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Bank of Canada
Monthly Research Update

January 2022

This monthly newsletter features the latest research publications by Bank of Canada economists. The report includes papers appearing in external publications and staff working papers published on the Bank of Canada's website.

PUBLISHED PAPERS

In-Press

Collin Brown & Jonathan Chiu & Thorsten V. Koeppl, "What drives Bitcoin fees? Using SegWit to assess Bitcoin's long-run sustainability", Journal of Financial Market Infrastructures, Vol 9(4): 1-25, January 2022

Cars Hommes & Kai Li & Florian Wagener, "Production delays and price dynamics", Journal of Economic Behavior & Organization, Vol 194: 341-362, February 2022

Tomiyuki Kitamura & Tamon Takamura, "Output Comovement and Inflation Dynamics in a Two-Sector Model with Durable Goods: The Role of Sticky Information and Heterogeneous Factor Markets", Journal of Money, Credit and Banking, Vol 54(1): 313-331, February 2022

Forthcoming

Jacek Rothert & Jacob Short, "Non-traded goods, factor markets frictions, and international capital flows", Review of Economic Dynamics

Jonathan Chiu & Thorsten Koeppl, "The Economics of Cryptocurrencies—Bitcoin and Beyond", Canadian Journal of Economics

Sushant Acharya & Julien Bengui & Keshav Dogra & Shu Lin Wee, "Slow Recoveries and Unemployment Traps: Monetary Policy in a Time of Hysteresis", The Economic Journal

STAFF WORKING PAPERS

Thibaut Duprey & Daniel E. Rigobon & Philip Schnattinger & Artur Kotlicki & Soheil Baharian & T. R. Hurd, "Business Closures and (Re)Openings in Real Time Using Google Places", Bank of Canada Staff Working Paper 2022-1

Wenting Song & Samuel Stern, "Firm Inattention and the Efficacy of Monetary Policy: A Text-Based Approach", Bank of Canada Staff Working Paper 2022-3

Sushant Acharya & Keshav Dogra & Sanjay Singh, "The Financial Origins of Non-fundamental Risk", Bank of Canada Staff Working Paper 2022-4

Shang-Jin Wei & Yinxi Xie, "On the Wedge Between the PPI and CPI Inflation Indicators", Bank of Canada Staff Working Paper 2022-5

STAFF DISCUSSION PAPERS

Y.-H. Henry Chen & Erik Ens & Olivier Gervais & Hossein Hosseini & Craig Johnston & Serdar Kabaca & Miguel Molico & Sergey Paltsev & Alex Proulx & Argyn Toktamyssov, ”Transition Scenarios for Analyzing Climate-Related Financial Risk”, Bank of Canada Staff Discussion Paper 2022-1

ABSTRACTS

What drives Bitcoin fees? Using SegWit to assess Bitcoin's long-run sustainability

Can Bitcoin remain tamper-proof in the long run? We use block-level data from the Bitcoin blockchain to estimate the impact of congestion and the US dollar price on fee rates. The introduction and adoption of the segregated witness (SegWit) protocol allows us to identify an aggregate demand curve for Bitcoin transactions. We find that SegWit has reduced fee revenue by about 70%. Fee revenue could be maximized at a block size of about 0.6 megabytes when SegWit adoption remains at current levels. At this block size, maximum fee revenue would be equivalent to one-eighth of the current average block reward. Hence, large sustained price increases are required to keep mining rewards constant in the long run.

Production delays and price dynamics

This paper develops a unified analysis of the impacts of production delays on aggregate price fluctuations in a continuous-time cobweb-type model. We find that the time inconsistency between demand and supply due to production delays inherently generates an overshooting effect in prices. Large production delays give rise to price fluctuations, even with a low intensity of choice. We also provide results consistent with the rational route to randomness of Brock and Hommes (1997) in a continuous-time infinite-dimensional economy.

