

Bank of Canada Monthly Research Update

November 2020

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

Cunningham, Rose & Hatzvi, Eden & Mo, Kun, “[The Size and Destination of China's Portfolio Outflows](#)”, *Applied Economics*, October 2020

Huynh, Kim P. & Henry, Christopher S. & Nicholls, Gradon & Nicholson, Mitchell W., “[Benchmarking Bitcoin Adoption in Canada: Awareness, Ownership and Usage in 2018](#)”, *Ledger*, Vol 5: 74-88, November 2020

Forthcoming

Chiu, Jonathan & Molico, Miguel, “[Short-Run Dynamics in a Search-Theoretic Model of Monetary Exchange](#)”, *Review of Economic Dynamics*

Bhandari, Anmol & Birinci, Serdar & McGrattan, Ellen & See, Kurt, “[What Do Survey Data Tell Us about U.S. Businesses?](#)”, *American Economic Review: Insights*

Camous, Antoine & Matveev, Dmitry, “[Furor over the Fed: A President's Tweets and Central Bank Independence](#)”, *CESifo Economic Studies*

Christoffersen, Peter & Feunou, Bruno & Jeon, Yoontae & Ornathanalai, Chayawat, “[Time-Varying Crash Risk Embedded in Index Options: The Role of Stock Market Liquidity](#)”, *Review of Finance*

STAFF WORKING PAPERS

Schroth, Josef, “[Outside Investor Access to Top Management: Market Monitoring versus Stock Price Manipulation](#)”, Bank of Canada Staff Working Paper 2020-43

Cao, Shutao & Dong, Wei, “[Production Networks and the Propagation of Commodity Price Shocks](#)”, Bank of Canada Staff Working Paper 2020-44

Eo, Yunjong & Uzeda, Luis & Wong, Benjamin, “[Understanding Trend Inflation Through the Lens of the Goods and Services Sectors](#)”, Bank of Canada Staff Working Paper 2020-45

Lochner, Lance & Park, Youngmin, “[Earnings Dynamics and Intergenerational Transmission of Skill](#)”, Bank of Canada Staff Working Paper 2020-46

- Birinci, Serdar & See, Kurt, “[How Should Unemployment Insurance Vary over the Business Cycle?](#)”, Bank of Canada Staff Working Paper 2020-47
- Kabaca, Serdar & Maas, Renske & Mavromatis, Kostas & Priftis, Romanos, “[Optimal Quantitative Easing in a Monetary Union](#)”, Bank of Canada Staff Working Paper 2020-49
- Diez de los Rios, Antonio, “[A Macroeconomic Model of an Epidemic with Silent Transmission and Endogenous Self-isolation](#)”, Bank of Canada Staff Working Paper 2020-50
- MacGee, James (Jim) C. & Pugh, Thomas & See, Kurt, “[The Heterogeneous Effects of COVID-19 on Canadian Household Consumption, Debt and Savings](#)”, Bank of Canada Staff Working Paper 2020-51
- Bellemare, Charles & Kpekou Tossou, Rolande & Moran, Kevin, “[The Determinants of Consumers’ Inflation Expectations: Evidence from the US and Canada](#)”, Bank of Canada Staff Working Paper 2020-52

STAFF DISCUSSION PAPERS

- Chen, Xin Scott & Jaffery, Ali & Nolin, Guillaume & Salhab, Karim & Shannon, Peter & Sarker, Subrata, “[Assessing Global Potential Output Growth: October 2020](#)”, Bank of Canada Staff Discussion Paper 2020-10
- Kryvtsov, Oleksiy & MacGee, James (Jim) C., “[Has the Inflation Process Changed? Selective Review of Recent Research on Inflation Dynamics](#)”, Bank of Canada Staff Discussion Paper 2020-11

ABSTRACTS

The Size and Destination of China's Portfolio Outflows

China's large financial system is relatively closed, raising concerns that liberalization of China's capital account could have disruptive effects on the global financial system. We estimate a portfolio allocation model to estimate an economy's foreign portfolio investment, using panel data for 39 economies. We estimate the model separately for equity and debt securities holdings. We find that portfolio allocation to a foreign economy depends on the destination economy's market size, gravity variables, governance indicators and capital controls in source and destination economies. We then construct a counterfactual scenario of China's overseas portfolio investment allocations in 2015 if China had liberalized capital outflows. The analysis indicates that China's holdings of overseas portfolio assets would have been large at 13% to 29% of Chinese GDP, or 5 to 12 times its actual levels. These asset holdings would have been predominantly from the world's deepest financial markets: the United States, euro area and Japan. Emerging-market economies would have received relatively little additional portfolio inflows from China, suggesting that liberalization of China's portfolio outflows may not prove disruptive to the global financial system.

