

Shocks Without Borders: U.S. Monetary Policy and the Canadian Economy

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Abstract

Canada and the United States share one of the closest economic partnerships in the world. Given the size of the United States economy, the monetary policy decisions of the United States are bound to affect the Canadian economy. This paper investigates the spillover effects of US monetary policy shocks on Canadian macroeconomic outcomes. I use a structural vector autoregression model with an instrumental variable approach (SVAR-IV) for the identification of monetary policy shocks. I estimate the long-term response of the Canadian economy to a US monetary policy shock through the exchange rate, trade, and financial channel variables.

Motivation and Background

The United States (US) is very economically important to Canada. The two countries have one of the closest trade partnerships in the world. **Notably, this relationship has been challenged in recent months.** There is a notable linkage between the two country's supply chains. Supply chain links are especially evident in the energy sector, the automotive sector, and the agriculture sector. For instance, the automotive sector consists of a supply chain that sends parts between the United States and Canada multiple times before a final product is produced (Government of Canada, n.d.). An important example of the linked supply chains is Crude oil. Alberta's Crude oil is often exported to the United States to be refined, and a portion of the refined oil is then re-imported by Canada (Canada Energy Regulator, 2024). The close economic relationship between the two countries means that economic changes in the United States and the subsequent effects on the Federal Funds Rate mean Canada is susceptible to spillovers from United States monetary policy. Understanding US monetary policy spillovers to Canada can provide insight on how Canadian policymakers can react to shocks. I investigate transmission of US monetary policy shocks through three channels, the exchange rate, trade, and financial markets.

***A monetary policy shock is a change to the U.S. policy interest rate that is unanticipated by financial markets, businesses, and consumers.**

