

# The Effect of Mortgage Rate Resets on Debt: Evidence from TransUnion (Part I)

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## Abstract

This note studies how decreases in mortgage rates affect the behaviour of borrowers in terms of spending on durable goods and repaying debt. It focuses on borrowers with the prevailing five-year fixed-rate mortgage term in Canada who renewed their contracts at lower interest rates between January 2015 and December 2016.

*JEL Codes: D12, D14, E43, E52, G21, R31*

*Topics: Credit and credit aggregates; Interest rates; Monetary policy; Transmission of monetary policy; Housing*

## Résumé

Dans cette note, nous étudions l'effet des baisses des taux hypothécaires sur les habitudes de dépense en biens durables et de remboursement de dettes des emprunteurs. Nous nous intéressons particulièrement aux emprunteurs détenant un prêt hypothécaire à taux fixe de cinq ans, l'option la plus courante au Canada, qui ont renouvelé leur contrat à un taux inférieur au précédent entre janvier 2015 et décembre 2016.

*Sujets : Crédit et agrégats du crédit; Taux d'intérêt; Politique monétaire; Transmission de la politique monétaire; Logement*

*Codes JEL : D12, D14, E43, E52, G21, R31*

## Introduction and overview

Mortgage debt outstanding represents the largest liability of the household sector. Changes to interest rates associated with this type of debt can have large effects on the decisions borrowers make about spending and savings and can therefore have important implications for the economy.

This note analyzes how borrowers respond to changes in mortgage rates associated with the renewal of their fixed-rate mortgages.<sup>1,2</sup> It begins by discussing the main institutional features of the Canadian mortgage market and the recent evolution of interest rates. It then describes the data and empirical strategy used in this research. It presents main findings on adjustments following interest rate changes to mortgage loans and to the liability side of mortgage borrowers' balance sheets more broadly. Finally, it discusses some implications of this analysis for monetary policy.

Key insights of the analysis:

1. On average, borrowers who renew a mortgage contract at a lower interest rate choose to repay their mortgage debt faster, primarily by shortening the amortization period. However, responses differ depending on borrower characteristics. Borrowers who appear to have less access to liquidity, as proxied by their credit score and utilization rate of revolving debt, both shorten their amortization period and raise their payments by less.
2. Borrowers, on average, increase spending financed by new auto and instalment loans by 16 percent and 18 percent, respectively. Considering that loan-to-value ratios on auto loans have recently been close to 1 and that an important share of instalment loans is used for durable purchases and home renovations, these increases represent the maximum effects of lower mortgage rates at renewal on these borrowers' durable expenditures.
3. Borrowers, on average, also choose to repay their more expensive credit card debt, but this repayment is nearly fully offset by increases in balances outstanding on lines of credit. The result is little change in overall revolving debt. The responses also vary with borrower characteristics. While the overall revolving debt (including balances on both credit cards and lines of credit) of less-constrained borrowers goes down, that of more-constrained borrowers does not.
4. The tendency of borrowers to repay mortgage debt faster suggests that declines in interest rates may not fully translate into an immediate increase in spending. However, this repayment behaviour would likely lead to a positive effect on future consumption by lowering the overall cost of mortgage debt. Rebalancing revolving debt away from more expensive credit card debt may also be associated with interest rate savings that can support future consumption.
5. The note focuses on responses to interest rate decreases of existing mortgage holders. The effect on the overall level of household debt in the economy would also depend on the responses of other groups in the population (such as renters, outright homeowners and non-renewing mortgage holders) not included in the analysis.

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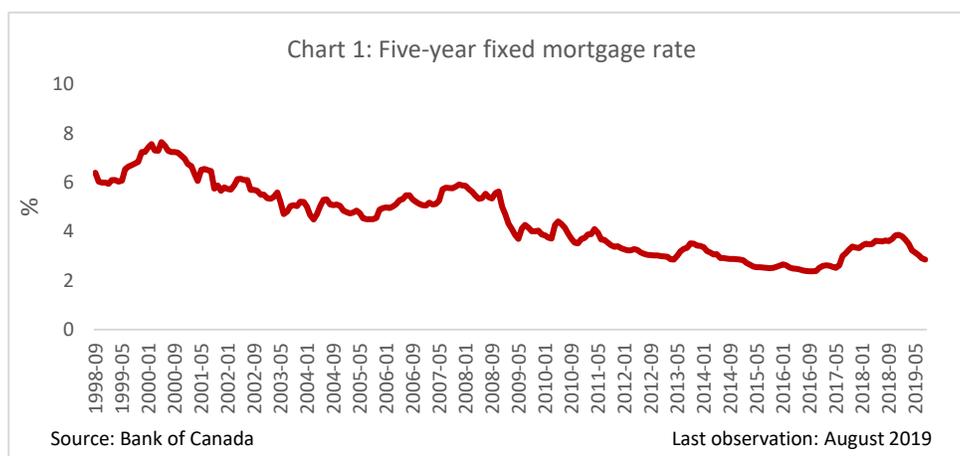
<sup>1</sup> The analysis in this note draws on Kartashova and Zhou (2019).

