0.000412)	0.0341*** (0.000412)	0.0399*** (0.000414)	0.0367*** (0.000412)	0.0372*** (0.000412)
Credit limit (\$)	0.0436*** (0.0000509)	0.0387*** (0.0000515)	0.0398*** (0.0000534)	0.0412*** (0.0000521)	0.0392*** (0.0000524)	0.0381*** (0.0000546)
Credit score		-1.752*** (0.000809)	-1.766*** (0.000817)		-1.758*** (0.000809)	-1.769*** (0.000817)
Age of account		0.0485*** (0.0000324)	0.0465*** (0.0000338)		0.0484*** (0.0000329)	0.0439*** (0.0000354)
Age of consumer		0.0612*** (0.000393)	0.0610*** (0.000393)		0.0610*** (0.000394)	0.0598*** (0.000394)
Current balance (\$)			-0.00235*** (0.00000942)			-0.00249*** (0.00000954)
Highest amount borrowed (\$)			0.00338*** (0.0000110)			0.00631*** (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 C.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*** (0.0000140)	-0.00166*** (0.0000140)	-0.00170*** (0.0000140)	-0.00272*** (0.0000141)	-0.00179*** (0.0000140)	-0.00184*** (0.0000140)
CBP compliant	-0.00168*** (0.00000823)	-0.00132*** (0.00000817)	-0.00109*** (0.00000820)			
Credit limit increased × CBP compliant	0.00237*** (0.0000210)	0.00183*** (0.0000208)	0.00180*** (0.0000208)	0.00250*** (0.0000210)	0.00200*** (0.0000209)	0.00200*** (0.0000209)
Credit limit (\$)	0.00129*** (0.00000289)	0.00151*** (0.00000293)	0.00121*** (0.00000303)	0.00125*** (0.00000298)	0.00153*** (0.00000300)	0.00127*** (0.00000311)
Credit score		-0.127*** (0.0000684)	-0.125*** (0.0000686)		-0.127*** (0.0000685)	-0.126*** (0.0000688)
Age of account		0.000882*** (0.00000160)	0.000650*** (0.00000169)		0.000951*** (0.00000164)	0.000725*** (0.00000179)
Age of consumer		0.00384*** (0.0000215)	0.00391*** (0.0000215)		0.00379*** (0.0000216)	0.00378*** (0.0000216)
Current balance (\$)			0.0000796*** (0.000000533)			0.0000535*** (0.000000545)
Highest amount borrowed (\$)			0.000271*** (0.000000594)			0.000258*** (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 C.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*** (0.000216)	-0.0111*** (0.000216)	-0.0128*** (0.000216)	-0.0172*** (0.000216)	-0.0115*** (0.000216)	-0.0132*** (0.000216)
CBP compliant	-0.0121*** (0.0000873)	-0.00983*** (0.0000872)	-0.00708*** (0.0000873)			
Credit limit increased × CBP compliant	0.0171*** (0.000279)	0.0138*** (0.000278)	0.0130*** (0.000278)	0.0175*** (0.000279)	0.0145*** (0.000278)	0.0141*** (0.000278)
Credit limit (\$)	0.0262*** (0.0000324)	0.0275*** (0.0000329)	0.0208*** (0.0000338)	0.0251*** (0.0000332)	0.0268*** (0.0000336)	0.0210*** (0.0000347)
Credit score		-0.778*** (0.000613)	-0.739*** (0.000615)		-0.776*** (0.000613)	-0.742*** (0.000616)
Age of account		0.00565*** (0.0000195)	0.00286*** (0.0000205)		0.00610*** (0.0000199)	0.00385*** (0.0000217)
Age of consumer		0.0211*** (0.000250)	0.0226*** (0.000250)		0.0227*** (0.000251)	0.0234*** (0.000251)
Current balance (\$)			0.00352*** (0.00000611)			0.00330*** (0.00000621)
Highest amount borrowed (\$)			0.00234*** (0.00000730)			0.00172*** (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 C.21: Effects of credit limit increase on avg. utilization, 36 months forward

