Optimal Mix of Monetary, Macroprudential and Fiscal Policies

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Motivation

- Since the global financial crisis, the Canadian economy has faced challenges in achieving economic and financial stability:
  - Downside risks to the real economy due to external headwinds
  - Household debt has reached historically high levels
- Policies prescribed in Canada
  - Keep the nominal interest rate low to stimulate the economy
  - Tighten mortgage lending standards to limit risks in the housing sector.
- Questions
  - Is this a good policy mix?
  - Should monetary policy instead lean against financial instability?

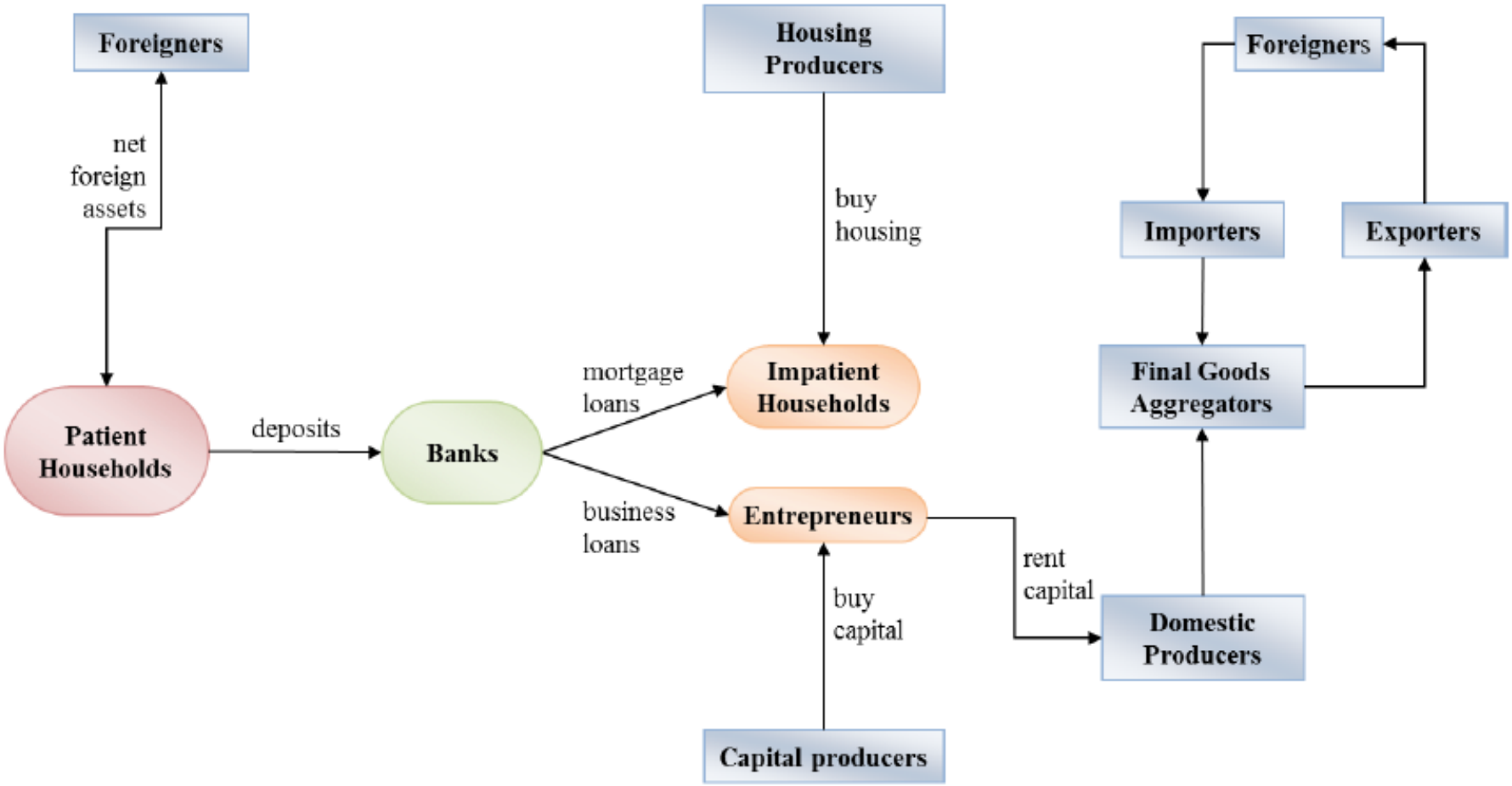
What we do in this project

- Examine *quantitatively* how to coordinate (i) the policy rate, (ii) regulatory LTV ratio and (iii) government-spending.
  - This analysis is conditional on a particular scenario of the Canadian economy involving high HH debt and external headwinds.
  - Use BoC's MP2 model (Alpanda, Cateau and Meh, 2014), which features the nexus between real and financial sectors.
- Derive the optimal mix of policies by minimizing a loss function that penalizes deviations of inflation from target and the output gap.
  - Financial stability concern captured by anticipated financial shocks.
  - The severity of the shock depends on the level of HH debt.
  - This gives the government an incentive to moderate HH debt.

Main results

- Given the baseline scenario, the optimal policy mix prescribes:
  - a reduction of the policy rate
  - a reduction in the LTV ratio
  - an increase in the government spending.
- Qualitatively, this is consistent with what is happening in Canada.
- Similar results when fiscal policy cannot provide additional stimulus.
  - Monetary policy becomes a bit more expansionary.
  - However, inflation goes back to the target, and output gap closes more slowly than in the fully optimal policy mix.

Overview of the model



Financial frictions

- Lenders pay monitoring costs of loans
  - This generates spreads on interest rates

    e.g. mortgage rate $>$ bank's funding rate
- Monitoring costs increase with borrower's leverage and generate financial accelerator mechanism
  - Two-way interactions between spread and leverage
  - Between (i) patient HHs and banks, (ii) banks and impatient HHs, (iii) banks and entrepreneurs
- Financial accelerator mechanisms interact to create further amplification.
  - monitoring costs$\uparrow$, bank's retained earnings$\downarrow$, banks' leverage$\uparrow$, deposit rate$\uparrow$, mortgage rate$\uparrow$