<sup>2</sup> The analysis of renewals in this note complements the findings of Bank staff reported in Box 2 of the October 2019 *Monetary Policy Report* (MPR). Using data from regulatory filings of Canadian banks, staff found that the effects of higher rates at renewal on debt-service ratios in 2019 were mitigated by mortgage prepayments over the preceding term, when borrowers faced lower interest rates. This note shows that scheduled mortgage prepayment is indeed an important part of borrowers' responses to lower interest rates. However, important differences are also evident in the scope of the two analyses. While the box in the October 2019 MPR focuses narrowly on the effects of rate changes on product choice and resulting debt-service ratios, here the focus is on a greater number of outcomes (loan and borrower) and not only on an average borrower response, but also on differences in responses. Our analysis of rate decreases is also relevant. As suggested in the October 2019 MPR box, an average borrower faced only a 10-basis-point increase in interest rates at renewal in August, which means that a non-trivial share of rate changes in the distribution were negative.

## Canadian mortgage market and recent mortgage rates

The Canadian mortgage market is characterized by partially amortizing debt contracts, featuring short terms (2 to 5 years) and long amortization periods (25 to 30 years), with 70 to 80 percent of mortgage balances outstanding at fixed interest rates. Borrowers with fixed-rate mortgages mainly feel the effects of changes in interest rates at the renewal of their contracts for a new term, when their rate is reset to the level prevailing in the market.

In the past, movements in market rates often translated into large reductions or increases in interest rates at renewal for existing fixed-rate mortgage borrowers. More recently, fixed mortgage rates were mostly on a downward trend (**Chart 1**), reaching their lowest point by the end of 2016. As a result, after the early 2000s, borrowers with 5-year mortgage terms mostly experienced decreases in their interest rates at renewal.<sup>3</sup>



In the period after the financial crisis, rate declines reached their peak in late 2012–early 2013, benefiting borrowers who originated or previously renewed their mortgages before the 2009 recession. However, at the trough of interest rates in the 2015–16 period, which also saw two monetary policy rate cuts, homeowners who bought their homes after the recession still experienced non-trivial rate declines at renewal. This note focuses on this latter group of borrowers due to the limited history of mortgage data.

## Data

This study uses detailed microdata from TransUnion Canada, one of the two credit reporting agencies serving the Canadian market.<sup>4</sup> These data consist of account-level information on different types of debt, including mortgages, and can be aggregated to the level of the borrower. This provides a comprehensive picture of the liability side of a borrower's balance sheet. Other borrower

<sup>3</sup> Between August 2017 and June 2019, fixed-rate borrowers with a 5-year term saw some increases in interest rates, but since then borrowers again experienced decreases in their interest rates at renewal.

<sup>4</sup> To protect the privacy of Canadians, no personal information was provided to the Bank by TransUnion. The TransUnion dataset was "anonymized," meaning that it does not include information that identifies individual Canadians, such as names, social insurance numbers or addresses. In addition, the dataset has a panel structure, which uses fictitious account and consumer numbers assigned by TransUnion.

information used in the analysis includes age, geographic area and credit score. The monthly snapshots of the data on different types of revolving debt are available from 2009, while most of the mortgage data are available from later dates that vary for each financial institution.

This analysis focuses on one of the Big Six Canadian banks that has a longer history of mortgage reporting than other financial institutions, including information required to measure changes in interest rates at renewal. However, even with this longer history of reporting, this analysis is limited to borrowers with the most popular 5-year fixed-rate term who, for the most part, originated their mortgages in 2010–11 and thus were renewing for the first time in 2015–16.<sup>5</sup>

In terms of representativeness of our sample, the financial institution in question has a 20 percent share of the mortgage market and its pool of borrowers displays characteristics similar to those in the rest of mortgage borrower population. This gives us confidence that the effects of interest rate resets we estimate using this sample can apply to the population of mortgage borrowers more generally.