Benchmarking Bitcoin Adoption in Canada: Awareness, Ownership and Usage in 2018

The Bank of Canada commissioned the Bitcoin Omnibus Survey in 2016 to monitor trends in the adoption and use of Bitcoin and other cryptoassets. This report presents findings from the latest iteration of the survey, which was conducted in 2018. We find that between 2016 and 2018 the share of Canadians who were aware of Bitcoin increased from 62 percent to 89 percent and those that owned Bitcoin increased from 3 percent to 5 percent. However, the share of past owners also increased, suggesting an influx of Bitcoin owners who subsequently divested after the steep rise of prices in 2017. The main reason for owning Bitcoin remains speculation, though this share decreased slightly since 2017. On the other hand, the share of Canadians who reported using Bitcoin for transactions a few times a month or more increased. Finally, we discuss how Bitcoin adopters differ from overall Canadians with respect to their financial literacy and cash holdings.

Short-Run Dynamics in a Search-Theoretic Model of Monetary Exchange

We study the short-run effects of monetary policy in a search-theoretic monetary model in which agents are subject to idiosyncratic liquidity shocks as well as aggregate monetary shocks. Namely, we analyze the role of the endogenous non-degenerate distribution of liquidity, liquidity constraints, and decentralized trade, for the transmission and propagation of monetary policy shocks. Money is injected through lump-sum transfers which have redistributive and persistent effects on output and prices. We propose a new numerical algorithm in the spirit of Algan et al. (2008) to solve the model. We find that a one-time expansionary monetary policy shock has persistent positive effects on output, prices, and welfare, even in the absence of nominal rigidities. Furthermore, the effects of positive and negative monetary shocks are typically asymmetric. Negative (contractionary) shocks have bigger effects than positive (expansionary) shocks. In addition, in an economy with larger shocks, the responses tend to be disproportionately larger than those in an economy with smaller shocks. Finally, the effectiveness of monetary shocks depends on the steady-state level of inflation. The higher the average level of inflation (money growth), the bigger the impact effect of a shock of a given size but the smaller its cumulative effect. These results are consistent with existing empirical evidence.

What Do Survey Data Tell Us about U.S. Businesses?

This paper examines the reliability of survey data on business incomes, valuations, and rates of return, which are key inputs for studies of wealth inequality and entrepreneurial choice. We compare survey responses of business owners with available data from administrative tax records, brokered private business sales, and publicly traded company filings and document problems due to nonrepresentative samples and measurement errors across several surveys, subsamples, and years. We find that the discrepancies are economically relevant for the statistics of interest. We investigate reasons for these discrepancies and propose corrections for future survey designs.

Furor over the Fed: A President's Tweets and Central Bank Independence

We illustrate how market data can be informative about the interactions between monetary and fiscal policy. Federal funds futures are private contracts that reflect investor's expectations about

monetary policy decisions. By relating price movements of these contracts with President Trump's tweets on monetary policy, we explore how markets have perceived presidential attempts to influence monetary policy decisions. Overall, our results indicate markets expected the Federal Reserve to adjust monetary policy in the direction suggested by President Trump.

Time-Varying Crash Risk Embedded in Index Options: The Role of Stock Market Liquidity

We estimate a continuous-time model with dynamic crash probability using the S&P500 index options and high-frequency information. We find that market illiquidity is an important factor in explaining the time-varying stock market crash risk embedded in index options. While market illiquidity and return volatility play complementary roles in explaining the time-varying crash risk, the relative contribution of the volatility factor is weakened once we include market illiquidity as an economic variable. Examining the link between market illiquidity and option-implied crash risk, we find that the availability of arbitrage capital and adverse selection facing liquidity providers are economic driving forces.

