

# The Value of Mortgage Choice

Payment structure and contract length

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# Research Question

- What determines household mortgage contract choice when three distinct contract types are simultaneously available?
- The prior literature has studied Fixed-rate Fixed-payment (FF) vs. Variable-rate Variable-payment (VV) mortgages.
- A third type, the Variable-rate Fixed-payment (VF) mortgage exists in many countries but has been almost entirely ignored
- VF is genuinely distinct: the interest rate floats, but the total payment is fixed.
- When rates change, the adjustment absorbs into principal repayment — so the household's outstanding balance at renewal depends on the path of rates during the term

# Main Results

- All three contracts — Fixed-rate Fixed-payment (FF), Variable-rate Fixed-payment (VF), and Variable-rate Variable-payment (VV) coexist in equilibrium.
  - low term premium and high household leverage drives FF
  - high term premia with financial buffers drive VV
  - Household managing short term liquidity drives VF
- Restricting contract choice to a single type generates welfare losses of 1–6% in consumption-equivalent terms
- The US system of long-term Fixed-Rate Mortgages (FRM) generates ~4% welfare loss relative to Canada — lenders price prepayment risk ex-ante, so all borrowers pay for an option that only some exercise
- Variable-rate Variable-payment (VV) economies respond ~5X more to conventional monetary policy shocks than Fixed-rate Fixed-payment (FF) economies

# Model, Data, and Setting

## MODEL

- Quantitative lifecycle model — households choose among FF, VF, and VV at origination and at each mandatory 5-year renewal, trading off payment risk, balance risk, and total cost
  - Risk-neutral lender prices each contract as a fixed spread over the relevant government bond (5-year for FF; 1-year for VF and VV)
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## DATA AND SETTING

- Loan-level data from the Office of the Superintendent of Financial Institutions (OSFI), 2014–2022, covering Canada's Big 6 banks
- Canada is the ideal laboratory: mandatory 5-year renewal, all three contracts simultaneously observed, and mid-term prepayment penalties make switching rare
- Counterfactual: model recalibrated to the US — long-term Fixed-Rate Mortgages with endogenous refinancing — to compare welfare across systems

## What I Find Compelling

- The VF contract is the missing instrument — it reveals what FF and VV are actually buying for households. The balance risk / payment risk taxonomy is genuinely new in the lifecycle mortgage literature
- The US critique is sharp: the +148bp equilibrium premium is the ex-ante cost every US borrower pays for a refinancing option that primarily benefits mobile, wealthy households
- Monetary policy: conventional policy works through VV contracts, unconventional policy through FF contracts. This has direct implications for how central banks should think about mortgage market structure

## Three Comments

- 1 The paper's central mechanism — balance risk accumulation in VF mortgages — could benefit from direct empirical test

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- 2 The paper assumes lenders charge the same rate premium for all three contracts. But VF is riskier for lenders than FF or VV — when rates rise, VF loans take longer to repay, and the lender bears that extra wait with no compensation

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- 3 All welfare results are economy-wide averages. The model implies the welfare loss from the US FRM system falls hardest on constrained households — but this is not shown

## What is Balance Risk?

- Variable-rate Fixed-payment (VF) holders pay a fixed total each period, but the interest/principal split varies with the market rate — when rates rise, more goes to interest and less to principal
- The household therefore enters renewal carrying more debt precisely when rates are at their highest
- Fixed-rate Fixed-payment (FF) and Variable-rate Variable-payment (VV) both have deterministic principal repayment paths. Only VF exposes the household to balance risk

*Balance risk is the paper's core conceptual contribution. It is what makes VF genuinely distinct from FF and VV — not merely a hybrid of the two.*

## The Mechanism is Not Directly Tested

- The model is validated by matching origination shares across contract types — this confirms the model replicates which households choose VF
- It does not tell us whether VF holders actually accumulate larger balances than FF or VV holders when rates rise
- Balance accumulation is the mechanism driving the model's welfare losses from VF. Without direct evidence it operates in the data, the welfare conclusions rest on an assumption rather than a demonstrated channel

# Why an Empirical Validation Might be Needed?

## 1 Do households offset balance risk through prepayments?

Canadian VF holders can prepay up to 10–20% of the original balance per year. If households accelerate prepayments when rates rise, effective balance risk is much smaller than the contract mechanics imply. The paper notes this option but does not quantify how much it is used

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## 2 Does the actual balance divergence match the model's prediction?