## Empirical approach

Most mortgages entail large prepayment penalties, and borrowers renewing with an existing lender do not need to requalify in terms of their loan-to-value and debt-service ratios. As a result, the timing of a mortgage rate reset is predetermined. As well, reductions or increases in mortgage rates, driven by movements in market rates over time, are mostly independent of the borrowers' spending and savings decisions and their financial situation.<sup>6</sup> Because of these institutional features of the Canadian mortgage market, we can estimate causal effects of interest rate changes at renewal.

This analysis focuses on several outcome variables. It starts by directly assessing adjustments at the mortgage loan level and then assesses debt outcomes at the borrower level. These outcomes are measured by revolving debt balances and take-out of new auto and instalment loans. In both cases, we use the following empirical specification:

$$y_{j,t} = \alpha_0 + \alpha_1 PostRenew_{j,t} + \alpha_2 x_{j,t} + \gamma_j + \delta_t + \varepsilon_{j,t}, \quad (1)$$

where  $j$  denotes the loan for the loan-level analysis, or the borrower for the borrower-level analysis.  $t$  denotes month.  $y_{j,t}$  denotes either a loan-level outcome variable or a borrower-level outcome variable.  $PostRenew_{j,t}$  is a dummy variable that takes the value of 1 starting with the month of mortgage renewal.  $x_{j,t}$  is a vector of time-varying borrower-level characteristics, including the credit score, age of the borrower and the loan-to-value ratio in borrowers' geographic area in the previous quarter.  $\gamma_j$  is the individual fixed effect, and  $\delta_t$  is the monthly fixed effect designed to capture the trend in the macroeconomy and to control for the confounding effects of aggregate shocks.  $\alpha_1$  is the key parameter of interest that captures the response of an outcome variable at mortgage renewal.

## Mortgage loan-level results

The results of this analysis suggest that a lower interest rate received by a mortgage borrower at renewal, all else being equal, would automatically result in a decline in required mortgage payments. Using our data, *we estimate that borrowers with a 5-year fixed-rate mortgage term who renewed their*

<sup>5</sup> We focus only on primary borrowers (defined in terms of age) for jointly owned mortgages and borrowers with individually owned mortgages, who hold only one mortgage at any point in time.

<sup>6</sup> The same empirical specification has been used in Di Maggio et al. (2017) and Fuster and Willen (2017).

*contracts in 2015 and 2016 experienced a 112-basis-point decrease in their mortgage rates, on average, which would have implied a \$92 decrease in required monthly mortgage payments (a 1-basis-point decrease in mortgage rate is associated with an 82-cent decrease in payments).<sup>7</sup>*

The findings also suggest that borrowers do not take full advantage of reductions in required payments. The actual decrease in mortgage payments following a reset to a lower interest rate is significantly smaller than the maximum possible. This is because borrowers choose to shorten their amortization period. *We estimate that borrowers lowered their payments by only about one-half (\$46) of the automatic reduction in required mortgage payments (\$92) by choosing to reduce their period to amortization by roughly 14 months (out of the remaining amortization of 238 months).<sup>8</sup>* Given that this analysis focuses on borrowers holding only one mortgage at each point in time, these larger-than-required payments amount to these borrowers voluntarily deleveraging on their overall mortgage debt.

The findings also indicate that these average estimates mask a substantial degree of variation in mortgage borrowers' loan-level adjustments. Borrowers with lower credit scores and higher credit utilization and those in the youngest age group choose to lower their actual payments by more (and thereby shorten their amortization period by less). For example, borrowers with a lower credit score saw their payments decrease by \$60 out of a potential decrease of \$96. For borrowers with higher credit scores, these numbers were \$30 and \$82, respectively. This implies that relative to an average borrower, those with a lower credit score saw larger decreases in their payments. This left them with more cash on hand to use for purposes other than mortgage debt repayment. The patterns for differences in credit utilization and in age are similar.

## Borrower-level results

Using account-level data for each mortgage borrower, we construct total balances associated with their credit cards and lines of credit as well as several debt-financed consumption measures (such as new auto and instalment loans) and assess their responses to mortgage rate resets.<sup>9,10</sup>

*Findings indicate that, in response to lower interest rates at mortgage reset, the spending financed by new auto and instalment loans increases on average by 16 percent and 18 percent, respectively.<sup>11</sup> These loans are not only used for car purchases but can also finance purchases of other durable goods and*

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<sup>7</sup> Without the monetary policy rate cuts (50 basis points over this period), we estimate that, on average, borrowers would have seen a decline in their interest rate of 83 basis points. This suggests a pass-through of 58 percent.