Output Comovement and Inflation Dynamics in a Two-Sector Model with Durable Goods: The Role of Sticky Information and Heterogeneous Factor Markets

In the United States, the inflation and output of durable and nondurable goods respond to a monetary policy shock in the same direction with a delay. However, the existing New Keynesian dynamic stochastic general equilibrium models that generate the positive output comovement cannot explain this delayed response in sectoral inflation. We show that adding sticky information to both goods along with heterogeneous factors of production can explain the observed patterns in sectoral inflation and output. Moreover, in line with recent empirical findings, the estimated information stickiness is larger for housing than for nondurable goods and services.

Non-traded goods, factor markets frictions, and international capital flows

The canonical one-sector model over predicts international capital flows by a factor of ten. We show that introducing a non-traded goods sector can reconcile the differences between the theoretical predictions and the observed flows. We analyze the quantitative impact of the nontraded sector using a calibrated model of a small open economy, in which non-traded goods are used in consumption and investment, and need capital and labor to be produced. The model features international frictions directly affecting international borrowing and lending, as well as domestic frictions that limit the scope of inter-sectoral reallocation of capital and labor. We find that: (1) the impact of domestic frictions on the size of international capital flows is similar to the impact of international frictions, and (2) the median elasticity of capital flows with respect to international frictions in the two-sector model with costly inter-sectoral reallocation is about 50- 60% lower than that same elasticity in the one-sector model.

The Economics of Cryptocurrencies—Bitcoin and Beyond

How well can a cryptocurrency serve as a means of payment? Cryptocurrencies need to overcome double spending by using costly mining and by delaying settlement. We formalize this insight through an incentive constraint that rules out double spending and pins down the welfare costs of a cryptocurrency. We find that it is optimal to use seignorage rather than transaction fees to finance costly mining. We estimate that Bitcoin generates a large welfare loss that is about 500 times as large as a monetary economy with 2% inflation. This welfare loss can be lowered in an optimal design to the equivalent of a monetary economy with moderate inflation of about 45%.

Slow Recoveries and Unemployment Traps: Monetary Policy in a Time of Hysteresis

We analyse monetary policy in a model where temporary shocks can permanently scar the economy’s productive capacity. Workers lose skill while unemployed and are costly to retrain, generating multiple steady-state unemployment rates. Following a large shock, unless monetary policy acts aggressively and quickly enough to prevent a significant rise in unemployment, hiring falls to a point where the economy recovers slowly at best – at worst, it falls into a permanent unemployment trap. Monetary policy can only avoid these outcomes if it commits in a timely manner to more accommodative policy in the future. Timely commitment is essential as the effectiveness of

monetary policy is state dependent: once the recession has left substantial scars, monetary policy cannot speed up a slow recovery, or escape from an unemployment trap.

Business Closures and (Re)Openings in Real Time Using Google Places

We present a new method to measure business opening and closure rates using real-time information from Google Places, the dataset behind the Google Maps service. Our Canadian application confirms the importance of temporary closures and reopenings during the COVID-19 pandemic. Over 50% of the temporarily closed food and retail businesses during the April 2021 lockdown reopened by the end of September. Our estimates align well with the timing of COVID-19 restrictions and are validated by a survey of recently opened businesses. Our framework provides policy-makers with a tool for the timely monitoring of business dynamics.

Firm Inattention and the Efficacy of Monetary Policy: A Text-Based Approach

This paper provides direct evidence of the importance of firm attention to macro-economic dynamics. We construct a text-based measure of firm attention to macro-economic news and document firm attention that is polarized and countercyclical. Differences in attention lead to asymmetric responses to monetary policy: expansionary monetary shocks raise market values of attentive firms more than those of inattentive firms, and contractionary shocks lower values of attentive firms by less. We use the measure to calibrate a quantitative model of rationally inattentive firms with heterogeneous costs of information. Less attentive firms adjust prices slowly in response to monetary innovations, which yields non-neutrality. As average attention varies over the business cycle, so does the efficacy of monetary policy.