The model generates welfare losses of up to 3.74% from VF-only restrictions. Those losses flow through the balance-risk channel. The 2022–23 rate shock is the first large-scale real-world test: do VF cohort renewal balances in OSFI diverge from FF and VV cohorts by the amount the model predicts?

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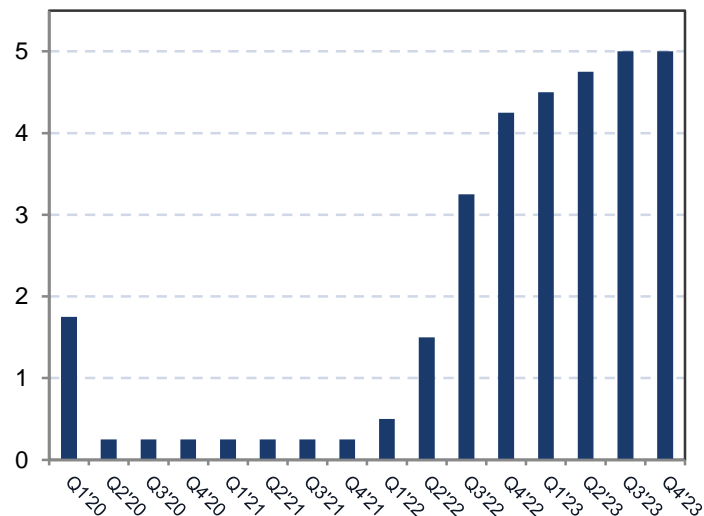
## 3 Does balance risk change household behaviour as the model assumes?

The model predicts VF holders switch to FF at renewal at much higher rates after a rate shock, because FF then insures against further balance risk. Might be a good idea to test the switching spike post 2022.

# The 2022–23 Rate Shock is a Direct Test

- Bank of Canada raised the policy rate from 0.25% to 5.00% in 18 months — 475bp, the fastest hiking cycle in the post-1990 period
- VF holders originating in 2020–21 at near-zero rates saw principal repayment collapse; effective amortisations exceeded 40 years for some
- The Canadian government introduced emergency amortisation extensions at renewal in 2024 — real policy responding to exactly the mechanism the model describes

Bank of Canada policy rate, 2020–2023



**+475bp in 18 months**

## Two Testable predictions from the model

- Simulate renewal balance distributions for the 2020–21 VF cohort and compare to FF and VV cohorts — a direct, out-of-sample test of the balance-risk channel
- Check whether VF→FF switching spiked at renewal post-2022 in OSFI, as the model's transition matrix predicts for a high-rate environment

## The equal mortgage premium assumption

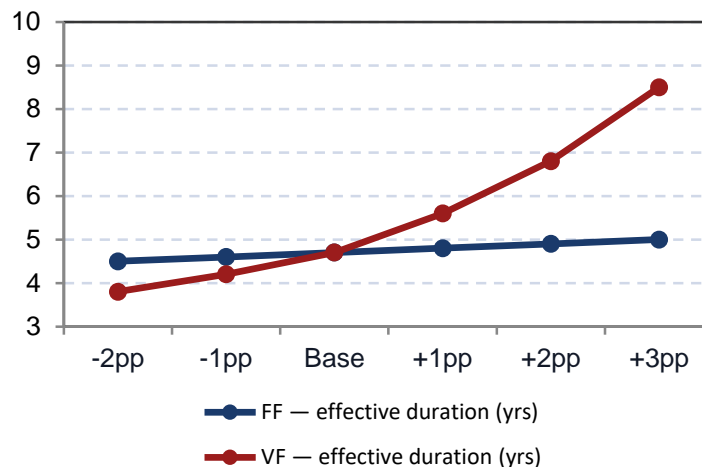
- The paper calibrates  $\phi_{FF} = \phi_{VF} = \phi_{VV} = 150\text{bp}$  — all three contract types carry the same lender spread over the relevant government bond
- Justified empirically: average spreads are approximately equal in OSFI data over 2014–22
- But 2014–22 is predominantly a low and stable rate environment — VF balance risk was dormant. Equal premia during a period when VF's distinctive risk never materialised do not validate that lenders correctly price it in general