	(1)	(2)	(3)	(4)	(5)	(6)
Credit limit increased	0.00669*** (0.0000678)	0.00945*** (0.0000671)	0.00130*** (0.0000649)	0.00819*** (0.0000675)	0.0108*** (0.0000669)	0.00247*** (0.0000648)
CBP compliant	-0.0229*** (0.0000223)	-0.0218*** (0.0000222)	-0.0158*** (0.0000202)			
Credit limit increased × CBP compliant	0.0123*** (0.0000808)	0.0108*** (0.0000800)	0.00778*** (0.0000774)	0.0114*** (0.0000805)	0.00983*** (0.0000797)	0.00724*** (0.0000772)
Credit limit (\$)	0.0213*** (0.00000880)	0.0220*** (0.00000889)	-0.00443*** (0.00000848)	0.0170*** (0.00000902)	0.0182*** (0.00000906)	-0.00729*** (0.00000872)
Credit score		-0.357*** (0.000117)	-0.187*** (0.000108)		-0.353*** (0.000116)	-0.186*** (0.000108)
Age of account		0.00281*** (0.00000600)	-0.00321*** (0.00000570)		0.00128*** (0.00000606)	-0.00469*** (0.00000593)
Age of consumer		-0.0247*** (0.0000721)	-0.0190*** (0.0000692)		-0.0182*** (0.0000713)	-0.0141*** (0.0000687)
Current balance (\$)			0.0176*** (0.00000180)			0.0173*** (0.00000181)
Highest amount borrowed (\$)			0.00153*** (0.00000180)			0.00189*** (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 D Additional lender response results

Tables D.1 and D.2 present estimated results of the implementation of CG5 on lenders' 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 D.1: Effects of CG5 on probability of credit limit increase

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CBP compliant	-0.00498*** (0.0000425)	-0.00391*** (0.0000426)	-0.00425*** (0.0000425)	-0.00394*** (0.0000425)	-0.00634*** (0.0000458)	-0.00547*** (0.0000460)	-0.00509*** (0.0000460)	-0.00570*** (0.0000458)
CG5 × CBP compliant	0.000968*** (0.0000435)	0.000667*** (0.0000437)	0.000743*** (0.0000435)	0.000433*** (0.0000435)	0.00127*** (0.0000461)	0.00137*** (0.0000463)	0.00122*** (0.0000463)	0.00171*** (0.0000461)
Credit limit (\$)	-0.00105*** (0.00000334)	-0.00317*** (0.00000354)	-0.000928*** (0.00000362)	0.000383*** (0.00000380)	-0.00316*** (0.00000654)	-0.00644*** (0.00000706)	-0.00450*** (0.00000677)	-0.00439*** (0.00000665)
Current balance (\$)		0.00215*** (0.000000935)				0.00211*** (0.00000128)		
Highest amount borrowed (\$)		0.000125*** (0.000000965)				0.000206*** (0.00000129)	0.000386*** (0.00000128)	
Utilization			0.0285*** (0.0000166)	0.0283*** (0.0000168)			0.0322*** (0.0000231)	0.0326*** (0.0000230)
Credit score			0.0264*** (0.0000441)	0.0324*** (0.0000449)			0.0521*** (0.0000821)	0.0516*** (0.0000819)
Age of account				-0.00134*** (0.00000269)				0.000816*** (0.00000364)
Age of consumer				-0.00759*** (0.0000107)				0.00532*** (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 D.2: Effects of CG5 on amount of credit limit increase