The Financial Origins of Non-fundamental Risk

We formalize the idea that the financial sector can be a source of non-fundamental risk. Households' desire to hedge against price volatility can generate price volatility in equilibrium, even absent fundamental risk. Fearing that asset prices may fall, risk-averse households demand safe assets from leveraged intermediaries, whose issuance of safe assets exposes the economy to self-fulfilling fire sales. Policy can eliminate non-fundamental risk by (i) increasing the supply of publicly backed safe assets, through issuing

government debt or bailing out intermediaries, or (ii) reducing the demand for safe assets, through social insurance or by acting as a market maker of last resort.

On the Wedge Between the PPI and CPI Inflation Indicators

While two strands of the literature suggest that PPI inflation, in addition to or instead of CPI inflation, should be a targeting variable in a monetary policy rule, the distinction between the two is only important when they do not co-move strongly. Our first contribution is to document that their correlation has indeed fallen substantially since the start of this century. Our second contribution is to propose a model to understand this divergence based on expanding global supply chains. Our theory produces additional predictions that are also confirmed in the data. As such changes are structural rather than temporary, the standard monetary policy rule that does not target the PPI inflation may have become increasingly problematic.

Transition Scenarios for Analyzing Climate-Related Financial Risk

In November 2020, the Bank of Canada launched a pilot project with the Office of the Superintendent of Financial Institutions aimed at better understanding risks to the economy and the financial system related to climate change. Part of this work included developing a set of Canada-relevant climate transition scenarios that explore pathways consistent with achieving certain climate targets. The scenarios vary in terms of two key drivers of climate transition risk: (i) the ambition and timing of climate policy and (ii) the pace of technological change and availability of advanced technologies. To develop the scenarios, we used a suite-of-models approach that linked a computable general equilibrium energy-economy model with two macroeconomic models. The scenarios focus on Canada and the United States because of the material exposure of the Canadian financial sector to these regions. They capture the evolution of the global economy, summarized across 10 emissions-intensive sectors of the economy and across 8 distinct regions of the world. The analysis illustrated the important sectoral restructuring the Canadian and global economies may need to undertake to meet climate targets. The analysis showed that every sector contributes to the transition and that the financial impacts vary across sectors. These impacts depend on how the sectors are impacted by emissions and capital expenditures costs and on how the demand for their products is affected by the decarbonization of economies. The scenarios also shed light on the risks of significant

macroeconomic impacts, in particular for commodity-exporting countries like Canada. The economic impacts for Canada are driven mostly by declines in global prices of commodities rather than by domestic policy decisions. Finally, the analysis showed that delaying climate policy action increases the overall economic impacts and risks to financial stability.

UPCOMING EVENTS

*** All onsite conferences and events are suspended until further notice. All events listed below will take place virtually.**

Katerina Petrova (Pompeu Fabra University)
Organizer: FMD / FSD EFR Seminar Series
Date: 2 March 2022

Christian Wolf (Massachusetts Institute of Technology)
Organizer: EFR CEA/INT Seminar Series
Date: 4 March 2022

Kyle Herkenhoff (University of Minnesota)
Organizer: FMD / FSD EFR Seminar Series
Date: 10 March 2022

Isabelle Mejean (Sciences Po)
Organizer: EFR CEA/INT Seminar Series
Date: 11 March 2022

Yuriy Gorodnichenko (UC Berkeley)
Organizer: EFR CEA/INT Seminar Series
Date: 18 March 2022

Giovanno Compiani (Booth School of Business)
Organizer: BAP Virtual Speaker Series
Date: 21 March 2022

David Evans (University of Oregon)
Organizer: FMD / FSD EFR Seminar Series
Date: 24 March 2022

Daphne Skandalis (University of Copenhagen)
Organizer: EFR CEA/INT Seminar Series
Date: 1 April 2022

Maxi Guennewig (University of Bonn)
Organizer: BAP Virtual Speaker Series
Date: 4 April 2022