Evaluating Credit Card Minimum Payment Restrictions

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Abstract

We study a government policy that restricts repayment choices with the aim of reducing credit card debt. The policy requires credit card minimum payments in Quebec to be at least 2% of the statement balance for cards opened before August 2019 and at least 5% for cards opened from August 2019. The rest of Canada is unaffected. We estimate this policy's effects by applying a difference-in-differences methodology to comprehensive Canadian consumer credit reporting data. The policy causes a persistent increase in minimum payments. The policy has trade-offs: reducing revolving debt comes at a cost of reducing credit access, and potentially increasing delinquency.

JEL: D18, E21, G28, G51
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1   Introduction

A key challenge for consumer financial protection is what to do when disclosure regulation and nudges are ineffective at achieving socially efficient improvements in consumer outcomes. A controversial option is imposing hard paternalistic policies that restrict consumer choice (Campbell, 2016; Laibson, 2020). Doing so requires estimating the trade-offs of such policies across consumer groups, and then making a policy evaluation to determine whether the costs of restricting choices are worthwhile to achieve the desired policy goal.

We evaluate the effectiveness of hard paternalistic regulation in the context of the Canadian credit card market. In 2019, the Quebec provincial government introduced consumer protection legislation "to prevent over-indebtedness"—restricting consumer choices of how much they must pay each month on their credit card by increasing the required monthly minimum payment.[1] The minimum payment due on a credit card is the minimum amount the cardholder is required to pay in order to remain in good standing with their lender.[2] By increasing the minimum payment, the policy forces all credit cardholders in the province of Quebec to pay more (revolve less debt).

Theoretically, increasing minimum payments can have ambiguous effects on consumers (e.g., Castellanos et al., 2023). Forcing cardholders to pay more of their balance each month is one way policymakers can attempt to reduce debt. One reason to do this is that high credit card debt increases consumer fragility, and, because interest rates are high, an increase in debt leads to large interest payments, which can be a drag on economic activity. Credit card debt also appears to arise from financial illiteracy (e.g., Ausubel, 1991; Soll et al., 2013; Lusardi and Tufano, 2015; Seira et al., 2017; Adams et al., 2022), and consumers making a variety of behavioral mistakes (as reviewed in Beshears et al., 2018; Gomes et al., 2021), something policymakers might want to internalize when forming regulation.

Increasing minimum payments, however, may be costly. For example, it can force individuals that are liquidity-constrained into delinquency. On the issuer side, it can make some lending unprofitable. By reducing the amount of interest they can collect, lenders might ultimately restrict access to credit card liquidity, which may lead consumers to turn to more expensive methods of credit. We therefore need to empirically estimate the trade-offs of reducing revolving debt compared to restricting the insurance benefits that credit cards

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[1]Legislative changes can be found here: http://m.assnat.qc.ca/en/travaux-parlementaires/projets-loi/projet-loi-134-41-1.html and here: http://www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=5&file=2017C24A.PDF

[2]A feature of consumer lending contracts are regular, monthly payments. Reasons for this feature may include keeping an active relationship between the borrower and the lender, keeping the card salient to encourage consumers to be attentive to spend on it, ensuring the lender collects some cash to cover their cash flow needs, and possibly helping to prevent losses from consumer default.

provide, and increasing delinquency.

In this paper, we estimate the effects of the first phase of Quebec's policy. This policy requires that, starting in August 2019, credit card minimum payments must be at least 2% of the statement balance for all cards opened before August 2019 ("existing cards"). The policy also requires that, for new cards opened starting in August 2019 ("new cards"), credit card minimum payments must be at least 5% of the statement balance. We study this policy phase's initial effects to February 2020, just before the start of the COVID-19 pandemic.[3] Furthermore, our analysis is entirely at the card level, and not the borrower level. Approximately 40% of cardholders have only one card, and for these borrowers the analysis is the same. In a future version of the paper, we will analyze the within-wallet use of cards.

Our setting is ideal for informing policymakers in developed credit card markets. Quebec is the second most populous Canadian province and 89% of adult Quebec residents hold at least one credit card (Statistics Canada, 2019). Before the Quebec policy, minimum payments across Canada are at a baseline *below* other developed countries with widespread use of credit cards and substantial credit card debt, such as the US and UK, and the policy tightens the minimum payment in Quebec to substantially *above* such levels.

We evaluate the trade-offs by measuring the effects of Quebec's minimum payment policy on credit card revolving debt—the statement balance less payments— and on credit card delinquency. We use comprehensive consumer credit reporting data from TransUnion containing monthly anonymized account-level information on credit cards held by all Canadian credit cardholders. We supplement these with data from Mintel Comperemedia on credit card offers. We estimate the account-level effects of the Quebec policy using a difference-in-differences (DID) design. The policy affects only credit card minimum payments of cardholders in the province of Quebec. We use credit cards in the neighboring province of Ontario as a control group unaffected by the policy.

We find this policy immediately and persistently shifts the distribution of minimum payments such that higher minimum payments are more common. In the very short run, this effect is mechanical for revolvers (i.e., borrowers who carry a balance month-to-month). The fraction of Quebec credit cards at the lowest feasible minimum payment value of $10 declines from approximately 50% to 20%. Before the minimum payment policy, 46.4% of Quebec credit cards required a minimum payment of under 2% of the statement balance. After the minimum payment policy, the share of cards with a minimum payment of under

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[3]As with many other countries, including the UK and the US, Canadian credit reporting data is affected by the start of the COVID-19 pandemic—some lenders temporarily stopped providing timely information, often because of temporary pandemic-related forbearance policies—although take-up of these in Canada was low, as shown in Allen et al. (2022).

2% declines to under 10% of Quebec credit cards. Using a DID approach, we estimate a \$23 average increase in credit card minimum payments in the month that the policy was introduced (August 2019), which is a 46% increase relative to July 2019. The effect persists and accumulates to a \$152 average increase in minimum payments over the first seven statements.

We estimate that the first phase of the policy on existing cards reduces these cards' revolving debt and potentially increases delinquency rates. The policy's effect of significantly reducing revolving debt strengthens over time. Six months after the policy is introduced, revolving debt is \$64 lower: a 3.4% decline relative to July 2019. This overall effect is driven by cards historically revolving debt, where revolving debt is reduced by \$109. The effect on delinquency is less clear-cut given pre-trends, but we estimate a 10% increase in delinquency rates six months after the policy was introduced, relative to the (relatively low) July 2019 baseline in Quebec. Our results vary by the size of the payment shock cardholders experience: some experience persistent increases in delinquency, others only temporary increases followed by declines.

In addition to examining existing cards, we study the policy's effects on new cards. Here, we find evidence that the policy led to a reduction in credit access. There are relatively fewer new credit cards in Quebec, and cards that are issued have lower credit limits relative to Ontario post-August 2019. This difference appears to partially reflect lenders anticipating the policy and encouraging cardholders in Quebec to open new credit cards earlier. Using data on credit card offers, we show that lenders concentrated their mailings in July 2019 to aggressively attempt to bring forward the timing of existing customers in Quebec opening new cards before the 5% policy takes effect. Just before August 2019, lenders' credit card offers in Quebec temporarily have lower interest rates, annual fees, and higher credit limits.

Overall, we find that the increase in minimum payment requirements lead to a reduction in revolving debt and an increase in delinquency, along with credit rationing. How policymakers trade off these effects depends on how they measure consumer welfare. Traditional economic models without present bias cannot explain both the observed levels of credit card debt and savings (Laibson et al., 2003, 2024; Zinman, 2015; Gomes et al., 2021). If consumers are present-biased, as is well-documented in the credit card market (e.g., Laibson, 1997; Shui and Ausubel, 2004; Meier and Sprenger, 2010; Kuchler and Pagel, 2021), and the long-run self is the relevant welfare criterion, then the reduction in debt may be interpreted as welfare-improving. However, if the demand for credit is driven by borrower preferences, the tightening of credit is only welfare-improving if the policymaker believes consumers are making behavioral mistakes.[4]

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[4]See Bernheim and Taubinsky (2018) and Ericson and Laibson (2019) for a discussion of these alternative

Our paper contributes to literatures spanning household finance, public economics, and behavioral economics by estimating the trade-offs of a paternalistic policy. Allcott et al. (2022) provide theory and empirical evidence evaluating mistakes in the payday loan market and the welfare effects of counterfactual policies. Cuesta and Sepúlveda (2021) study the trade-off between consumer protection from bank market power and reduction in credit access in the context of restricting interest rates on unsecured consumer loans in Chile. Garber et al. (2024) provides an example for how a government policy in Brazil encouraging increased payroll credit resulted in increased indebtedness with consumers borrowing at high real interest rates with adverse effects (higher consumption volatility and lower consumption) that are inconsistent with consumption smoothing motives and consistent with unsophisticated consumers borrowing "too much". DeFusco et al. (2020) shows that the effects of US mortgage leverage restrictions, which are designed to improve financial stability, come at a cost of restricting productive risk-taking. Heimer and Imas (2022) document how restricting retail traders' leverage improves these individuals' trading returns. Paternalistic policies are debated across a broad range of topics outside consumer financial protection; for example, see Allcott (2016) for a review of paternalism in energy efficiency policy and Allcott et al. (2019) for sugar taxes.

Our second contribution is to advance the literature on credit cards and consumer financial protection. Reducing credit card debt is known to be difficult. Prior research across countries has found providing information or nudging consumers to be largely ineffective at reducing credit card debt (Agarwal et al., 2015b; Seira et al., 2017; Adams et al., 2022; Batista et al., 2024; Guttman-Kenney et al., 2023), beyond simply reminding consumers to not forget to make a payment (Mazar et al., 2018; Bursztyn et al., 2019; Medina, 2021; Campbell et al., 2022; Schwartz, 2024). Policies restricting shrouded late fees (Agarwal et al., 2015a) and raising interest rates over time (Nelson, 2024) have been effective at reducing borrowing costs but are not designed to reduce revolving debt. We contribute to the literature by studying a policy that *is* effective at reducing debt but restricts consumer choices, increases delinquency, and reduces credit access.

No prior work has estimated the effects of a market-wide policy forcing all lenders to increase their minimum payments in a developed country. We study this topic in Canada, where 89% of adults hold a credit card (Statistics Canada, 2019), the highest fraction globally (World Bank, 2022). In developed countries, d'Astous and Shore (2017) and Keys and Wang (2019) study the effects of North American lenders voluntarily changing their minimum payment policies. Keys and Wang (2019) provides evidence of consumers anchoring to the

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approaches to measuring welfare. See Heidhues and Kőszegi (2010, 2015) for theory on the costs of naivete in the credit card market.

minimum payment, but their approach is not designed to estimate the effects on debt.[5] In developing countries, where only a minority of consumers use credit cards and default rates are substantially higher, three studies have investigated the effects of increasing minimum payments. Medina and Negrin (2022) examine the effect of one Mexican lender voluntarily raising its minimum payment. Castellanos et al. (2023) examine the effect of one Mexican lender voluntarily conducting a field experiment testing raising minimum payments from 5% to 10% of the statement balance. Agarwal et al. (2023) examine the effect of a nationwide policy in Turkey that increases minimum payments from 20% to 40% of the statement balance, and this policy also requires consumers to pay at least half of their balance three or more times a year to continue using cash advances and credit limit increases. This Turkish policy largely prevents credit cards being used to revolve debt and is far beyond a politically feasible policy option in most countries.

This is an early draft working paper. In work-in-progress, we take into account that some consumers hold multiple cards, and therefore experience different levels of treatment. This allows us to study potential spillovers across cards, and the rest of a consumers' debt portfolio. Also, in this draft we only examine the first part of the Quebec policy: increasing minimum payments on credit cards opened before August 2019 to 2% in 2019, and to 5% for new cards opened from August 2019. In work-in-progress, we are examining the effects of the other parts of the Quebec policy: increasing minimum payments on credit cards opened before August 2019 by 0.5 percentage points each year from 2.5% in 2020 to 5% in 2025. We intend to incorporate this into a future draft and update our conclusions accordingly.

The paper proceeds as follows. In Section 2, we describe the institutional details of minimum payments and the Quebec policy, the data we use, and our DID empirical methodologies. Section 3 covers our results for the first phase of the policy increasing minimum payments on existing cards to 2%. This section shows how lenders' policies changed in response to the policy, and our DID estimated effects on minimum payments, revolving debt, delinquency, and other key outcome variables including card activity and spending. This section also examines heterogeneity by revolvers and transactors, and by lenders. Section 4 shows our results for the part of the policy affecting new cards: increasing minimum payments to 5%. Section 5 briefly concludes.

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[5]Indeed, Keys and Wang (2019) conclude "Developing more theory and evidence on optimal policy under consumer heterogeneity is an important area for future work."

2 Minimum Payments, Data, and Methodology

2.1 Minimum Payments

2.1.1 Economics and Psychology of Minimum Payments

Credit card interest is charged on balances net of payments, and even small changes in minimum payment amounts can produce large changes in the amount of time it takes to pay off credit. For example, moving from a 2.0% to a 2.5% minimum payment reduces the time to repay $1,000 in debt from 26 to 14 years (all assuming no further spending).[6]

Approximately 40% of Canadian (Statistics Canada, 2019), and 50% of American (Board of Governors of the Federal Reserve System, 2023) credit cardholders revolve part of their credit card debt every month, and most pay relatively high interest rates in order to borrow in this manner. There are strong economic incentives for cardholders to make at least the minimum payment. Doing so allows the borrower to avoid being charged late fees and interest on delinquent balances (Gathergood et al., 2020).[7] Furthermore, if a consumer has not made their minimum payment on time and becomes delinquent for 30 days or more, this information is recorded on their credit report, which negatively affects their credit score and may ultimately limit current and future credit access.

Whether a consumer makes repayments above the minimum or not could be driven by temporary liquidity needs or mistakes. Minimum payments tend to be poorly understood by consumers (e.g., Adams et al., 2022; Hirshman and Sussman, 2022). Consumers tend to "bunch" repayments at or just above minimum payment amounts rather than make larger repayments to reduce their level of debt. Such behavior is attributed to the minimum payment having an unintentional psychological default effect (Sakaguchi et al., 2022) and acting as an anchor (Stewart, 2009; Keys and Wang, 2019; Medina and Negrin, 2022) or target (Bartels et al., 2024; Schwartz, 2024).

2.1.2 Quebec Policy

Prior to August 2019, there were no Canadian regulations restricting how credit card lenders should calculate minimum payments. Minimum payments were commonly as low as $10 plus interest and fees, irrespective of a consumer's statement balance. Table 1 displays the minimum payment rules of eleven Canadian lenders in July 2019—each lender's rule was the

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[6]Calculations using the Financial Consumer Agency of Canada's Credit Card Payment Calculator, and assuming an interest rate of 19.9%.

[7]In Canada, lenders have the right to increase the interest rate on borrowers who do not make their minimum payments—such practices were banned in the US since 2010 under the CARD Act (Nelson, 2024). No Canadian regulator collects information on the extent that this happens.

same across Quebec, Ontario, and the rest of Canada. Lenders choose this contract term, along with other product features, such as interest rates, fees, rewards, and credit limits, to maximize profits. As credit card lenders are large, sophisticated companies, we interpret each lender's choice of their minimum payment rule in Canada before the policy, and afterwards for all provinces in Canada excluding Quebec, as being each lenders' unconstrained profit maximizing choice for this contract feature.

On August 1, 2019, a new regulation, Bill 134, became effective in Quebec.[8] Bill 134 amended Quebec's Consumer Protection Act, restricting how credit card minimum payments should be calculated for all Quebec credit cards (summarized in Figure 1). The regulation requires that credit cards opened before August 1, 2019 ("existing credit cards") have a minimum payment of at least 2% of the statement balance. For these existing credit cards that are still open in August 1, 2020, this requirement tightened minimum payments by an additional 50 basis points to at least 2.5% of the statement balance. Each year after 2020, for cards that remain open in August of that year, the minimum payment ratchets up by another 50 basis points, until August 1, 2025, when the minimum payment must be at least 5% of the statement balance. An earlier version of Bill 134 proposed minimum payments increase from 2% to 5% by 100 basis points per year; however, there was concern that this increase would be too large a shock to household budgets.[9]

The regulation also requires all credit cards opened starting August 1, 2019 ("new credit cards") to have a minimum payment of at least 5% of the statement balance. During our period of study (2018—2024), no other Canadian province imposed a minimum payment regulation (either in place or changed).

The overall objective of the regulation is to increase repayments and reduce credit card debt. One of the architects of Bill 134, Quebec politician André Lamontagne, describes why they consider such interventions necessary: "Consumers, and in particular the most vulnerable among them, do not always have the tools to make informed decisions regarding the credit offered to them" and notes that the aim is "to avoid consumer over-indebtedness," (see National Assembly sittings on Bill 134 in October and November 2017). When the regulation came into effect, the Quebec Consumer Protection Office similarly stated "the increase in the minimum payment aims to prevent debt problems," and states the government's preference for consumers to reduce their credit card debt: "it is advantageous to pay the balance of your credit card each month, because no credit charges are then applicable."

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[8]This regulation received assent on November 15, 2017, having been announced on May 2, 2017, following earlier unsuccessful attempts to introduce similar legalisation in Bill 24 during 2011–2012.

[9]For example, one Quebec politician, Catherine Fournier said when the bill was being debated in the Assembly, "We find it good that we are gradually increasing to 5%, but we were afraid of the price shock that it could have on more vulnerable consumers."

Our Canadian setting is informative about minimum payment requirements as we start from a baseline where minimum payments are *below* standards currently set in other developed countries, and the Quebec policy changes that to substantially above these minimums. In the US, for example, lenders are required to ensure non-negative amortization of their credit card accounts as part of broader "safety and soundness" supervision designed to ensure lenders are managing their credit risks. The simplest way to satisfy such a rule is to have a minimum payment of at least the maximum of (i) \$10, or (ii) 1% of the statement balance plus interest and fees. Discussions with US industry participants indicate 1% is the lowest bound that amortizes debt that can be feasibly chosen by lenders to satisfy regulators. In the UK, lenders' minimum payment rules must be at least the maximum of £5 or 1% of the statement balance plus interest and fees. In Mexico, the minimum payment is required to be the greater of (i) 1.5% of the outstanding balance plus interest and fees, or (ii) 1.25% of the credit limit (Medina and Negrin, 2022).