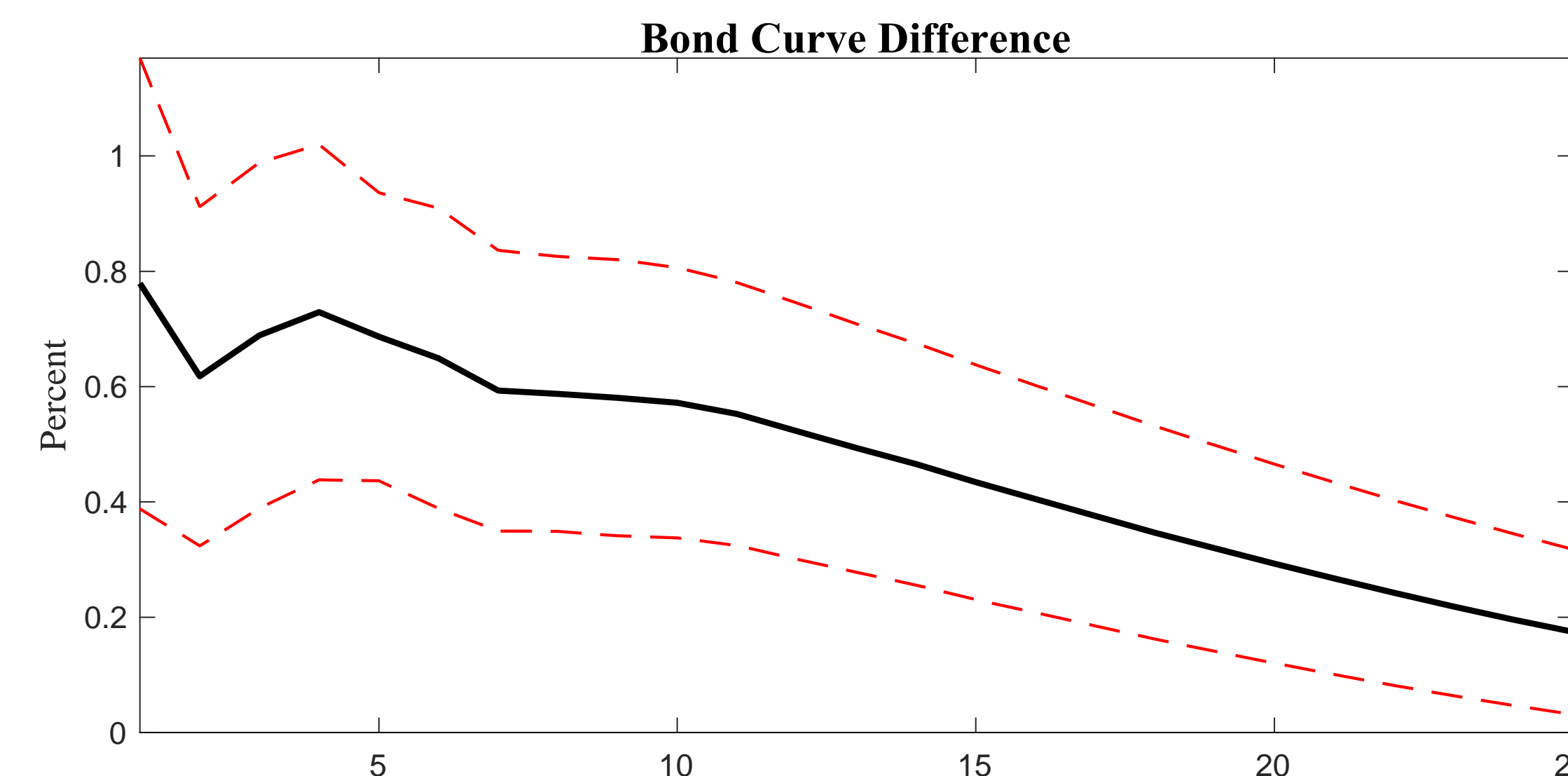
References

- Stock, J. H., & Watson, M. W. (2018). Identification and Estimation of Dynamic Causal Effects in Macroeconomics Using External Instruments. *The Economic Journal*, 128(610), 917–948.
- Gertler, M., & Karadi, P. (2015). Monetary Policy Surprises, Credit Costs, and Economic Activity. *American Economic Journal: Macroeconomics*, 7(1), 44–76.
- A Strong Partnership (Connect2Canada). (n.d.). Government of Canada. Retrieved November 9, 2024
- Almost all Canadian crude oil exports went to the United States in 2023 (Market Snapshots). (2024). Canada Energy Regulator.