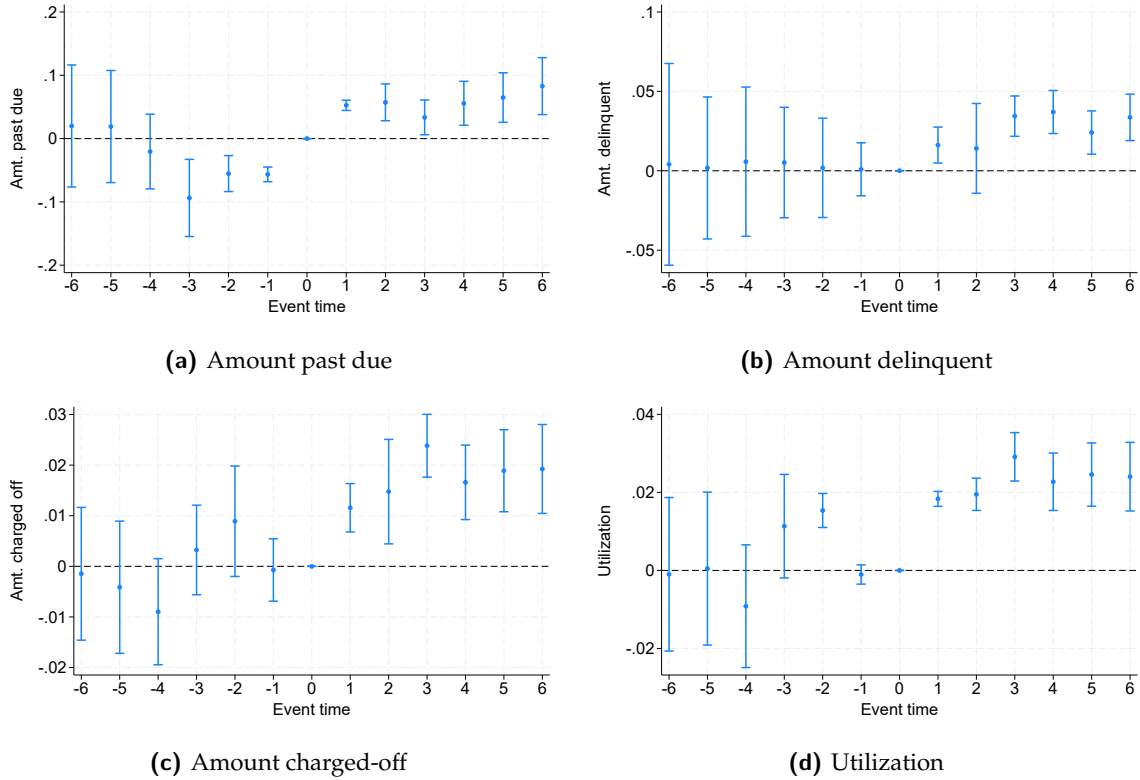
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CBP compliant	0.0159*** (0.00106)	0.102*** (0.00112)	0.0560*** (0.00121)	0.0509*** (0.00121)	-0.0133*** (0.00251)	-0.00129 (0.00253)	0.00472 (0.00253)	-0.00663** (0.00251)
CG5 × CBP compliant	-0.276*** (0.00115)	-0.347*** (0.00120)	-0.276*** (0.00129)	-0.274*** (0.00129)	-0.188*** (0.00237)	-0.200*** (0.00238)	-0.197*** (0.00238)	-0.191*** (0.00238)
Credit limit (\$)	0.334*** (0.000254)	0.384*** (0.000259)	0.277*** (0.000253)	0.292*** (0.000291)	0.258*** (0.000565)	0.277*** (0.000588)	0.249*** (0.000568)	0.249*** (0.000599)
Current balance (\$)		-0.0666*** (0.000102)				-0.0179*** (0.000149)		
Highest amount borrowed (\$)		0.0173*** (0.000119)				0.00165*** (0.000184)	0.00265*** (0.000181)	
Utilization			-0.392*** (0.000899)	-0.382*** (0.000902)			-0.181*** (0.00145)	-0.178*** (0.00143)
Credit score			2.419*** (0.00386)	2.478*** (0.00391)			1.260*** (0.00752)	1.254*** (0.00752)
Age of account				-0.0319*** (0.000262)				-0.00681*** (0.000551)
Age of consumer				-0.0336*** (0.000689)				0.454*** (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 E Additional parallel trends analysis