2.2 Data

2.2.1 Canadian Consumer Credit Reporting Data

We use data from the Bank of Canada's anonymized consumer credit reporting data sourced from TransUnion (see Gibbs et al., 2024, for a review). These include monthly data covering all Canadians with credit reports between 2012 and 2024, redacted of personal information.[10] We focus our study on the period before the COVID-19 pandemic. Most consumer credit reporting datasets used by researchers are samples—often 1% or 5%—whereas our data, contains the credit histories of more than 30 million Canadian residents. This means we have power to precisely estimate heterogeneous consumer treatment effects.

We observe consumer-level information including age, credit score and the postal code of the consumer's primary address. For each consumer, we observe monthly account-level data for each of their credit accounts. These data includes credit cards, mortgages, personal loans, auto loans, lines of credit, student loans, and utilities. At the account-level, we observe opening and closing dates. Each month, we observe outstanding balances—for credit cards this is the statement balance—monthly required payments, monthly actual payments, delinquency status (30, 60, and 90 days late), and credit limits. We observe anonymized identifiers to follow individual consumers and individual accounts over time.

Importantly for our study, we observe consumers' actual monthly payments for all credit cards. This enables us to accurately measure consumers' responses to the Quebec policy. We

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[10]To protect the privacy of Canadians, TransUnion did not provide any personal information to the Bank. The TransUnion dataset was anonymized, meaning it does not include information that identifies individual Canadians, such as names, social insurance numbers or addresses (with the exception of postal codes).

can measure how much consumers pay relative to their credit card minimum payment, how much revolving debt they carry to their next statement, and new spending. This is a notable advantage relative to credit reporting data in the United States where this information is missing for all of the largest credit card lenders from 2015 onwards (Guttman-Kenney and Shahidinejad, 2024). Our dataset enables us to label credit card accounts based on whether they are historically "revolvers" or "transactors". "Revolvers" persistently roll over debt on their card. "Transactors" are convenience users who do not persistently roll over debt on their credit card.[11]

Different to most credit reporting datasets available to researchers, we also observe the name of the credit card issuer, card network, and bank identification number ("BIN"). A BIN is the first four to six numbers that appear on a card, and in addition to revealing information about the issuer and network, it reveals the specific card type (e.g., gold, platinum). This allows us to control for a substantial amount of unobserved heterogeneity across cards.

2.2.2 Mintel Comperemedia

We include credit card solicitation data from Mintel Comperemedia. This is a monthly panel of nearly 8,000 Canadian households who report on all credit card offers they receive in the mail or email. It includes lender identity, contract terms, and socio-demographics of the panelist (e.g., income, age, education, and location). We use monthly data from July 2018 to January 2020. In the U.S., Mintel data has been used, for example, by Grodzicki (2022), Ru and Schoar (2016), and Honka et al. (2017), among others, to study how credit card issuers compete for consumers. Han et al. (2018) establish that Mintel data are a good indicator of credit supply.

2.2.3 Sample Selection for Existing Cards

We take all credit card accounts in our credit reporting data that were open in Quebec or Ontario as of July 2019—this is the month before the Quebec policy was introduced. We retain data on cards for eleven lenders who operate in both Quebec and Ontario. These lenders represent 64% of Quebec card balances and 84% of Ontario card balances. The difference in coverage is because there is one large lender that operates only in Quebec. For the eleven lenders, we then exclude cards that are closed, in persistent severe arrears, or inactive (i.e. persistently have both zero statement balances and zero repayments) up to July 2019.

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[11]Repayment behavior is highly persistent, at least over short time-horizons, c.f., Keys and Wang (2019); Nelson (2024); Grodzicki and Koulayev (2021); Guttman-Kenney and Shahidinejad (2024).

We create a balanced panel containing 13 months of observations for each credit card. We retain observations where a cardholder has moved after the policy was introduced since card features are set based on residential location at the time the policy was introduced and do not adjust with subsequent residential location. Closed accounts continue to be reported in our dataset. If a card closes post-August 2019 we classify it as having a zero statement balance, zero minimum payment amount due, and zero actual payment made, and regard such observations as a payment in full. When a card is closed, we classify the card as being current, unless the reporting indicates it was delinquent when closed. We winsorize continuous variables to their 99.9 percentile.

The treatment credit cards are in Quebec and the control credit cards are in Ontario. Although geographically close, there are some important differences across provinces in terms of average income, employment, and spending. For example, according to Statistics Canada (Table 11-10-0190-01), the median after-tax household income in 2018 for Quebec was $53,700 and in Ontario it was $66,200, both in 2020 constant dollars. The unemployment rate in July 2019 for Quebec was 4.9% and for Ontario it was 5.7% (Statistics Canada Table 14-10-0287-03). Finally, in terms of credit card spending, according to the Ipsos-Reid Personal Cardholder Survey, the average monthly credit card spending in 2018 was $663 in Quebec and $712 in Ontario. Appendix A contains additional descriptive evidence of credit card behavior in Quebec and Ontario using survey data.

We show results for an unmatched sample and a matched sample that takes cards in Quebec and constructs a matched control group in Ontario using the combination of the same lender and BIN, and an indicator for whether a consumer has repaid their balance in full the majority of times in a six month period a year before the policy, and matching on covariates within this combination–see Appendix B.1 for details of this matching.

Our unmatched dataset contains 10.6 million cards and 138 million observations; our matched dataset contains 5.3 million cards and 69 million observations. Table 2 contains summary statistics for the outcomes we examine. This table separately displays outcomes six months before and six months after the policy, for both Quebec and Ontario.

2.2.4 Sample Selection for New Cards

We construct a separate dataset to study the effects of Quebec's policy raising minimum payments to 5% on new cards opened from August 2019 onwards. We sample all credit cards opened in Quebec and Ontario from July 2018 until January 2020.

We focus primarily on cohorts of cards opened in Quebec and Ontario between August and October 2019 to ensure we have sufficient time to evaluate outcomes before the COVID-19 pandemic's onset. We also add a control group of cohorts of cards opened in both Quebec

and Ontario between August and October 2018. For each card, we keep up to three months of observations: months three to six after card opening. By the third month, most newly opened credit cards have started to appear in credit reports, which allows sufficient time for a card's first full statement with a non-zero minimum payment due to occur, and for statement balances to include balance transfers.

2.2.5 Outcomes

We measure our main outcomes in consumer credit reporting data as follows:

- **Minimum Payment** is observed in credit reporting data as the scheduled payment amount. This amount is inclusive of any interest and fees, as well as repayment of capital.

- **Revolving Debt** is defined in Equation 1, following the approach used in Gibbs et al. (2024) and Guttman-Kenney and Shahidinejad (2024). For each credit card account, i, and month t, we record the amount of credit card debt remaining after subtracting actual payments $p_{i,t}$ from the previous month's statement balance $b_{i,t-1}$. If this calculation is negative, we bound at zero. This can happen when cardholders repay more than their statement balance (e.g., paying their outstanding balance, making payments before their statement and minimum payment becomes due). Given that credit cards have a 21-day grace period, statement balances are recorded in month $t-1$ rather than in month t.

$$d_{i,t} \equiv \begin{cases} b_{i,t-1} - p_{i,t} & \text{if } b_{i,t} - p_{i,t} \geq 0 \\ 0 & \text{otherwise} \end{cases} \qquad (1)$$

- **Delinquency** is measured as any missed payment recorded in the credit report. This occurs when an account is 30 days or more past the date when the minimum payment is due.

2.3 Methodologies

2.3.1 Existing Cards

We estimate the effects of changes to credit card minimum payments in Quebec on existing credit card accounts opened before August 2019. To estimate the causal effects of this policy we use a DID identification strategy. We use credit cards in Ontario as a control group for evaluating the effects of changes in Quebec. Under the standard common trends assumption

that in the absence of the Quebec policy cards in Quebec would have trended similarly to Ontario, this approach produces the causal effect of the Quebec policy. Our dynamic DID specification is shown in Equation 2. We estimate this equation by ordinary least-squares (OLS) with standard errors clustered at the consumer-level to allow for correlation across cards held by the same consumer over time.[12] There is one observation for each credit card ($i \in \{1, ..., N\}$) and each calendar year-month ($t \in \{1, ..., T\}$) observed. An indicator $QUEBEC_i$ equals 1 if the card is located in Quebec in July 2019, and 0 otherwise. Calendar year-month indicators are included (γ) to non-parametrically capture common time fixed effects (β_τ). The omitted category is the month preceding the policy's introduction, $\tau = $ July 2019.

$$y_{i,t} = \sum_{\tau \neq \text{July 2019}} \delta_\tau \Big(D_\tau \times QUEBEC_i \Big) + \gamma_i + \gamma_t + \varepsilon_{i,t}. \tag{2}$$

The coefficients of interest are the dynamic estimated average treatment effects on the treated—δ_τ. These are the coefficients from the interaction between the indicator for Quebec and indicators for months relative to August 2019, where $\tau < 0$ checks for pre-trends and $\tau \geq 0$ shows the effects of the policy over time.

2.3.2 New Cards

We also study how the Quebec policy impacted new credit cards, defined as those opened after the policy came into effect, i.e., from August 2019 onwards. We do so by aggregating cards into cohorts by the combination of their opening month and province. We then track outcomes on these cohorts in months since origination ("vintage months").

We describe how the extensive margin of the number and value of originations change, and then study the intensive margin of how outcomes change, for the selected sample of new cards opened. Our First-Difference (FD) methodology compares outcomes for cohorts of cards that originated in Quebec and Ontario that are opened between August and October 2019. Our sample is one observation per cohort year-month (c), province (p), vintage month (v). Each observation occurs at calendar time t. As it takes a few months for a new credit card to appear in a credit report, with a full statement cycle and minimum payment due, we show results from vintage months three to six (before cohorts are impacted by COVID-19). We estimate Equation 3, where we weigh each observation by the number of cards in each cohort.

Our parameters of interest are δ_v^{FD}, which show the interaction between vintage month

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[12]In addition to wanting to capture correlation across cards in the same wallet, we cluster at the consumer level because there are too few provinces (two) and too few lenders (eleven) to cluster at these levels.

indicators (D_v) and an indicator $QUEBEC_p$ equal to 1 if the card is located in Quebec and 0 otherwise. We also include fixed effects for each cohort, vintage month, and calendar year-month.

For our estimates to be interpreted causally, we require that in the absence of the Quebec policy, outcomes for cohorts of cards opened in Quebec after the policy would have been similar to those opened in Ontario after the policy, controlling for fixed effects. A limitation of our FD approach is that, unlike our existing cards DID approach, there is no pre-period. As a result, we cannot include card fixed effects, and therefore our estimates can be biased by time-invariant differences between provinces.

$$y_{c,p,v,t} = \sum_{v=3,\ldots,6} \delta_v^{FD}\Big(D_v \times QUEBEC_p \Big) + \gamma_c + \gamma_{v(c,t)} + \gamma_t + \varepsilon_{c,p,v,t}. \tag{3}$$

Going forward, we seek to address this bias in our DID methodology by adding a control group of cohorts of cards opened between August 2018 and October 2018 in both Quebec and Ontario. We choose these controls given seasonality in card openings, and also to ensure that we observe six months of outcomes for these Quebec cards before they are impacted by the increases in minimum payments to 2% for existing cards opened before August 2019. We estimate Equation 4. As with Equation 3, our specification includes fixed effects for each cohort, vintage month, and calendar year-month. Unlike Equation 3, this specification now includes a fixed effect for card cohorts opened in Quebec ($QUEBEC_p$).

Our parameters of interest in this regression are the coefficients on the triple interaction between indicators for vintage months (D_v^{DID}), an indicator for card cohorts opened in Quebec ($QUEBEC_p$), and an indicator for card cohorts opened from August 2019 onwards ($CPOST_c$). For the δ_v^{DID} coefficients to be interpreted causally, we require that in the absence of the Quebec policy, the difference in outcomes between cohorts of cards opened in Quebec after the policy, and those opened in Quebec before the policy, would have trended similarly to the difference in outcomes between cohorts of cards opened in Ontario after the policy to those opened in Ontario before, after controlling for fixed effects. The fixed effects included are for the interaction between indicators for vintage months and card cohorts opened in Quebec, and the interaction between indicators for vintage months and an indicator for card cohorts opened from August 2019 onwards.

$$
\begin{aligned}
y_{c,p,v,t} = \sum_{v=3,\ldots,6} \Big[&\delta_v^{DID}\Big(D_v \times QUEBEC_p \times CPOST_c \Big) + \alpha_v(D_v \times QUEBEC_p) + \\
&\beta_v(D_v \times CPOST_c) \Big] + QUEBEC_p + \gamma_c + \gamma_{v(c,t)} + \gamma_t + \varepsilon_{c,p,v,t}.
\end{aligned}
\tag{4}
$$

3 Results: Existing Cards

This section presents our results for the account-level effects of the Quebec minimum payment policy on accounts opened before August 2019. Table 3 Panel A shows baseline means of outcomes in Quebec and Ontario in July 2019, for unmatched and matched samples. Focusing on the matched sample, we see that minimum payments in Quebec and Ontario pre-policy are about $50 per month. The average amount of revolving debt, across transactors and revolvers, is just under $2,000, but only 48% of cards revolve debt. Average statement balances are $2,750, credit limits are just over $9,000, and as a result, utilization is about 36% in both provinces. Spending is somewhat lower in Quebec than Ontario in the matched sample (whereas it's higher in Ontario in the raw data). Finally, delinquency rates in both provinces are very low: approximately 1% overall, and 2% for revolvers.

3.1 Minimum Payment

The "first stage" is how the Quebec policy affects credit card minimum payments. For the policy to have a non-trivial effect on cardholder outcomes, such as debt and delinquency, it needs to have a non-trivial impact on minimum payments. We provide descriptive evidence on the distribution of credit card repayments and then proceed to estimate the causal effects using our DID design.

3.1.1 Lender Minimum Payment Policies

Table 1 summarizes how lenders changed their minimum payment rules for Quebec credit cards but did not change them in Ontario nor in the rest of Canada.

Before the policy, seven out of the eleven lenders had minimum payment rules below 2% of the statement balance, and so were forced to tighten their minimum payment rules for their existing Quebec cards. Two lenders tightened their minimum payment rule to 2.0% of the statement balance, and three lenders did so to 2.5% of the statement balance. These five lenders all previously had a very low minimum payment rule that required consumers to pay only $10 plus interest and fees. Two lenders increased their minimum payment to 3.0% of the statement balance—one from $10 plus interest and fees, and the other from 1% of the statement balance. The remaining four lenders already had minimum payment rules at 2% or higher and so were not mandated to tighten their minimum payment rules in the first policy phase, and indeed did leave their rules unchanged at 2.0% (two lenders), 2.5%, and 3.0% of the statement balance, for this first phase of the policy. We do not have a great explanation for the different lender responses, especially the increases above the minimum

requirement. In interviews with bank lending officers, the typical response was that the fixed costs associated with changing minimum requirements every August were substantial. In Section 3.5, we take advantage of lender heterogeneity to quantify differential impacts on consumers. Finally, all eleven lenders had minimum payment rules below 5% of the statement balance and all of these tightened minimum payment rules on their new cards opened in Quebec from August 2019 to 5%. In Section 4, we focus on these new cards.

3.1.2 Descriptive Evidence

We use our consumer credit reporting data to describe changes to minimum payment requirements. Figure 2 shows the cumulative distribution function (CDF) of credit card minimum payments for credit cards active in July 2019 in Quebec (Panels A and C) and in Ontario (Panels B and D). In each panel, the orange line shows the CDF for cards open in July 2019—the month before the Quebec policy took effect, and the black line shows this for August 2019—the month after the Quebec policy took effect. Panels A and B show the minimum payment in levels of Canadian dollars. Panels C and D show the minimum payment as a percentage of the statement balance (excluding observations when statement balances are zero).

The Quebec policy immediately increases credit card minimum payments in Quebec but not in Ontario. Panel A shows the fraction of Quebec credit cards with a minimum payment of less than or equal to $10 declines from 47% to 23%. The Quebec minimum payment distribution shifts to the right, showing higher minimum payments are increasingly common.

Panel C shows that prior to the minimum payment policy, over 46% of Quebec credit cards had a minimum payment of under 2% of the statement balance. After the minimum payment policy, this declines to under 10% of Quebec credit cards.[13] Cards increasingly have minimum payments at 2%, 2.5%, and 3% of statement balances, or amounts just above these, as would be expected if interest and fees are added.[14]

Between July and August 2019, there is no change in the distribution of minimum payments in Ontario. This result is robust irrespective of whether we measure minimum payments in levels (Panel B), or as a fraction of the statement balance (Panel D). Results are

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[13]There are a couple of reasons why this does not fall to zero cards: (i) regulatory forbearance (about 5% of cards have zero minimum payment requirements on the outstanding balance), and (ii) missing minimum payment requirements in some months for some cards.

[14]The fraction of Quebec cards with minimum payments below 2.05% of the statement balance declines from 47% in July 2019 to 17% in August 2019. The fraction below 2.55% declines from 59% to 46%., the fraction below 3.05% increases from 70% to 74%, the fraction below 3.55% increases from 76% to 78%, and the fraction below 4.05% is effectively unchanged at 79%.

similar for our matched sample, as shown in Appendix Figure B1. This descriptive evidence validates our DID experimental design. The Quebec policy clearly increases minimum payments in Quebec without affecting our control group of Ontario.

3.1.3   Causal Evidence

We use our DID approach to estimate the causal effect of the Quebec policy on minimum payments. Figure 3 shows how the estimated effects change over time (δ_τ from Equation 2) relative to $t = -1$ (July 2019), i.e., before the policy came into effect. Panel A shows results for minimum payments in dollars and Panel B shows results for minimum payments as a percentage of statement balances. In this figure, the black estimates are for the unmatched sample and the orange estimates are for the matched sample: results are effectively identical. This and subsequent figures all show 95% confidence intervals from clustering standard errors at the consumer-level.

We estimate an immediate and persistent increase in minimum payments in Quebec when the policy came into effect. In the month that the policy is introduced, the average increase in minimum payments is $22.68 for the unmatched sample. Six months later, this average increases declines slightly to $19.28. These are increases of 46% and 39% relative to Quebec's July 2019 baseline mean minimum payment of $49. If we sum up the minimum payments over the first seven statement cycles, this is a $151.84 average increase in minimum payments.