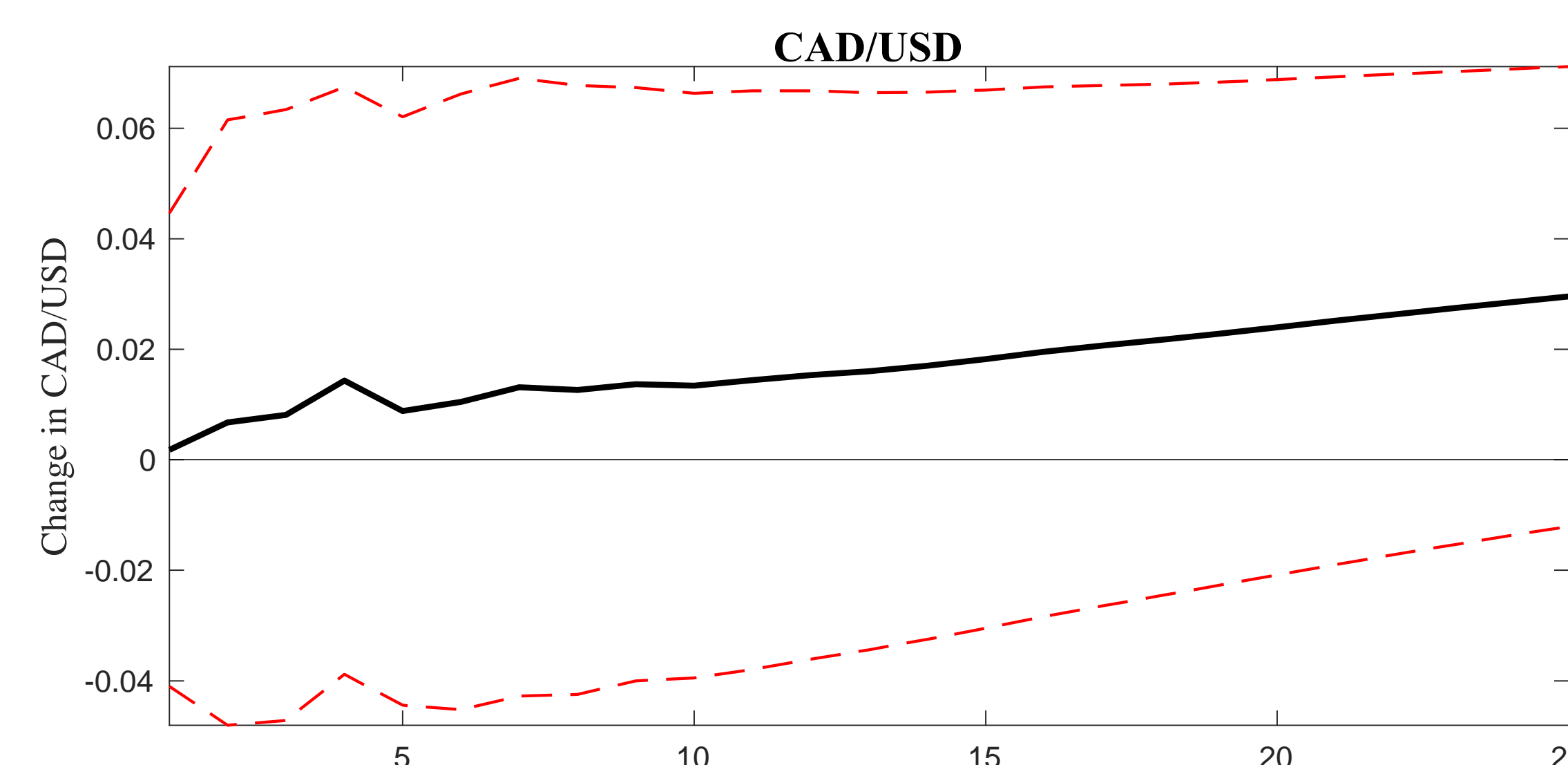
Preliminary Results - Channels

Financial Channel: The bond spread difference variable shows an instantaneous increase of 0.8% from the shock. The effect gradually decreases over a two-year horizon. **The variable potentially indicates investors will shift capital from Canada to US bonds (capital flight).** Notably, this variable is hard to interpret with certainty because of the many possible combination of changes. The result *possibly* indicates the largest increase was in the US 2-year bond yield, followed by a smaller increase in the US 10-year bond yield. In contrast, the instantaneous Canadian bond yield changes are harder to predict. A possible scenario is the Canadian 10-year bond may have increased slightly due to an expected increase in the Canadian policy interest rate.

(CAN10YR – CAN2YR) – (US10YR – US2YR)