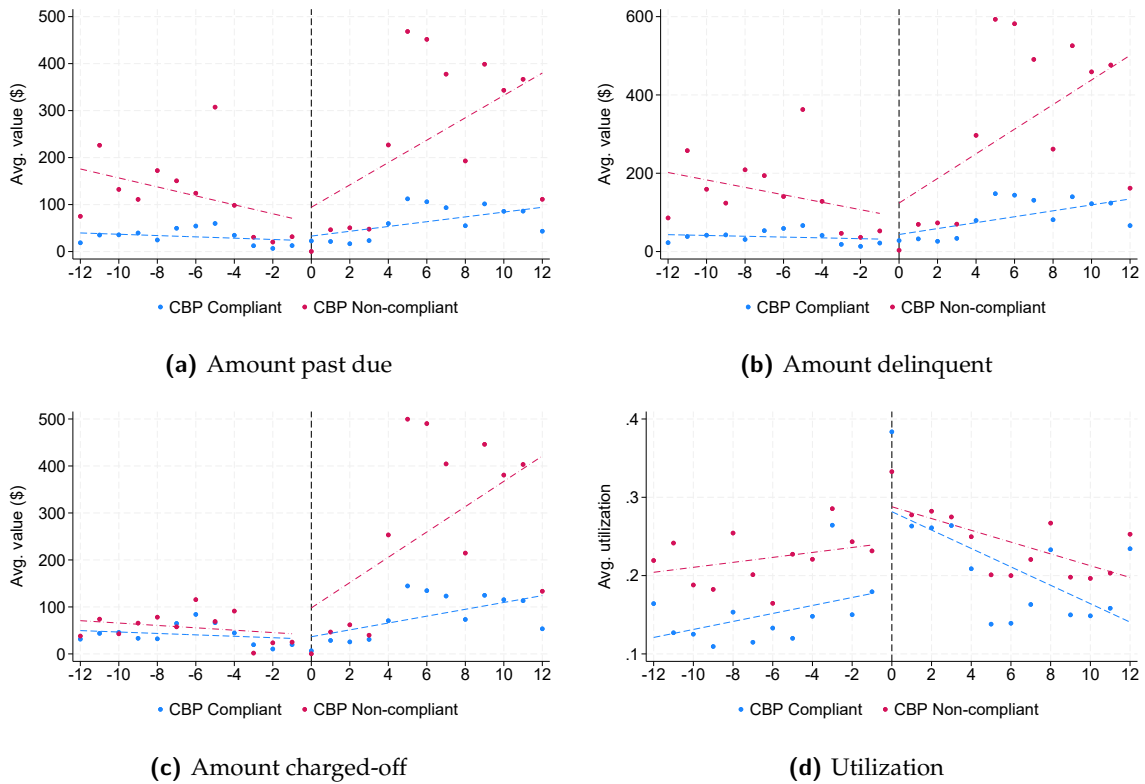
E.1 Adverse selection variables

Figure E.1: Trends in adverse selection outcomes



Notes: Plotted series in Figure E.1 are the monthly differences between CG5 compliance groups in event time with 99 percent confidence intervals. The dependent variable in Panel (a) is the amount past due. The dependent variable in Panel (b) is the amount delinquent. The dependent variable in Panel (c) is the amount charged-off. The dependent variable in Panel (d) is the utilization rate. The x-axis is the event time where 0 marks the month an account received a credit limit increase.