Pecuniary externality

- A key is that monitoring costs increase when the borrowers' net worth declines relative to what they need.
- In MP2, this is characterized in a reduced-form, increasing function:

$$\text{monitoring cost} = f\left(\frac{(1-m)\,qh}{n}\right),$$

  m: regulatory LTV ratio, qh: value of houses, n: borrower's net worth.

- This captures the tightness of borrowing constraints in a collateral model.
- Importantly, this function is not internalized by economic agents.
- As a result, the externality leads to inefficiencies and provide reasons for policy intervention.

Policies to moderate household debt

- How can policies mitigate inefficiencies arising from financial frictions? Consider how each policy can moderate HH debt.
- **Macro-prudential policy**: A reduction in the regulatory LTV ratio.
  - Raises the required down payment. Mortgage rate increases.
- **Monetary policy**: An increase in the policy rate.
  - Raises the funding cost of banks, translating into higher mortgage rates.
  - A decline in aggregate demand also reduces housing demand.
- **Fiscal policy**: A reduction in government spending.
  - A decline in aggregate demand reduces housing demand.
- Coordination of these policies is a quantitative issue.

Optimal policy mix: outline

- We are interested in the optimal paths of:
  - the policy rate
  - the regulatory LTV ratio for mortgage loans
  - government spending on goods and services.
- We solve for the optimal policies given the baseline scenario of the Canadian economy going forward:
  - High levels of household debt
  - Weakening of foreign demand for Canadian goods
  - Anticipated financial crisis in 6th year of simulation
- The way to solve for optimal policy mix:
  - Allow policy paths to deviate from the baseline scenario, and find the one that maximizes the welfare.

Baseline scenario

- Generate high HH debt and external headwinds by feeding in relevant structural shocks.
- In addition, financial shocks occur in the 6th year of simulation.
  - Rebalance patient HHs' asset portfolio away from risky assets and toward safe assets. This flight-to-quality will increase mortgage and business loan rates.
- Particular form of financial shock:

$$\varepsilon_{x,21} = \alpha_{\varkappa} \max\left\{\widehat{b}_{l,20}, 0\right\}$$

  - The severity of financial shocks depends on the size of HH debt gap.
  - Incentive to avert a crisis by reducing HH debt before the shock arrives.
  - Agents do not internalize this when they make their decisions.