The estimated effect of the policy on credit card minimum payments as a percentage of statement balances is an increase of 0.59 percentage points in the month that the policy is introduced, and 0.51 percentage points after six months. These are 11% and 9% increases relative to Quebec's July 2019 baseline mean minimum payment of 5.58% of the statement balance. The slight decline in the level of minimum payments over time may be consistent with cardholders carrying lower statement balances. This decline could arise from holding less revolving debt, spending less, incurring less in financing charges (interest or fees), or a combination of these. We evaluate these potential explanations in the following sections.

3.2   Revolving Debt

As minimum payments under the new policy are a function of the statement balance, the fact that we observe a decrease in minimum payments from when the policy is introduced to six months later indicates cardholders are revolving lower debt.

The estimates presented in Figure 4 Panel A show that the policy reduced revolving debt over time. September 2019 ($t = 1$) is the first month when payments come due against the August 2019 statements with higher minimum payments. We estimate the policy causes a

decrease in revolving debt by $9.48 in September 2019. The effect grows over time. Revolving debt declines by $63.74 in the sixth month after the policy is introduced. Relative to Quebec's July 2019 baseline mean revolving debt of $1,871 these effects represent a decline in revolving debt from 0.5% in September 2019 to 3.4% by February 2020. As shown in the figure, results are similar for the matched sample. However, we remain cautious about these results because there is some evidence of a slight pre-trend: estimating higher trends in revolving debt for Quebec relative to Ontario in the earlier pre-periods. We therefore intend to use new methods to account for this pre-trend (Roth, 2022; Rambachan and Roth, 2023).

When interpreting our effects, it is important to consider how substantial heterogeneity in credit card repayment behaviors limits how large any average treatment effect on revolving debt can feasibly be. We would not expect a one-to-one pass-through from mean minimum payments to mean revolving debt because the consumers who already repay their statement balance in full have a revolving debt of zero and this is bounded at zero irrespective of the minimum payment. This indicates that our estimated average reduction in revolving debt is primarily expected to be driven by the accounts that were revolving debt before the policy. We examine this in Figure 5 Panel A, where, using our matched sample, we split cards by whether they transacted (52%) or revolved (48%) at $t = -12$ to $t = -6$ (July 2019 baseline means for revolvers and transactors are in Table 3 Panel B). The window choice for determining 'type' follows (Keys and Wang, 2019). Being labeled a transactor, therefore, does not mean the statement balance is always paid in full, but paid in full most of the time. The impact of the policy on transactors is small—zero in the first few months, and a drop of $16.99 in month 6. There are two implications of this result. First, even historical transactors sometimes carry debt over time (average is $84.84), and the impact of the policy is to reduce that debt in Quebec relative to Ontario. Second, our aggregate effect is mostly coming from a larger absolute effect on revolvers.

The policy has a large absolute effect on cards that historically revolved debt, and the effect to reduce revolving debt on these cards grows over time. Among these historically revolving cards, the policy started to significantly reduce revolving debt by $33.92 by October 2019. By the sixth month after the policy's introduction, the policy reduces revolving debt by $108.90 This is a 2.8% decline on the July 2019 baseline mean in Quebec of $3,880.95 among these cards.

We can benchmark our estimated reduction in revolving debt relative to a mechanical effect of one-to-one pass-through if revolvers' repayments increased to exactly the higher minimum without changes in spending behavior. Given approximately 50% of Quebec credit card accounts are revolvers, our average effect size of a 3.4% decline in revolving debt makes sense, and has a high pass through, relative to a 3.6% mechanical decline of one-to-one

pass-through.[15]

How do our results compare to the existing literature? Our results contrast with Castellanos et al. (2023), who study one Mexican bank and find that the increase in minimum payment from 5% to 10% caused an immediate increase in debt—due to increasing delinquency leading to late payment fees. Within nine months of the policy, however, the authors document a decline in debt that is imprecisely estimated such that increases in debt cannot be ruled out. Such a difference in results may be expected for a couple of reasons. First, the Mexico experiment involves a far higher minimum payment than we observe in Canada. Second, Mexico is a developing country where fewer than 10% of households use credit cards, where cardholders have much higher delinquency rates than credit card markets in developed countries such as Canada, the US, and the UK. In developed countries, neither Keys and Wang (2019) nor d'Astous and Shore (2017) are designed to, or have the power to, detect effects of increasing minimum payments on reducing debt, though results from both suggest this may be the case.

3.3 Delinquency

The most natural trade-off of higher minimum payments is the cost of forcing constrained cardholders, who cannot afford the higher minimum, into delinquency. Figure 4 Panel B shows our estimates for how the Quebec policy affects the likelihood of being delinquent (30+ days past due).

Both our unmatched and matched DID estimates indicate that the policy significantly increases the likelihood of being delinquent every month from the first month to the sixth month after the policy was introduced. The unmatched sample estimates indicate the effects on delinquency increase over time; however, the matched sample estimates indicate the effects on delinquency stabilize.

However, we advise treating these results with caution as the estimates post-policy are similar to those pre-policy. Delinquency rates trend approximately 0 to 0.2 percentage points higher per month in Quebec than Ontario both pre- and post-policy. Such pre-trends make this result challenging to interpret and we intend to use more robust methods to account for this pre-trend (Roth, 2022; Rambachan and Roth, 2023).

In our matched sample, we estimate that the policy increases the likelihood of being delinquent by 0.105 percentage points six months after its introduction. This represents an increase of 10% relative to the baseline delinquency rate of 1% in Quebec in July 2019. In

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[15]We calculate this by accumulating across the first six months—average minimum payments increase by $132. This translates into a reduction in revolving debt of 7.1% relative to the July 2019 baseline mean. We then halve this, given increasing minimum payments can only reduce revolving debt of revolvers.

our unmatched sample, we estimate the policy increases the likelihood of being delinquent by 0.229 percentage points six months after its introduction. This is an increase of 23% relative to the baseline delinquency rate of 1% in Quebec in July 2019.

Figure 5 Panel B shows that our overall results are driven by the accounts that historically revolve debt. For accounts that historically transact, the policy has no significant effect on delinquency, whereas for accounts that historically revolve debt, the policy appears to increase delinquency with a stable effect over time. However, there are also pre-trends of a similar magnitude which make it difficult to interpret whether delinquency rates are increasing.

Given pre-trends, we cautiously interpret these results as potentially indicating that there is a trade-off of higher minimum payments reducing revolving debt at a cost of increased delinquency. How do these results compare to prior estimates? Castellanos et al. (2023) found that in Mexico, increases to minimum payments had no significant increase in default— defined as failing to meet the minimum payment in three consecutive monthly payments— in the first eight months, but then default rates increase over nine to fourteen months, with a persistent, stable effect for up to 26 months (the end of the experiment). Keys and Wang (2019) estimate increases in delinquency, measured by not paying at least the minimum, of 0.4 percentage points after one month and d'Astous and Shore (2017) find delinquency, measured by write-offs, increases by 0.04 percentage points after 12 months.

3.4   Other Outcomes

In addition to revolving debt and delinquency, we observe other outcomes. In this section, we present results for the most salient. Figure 6 shows our results separately for revolvers and transactors, for the matched sample. Outcomes include an indicator variable for whether a card is active, credit limit, statement balance, utilization, repayment (actual payment), and spending. Spending is measured in Equation 3, calculated as the change in statement balances plus the value of repayments, as used in Ganong and Noel (2020) and Guttman-Kenney and Shahidinejad (2024).

$$s_{i,t} \equiv \begin{cases} b_{i,t} - b_{i,t-1} + p_{i,t} & \text{if } b_{i,t} - b_{i,t-1} + p_{i,t} \geq 0 \\ 0 & \text{otherwise} \end{cases} \tag{5}$$

Appendix Figure B2 shows results, aggregated across revolvers and transactors, separately for unmatched and matched samples. The policy causes no economically meaningful change in the likelihood of cards remaining active and open six months after the policy (Figure 6 Panel A). Consistent with the pattern observed for declining revolving debt over

time, we also observe that the treatment significantly lowers statement balances over time (Figure 6 Panel C). This decline in statement balances also leads to declining credit card utilization from the fourth month after the policy (Figure 6 Panel D). This is despite a decrease in credit limits (Figure 6 Panel B). Spending appears to fall somewhat, although not meaningfully—see Figure 6 Panel E.

The main takeaway, given that spending is relatively constant, is that the increase in minimum payments have led to a decrease in revolving debt. The cost is a slight increase in delinquency rates. Abstracting from balance transfers, the reduction in revolving debt must be driven by repayments being larger than the sum of new spending plus fees/interest. Figure 6 Panel F highlights that repayments actually fall over time. This is likely driven by lower accumulated interest and fees as consumers face higher minimum payment requirements.[16]

3.5 Heterogeneity in Changes to Minimum Payment Formulae

We study the heterogeneous effects of Bill 134 by exploiting variation across lenders. Lenders varied their nationwide minimum payment formulae before the policy, and also varied in the formulae they changed to in Quebec after the policy.

We classify lenders into four groups based on their Quebec minimum payment formula, described in Table 1 Panel A. Group Z (yellow in Figure 7) are lenders whose minimum payment requirement in July 2019 was already at or above the 2% level required by the new policy. Group 2.0% (G2, blue) are lenders whose minimum payment increased to the lowest level required by the policy. Group 2.5% (G2.5, green) and 3.0% (G3, orange) are lenders who increased their minimum payment requirements to 2.5% and 3.0%, respectively. Table 4 shows July 2019 baseline means of outcomes, by these groups. As a reminder, the heterogeneous effects we estimate can be affected by spillovers from changes in minimum payments arising from other cards held by a consumer.

Figure 7 shows results for each of our groups using the matched sample, with comparable results in the Appendix for our unmatched sample (Appendix Figure B3), and additional outcomes for unmatched and matched samples (Appendix Figures B4 and B5). Figure 7 also displays results in black for a fifth group that aggregates all groups except Group Z, which was unaffected by the policy.

Focusing on Group Z, where lenders' minimum payment requirements are unchanged, we find no effect on revolving debt, or other outcomes. This group is interesting because the same Quebec legislation that imposed minimum payment requirements also imposed increased disclosure to Quebec residents. Starting in August 2019, lenders in Quebec had to

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[16]Our analysis is at the account level, and not at the consumer level. It could be that consumers are reallocating their payments and spending across cards. In work-in-progress we are exploring this hypothesis.

display information showing the estimated number of months (years, if applicable) required to pay off the balance owing if only the minimum payment is made each period. Although prior research across the US, UK, and Mexico has consistently found that providing such credit card information is ineffective at changing consumer behavior (Agarwal et al., 2015b; Keys and Wang, 2019; Seira et al., 2017; Adams et al., 2022), we might still be concerned that our estimates are capturing the combination of disclosure and hard paternalism.[17] Our null result for this group informs us that disclosures introduced in Quebec were also ineffective, consistent with the previous literature. As a result, we are confident that any effect we observe for other groups is attributable to minimum payment formula changes, and not disclosure.

Figure 7 Panel A shows effects on minimum payments as a percentage of statement balance are as expected: effects being smallest for G2, and largest for G3, with G2.5 in-between. However, the ordering differs in Figure 7 Panel B, where the effect of the policy on minimum payments in dollars is highest for G2.5—$33 in August 2019 and $29 six months later, whereas for G3 it is $21 in August 2019 and $17 six months later, and for G2, where it is $15 in August 2019 and $13 six months later. This is because the portfolios of G2.5 lenders, compared to G3 lenders have, on average, higher statement balances ($3,253 vs. $2,073) and revolving debt ($2,121 vs. $1,318) in July 2019. This means that G2.5 cardholders experience a larger minimum payment shock from their lenders' responses to the Quebec policy than G3 cardholders.

Figure 7 Panel C shows significant declines in revolving debt across G2, G2.5, and G3. Across all of these three groups, the significant declines in revolving debt grow in magnitude over time. This persistent and growing effect contrasts to recent literature on nudges, which documents examples of consumers taking offsetting actions over time that counteract nudges' initial effects (e.g., Laibson, 2020; Guttman-Kenney et al., 2023; Choukhmane, 2024).

Figure 7 Panel D reveals important variation in how much of a trade-off these reductions in revolving debt have. All of G2, G2.5, and G3 show initial increases in delinquency in the first couple of months following the policy's introduction. G2, which has the lowest absolute

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[17]The Quebec requirements are vague and do not require the disclosure to be on the front page of the statement or in a specific format (e.g., in table or graphical form) to be salient or disclose the costs of borrowing. In the US, disclosures have been required on the front page of credit card statements since 2009 under the US CARD Act. The CARD Act disclosures provide, in a table format: (i) the estimated number of months (and years, if applicable) required to pay off the balance owing if only minimum payments are made, (ii) information on the costs of borrowing, and (iii) a comparison of the cost of borrowing when making only the minimum payment relative to the costs associated with increasing the monthly payments to pay off the debt in three years. DID studies such as those by Agarwal et al. (2015b); Keys and Wang (2019) in the US found these to have little to no effect on consumer behavior. Seira et al. (2017) and Adams et al. (2022) find precise zero effects, even with more forceful nudge designs and graphical presentations, using field experiments in Mexico and the UK respectively.

reduction in revolving debt, has the largest increases in delinquency, with effect sizes growing over time. G3 achieves a similar absolute reduction in revolving debt; however, the initial increase in delinquency is temporary and becomes negative over time. G2.5 achieves the largest absolute reduction in revolving debt but this comes at a cost of a persistent increase in delinquency, although the effect size appears stable over time.

4 Results: New Cards

This section presents our results for the account-level effects of the Quebec minimum payment policy on accounts opened between August 2019 and 2020. For these new cards, all eleven lenders tightened their minimum payment policies in Quebec to 5%—the lowest level allowed. These lenders left their policies unchanged in Ontario, as well as the rest of Canada. Table 1 Panel B shows that there is a sharp tightening in minimum payments in Quebec relative to that required by the same lenders for cards opened just a month earlier, or in Ontario pre- and post-policy.

4.1 Card Openings

Figure 8 Panel A shows the number of new credit card openings per month, while Panel C shows the total credit limit. Since Ontario is larger than Quebec, Panel B normalizes the number of openings to August 2018 and Panel D does the same for limits.

Prior to August 2019, relatively more new credit cards were opened in Quebec than in Ontario. After the policy, relatively fewer new credit cards opened in Quebec than Ontario. A combination of three reasons may explain this. First, lenders likely anticipated that the 5% minimum payment policy on new cards would impact their profitability, and change the customer's "top of wallet card". Offering consumers new credit cards can help to shift spending towards those new card, consistent with mental accounting (Gelman and Roussanov, 2024). As a result, lendersmight have expanded their marketing efforts to bring forward the timing of when customers opened new cards. This appears likely given the timing: there is a short-term decrease in new card openings (in July, August, and September 2019) following earlier short-term increases—most notably in October and November of 2018 and in April and May of 2019. Second, the marginally profitable consumer with a 2-3% repayment requirement might no longer be profitable at 5%. As a result, lenders might have tightened approval criteria and rationed credit. Finally, the result is consistent with reduced demand by consumers for credit cards with higher minimum payments. In the next subsection, we use credit offers to evaluate the supply-side explanations. We plan to quantify the size and

characteristics of a missing mass of new credit cards to better understand this result and potential explanations.

Irrespective of the reason, the 5% requirement on new cards is associated with a reduction in credit access. The total value of credit limits (measured three months after opening) for each card cohort are shown in Figure 8 Panels C (levels) and D (indexed). For cohorts of cards opened before August 2019, the patterns in Quebec and Ontario are similar. For cohorts of cards opened from August 2019 onwards, there is a relative decline in the total value of credit card limits opened in Quebec relative to Ontario. The mean value of credit limits is shown in Figure 8 Panels E (levels) and F (indexed). These two series closely track one another until October 2019. Among cards opened, the mean credit limits of cards opened in October or November 2019 in Quebec is relatively lower than in Ontario.

In the Appendix we also show that credit limits are decreasing. Using the FD estimator, limits decrease by $632 five months post-policy, and $603 six months post-policy. The results from the DID are much smaller, -$51 and $9 for months five and six, respectively.

4.1.1 Credit Supply

The previous section points to an increase in credit card openings in Quebec just before the policy came into effect, and a decrease just after Bill 134 came into effect. Here we take advantage of credit card offers, collected by Mintel for a panel of Canadian households, to investigate the supply of cards in the market.

Figure 9 and Appendix Figure B6 plot the defining features of card offers between 2018 and 2020 for Quebec and Ontario. The pattern for number of offers is largely similar in both provinces, with an increase in offers in the spring of 2019 and a decrease in the summer of 2019. In the fall and winter of 2019 there are relatively fewer mailings in Quebec than in Ontario.

The largest difference between the two provinces is in the type of offers just before August 2019. Focusing on Panel B, in Ontario the majority of offers are to attract new consumers, and this is consistent over the sample period. Meanwhile, in Quebec, the offers in the summer of 2019 are for retention. In our sample, retentions are largely offers to upgrade an existing card for a loyal customer.

Just prior to the policy coming in effect, lenders in Quebec offer lower interest rates (Panel C), lower annual fees (Panel D), and higher credit limits (Panel E). Post-August 2019, we see a return to normal. These patterns are consistent with lenders trying to stay, or become top of wallet for their existing consumers, by ensuring their cards have a minimum payment requirement lower than the 5% required for cards activated post-August 2019. As a result, we think that most, if not all, of the increase in cards reported in TransUnion comes from a

targeted increase in supply before the policy.

4.2   Minimum Payments

Cohorts of cards opened in Quebec from August 2019 onwards had substantially higher minimum payments than cohorts of cards opened before August 2019 in Quebec, or those opened before or after in Ontario. Figure 10 Panel A displays the unconditional mean of minimum payments for each cohort of newly opened credit cards in months since origination. Each line shows a cohort of cards opened in a province in a month. Quebec card cohorts are in black, and Ontario card cohorts in orange. Lines are solid with circled points if cohorts are card cohorts opened after August 2019, and dashed lines without circled points are card cohorts opened before August 2019. This figure shows these results for cohorts of cards opened in August to October of 2018 and 2019, while Appendix Figure B7 shows all cohorts from July 2018 to November 2019.

   We use our two regression approaches (FD and DID) to formalize this descriptive evidence. Figure 11 Panel A shows our mean estimates of δ_v^{FD} and δ_v^{DID} for each vintage month. Both methodologies show minimum payments persistently increase over time and, six months after card opening are approximately $34 relative to Ontario cards by our FD method, and $17 relative to the difference between Quebec and Ontario cards by our DID method.