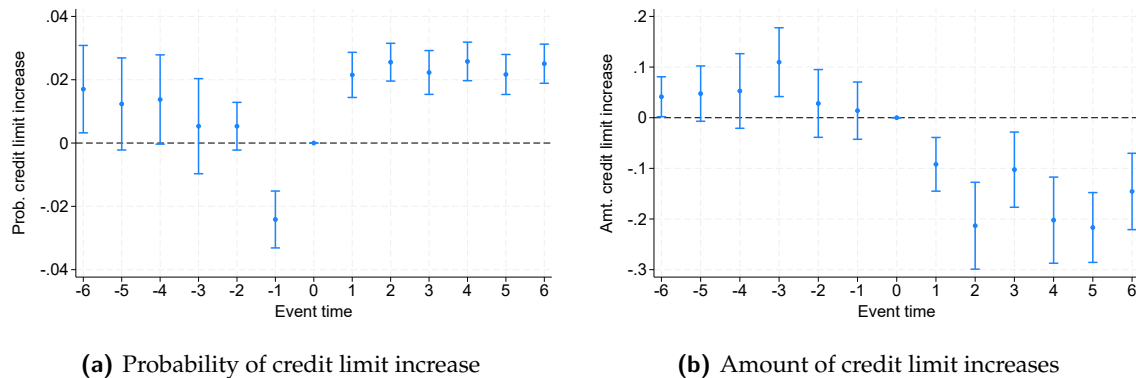
Figure E.2: Trends in adverse selection outcomes



Notes: Plotted series in Figure E.2 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 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 compliant lenders and red series are non-compliant lenders. All dashed lines plot the average linear trend across time of the corresponding scatter plots. The x-axis is the event time where 0 marks the month an account received a credit limit increase.

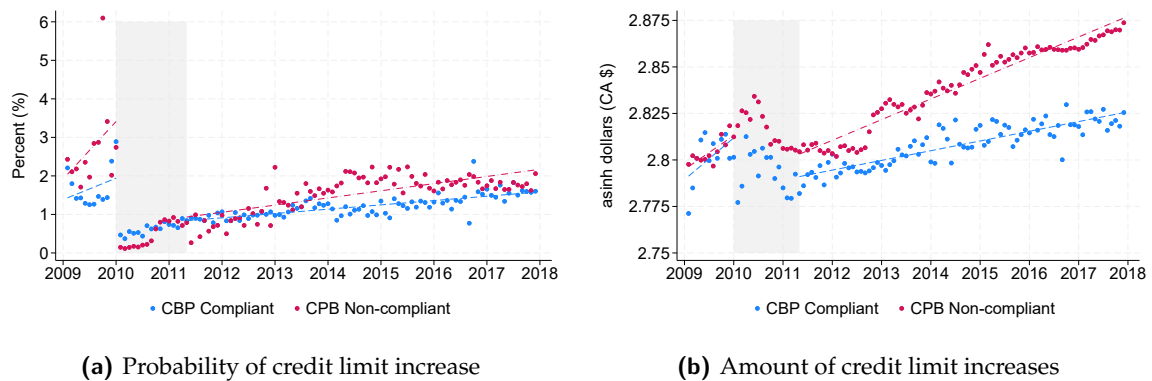
E.2 Lender response variables

Figure E.3: Trends in credit limit increases



Notes: Plotted series in Figure E.4 are the monthly differences between CG5 compliance group in event time with 99 percent confidence intervals. 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. Time 0 marks the start of CG5 guidance in April 2011.

Figure E.4: Trends in credit limit increases



Notes: Plotted series in Figure E.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 the non-compliant bank, the institution that was found to have violated CG5. All dashed lines plot the average linear trend across time of the corresponding scatter plots. The gray bars in both panels indicate the period 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 F Propensity score-matched sample results