Outside Investor Access to Top Management: Market Monitoring versus Stock Price Manipulation

This paper studies the role of voluntary disclosure in crowding out independent research about firm value. In the model, when inside firm owners make it easier for outside investors to obtain inexpensive biased information from the manager, investors rely less on costly unbiased research. As a result, managers are tempted to manipulate the firm stock price more, but investors are better informed because they anticipate manager manipulation. An increase in stock-price informativeness, therefore, has to be traded off against an increase in resources wasted on manipulation. I find that, surprisingly, firm owners grant investors more access to managers that manipulate more strongly. An implication is that the firm cost of capital is negatively related to manager manipulation.

Production Networks and the Propagation of Commodity Price Shocks

We examine the macro implications of commodity price shocks in a general equilibrium model with input-output linkages for a commodity-exporting small open economy. In the model, fluctuations in commodity price affect aggregate output not only through resource

reallocation, currency value changes and monetary policy reaction, but also through upstream and downstream input-output linkages (both domestically and with the rest of the world). Calibrated to the Canadian economy, our model is able to explain a large part of the decline in real gross domestic product (GDP) in 2015 and 2016 following the sharp drop in commodity prices. We find that as the model economy adjusts to a commodity price shock, domestic downstream linkages and the export connection with the rest of the world play an important role.

Understanding Trend Inflation Through the Lens of the Goods and Services Sectors

We distinguish between the goods and services sectors in an otherwise standard unobserved components model of US inflation. Our main finding is that, while both sectors used to contribute to the overall variation in aggregate trend inflation, since the 1990s this variation has been driven almost entirely by the services sector. Two changes in sector-specific inflation dynamics are responsible for this finding: (i) a large fall in the variance of trend goods inflation; and (ii) the disappearance of comovement between trend goods and trend services inflation. Extensions to our baseline analysis by excluding energy prices and decomposing trend inflation into a common and a relative price component suggest a possible role of monetary policy in explaining our empirical findings. We also document similar changes in inflation dynamics internationally when extending our analysis to Australia and Canada.

Earnings Dynamics and Intergenerational Transmission of Skill

This paper develops and estimates a two-factor model of intergenerational skill transmission when earnings inequality reflects differences in individual skills and other non-skill shocks. We consider heterogeneity in both initial skills and skill growth rates, allowing variation in skill growth to change over the lifecycle. Using administrative tax data on two linked generations of Canadians covering 37 years, we exploit covariances in log earnings (at different ages) both across and within generations to identify and estimate the intergenerational correlation structure for initial skills and skill growth rates, lifecycle skill growth profiles, and the dynamics of non-skill earnings shocks.

We estimate low intergenerational elasticities (IGEs) for earnings in Canada (less than 0.2, even when based on 5-year and 9-year average earnings); however, skill IGEs are typically 2–3 times larger

due to considerable (and persistent) variation in earnings conditional on skills. Both earnings and skill IGEs decline substantially for more recent cohorts and are lower for children born to younger fathers. We estimate significant heterogeneity in both initial skills and skill growth rates, showing that intergenerational transmission of these factors explains up to 40% of children's skill variation. Skills become a more important determinant of earnings over the first part of workers' careers, while intergenerational transmission of skills becomes less important with age. Although "inherited" initial skills (compared with skill growth) are a more important determinant of children's skills throughout their lives, parents' initial skills and skill growth rates are equally important determinants of children's skills, largely because both strongly influence children's initial skills.

Finally, we study intergenerational mobility for the 35 largest cities in Canada, determining the extent to which considerable differences in earnings and skill IGEs vary with the extent of local heterogeneity in parental skills vs. earnings instability.

How Should Unemployment Insurance Vary over the Business Cycle?

We study optimal unemployment insurance (UI) policy over the business cycle, using a heterogeneous agent job-search model with aggregate risk and incomplete markets. We validate the model-implied micro and macro labor market elasticities to changes in the generosity of UI benefits against existing estimates and we reconcile divergent empirical findings. We show that generating the observed demographic differences between UI recipients and non-recipients is critical for determining the magnitudes of these elasticities. We find that the optimal UI policy features countercyclical replacement rates with an average generosity that is close to current U.S. policy but that it adopts drastically longer payment durations reminiscent of European policies.