4.3   Revolving Debt

Figure 10 Panel C shows that the unconditional average revolving debt five to six months after card opening is lower in Quebec for cohorts after August 2019 than those cohorts before. This is also true, however, for Ontario cohorts.

   Post-policy implementation, revolving debt is also lower for cohorts of cards opened in Quebec after the policy than for cards opened in Ontario. Figure 11 Panel C shows our FD estimate of the policy impact on Quebec cohorts revolving debt six months after card openings is -$110.

   Five and six months after card openings, our DID estimate on the change in revolving debt is slightly higher, $14 to $15, in the Quebec cohorts relative to the Ontario cohorts. Results for statement balances in the Appendix (Figure B8) show a similar pattern of balances declining in FD estimates (-$142 and -$119 after five and six months, respectively) and increasing slightly in DID estimates (-$2 and +$10 after five and six months, respectively).

   When interpreting these results, it is important to highlight that these DID estimates reflect both how the policy affects the composition of cardholders (e.g., changing lenders'

criteria for approving applications and setting credit limits), and changes in how cards are used (e.g., changing consumer repayment and spending behavior). We plan to run regressions with controls pre-card opening (e.g., age and credit score) to control for the composition of cardholders, which then enables us to isolate the effects of minimum payments on consumer behaviors.

4.4 Delinquency

Unconditional means (Figure 10 Panel D) show delinquency rates are higher, on average, in Quebec for cohorts after August 2019 than those cohorts before; however, this is also the case for Ontario cohorts. We measure delinquency by whether a card is delinquent at any month to or before that date.

Estimates on how delinquency rates change following the Quebec policy are similar by both FD and DID estimation approaches (Figure 11 Panel D). After six months, delinquencies are 0.4 (FD) to 0.5 (DID) percentage points higher for cohorts of cards opened in Quebec after the policy compared to the control cohorts.

5 Conclusions

This paper provides an analysis of the initial impact of a paternalistic government policy which restricts consumers' payment choice by tightening credit card minimum payments in Quebec but not in the rest of Canada. We use a DID approach to estimate the causal effects of this policy, at the account level. We find the policy was effective at reducing revolving debt but this comes at a cost of reducing credit access, and potentially increasing delinquency for credit card revolvers. As Campbell (2016) writes, "Consumer financial regulation must confront the trade-off between the benefits of intervention to behavioral agents, and the costs to rational agents." Our evidence helps to inform such evaluations.

We plan to extend our analysis to examine the consumer-level effects of this policy over a longer time horizon. Doing so will allow us to estimate the trade-offs for how different levels of minimum payments impact revolving debt, delinquency, and credit access. This enables us to better evaluate a paternalistic policy to reduce credit card debt to inform consumer financial protection regulators about whether to make policy constraining lenders' minimum payment policies. We intend to incorporate this analysis into a future draft and update our conclusions accordingly.

Figure 1: Quebec credit card minimum payment policy

Minimum Payment

Every month, you have to reimburse the amount that appears on your credit card statement, or a part of that amount.

If you only reimburse part of the balance, you have to pay the "minimum payment" or "minimum instalment." The way to determine this amount is indicated in the contract, generally expressed as a percentage of the balance owing.

Amount of the minimum payment

The *Consumer Protection Act* provides for the minimum payment percentage you can be charged.

Contract entered into on or after August 1, 2019

If you entered into a credit card contract on or after August 1, 2019, the minimum payment to be made every month must correspond to **at least 5%** of the balance owing indicated on your account statement.

Contract entered into before August 1, 2019

If you already had a credit card before August 1, 2019 and the minimum payment percentage was set at less than 2%, **for the period from August 1, 2019 to July 31, 2020**, the minimum payment to be made every month must correspond to **2%** of the balance owing indicated on your account statement.

What if the issuer of your credit card claims more than 2%?

- They may do so if the contract already provided for that possibility.
- They may not do so if they amended the contract so as to charge more than 2% without your consent.

Over the coming years, the minimum payment percentage will increase. Credit card issuers will have to charge a minimum payment that corresponds to at least the following percentage of the balance owing:

- 2.5%, as of August 1, 2020;
- 3%, as of August 1, 2021;
- 3.5%, as of August 1, 2022;
- 4%, as of August 1, 2023;
- 4.5%, as of August 1, 2024;
- 5%, as of August 1, 2025.

If the credit card issuer charges you a percentage that is higher than what is provided for in the contract or by the Act, contact the Office de la protection du consommateur.

Notes: Data source is Québec Office de la Protection du Consommateur.

Figure 2: Distribution of credit card minimum payments for existing cards in Quebec and Ontario in July 2019 (orange line) before the Quebec policy's introduction and August 2019 (black line) when the Quebec policy becomes effective
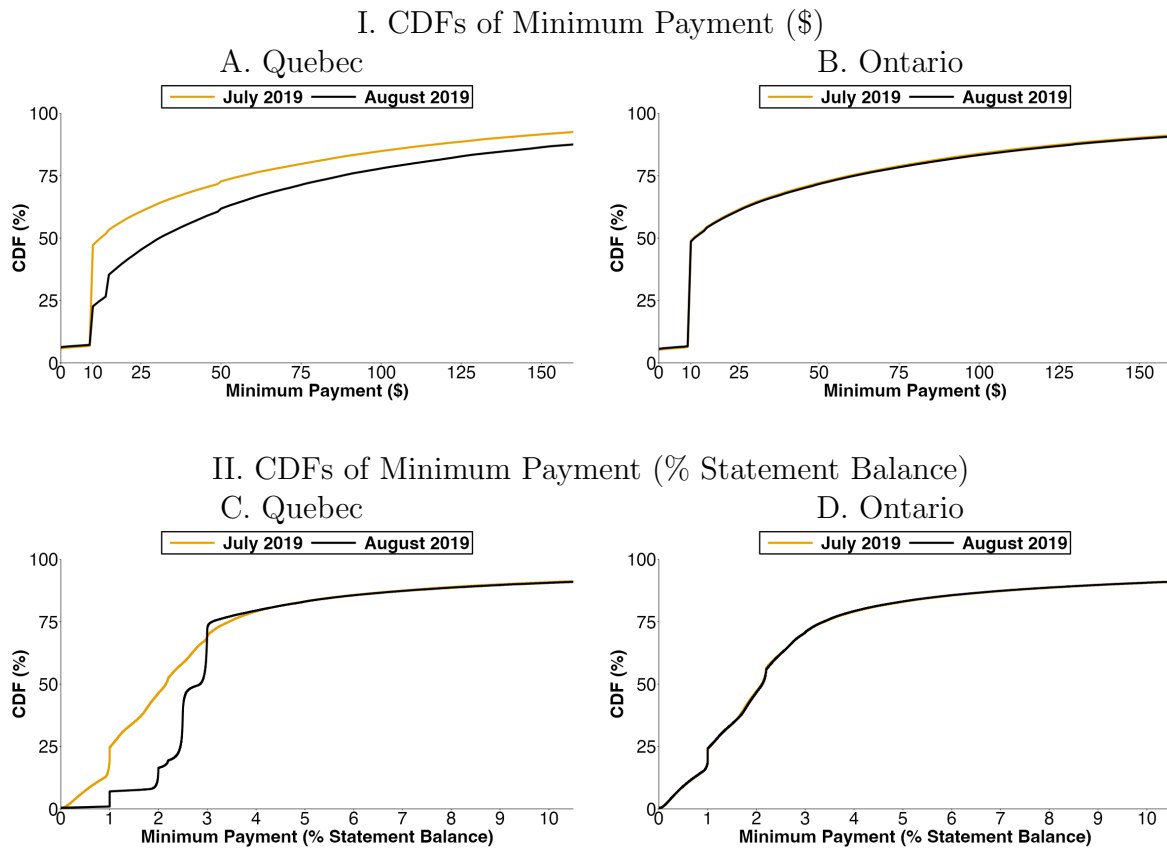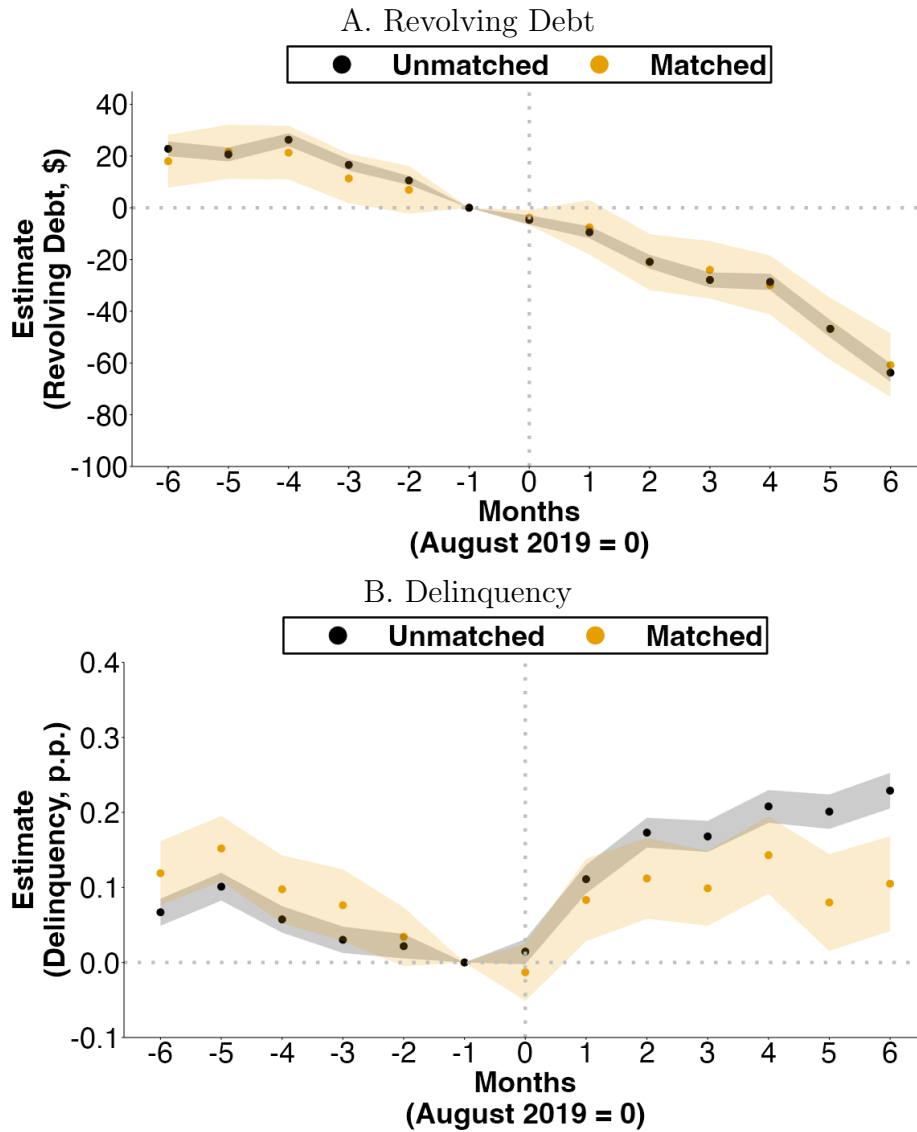

Notes: Data source is TransUnion. Includes all active cards open in Ontario or Quebec as of July 2019 and excludes observations with zero statement balances. In all panels, x-axes of CDFs are right-censored to ease presentation. The minimum payment amount is a combination of interest, fees, and capital repayment.

Figure 3: Difference-in-differences estimates for effects of policy on credit card minimum payments

A. Minimum Payment ($)

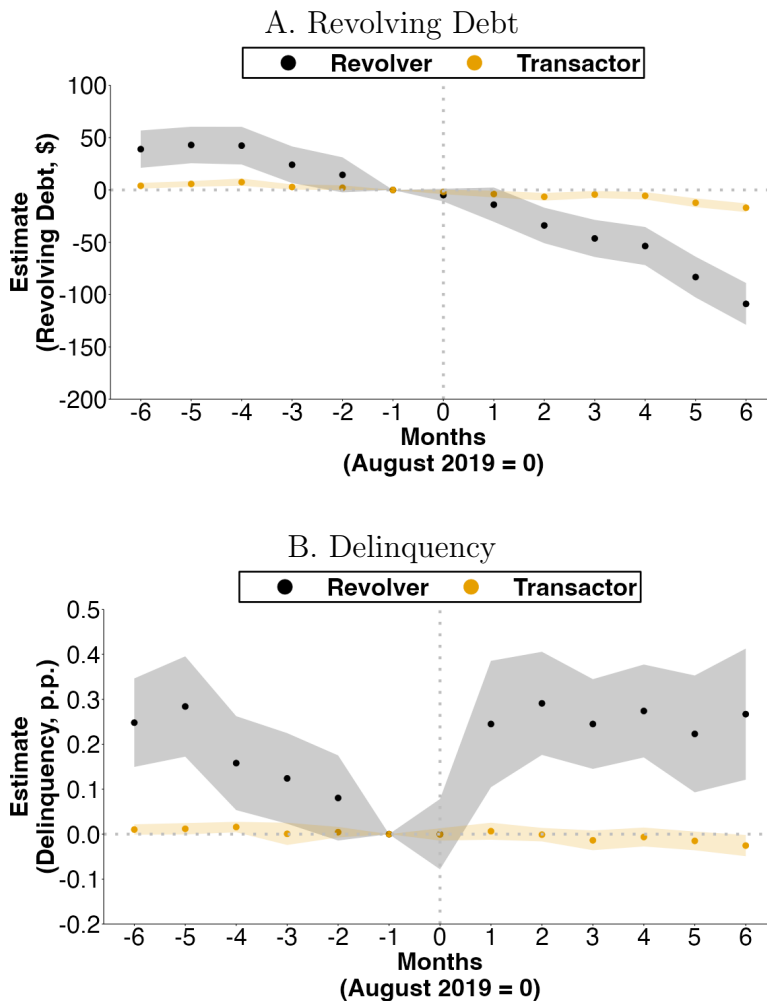B. Minimum Payment (% Statement Balance)
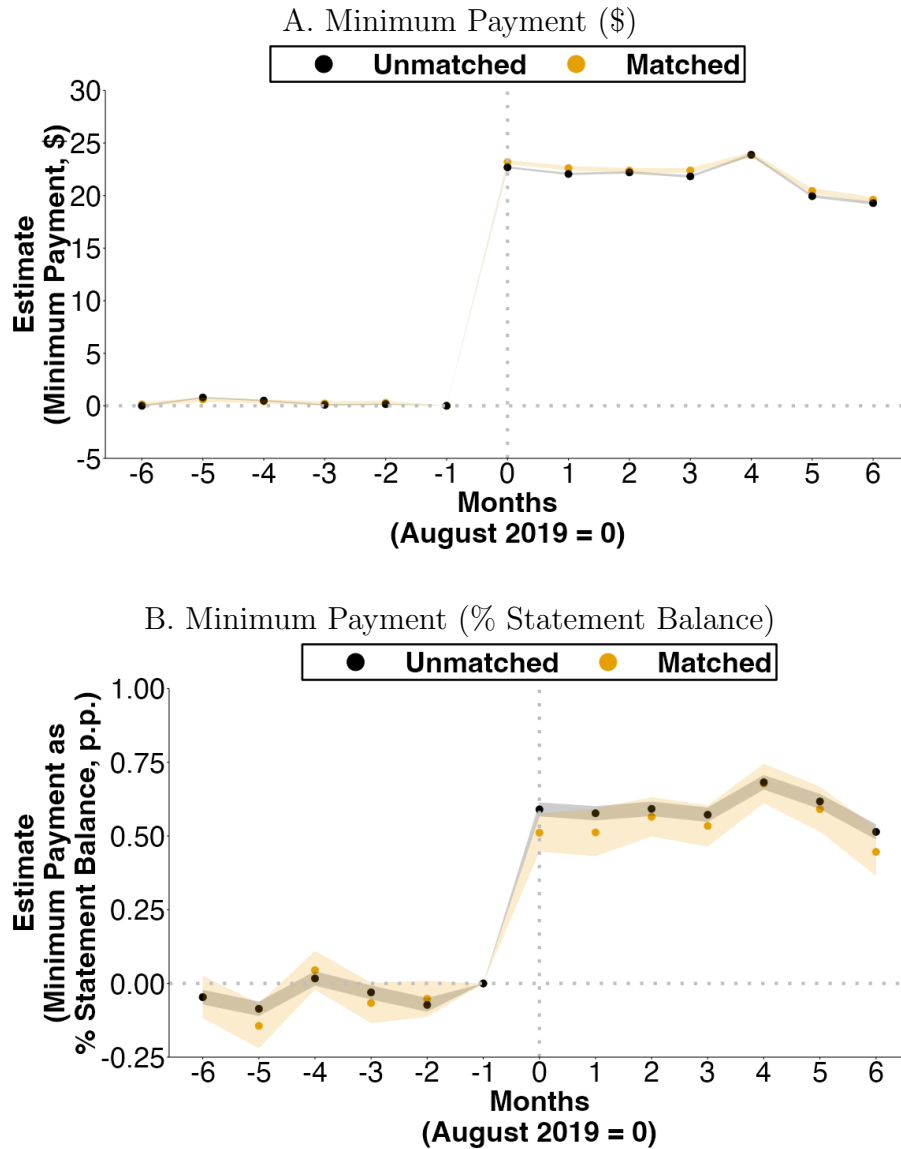
Notes: Data source is TransUnion. Estimates for the credit card account-level effect of the first phase of the Quebec policy requiring credit card minimum payments for existing cards to be at least 2% of statement balance. The outcome in Panel A is credit card minimum payment in $; the outcome in Panel B is minimum payment as a percentage of statement balance. We plot the δ_τ estimates from our dynamic DID specification—Equation 2. These are the coefficients on the interaction between an indicator for Quebec and calendar year-month fixed effects. The regression includes card and calendar year-month fixed effects. Time periods are months relative to August 2019 (t = 0) when the Quebec policy becomes effective. Data include all active card accounts open in Ontario or Quebec as of July 2019. Standard errors are clustered at the consumer level with error bars showing 95% confidence intervals. Black denotes estimates from unmatched data; orange are for our matched sample.