Welfare criterion

- To evaluate the welfare under different policies, we use the loss function:

$$L_t = \sum_{t=1}^{100} \beta^{t-1} \left\{ (\pi_t - \pi^*)^2 + \lambda \hat{y}_t^2 \right\}$$

- Alternatives?

Comparing different policies

- We allow three policy instruments to deviate from the baseline paths:
  - Introduce additional *policy* shocks while keeping other shocks the same as in the baseline scenario
  - Additional policy shocks affect policy profiles through policy rules
- Given these shocks, we simulate the model under perfect foresight, and compute the loss.
  - To solve for the equilibrium paths, we use the log-linearized equilibrium conditions.
  - Nonlinearity due to ZLB of nominal interest rate as well as the financial shocks.

Computationally feasible approach

- It is very challenging to search optimal policy paths in an entirely unrestricted way
  - The dimensionality problem associated with the length of simulation
- We restrict our focus on a particular set of policy paths.
  - Adopt an initial guess of the optimal policy profiles
  - Allow additional policy shocks implied by the guessed policy profiles to shift up or down
- The size of each shift is controlled by a scalar
  - Allow these scalars to be picked form a wide range of intervals
- After all, we find a combination of three scalars that minimizes the loss function.

Initial guess for the optimal policy paths

- Relative to the baseline policy profile, our initial guess for the policy paths implies that
  - the policy rate cumulatively increases by 100 bps over 4 quarters
  - the LTV ratio permanently decreases by 5 p.p.
  - government expenditure cumulatively increases by 5% over 4 quarters
- Note that scalars on the initial guesses can be positive or negative.
  - Positive: the policy rate rises to lean against financial imbalances.
  - Negative: the policy rate might hit ZLB
- This approach allows us to compare policies with different implications even though the range of policy profiles is restricted.

Results: optimal policy paths

Changes from the baseline (in percentage points)

Year	1st	2nd	3rd	4th	5th
Policy rate					
Optimal mix	-0.6	-0.06	+0.4	+0.6	+0.7
Optimal excl. fiscal	-0.6	-0.15	+0.25	+0.47	+0.52
Regulatory LTV ratio					
Optimal mix	-3.5	-5.6	-5.6	-5.6	-5.5
Optimal excl. fiscal	-3.3	-5.3	-5.3	-5.3	-5.3
Government expenditure to GDP ratio					
Optimal	+0.9	+1.4	+1.3	+1.1	+0.9

Results: key variables

Changes from the baseline (in percentage points)

Year	1st	2nd	3rd	4th	5th
Inflation rate					
Optimal mix	+0.10	+0.17	+0.25	+0.30	+0.27
Optimal excl. fiscal	+0.06	+0.10	+0.18	+0.23	+0.22
Output					
Optimal mix	+0.78	+0.90	+0.79	+1.06	+1.36
Optimal excl. fiscal	-0.03	-0.05	+0.18	+0.67	+1.13
Household debt					
Optimal	-0.71	-2.33	-3.79	-4.83	-5.44
Optimal excl. fiscal	-0.75	-2.31	-3.78	-4.85	-5.45

Intuition

The results do not support the leaning of monetary policy against HH imbalances.

1. Regulatory LTV policy is more efficient than monetary policy in addressing housing sector issues.
   - Regulatory LTV policy can directly affect the housing sector.
   - Monetary policy affects all sectors in the economy.
2. Monetary policy is more effective against external headwinds that negatively affects the aggregate economy.

Conclusion

- Given the scenario for the Canadian economy, the optimal policy mix calls for a tightening in the regulatory LTV ratio and expansionary monetary and fiscal policies.
- Monetary authority may have to be cautious about leaning against financial imbalances if macro-prudential policy can directly and more efficiently address risks in the financial sector.
- However, more research needs to be done to deepen the understanding of policy mix.
  - A more elaborate endogenous channel to generate financial crises.
  - Ramsey policies taking into account heterogeneity of agents and contingent future paths.