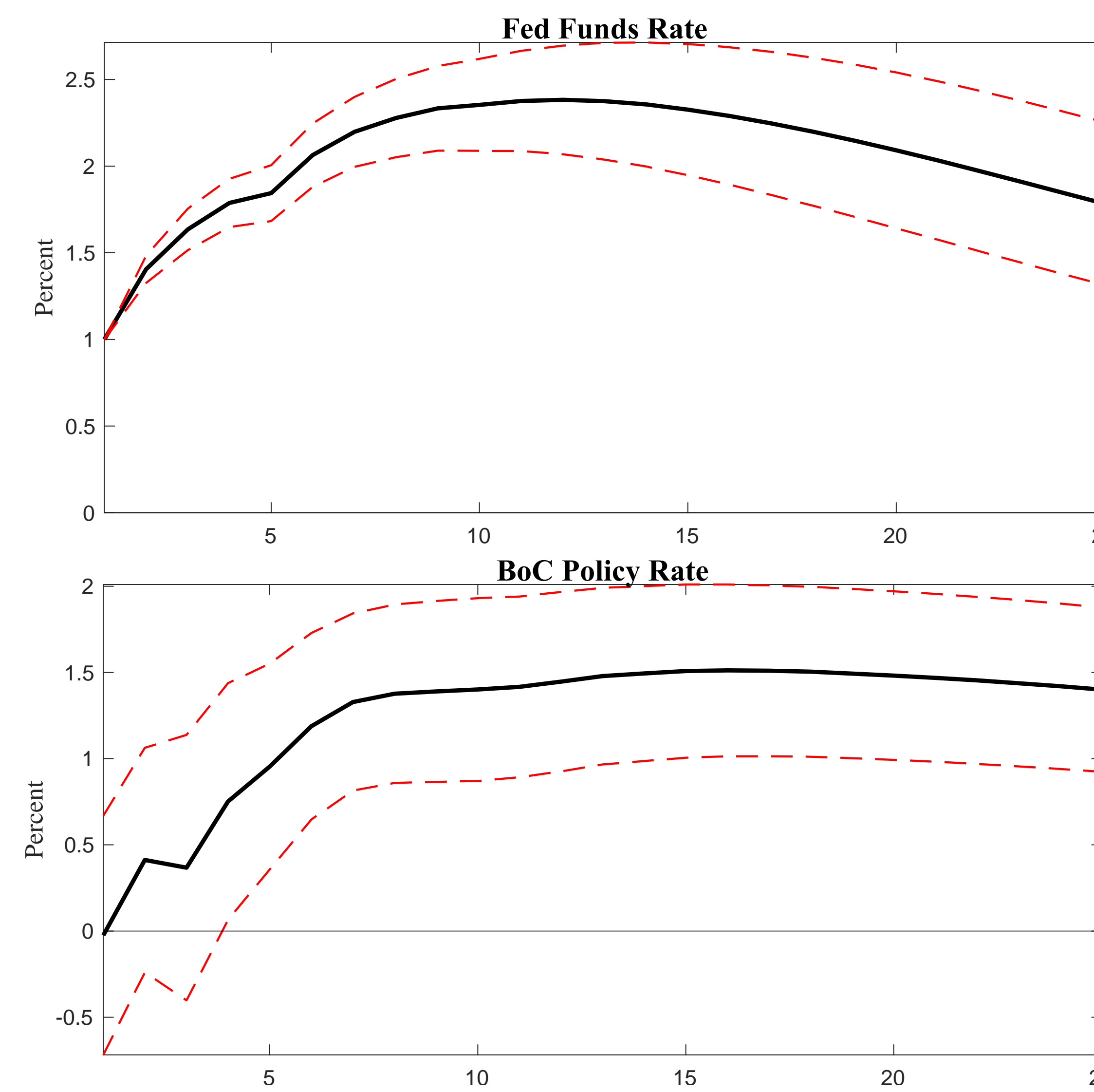


Exchange Rate Channel: The CAD/USD (e.g., 1.4CAD/1USD) exchange rate response shows a small instantaneous **depreciation** of the Canadian dollar followed by a further depreciation over time. There is no clear indication of a return to zero. This means Canadian goods become relatively cheaper to export over time. A depreciating currency generally increases economic growth due to higher exports but also causes inflationary pressures. It is important to note the large standard errors on this impulse response. CAD/USD is very volatile and influenced by many other variables.



Trade Channel: The Canadian-US trade balance is the dollar (CAD) value of Canadian goods exports to the United States less the Canadian imports of US goods. Consistent with the depreciation of the CAD/USD exchange rate, the trade balance increases instantaneously with the shock, then decreases over time. This means **Canadian exports increase, imports decrease, or both.**

Preliminary Results - Interest Rates



Interest Rates: The result of a one percentage point shock to U.S. Federal Funds Rate (FFR). The graphs show the key interest rates in the United States (FFR) and Canada (BoC Policy Rate) over time. The FFR approximately increases 2.4% after a year. The Bank of Canada policy rate also increases, but its peak is about 16 months after the initial shock and the effect is more persistent. Notably, the policy rate hike in Canada is nearly a full percentage point lower than in the US at their respective peaks. Consistent with theory, this result shows that rate hikes in the United States affect the Bank of Canada's policy interest rate. The transmission through the channels affect economic outcomes in Canada, which affect the policy rate.