*If VF is underpriced, households choose it partly due to a pricing subsidy rather than genuine insurance preferences — the welfare comparison between Canada and the US is affected.*

# Variable-rate Fixed-payment (VF) creates negative convexity for lenders

- When rates rise, principal repayment on a VF loan slows — the loan's effective duration extends without any compensation in the contract rate
- A risk-neutral lender correctly pricing this risk should charge a higher spread for VF than for FF or VV

Effective loan duration: FF vs. VF (years, illustrative)



FF (navy): nearly flat — once locked, the lender's cash flow timing is barely affected by rate movements. VF (red): curves sharply upward when rates rise — duration extends as principal repayment slows. This is negative convexity: extra risk the lender bears without compensation in the contract rate.

## Three suggested exercises

- Estimate mortgage premia separately by contract type from OSFI, with time variation — did the VF spread rise relative to FF and VV after the 2022 rate shock, when balance risk first became salient for lenders?
- Run a counterfactual with a higher VF premium — does VF remain the preferred contract for constrained households, or does the insurance interpretation break down?
- Structurally decompose the +148bp US premium into duration, prepayment, and balance-risk components — this number is currently a reduced-form residual

## Aggregate welfare numbers hide the distributional story

- All welfare results are economy-wide averages: Canada beats the US by ~4%, FF-only costs 3.18%, VF-only costs 1.82%
- The paper's own model already tells us who chooses VF: low-cash-on-hand, high-leverage households prefer VF — they value payment certainty because they cannot absorb payment shocks
- These are exactly the households who face the largest welfare loss from restricting the menu to Fixed-rate Fixed-payment (FF). But the paper reports only the average loss, which may conceal a large loss for this group and near-zero loss for wealthy households who refinance and recoup the option premium

## Inverting the 30-year Fixed-Rate Mortgage (FRM) narrative

- The 30-year FRM is presented as a democratising institution — giving low-income buyers payment stability. This view underpins the Qualified Mortgage rule, and post-crisis US regulatory policy
- This paper's framework implies the opposite: the long-term FRM embeds a prepayment option priced ex-ante into the rate. Every borrower pays the 148bp premium — including those who never refinance
- Low-income, high-leverage households — those who would choose VF in Canada — are least likely to refinance in the US: higher transaction costs, lower mobility, tighter credit constraints. They pay the full option premium and capture none of its value

## Making the distributional story explicit

- Report welfare losses (from Table 4) by wealth quartile and leverage quartile — the model already simulates heterogeneous households, so this decomposition requires no new modelling
- Estimate the homeownership margin effect: if VF enables entry for liquidity-constrained households, restricting the menu reduces homeownership rates, not just welfare conditional on owning
- Flag the general equilibrium direction: if VF raises housing demand, equilibrium house prices may partially offset the welfare gain — the sign matters for policy

## Minor comments

- Monetary policy passthrough — VF channel: the 0.8% consumption response in VF-only economies runs through net worth, not income (rising rates slow principal repayment, eroding balance sheets). This distinction matters for the transmission literature and deserves explicit discussion
- Amortisation heterogeneity: the model fixes amortisation at 25 years for all households. High loan-to-value borrowers typically originate with longer amortisations, which would amplify VF balance risk
- US calibration — ARM share: the model restricts to FF only, but 5–10% of US originations are Adjustable-Rate Mortgages. How sensitive is the 4% welfare estimate to allowing a small VV share?
- Partial prepayments: Canadian VF holders can prepay up to 10–20% of the original balance per year, partially offsetting rising balance risk. The paper notes this but does not quantify how much it matters in practice

# Conclusion

- This is an important paper. The VF contract is the missing instrument that reveals what FF and VV mortgages are actually buying for households — balance risk is largely unexplored
- The calibration is disciplined, the Canadian setting is used well, and the US comparison generates striking numbers that speak directly to current mortgage policy debates
- The authors have the data and the model to push these results considerably further — particularly on mechanism validation, premium heterogeneity, and distributional welfare