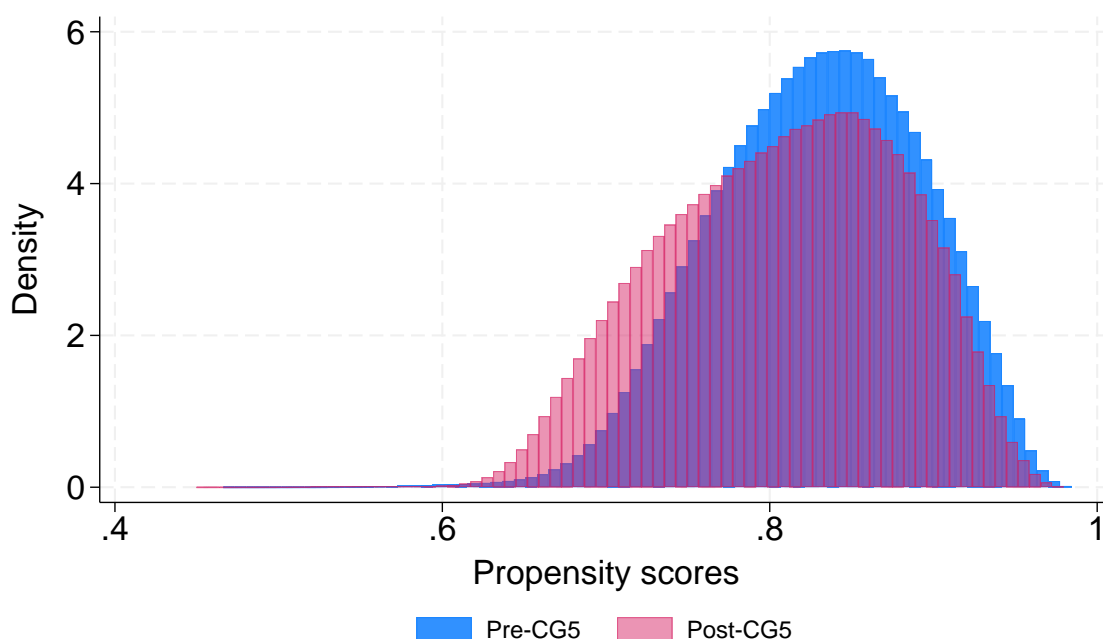
F.1 Matching Methodology

We employ one-to-one propensity-score matching with replacement using a probit model. We match non-compliant bank accounts to similar accounts from CBP-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, because 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 F.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 F.1: Distribution of estimated propensity scores



Notes: Figure F.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.

F.2 Adverse selection results using matched sample

Table F.1 reports the adverse selection test results using a one-to-one propensity score-matched sample to adjust for imbalances in the controls across CBP-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 F.1: Adverse selection test results on various outcomes of interest, 24-months forward, propensity score-matched sample

	(1) Amount past due	(2) Amount delinquent	(3) Amount charged off	(4) Utilization
Credit limit increased	-0.0281*** (0.000167)	-0.0350*** (0.000180)	-0.0114*** (0.000107)	0.00763*** (0.0000400)
Credit limit increased \times CBP compliant	0.0409*** (0.000301)	0.0348*** (0.000326)	0.0144*** (0.000202)	0.0169*** (0.0000625)
Credit limit (\$)	0.0695*** (0.0000380)	0.0302*** (0.0000469)	0.0191*** (0.0000268)	0.0170*** (0.00000851)
Credit score	-1.369*** (0.000637)	-2.299*** (0.000716)	-1.004*** (0.000495)	-0.437*** (0.000104)
Age of account	0.00989*** (0.0000234)	0.0563*** (0.0000294)	0.00789*** (0.0000157)	0.00151*** (0.00000564)
Age of consumer	-0.0141*** (0.000309)	0.123*** (0.000360)	0.0329*** (0.000203)	-0.0220*** (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 F.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.

F.3 Lender response results using matched sample

Table F.2 reports estimates of the effect of CG5 guidelines on the probability and amount of credit limit increases using a propensity score-matched sample to adjust for imbalances in the controls across CBP-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 $CG5 \times CBP\text{-compliant}$ is consistent with our main findings that banks complying with CG5 surprisingly gave more frequent credit limit increases, albeit of smaller size as a result of the policy.

Table F.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*** (0.0000276)	-0.0346*** (0.00268)
CG5 \times CBP compliant	0.00102*** (0.0000274)	-0.236*** (0.00215)
Credit limit (\$)	-0.00555*** (0.00000593)	0.231*** (0.000592)
Utilization	0.0324*** (0.0000196)	-0.196*** (0.00141)
Credit score	0.0584*** (0.0000694)	1.257*** (0.00711)
Age of account	0.00151*** (0.00000328)	-0.00612*** (0.000555)
Age of consumer	0.00709*** (0.0000514)	0.446*** (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 F.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.