Figure 4: Difference-in-differences estimates for effects of policy on credit card (A.) revolving debt, and (B.) delinquency
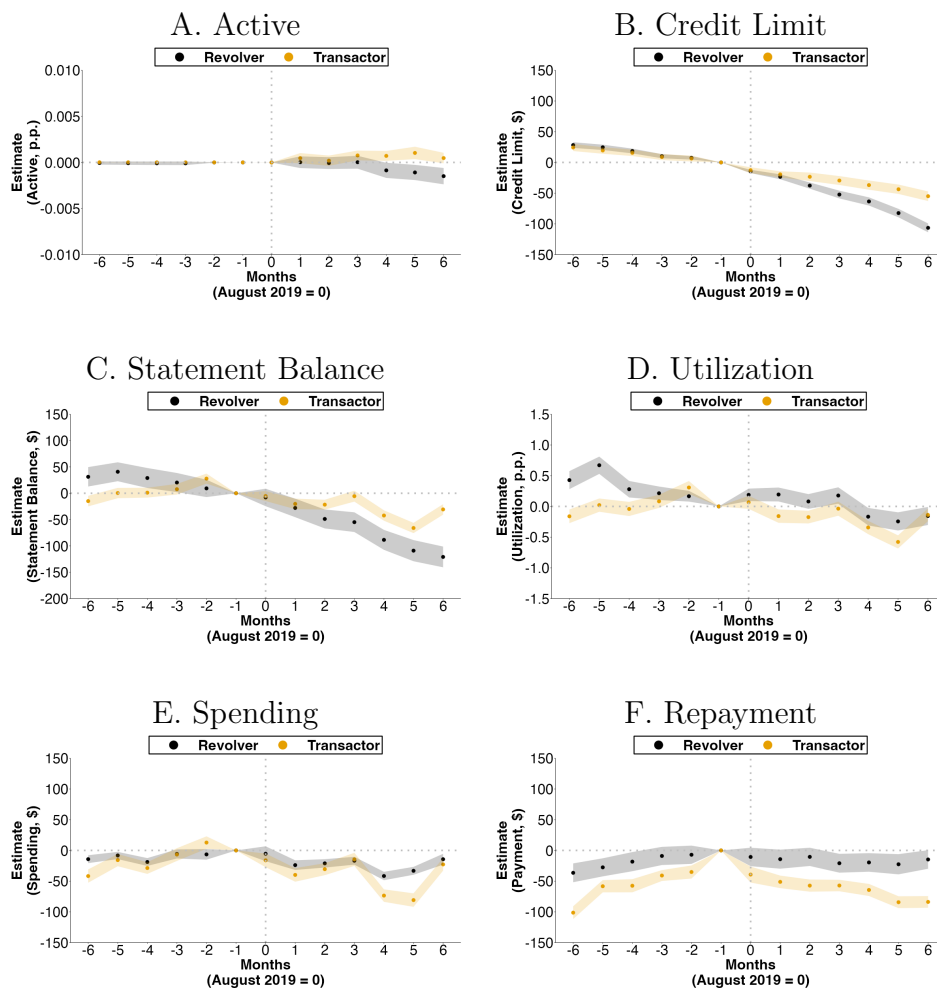

Notes: Data source is TransUnion. Estimates for the credit card account-level effect of the first phase of the Quebec policy requiring credit card minimum payments for existing cards to be at least 2% of statement balance. The outcome in Panel A is credit card revolving debt; the outcome in Panel B is credit card delinquency (30+ days past due). We plot the δ_τ estimates from our dynamic DID specification—Equation 2. These are the coefficients on the interaction between an indicator for Quebec and calendar year-month fixed effects. The regression includes card and calendar year-month fixed effects. Time periods are months relative to August 2019 ($t = 0$) when the Quebec policy becomes effective. Data include all active card accounts open in Ontario or Quebec as of July 2019. Standard errors are clustered at the consumer level with error bars showing 95% confidence intervals. Black denotes estimates from unmatched data; orange are for our matched sample.

Figure 5: Heterogeneous matched difference-in-differences estimates for effects of policy, for transactors and revolvers, on credit card (A.) revolving debt, and (B.) delinquency
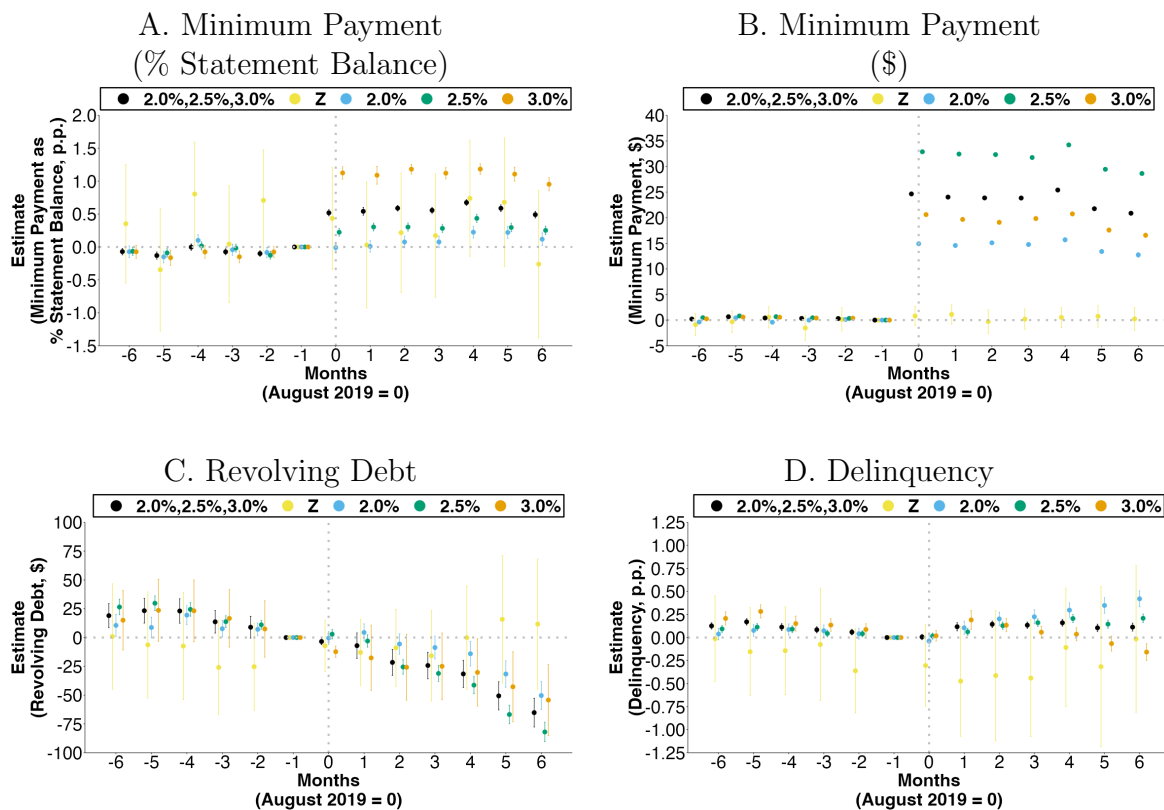
A. Revolving Debt

B. Delinquency

Notes: Data source is TransUnion. Estimates for the credit card account-level effect of the first phase of the Quebec policy requiring credit card minimum payments for existing cards to be at least 2% of statement balance. Black denotes cards revolving at $t = -12$ to $t = -6$; orange denotes cards transacting at $t = -12$ to $t = -6$. The outcome in Panel A is credit card revolving debt; the outcome in Panel B is credit card delinquency (30+ days past due). We plot the δ_τ estimates from our dynamic DID specification—Equation 2. These are the coefficients on the interaction between an indicator for Quebec and calendar year-month fixed effects. The regression includes card and calendar year-month fixed effects. Time periods are months relative to August 2019 ($t = 0$) when the Quebec policy becomes effective. Data include all active credit card accounts open in Ontario or Quebec as of July 2019. Standard errors are clustered at the consumer level with error bars showing 95% confidence intervals. Results are for sample of Quebec credit cards with a matched control group of Ontario credit cards.

Figure 6: Heterogeneous matched difference-in-differences estimates for effects of policy, for transactors and revolvers, on credit card (A.) activity, (B.) credit limit, (C.) statement balance, (D.) utilization, (E.) spending, (F.) repayment
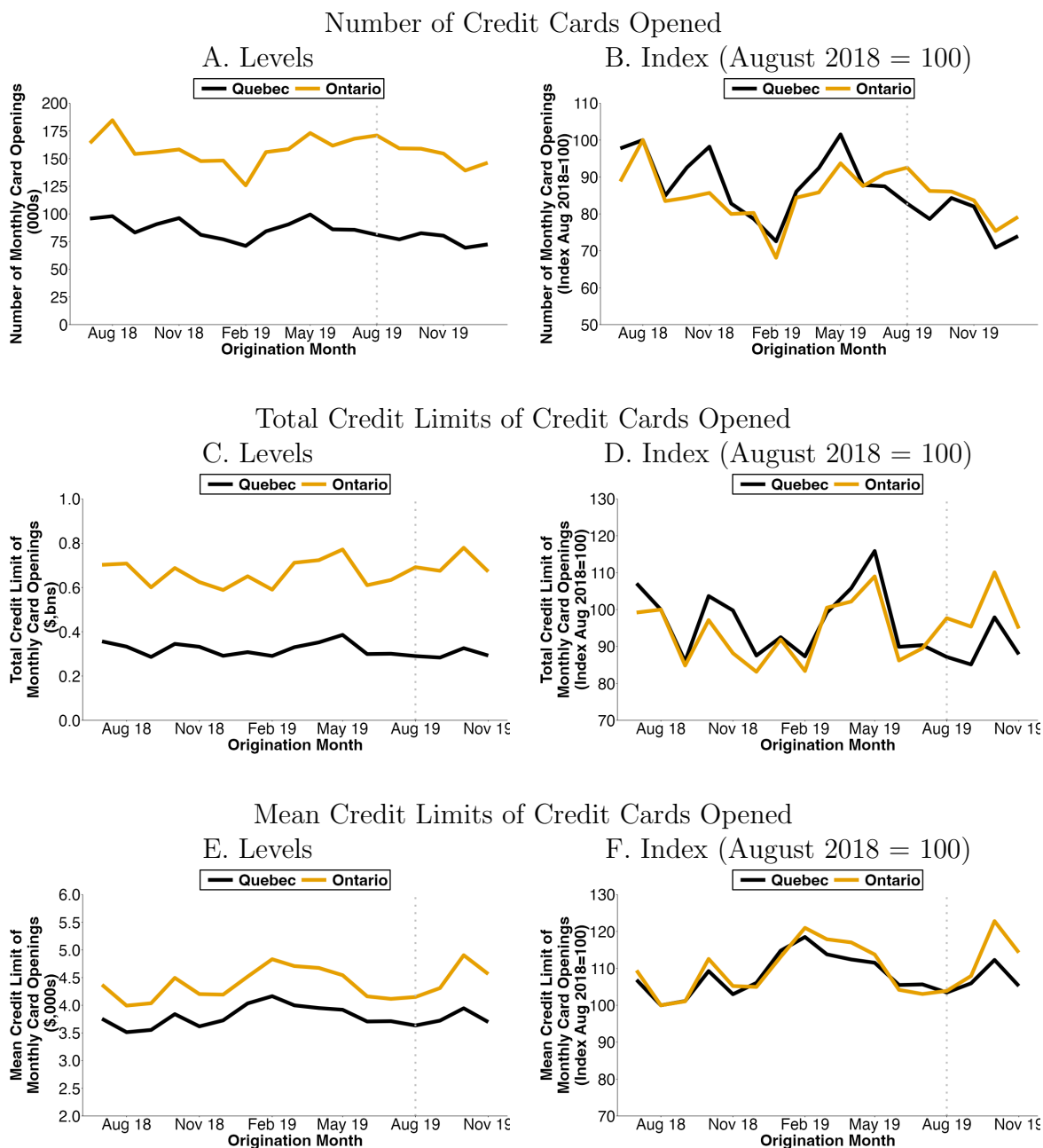

Notes: Data source is TransUnion. This estimates the credit card account-level effect of the first phase of Quebec policy requiring credit card minimum payments for existing cards are at least 2% of statement balance. Black denotes cards revolving (i.e., repaying less than the statement balance) at $t = -12$ to $t = -6$; orange denotes cards transacting (i.e., fully repaying the statement balance) at $t = -12$ to $t = -6$. The outcome in Panel A is an indicator equal to 1 if a card is active and 0, otherwise; the outcome in Panel B is credit limit; Panel C plots statement balance; Panel D plots utilization (statement balance divided by credit limit); Panel E plots the amount of new spending; Panel F plots repayments in dollars. We plot the δ_τ estimates from our dynamic DID specification—Equation 2. These are the coefficients on the interaction between an indicator for Quebec and calendar year-month fixed effects. The regression includes card and calendar year-month fixed effects. Time periods are months relative to August 2019 ($t = 0$) when the Quebec policy becomes effective. Data include all active credit card accounts open in Ontario or Quebec as of July 2019. Standard errors are clustered at the consumer level with error bars showing 95% confidence intervals. Results are for sample of Quebec credit cards with a matched control group of Ontario credit cards.

Figure 7: Heterogeneous matched difference-in-differences estimates for effects of policy, by credit card lender minimum payment group, on credit card (A.) minimum payments (% statement balance), (B.) minimum payments ($), (C.) revolving debt, (D.) delinquency


Notes: Data source is TransUnion. We plot estimates of the credit card account-level effect of the first phase of Quebec policy requiring credit card minimum payments for existing cards are at least 2% of statement balance. The colors are for different groups of credit card lenders based on how much they changed their minimum payment formulae as specified in Table 1. Black combines groups 2.0%, 2.5%, and 3.0%: all lenders that increased their minimum payment formulae. Yellow shows group Z, who made no changes to their minimum payment formulae. Blue, green, and orange respectively denote lenders moving their minimum payment formulae 2.0%, 2.5%, and 3.0%. The outcomes are as follows: Panel A plots minimum payment as a percent of the statement balance; Panel B plots the minimum payment amount in dollars; Panel C plots revolving debt; Panel D plots delinquency rates (30 or more days past due). We plot the δ_τ estimates from our dynamic DID specification—Equation 2. These are the coefficients on the interaction between an indicator for Quebec and calendar year-month fixed effects. The regression includes card and calendar year-month fixed effects. Time periods are months relative to August 2019 ($t = 0$) when the Quebec policy becomes effective. Data include all active credit card accounts open in Ontario or Quebec as of July 2019. Standard errors are clustered at the consumer level with error bars showing 95% confidence intervals. Results are for sample of Quebec credit cards with a matched control group of Ontario credit cards.

Figure 8: New credit card openings, by month of opening

Number of Credit Cards Opened

A. Levels

B. Index (August 2018 = 100)

Total Credit Limits of Credit Cards Opened

C. Levels

D. Index (August 2018 = 100)

Mean Credit Limits of Credit Cards Opened

E. Levels

F. Index (August 2018 = 100)

Notes: Data source is TransUnion. This figure summarizes the number of new credit cards opened separately in Quebec and Ontario, each month from July 2018 to November 2018 (and December 2018 for Panels A and B). Panels C to F use credit limits as recorded three months after origination. Panel A shows the number of originations in $ thousands, B in $ billions, and E in $ thousands. Panels B, D, and E normalizes each province's series to 100 for their levels in August 2018.

Figure 9: Monthly mailed credit card offers
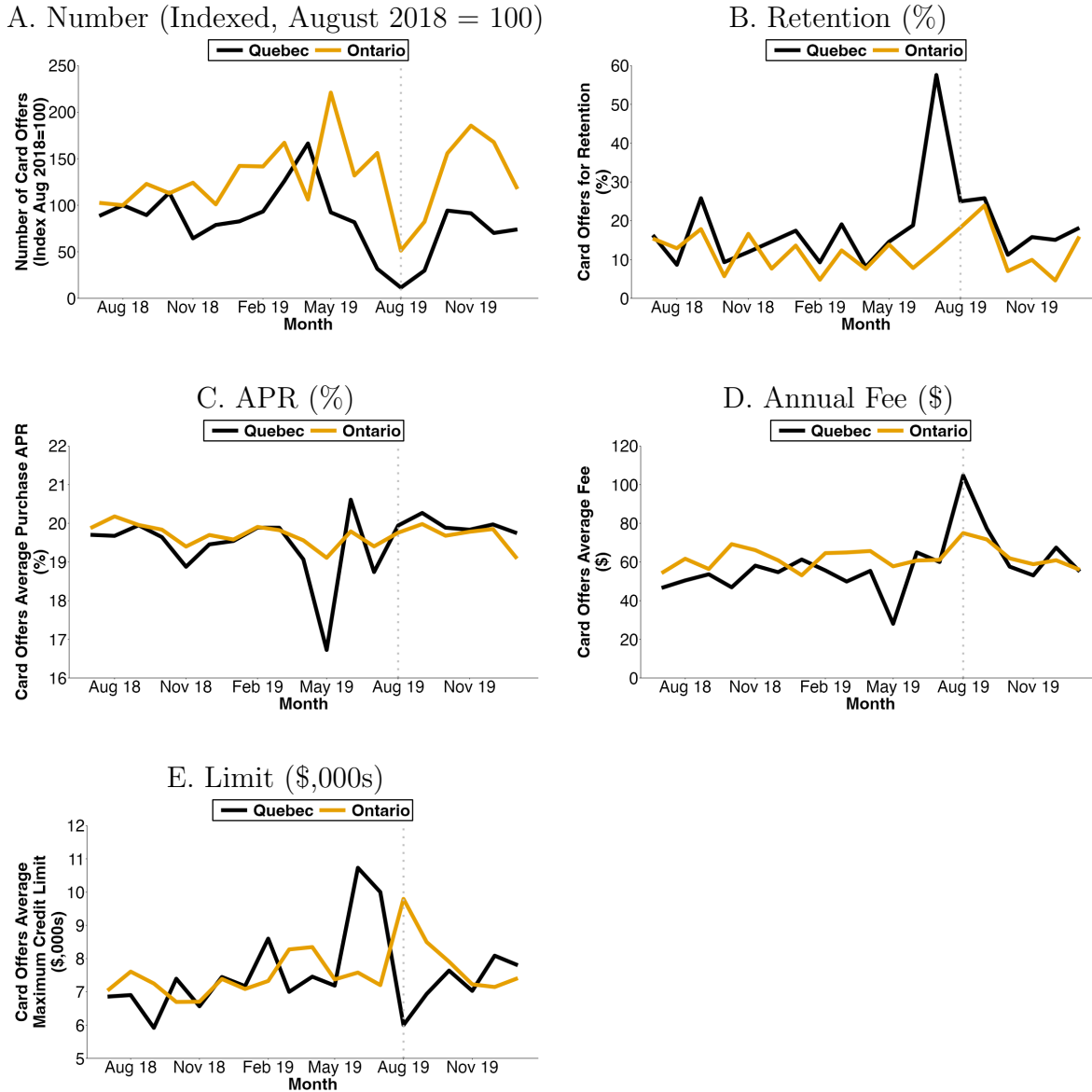
A. Number (Indexed, August 2018 = 100)

B. Retention (%)

C. APR (%)

D. Annual Fee ($)

E. Limit ($,000s)

Notes: Data source is Mintel Comperemedia. This figure summarizes the number and characteristics of credit cards offers sent via mail in Quebec and Ontario, each month from July 2018 to January 2020. Panel A normalizes each province's series to 100 for the number of card offers mailed to consumers in the Mintel panel in August 2018. For consumers receiving offers: (i) Panel B shows the percentage of offers meant to retain an existing cardholder (e.g., to upgrade or renew an existing card); (ii) Panel C shows the average interest rate (APR) on new purchases listed on offers; (iii) Panel D shows the average annual fee listed on offers; (iv) Panel E shows the average maximum credit limit listed on offers.