<sup>8</sup> For an average mortgage balance of \$162,000, assuming an average interest rate of 4.5 percent over the remaining amortization period, the reduction in amortization period from 238 to 224 months would amount to interest savings of approximately \$5,400. This amount represents the maximum available for a future increase in consumption.

<sup>9</sup> Credit lines often require only payment of interest, so decreases in balances outstanding would represent a voluntary debt repayment in excess of any new balances accumulated, which is why we focus on these.

<sup>10</sup> TransUnion data do not provide an identifier for whether lines of credit are secured by a home (home equity lines of credit, or HELOCs) or any other asset or whether they are unsecured. While an industry standard is to proxy HELOCs with a limit of at least \$50,000, we choose to focus on the total of lines of credit to capture the behaviour of different types of homeowners, including those who may not have enough equity in their home to access a HELOC.

<sup>11</sup> Due to differences in reporting by different financial institutions, auto loans refer only to captive auto financing. A substantial part of financing of vehicle purchases is included with instalment loans.

home renovations. In this way, they contribute to raising durable expenditures overall.<sup>12</sup> We also find that borrowers who are more credit-constrained are less likely to take out these loans and therefore increase their new instalment debt by less.

As for revolving debt, findings indicate that in response to lower interest rates at mortgage reset, borrowers, on average, reduce credit card balances. But these reductions are largely offset by increases in balances outstanding on lines of credit.<sup>13</sup> As a result, total balances outstanding on revolving debt remain largely unchanged. However, there is significant variation in these responses. While less-constrained borrowers reduce balances outstanding on both credit cards and lines of credit, more-constrained borrowers deleverage less and, in some cases, even increase their debt. As mentioned above, these more-constrained borrowers may have less access to new debt and may use room available on their existing revolving debt to finance durable expenditures.

The limitation of this analysis is that the data are only on the liability side of borrowers' balance sheets and therefore cannot provide a full picture of their responses to interest rate changes. However, we can still highlight some implications of this analysis for policy.

## Policy implications

Since the early 2000s, borrowers with 5-year fixed-rate mortgages have mostly experienced lower interest rates at renewal. In this note, we focused on the 2015–16 period to understand borrowers' responses to these rate reductions. If our findings extend to other episodes of lower rates, the analysis suggests several implications for monetary policy:

1. Lower interest rates may not directly translate to current spending by increasing the disposable income of borrowers, net of interest payments (the direct income effect). On average, borrowers may instead choose to deleverage by repaying their mortgage debt and more expensive revolving debt (perhaps in expectation of higher interest rates in the future).
2. Deleveraging on mortgage and other debt today is associated with an overall lower interest cost of debt over its duration, which could provide future economic stimulus.
3. The responses of mortgage borrowers to interest rate resets vary substantially, which could be important for overall effects. Constrained borrowers get more cash on hand from decreases in mortgage payments following reductions in interest rates. This cash can be available for different uses, including consumption expenditures. They also reduce revolving debt less, which could similarly offset some of the potential drag on current spending from less-constrained borrowers. The overall size of these effects would depend on the composition of different types of borrowers over time.
4. The total size of economic effects associated with mortgage renewals is determined by the change in interest rates at renewal and the number of mortgages renewed. The mortgage number, in turn, depends only on past mortgage originations. Since past monetary policy stance influences the number of previous mortgage originations, the effects of current monetary policy also depend on its past actions.

The findings presented in this note characterize mortgage borrowers' responses to lower interest rates at renewal. On the one hand, borrowers respond to lower rates by deleveraging, primarily on their

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<sup>12</sup> In the data, auto loans can finance purchases of both new and used vehicles, which we cannot distinguish directly, but we can use the size of a new loan as an imperfect proxy for a new vehicle.

<sup>13</sup> Supply factors do not appear to be associated with either reductions in credit limits or increases in required payments on revolving debt.

mortgage debt. On the other hand, they take out new debt, such as auto and instalment loans. Changes in interest rates can also raise demand for loans from other groups of borrowers, such as renters, outright homeowners and non-renewing mortgage holders, which were not part of the analysis. Thus, we cannot assess the contributions of lower interest rates to the evolution of total household debt, as measured by the ratio of debt to disposable income.

Finally, in ongoing work we study the effects of interest rate increases at renewal on the same set of loan- and borrower-level outcomes, focusing on the period from July 2017 to June 2019. The results of this analysis will be featured in a forthcoming companion staff analytical note.

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