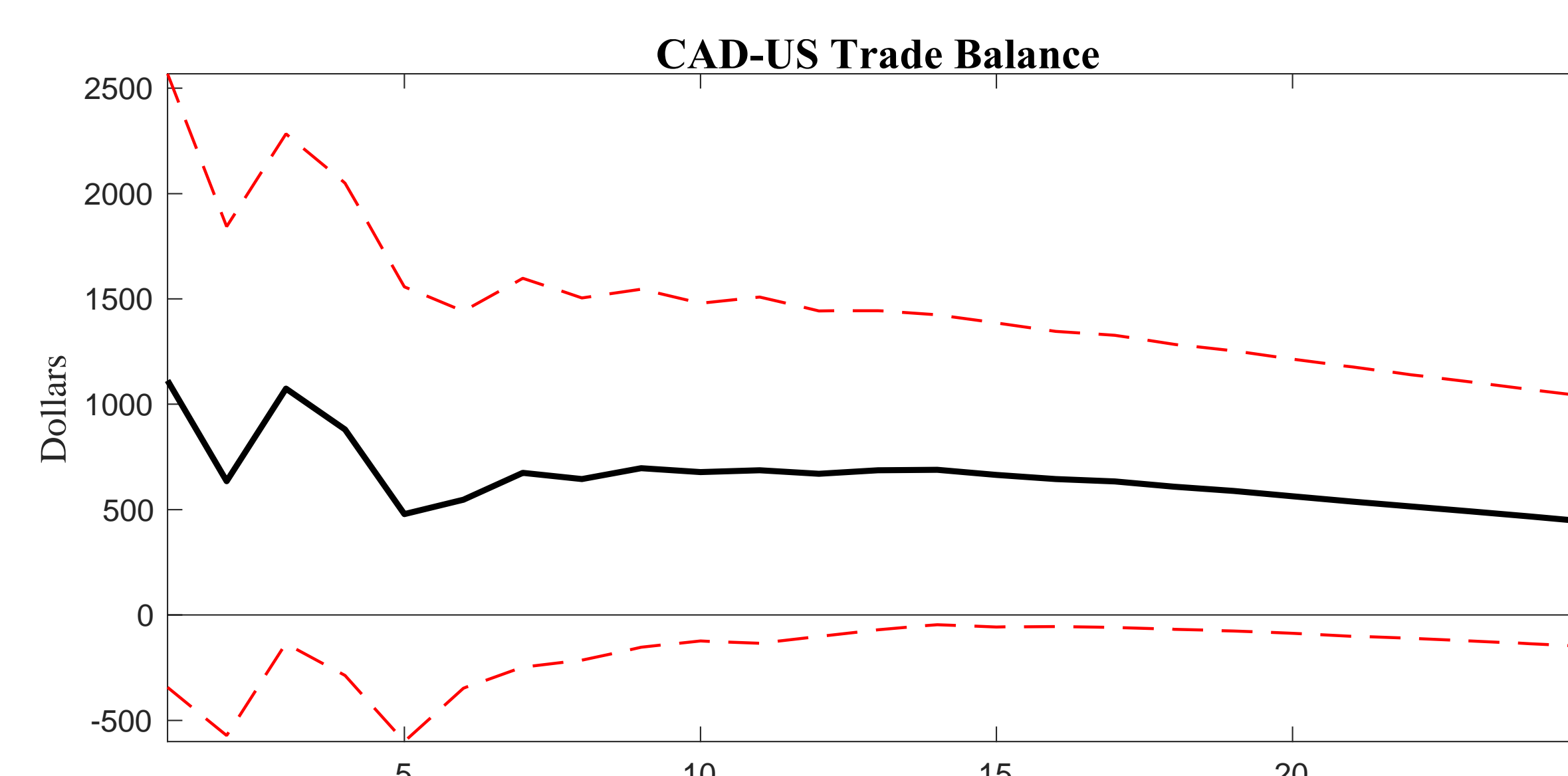
***Note:** All impulse response functions are from a seven variable specification and identified with a single instrument.

Contact and Acknowledgements

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Methodology

I use a Structural Vector Autoregression (SVAR) econometric model with factors to estimate shocks, then I identify the monetary policy shocks through an instrumental variable (IV) approach. The approach is based on the Stock and Watson (2018) "SVAR-IV" method. My structural vector autoregression model has multiple specifications containing up to seven variables. The final reduced form SVAR equation:

$$Y_t = \sum_{j=1}^l \Phi_j Y_{(t-j)} + \sum_{k=0}^m \Gamma_k F_{(t-k)} + \mu_t$$

where,

$$\mu_t = S \varepsilon_t$$

Y_t is the vector of endogenous macroeconomic variables at time t . $Y_{(t-j)}$ are the lags of Y_t , $F_{(t-k)}$ is the vector of factors and its lags, and Φ, Γ are their respective coefficient matrices. μ_t is the vector of structural shocks, S is the "structural" part of SVAR, and ε_t are the shocks in non-reduced form.

In the vector of structural shocks, I identify the monetary policy shocks through my instrumental variables. The IV's must be correlated with the U.S. policy rate but uncorrelated with other shocks.

$$\mu_t^p = \sum_{n=1}^z (IV)_n + \tau$$

This equation identifies the part of the US FFR structural shock that is due to monetary policy shocks, $\hat{\mu}_t^p$. I then regress the remaining variables shocks on $\hat{\mu}_t^p$ to learn the monetary policy shocks effect on other variables.

$$\mu_t^q = \frac{s^q}{s^p} \hat{\mu}_t^p + \zeta$$

Where s is a vector in S . s^q contains the information to create impulse response functions (IRF). IRF's give information on how the variables of interest react over time to a standardized 1% monetary policy shock.

Data

SVAR Variables (Y_t)	Unit
Federal Funds Effective Rate (FRED)	Percent
Canadian Real GDP (LCDMA)	Growth Rate
Consumer Price Index (StatsCan)	YoY change
BoC Policy Interest Rate (StatsCan)	Percent
CAD/USD Exchange Rate (FRED)	Ratio
Canada-US Trade Balance (StatsCan)	Dollars
Bond Spread Difference (FRED, StatsCan)	Percent
Unemployment Rate (StatsCan)	Percent

My set of instrumental variables contains all available instruments and shocks used in past U.S. monetary policy shock literature. I use three different subsets of instruments for robustness: a one instrument approach (Gertler and Karadi, 2015), instruments from "high frequency identification" papers, and all 19 available instruments from a variety of literature.