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A. Minimum Payment

B. Credit Limit

C. Revolving Debt

D. Delinquency
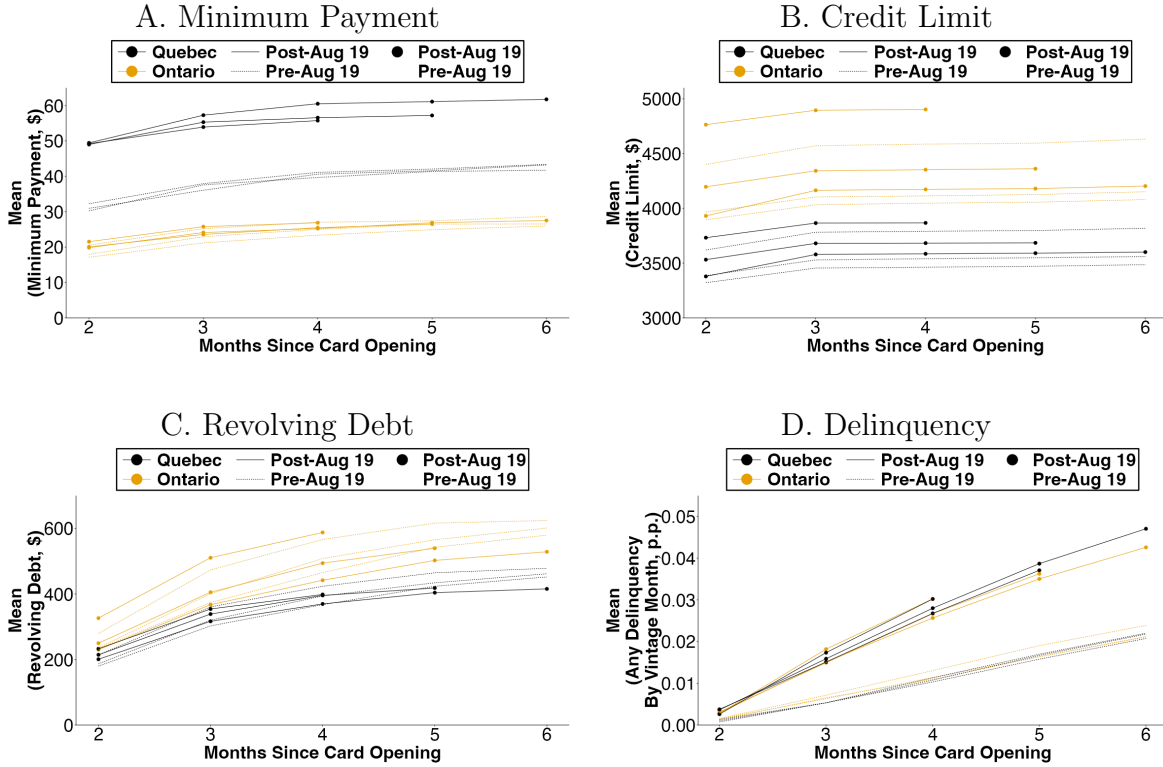
Notes: Data source is TransUnion. This figure shows unconditional means for cohorts of new cards opened in Quebec or Ontario during August, September, and October of 2018 and 2019. The x-axes show months since card opening. Black solid lines denote card cohorts opened in Quebec in 2019, after the policy. Black dashed lines denote card cohorts opened in Quebec in 2018, before the policy. Yellow solid and dashed lines denote card cohorts opened in Ontario in 2019 and 2018, respectively. Panels A, B, C, and D, respectively, show unconditional means of minimum payments, credit limits, revolving debt, and delinquency, for each card cohort by number of months since card opening.

Figure 11: New cards—regression estimates
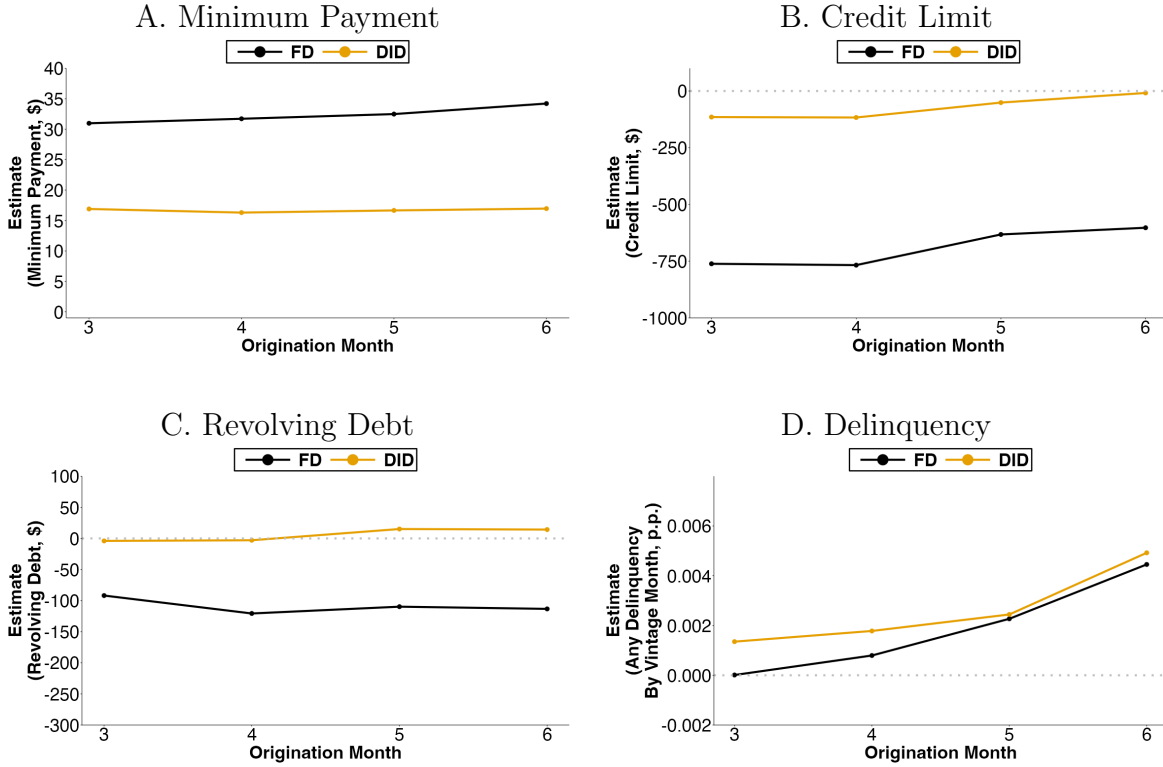
Notes: Data source is TransUnion. The x-axes show months since origination. The y-axes show regression estimates. The black lines show regression estimates of δ_v^{FD} from Equation 3. These are the coefficients on the interaction between indicators for months since card opening and an indicator for card cohorts opened in Quebec. FD estimates use data from cohorts of new cards opened in Quebec or Ontario during August, September, and October of 2019. The FD regression includes controls for months since card opening, cohort year-month, and calendar year-month. The orange lines show regression estimates of δ_v^{DID} from Equation 4. These are the coefficients on the interaction between indicators for months since card opening and indicators for card cohorts opened from August 2019 onward and in Quebec. DID estimates use data from cohorts of new cards opened in Quebec or Ontario during August, September, and October of 2018 and 2019. The FD regression also includes controls for months since card opening, province of card opening, cohort year-month, and calendar year-month, as well as allowing card cohorts opened from August 2019 to vary differentially in months since origination relative to cohorts opened before August 2019, and also allowing card cohorts opened in Quebec to vary differentially in months since origination relative to cohorts opened in Ontario.

Table 1: Lender minimum payment formulae in Quebec and Ontario

A. Existing Cards

Group	Lender	July 2019 Ontario Quebec	August 2019 Ontario	Quebec
2.0%	A	$10 + interest + fees		max {2.0% statement balance, $10}
	B	$10 + interest + fees		max {2.0% statement balance, $10}
2.5%	C	$10 + interest + fees		max {2.5% statement balance, $10}
	D	$10 + interest + fees		max {2.5% statement balance, $10}
	E	$10 + interest + fees		max {2.5% statement balance, $10}
3.0%	F	$10 + interest + fees		max {3.0% statement balance, $10}
	G	max {1.0% statement balance, $10}		max {3.0% statement balance, $10}
Z	H	max {2.0% statement balance, $10}		max {2.0% statement balance, $10}
	I	max {2.0% statement balance, $10}		max {2.0% statement balance, $10}
	J	max {2.5% statement balance, $10}		max {2.5% statement balance, $10}
	K	max {3.0% statement balance, $10}		max {3.0% statement balance, $10}

B. New Cards

Group	Lender	July 2019 Ontario Quebec	August 2019 Ontario	Quebec
2.0%	A	$10 + interest + fees		max {5.0% statement balance, $10}
	B	$10 + interest + fees		
2.5%	C	$10 + interest + fees		
	D	$10 + interest + fees		max {5.0% statement balance, $10}
	E	$10 + interest + fees		
3.0%	F	$10 + interest + fees		max {5.0% statement balance, $10}
	G	max {1.0% statement balance, $10}		
Z	H	max {2.0% statement balance, $10}		
	I	max {2.0% statement balance, $10}		max {5.0% statement balance, $10}
	J	max {2.5% statement balance, $10}		
	K	max {3.0% statement balance, $10}		

Notes: Panel A shows lenders' minimum payment formulae in July and August 2019, for existing cards opened before August 2019. Panel B shows lenders' minimum payment formulae for new cards opened in July and August 2019. Minimum payment formulae are the same in non-Quebec Canadian provinces as in the Province of Ontario.

Table 2: Summary statistics for existing cards before (t=-6 to t=-1) and after (t=1 to t=6) the Quebec Policy, for (A.) Unmatched and (B.) Matched Samples

A. Means for Unmatched Sample

Outcome	Quebec		Ontario	
	Before	After	Before	After
Minimum Payment ($)	48.59	72.30	51.70	54.16
Minimum Payment (%)	5.57	6.12	5.72	5.64
Revolving Debt ($)	1,853	1,878	1,999	2,074
Delinquency (%)	0.91	1.62	0.92	1.49
Active (%)	100	98.64	100	98.53
Credit Limit ($)	8,875	9,106	10,393	10,727
Statement Balance ($)	2,715	2,740	3,017	3,112
Utilization (%)	36.50	35.77	35.12	34.74
Spending ($)	1,061	1,079	1,318	1,357
Repayment ($)	1,030	1,080	1,287	1,358

B. Means for Matched Sample

Outcome	Quebec		Ontario	
	Before	After	Before	After
Minimum Payment ($)	49.10	73.04	49.37	51.73
Minimum Payment (%)	5.45	5.98	5.69	5.61
Revolving Debt ($)	1,875	1,900	1,861	1,931
Delinquency (%)	0.92	1.65	0.97	1.66
Active (%)	100	98.64	100	98.63
Credit Limit ($)	8,953	9,183	8,946	9,240
Statement Balance ($)	2,746	2,771	2,738	2,825
Utilization (%)	36.82	36.07	36.65	36.17
Spending ($)	1,072	1,079	1,118	1,149
Repayment ($)	1,040	1,090	1,088	1,147

Notes: Table shows means for existing cards: unmatched sample in Panel A and for matched sample in Panel B. 'Before' columns show the means for months $t = -6$ to $t = -1$. 'After' columns show the means for months $t = 1$ to $t = 6$. Where $t = 0$ is August 2019 when the Quebec policy becomes effective.

Table 3: Baseline means for existing cards in July 2019 before the Quebec Policy for (A.) unmatched and matched samples, and (B.) revolvers and transactors for matched sample

A. Unmatched and Matched Samples

	Unmatched		Matched	
Outcome	Quebec	Ontario	Quebec	Ontario
Minimum Payment ($)	49.06	52.42	49.56	50.13
Minimum Payment (%)	5.58	5.69	5.47	5.66
Revolving Debt ($)	1,871	2,033	1,893	1,892
Delinquency (%)	1.00	1.06	1.01	1.14
Active (%)	100	100	100	100
Credit Limit ($)	8,965	10,519	9,042	9,051
Statement Balance ($)	2,774	3,092	2,805	2,807.66
Utilization (%)	36.63	35.34	36.96	36.91
Spending ($)	1,121	1,373	1,131	1,168
Repayment ($)	1,134	1,367	1,146	1,160
N (millions)	2.68	7.91	2.65	2.65

B. Matched Sample: Revolvers and Transactors

	Revolver		Transactor	
Outcome	Quebec	Ontario	Quebec	Ontario
Minimum Payment ($)	86.94	88.02	15.56	16.10
Minimum Payment (%)	4.25	4.36	6.57	6.74
Revolving Debt ($)	3,880.95	3,884.46	84.84	96.09
Delinquency (%)	2.04	2.31	0.08	0.10
Active (%)	100	100	100	100
Credit Limit ($)	8,046.13	8,055.18	9,937.22	9,937.95
Statement Balance ($)	4,472.21	4,497.69	1,287.48	1,282.07
Utilization (%)	60.85	61.08	15.27	15.30
Spending ($)	668.49	698.77	1,550.80	1,586.71
Repayment ($)	655.81	671.40	1,589.99	1,598.66
N (millions)	1.26	1.26	1.39	1.39

Notes: Panel A shows baseline means for existing cards, unmatched and matched samples. Panel P shows baseline means for existing cards in matched sample, split by subsamples of revolvers (i.e., repaying less than the statement balance) at $t = -12$ to $t = -6$ and transactors (i.e., fully repaying the statement balance) at $t = -12$ to $t = -6$. Means in both panels are calculated as of $t = -1$, July 2019, the month before the Quebec policy becomes effective.

Table 4: Baseline means for existing cards in July 2019 before the Quebec Policy, by credit card lender minimum payment group

Outcome	A. Quebec 2.0%,2.5%,3.0%	Z	2.0%	2.5%	3.0%
Minimum Payment ($)	49.31	53.47	63.39	47.91	43.49
Minimum Payment (%)	5.42	6.16	6.38	5.51	4.82
Revolving Debt ($)	1,935	1,260	2,717	2,121	1,318
Delinquency (%)	1.01	1.14	0.99	0.90	1.13
Active (%)	100	100	100	100	100
Credit Limit ($)	9,220	6,321	8,976	11,343	6,997
Statement Balance ($)	2,854	2,065	3,502	3,253	2,073
Utilization (%)	36.77	39.83	42.47	34.28	36.54
Spending ($)	1,143	950	893	1,490	890
Repayment ($)	1,158	955	910	1,510	899
N (millions)	2.50	0.16	0.49	1.05	0.95

Outcome	B. Ontario 2.0%,2.5%,3.0%	Z	2.0%	2.5%	3.0%
Minimum Payment ($)	49.88	54.17	62.36	49.07	44.23
Minimum Payment (%)	5.60	6.75	6.48	5.67	5.05
Revolving Debt ($)	1,935	1,214	2,648	2,133	1,340
Delinquency (%)	1.17	0.71	1.09	1.00	1.40
Active (%)	100	100	100	100	100
Credit Limit ($)	9,218	6,399	8,995	11,299	7,015
Statement Balance ($)	2,855	2,057	3,444	3,260	2,094
Utilization (%)	36.79	38.87	41.97	34.49	36.63
Spending ($)	1,178	1,008	927	1,533	913
Repayment ($)	1,171	975	927	1,528	902
N (millions)	2.50	0.16	0.49	1.05	0.95

Notes: Table shows baseline means for matched sample of existing cards, for subsamples of credit card lender minimum payment group. Panel A shows Quebec cards and Panel B shows Ontario cards. In both panels, the columns are for different groups of credit card lenders based on how much they changed their minimum payment formulae as specified in Table 1. The second column combines groups 2.0%, 2.5%, and 3.0%: all lenders that increased their minimum payment formulae. The third column shows group Z who made no changes to their minimum payment formulae. The fourth, fifth, and sixth columns respectively denote lenders moving their minimum payment formulae 2.0%, 2.5%, and 3.0%. Means are calculated as of $t = -1$, July 2019, the month before the Quebec policy becomes effective.

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6 Appendix

A Survey Evidence On Credit Card Repayments

Survey of Financial Security (SFS). The 2016 and 2019 Canadian Surveys of Financial Security, conducted by Statistics Canada, ask households about their credit card behaviors. Earlier vintages of the survey (1999, 2005, 2012) ask households only whether or not they usually pay off their credit card balances. All responses are weighted using the provided probability weights.

Both surveys ask "Over the last 12 months, on your (and your family's credit cards), what did you usually pay?" Table A1 reports results.

Table A1: SFS Card Repayment

	2016			2019		
	ON	QC	Canada	ON	QC	Canada
% with a credit card	89.1	85.6	87.2	90.7	88.8	89.9
Less than the minimum	1.2	1.6	1.4	1.1	0.8	1.4
Minimum	6.2	5.7	5.8	6.6	6.8	6.6
More than min. but less than full	28.0	28.5	28.9	30.5	27.6	29.6
Full amount	64.5	64.2	63.9	61.9	64.8	62.3

Personal Cardholder Survey (PCS). Every year the marketing firm Ipsos-Reid surveys approximately 10,000 households about their credit cards. Similar to the SFS, Table A2 reports on how much people typically pay on their outstanding balance. Households in the PCS report slightly higher full repayment, but minimum repayment is similar across surveys.

Table A2: PCS Card Repayment

	2016			2019		
	ON	QC	Canada	ON	QC	Canada
Minimum	5.5	6.8	5.7	6.8	6.7	5.9
More than min. but less than full	21.4	23.2	22.5	20.9	23.2	22.6
Full Amount	70.4	67.6	69.3	69.3	67.5	68.8
Don't know	2.6	2.4	2.5	3.0	2.6	2.7

The PCS also asks about the number of cards in the respondent's wallet. Figure A1 plots a histogram of the number of cards in the wallets of people living in Ontario and Quebec. The same share of respondents—approximately one-third—have two cards. Quebec residents are more likely to have only one card relative to Ontarians, while Ontarians are more likely to have three cards.

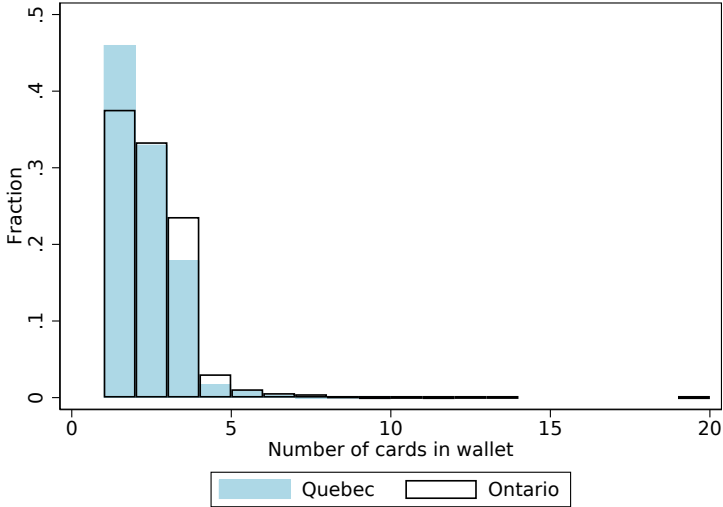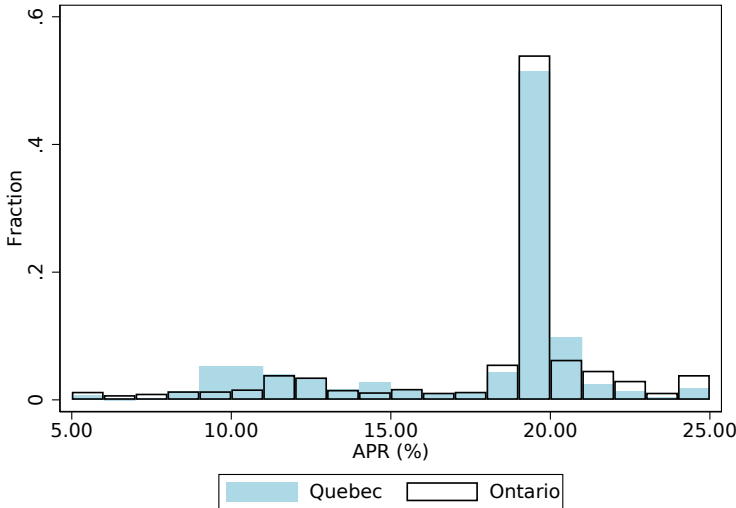**Figure A1:** Number of cards in the wallet (2018)


Figure A2: Interest rate dispersion (2018)

B   Additional Difference-in-Differences Results

B.1   Matching Methodology

After restricting to active cards, we then keep credit cards in Quebec which have exact matches to cards in Ontario with the same lender, the same card bank identification number (BIN: the first four to six numbers that appear on a card and reveal the specific card type, e.g., rewards) and an indicator for whether the majority of months revolved or transacted. Within these, we find the closest match by propensity score matching on standardized credit score, standardized credit limit, standardized statement balance, and MOP, where MOP is a categorical variable identifying whether the account is current or late, and how late. This matching is conducted by only using data at $t = -12$ to $t = -6$.

Figure B1: Distribution of credit card minimum payments for existing cards in Quebec matched with Ontario in July 2019 (orange line) before the Quebec policy's introduction, and August 2019 (black line) when the Quebec policy became effective

I. CDFs of Minimum Payment ($)

A. Quebec   B. Ontario

II. CDFs of Minimum Payment (% Statement Balance)
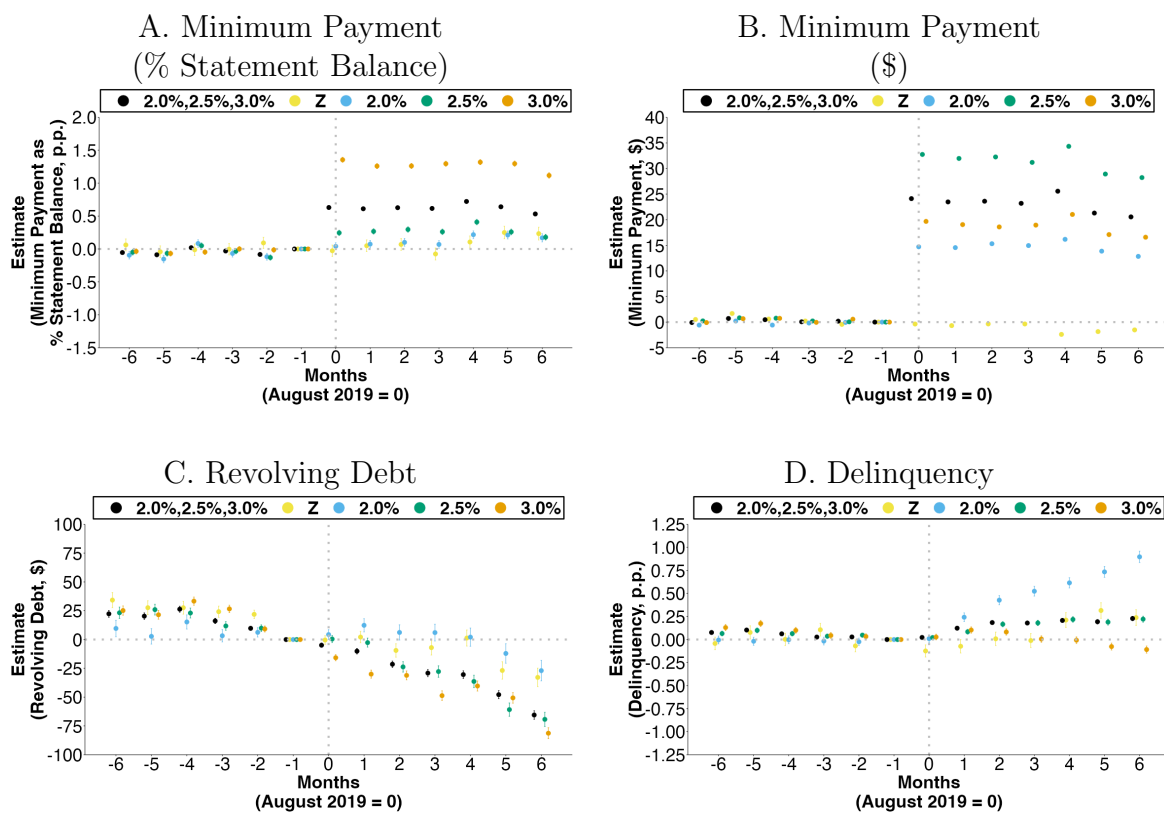
C. Quebec   D. Ontario
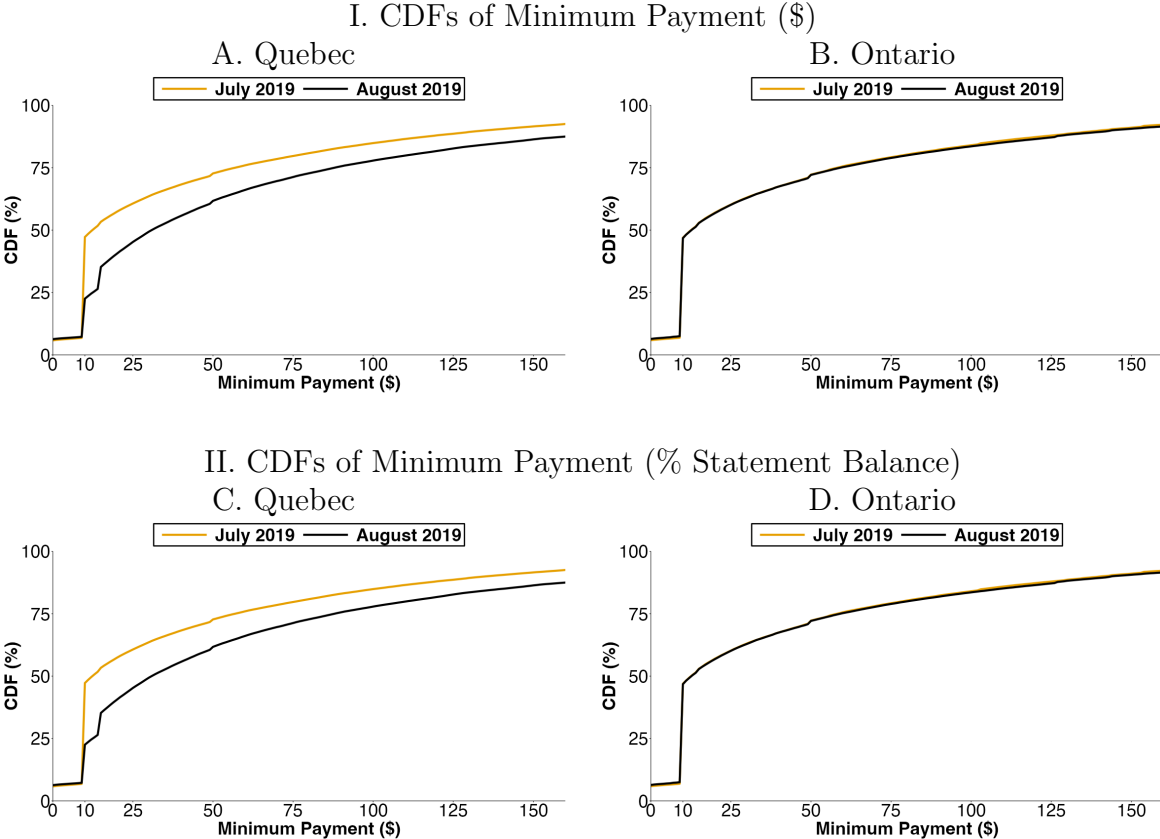
Notes: Data source is TransUnion. Includes all active cards open in Ontario matched to those in Quebec as of July 2019 and excludes observations with zero statement balances. In all panels, x-axes of CDFs are right-censored to ease presentation. The minimum payment amount is a combination of interest, fees, and capital repayment.

Figure B2: Difference-in-differences estimates for effects of policy on credit card (A.) activity, (B.) credit limit, (C.) statement balance, (D.) utilization, (E.) spending, (F.) repayment
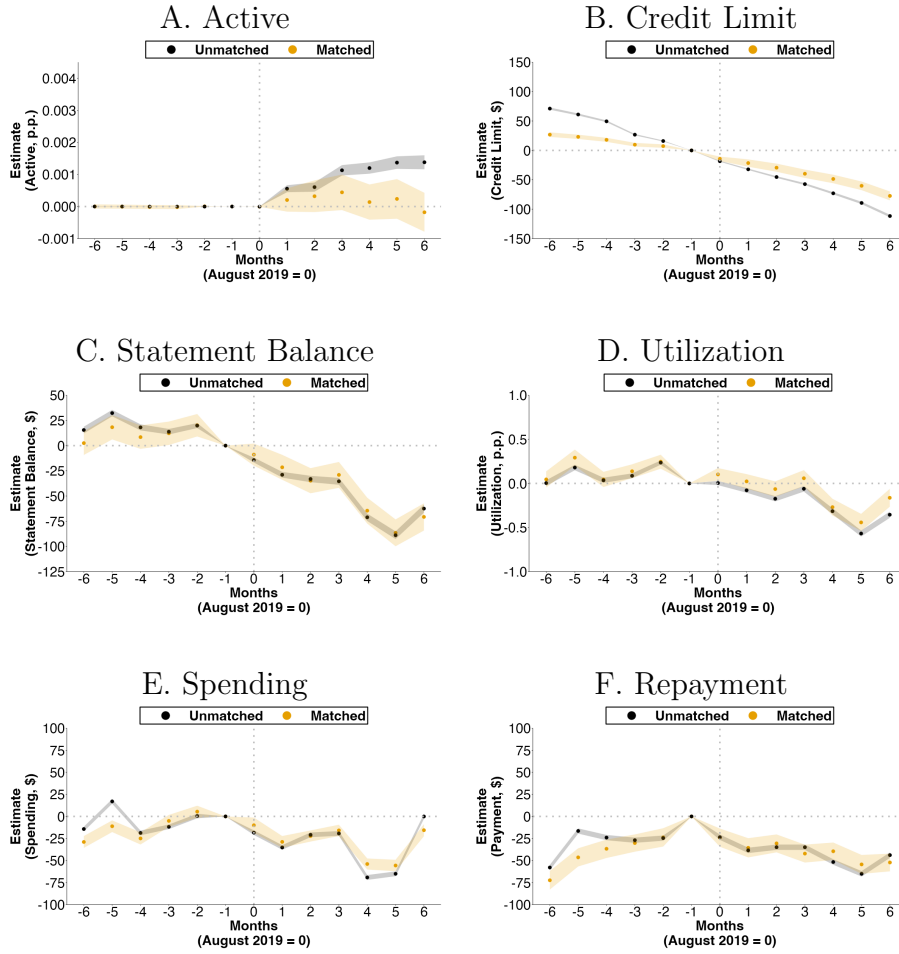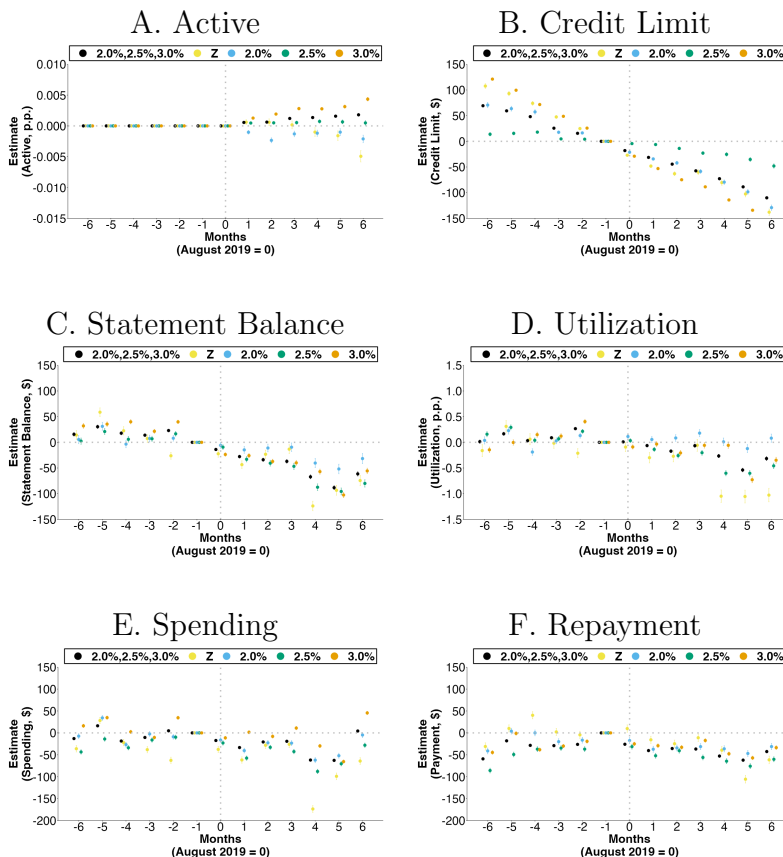

Notes: Data source is TransUnion. This estimates the credit card account-level effect of the first phase of Quebec policy requiring credit card minimum payments for existing cards are at least 2% of statement balance. The outcomes are: Panel A plots our indicator for whether a card remains active and open; Panel B plots credit card limit; Panel C plots credit card statement balance; Panel D plots credit card utilization (statement balance divided by credit limit); Panel E plots new spending; Panel F plots repayment amounts. Estimates are from OLS regression of dynamic DID as specified in Equation 2. These show the δ_τ estimates which are the coefficients on the interaction between an indicator for Quebec and calendar year-month fixed effects. The regression includes card and calendar year-month fixed effects. Time periods are months relative to August 2019 ($t = 0$) when the Quebec policy becomes effective. Data includes all active credit card accounts open in Ontario or Quebec as of July 2019. Standard errors are clustered at the consumer-level with error bars showing 95% confidence intervals. Black denotes estimates from unmatched data; orange are for matched sample.

Figure B3: Heterogeneous unmatched difference-in-differences estimates for effects of policy, by credit card lender minimum payment group, on credit card (A.) minimum payments (% statement balance), (B.) minimum payments ($), (C.) revolving debt, (D.) delinquency
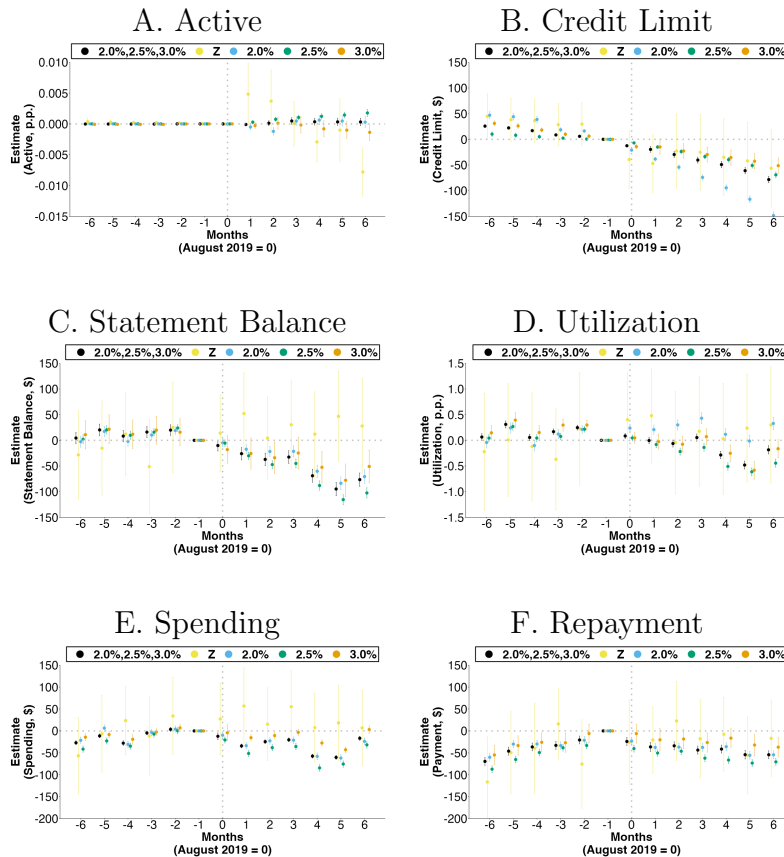

Notes: Data source is TransUnion. This estimates the credit card account-level effect of the first phase of Quebec policy requiring credit card minimum payments for existing cards are at least 2% of statement balance. The colors are for different groups of credit card lenders based on how much they changed their minimum payment formulae as specified in Table 1. Black combines groups 2.0%, 2.5%, and 3.0%: all lenders that increased their minimum payment formulae. Yellow shows group Z, who made no changes to their minimum payment formulae. Blue, green, and orange respectively denote lenders moving their minimum payment formulae 2.0%, 2.5%, and 3.0%. The outcomes are in Panel A. minimum payment as a percent of the statement balance, in Panel B. the minimum payment amount in dollars, in Panel C. credit card revolving debt, and in Panel D the credit card delinquency (30 or more days past due). Estimates are from OLS regression of dynamic DID as specified in Equation 2. These show the δ_τ estimates which are the coefficients on the interaction between an indicator for Quebec and calendar year-month fixed effects. The regression includes card and calendar year-month fixed effects. Time periods are months relative to August 2019 ($t = 0$) when the Quebec policy becomes effective. Data includes all active credit card accounts open in Ontario or Quebec as of July 2019. Standard errors are clustered at the consumer level with error bars showing 95% confidence intervals. Results are for sample of Quebec credit cards with an (unmatched) control group of Ontario credit cards.

Figure B4: Heterogeneous unmatched difference-in-differences estimates for effects of policy, by credit card lender minimum payment group, on credit card (A.) activity, (B.) credit limit, (C.) statement balance, (D.) utilization, (E.) spending, (F.) repayment


Notes: Data source is TransUnion. This estimates the credit card account-level effect of the first phase of Quebec policy requiring that credit card minimum payments for existing cards are at least 2% of statement balance. The colors are for different groups of credit card lenders based on how much they changed their minimum payment formulae as specified in Table 1. Black combines groups 2.0%, 2.5%, and 3.0%: all lenders that increased their minimum payment formulae. Yellow shows group Z, who made no changes to their minimum payment formulae. Blue, green, and orange respectively denote lenders moving their minimum payment formulae 2.0%, 2.5%, and 3.0%. The outcomes are in Panel A. whether the card remains active and open, in Panel B. the credit card limit, in Panel C. credit card statement balance, in Panel D the credit card utilization (statement balance divided by credit limit), in Panel E the amount of new spending, and in Panel F the amount of repayments made. Estimates are from OLS regression of dynamic DID as specified in Equation 2. These show the δ_τ estimates, which are the coefficients on the interaction between an indicator for Quebec and calendar year-month fixed effects. The regression includes card and calendar year-month fixed effects. Time periods are months relative to August 2019 ($t = 0$) when the Quebec policy becomes effective. Data includes all active credit card accounts open in Ontario or Quebec as of July 2019. Standard errors are clustered at the consumer level with error bars showing 95% confidence intervals. Results are for sample of Quebec credit cards with an (unmatched) control group of Ontario credit cards.

Figure B5: Heterogeneous matched difference-in-differences estimates for effects of policy, by credit card lender minimum payment group, on credit card (A.) activity, (B.) credit limit, (C.) statement balance, (D.) utilization, (E.) spending, (F.) repayment


Notes: Data source is TransUnion. This estimates the credit card account-level effect of the first phase of Quebec policy requiring that credit card minimum payments for existing cards are at least 2% of statement balance. The colors are for different groups of credit card lenders based on how much they changed their minimum payment formulae as specified in Table 1. Black combines groups 2.0%, 2.5%, and 3.0%: all lenders that increased their minimum payment formulae. Yellow shows group Z, who made no changes to their minimum payment formulae. Blue, green, and orange respectively denote lenders moving their minimum payment formulae 2.0%, 2.5%, and 3.0%. The outcomes are in Panel A. whether the card remains active and open, in Panel B. the credit card limit, in Panel C. credit card statement balance, in Panel D the credit card utilization (statement balance divided by credit limit), in Panel E the amount of new spending, and in Panel F the amount of repayments made. Estimates are from OLS regression of dynamic DID as specified in Equation 2. These show the δ_τ estimates, which are the coefficients on the interaction between an indicator for Quebec and calendar year-month fixed effects. The regression includes card and calendar year-month fixed effects. Time periods are months relative to August 2019 ($t = 0$) when the Quebec policy becomes effective. Data includes all active credit card accounts open in Ontario or Quebec as of July 2019. Standard errors are clustered at the consumer level with error bars showing 95% confidence intervals. Results are for sample of Quebec credit cards with a matched control group of Ontario credit cards.

Figure B6: Additional details on monthly mailed credit card offers
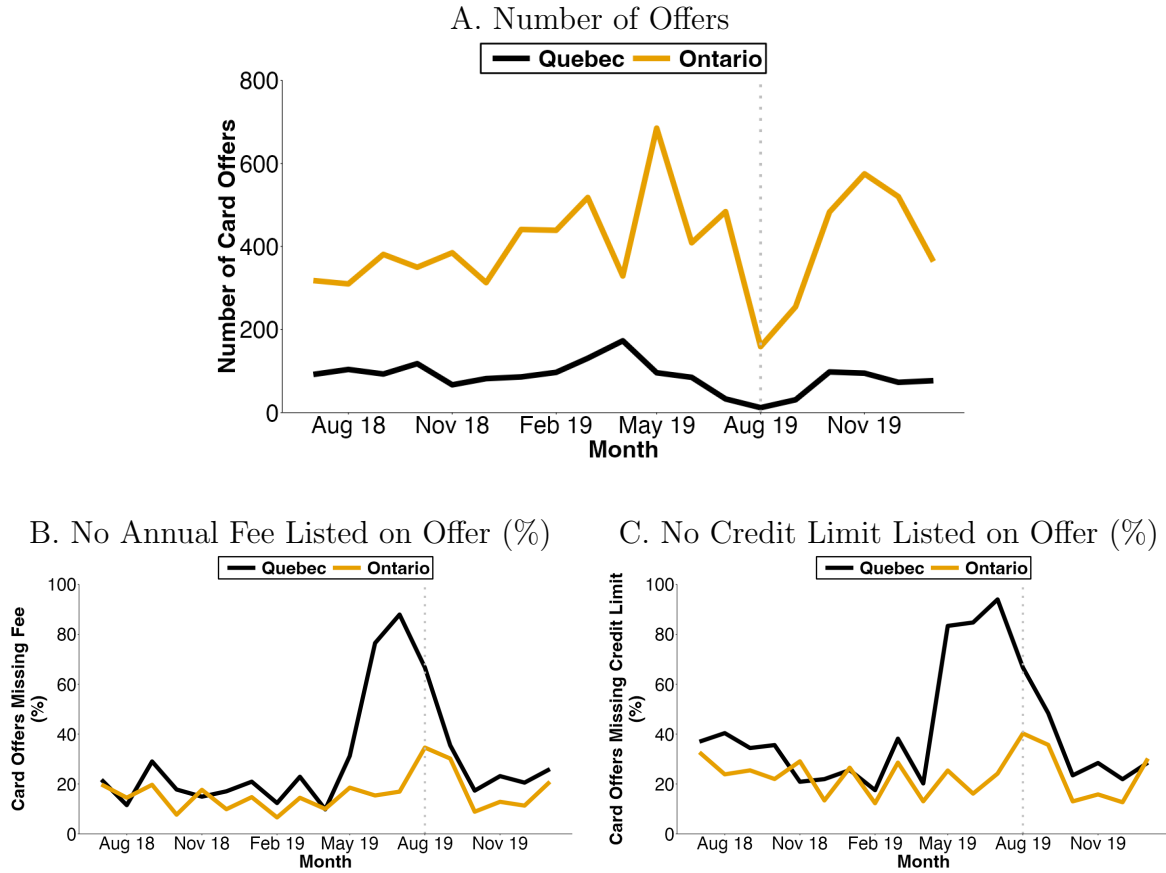
A. Number of Offers

B. No Annual Fee Listed on Offer (%)

## C. No Credit Limit Listed on Offer (%)

Notes: Data source is Mintel Comperemedia. This figure summarizes the number and characteristics of credit cards offers sent via mail in Quebec and Ontario, each month from July 2018 to January 2020. Panel A shows the number of credit card offers mailed to consumers in the Mintel panel each month. Panel B shows, for consumers receiving offers, the percentage where the offer does not list an annual fee. Note that not listing an annual fee on an offer does not necessarily mean a zero annual fee. Panel C shows, for consumers receiving offers, the percentage where the offer does not list a credit limit.

Figure B7: New cards—unconditional means (all cohorts)

A. Minimum Payment

B. Credit Limit

C. Revolving Debt

D. Delinquency
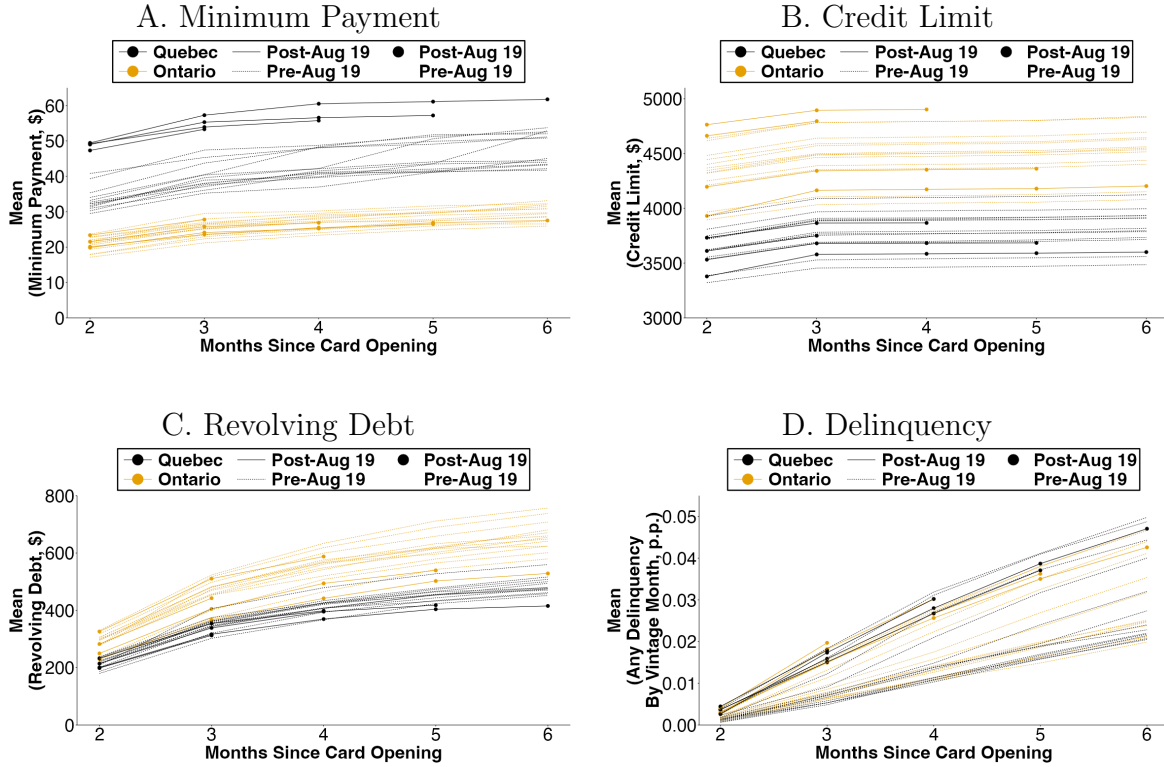
Notes: TransUnion data. This figure shows unconditional means for cohorts of new cards opened in Quebec or Ontario from July 2018 to November 2019. The x-axes are number of months since card opening. Black solid lines denote card cohorts opened in Quebec from August 2019, after the policy. Black dashed lines denote card cohorts opened in Quebec before August 2019, before the policy. Yellow solid and dashed lines denote card cohorts opened in Ontario from, and before, August 2019, respectively. Panels A, B, C, and D respectively show unconditional means of minimum payments, credit limits, revolving debt, and delinquency, for each card cohort by number of months since card opening.

Figure B8: New cards—unconditional means and regression estimates for statement balances

A. Means

B. Means (All Cohorts)

C. Estimates
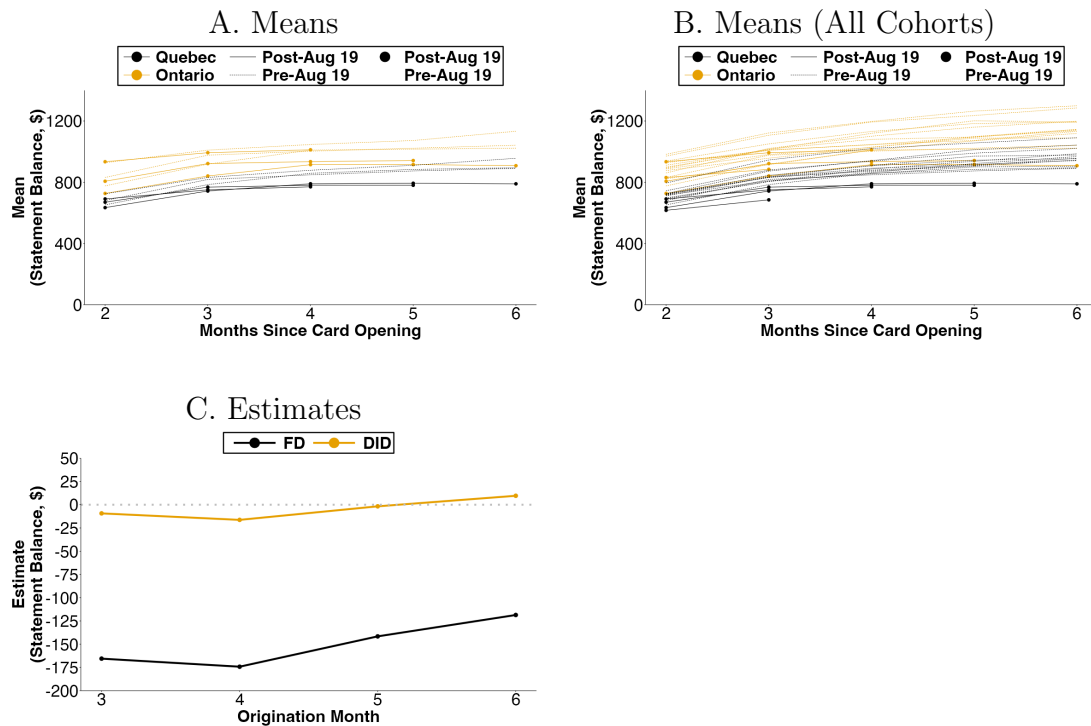
Notes: TransUnion data. Panels A and B show unconditional means of statement balances for cohorts of new cards opened in Quebec or Ontario. On the x-axes are number of months since card opening. Black solid lines denote card cohorts opened in Quebec starting in August 2019. Black dashed lines denote card cohorts opened in Quebec before August 2019. Yellow solid and dashed lines denote card cohorts opened in Ontario from and before August 2019, respectively. Panel A shows unconditional means for cohorts of new cards opened in Quebec or Ontario from July 2018 to November 2019. Panel B shows cohorts of new cards opened in Quebec or Ontario from July 2018 to November 2019. Panel C shows regression estimates: the x-axes show number of months since origination and the y-axes show regression estimates. The black lines show regression estimates of δ_v^{FD} from Equation 3. These are the coefficients on the interaction between indicators for number of months since card opening and an indicator for card cohorts opened in Quebec. FD estimates use data from cohorts of new cards opened in Quebec or Ontario during August, September, and October of 2019. The FD regression includes controls for months since card opening, cohort year-month, and calendar year-month. The orange lines show regression estimates of δ_v^{DID} from Equation 4. These are the coefficients on the interaction between indicators for months since card opening and indicators for card cohorts opened from August 2019 onward and in Quebec. DID estimates use data from cohorts of new cards opened in Quebec or Ontario during August, September, and October of 2018 and 2019. The FD regression also includes controls for number of months since card opening, province of card opening, cohort year-month, and calendar year-month, as well as allowing card cohorts opened from August 2019 to vary differentially in the number of months since origination relative to cohorts opened before August 2019, and also allow card cohorts opened in Quebec to vary differentially in number of months since origination relative to cohorts opened in Ontario.

Table B1: Baseline means for existing cards in July 2019 before the Quebec Policy, revolver and transactor subsamples

| | Revolver | | Transactor | |
Outcome	Quebec	Ontario	Quebec	Ontario
Minimum Payment ($)	86.94	88.02	15.56	16.10
Minimum Payment (%)	4.25	4.36	6.57	6.74
Revolving Debt ($)	3,880.95	3,884.46	84.84	96.09
Delinquency (%)	2.04	2.31	0.08	0.10
Active (%)	100	100	100	100
Credit Limit ($)	8,046.13	8,055.18	9,937.22	9,937.95
Statement Balance ($)	4,472.21	4,497.69	1,287.48	1,282.07
Utilization (%)	60.85	61.08	15.27	15.30
Spending ($)	668.49	698.77	1,550.80	1,586.71
Repayment ($)	655.81	671.40	1,589.99	1,598.66
N (millions)	1.26	1.26	1.39	1.39

Notes: Table shows baseline means for matched sample of existing cards, for revolver and transactor subsamples. Revolver (i.e., repaying less than the statement balance) at $t = -12$ to $t = -6$, Transactor (i.e., fully repaying the statement balance) at $t = -12$ to $t = -6$. Means are calculated as of $t = -1$, July 2019, the month before the Quebec policy becomes effective.