Optimal Quantitative Easing in a Monetary Union

This paper explores the optimal allocation of government bond purchases within a monetary union, using a two-region DSGE model, where regions are asymmetric with respect to economic size and portfolio characteristics: the extent of substitutability between assets of different maturity and origin, asset home bias, and steady-state levels of government debt. An optimal quantitative easing (QE) policy under commitment does not only reflect different region sizes but is also a function of these dimensions of portfolio heterogeneity. By

calibrating the model to the euro area, we show that optimal QE favors purchases from the smaller region (Periphery instead of Core), given that the former faces stronger portfolio frictions. A fully optimal policy consisting of both the short-term interest rate and QE lifts the monetary union away from the zero lower bound faster than an optimal interest rate policy alone, which entails forward guidance.

A Macroeconomic Model of an Epidemic with Silent Transmission and Endogenous Self-isolation

We study the interaction between epidemics and economic decisions in a model where (1) agents allocate their time to market and home production and social and home leisure, (2) these activities differ in their degree of contagiousness, (3) some infected individuals are indistinguishable from susceptible individuals, and (4) agents are not necessarily rational. For baseline parameter values for the COVID-19 pandemic, we find that agents partially self-isolate by allocating more time to home activities and that the effective reproduction number of the disease stabilises at one. Detection and isolation of infected individuals severely mitigate the recession caused by the pandemic.

The Heterogeneous Effects of COVID-19 on Canadian Household Consumption, Debt and Savings

This paper develops an agent-based modelling approach to quantify the impact of COVID-19-induced economic disruptions on household debt and unplanned savings over 2020. We merge data from the Survey of Financial Security and the Survey of Household Spending to construct a representative cross-section of households who vary in their income, debt portfolios and mix of consumption expenditures. We simulate a series of individual and aggregate shocks to household income and consumption expenditures that incorporate government policies such as Canadian Emergency Response Benefit (CERB) as well as shifts in consumption expenditures across hard-to-distance goods (e.g., travel, restaurants) and easy-to-distance goods (e.g., groceries). Differential impact on household incomes resulting from unemployment and reduced hours play an important role in driving household debt and savings. We highlight two other important channels. First, income replacement programs (notably CERB) only partially replace lost income for unemployed, previously middle-income households—which drives a rise in borrowing, particularly for those with mortgages. Second, upper-income households have relatively larger expenditures on hard-to-distance goods and so

experience larger declines in consumption expenditures. This contributes to the high savings observed during March and April.

The Determinants of Consumers' Inflation Expectations: Evidence from the US and Canada

We propose and estimate a dynamic and individual model of expectations formation that links individual consumers' inflation expectations to their own lagged forecasts as well as proxies for the rational expectation forecasts. The model builds on the existing rational inattention literature and extends it in several dimensions. We explicitly model the expectations updating rule which consumers use to incorporate new information in their experience and take seriously heterogeneity in inflation expectations extensively documented in the literature. We estimate the model using data from two important new surveys — the Federal Reserve Bank of New York's Survey of Consumer Expectations and the Bank of Canada's Canadian Survey of Consumer Expectations. We find that inflation expectations appear to correlate more strongly to measures of rational expectations forecasts in Canada than in the US, and conversely less to lagged expectations. More specifically, the median respondent assigns overall weights of roughly 75% to proxies for the rational expectation forecasts and 25% to lagged expectations in Canada, while these weights are around 50-50 for the US. We show that these differences in weights are not explained by differences in the characteristics of their stand-in consumers. Given this finding, one candidate explanation could be related to the explicit inflation target in Canada in comparison to the dual mandate in the US.

Assessing Global Potential Output Growth: October 2020

This paper presents updated estimates of potential output growth for the global economy through 2022. Global potential output growth is expected to decline sharply in the aftermath of the COVID-19 pandemic and recover partially by the end of the projection horizon of the October 2020 Monetary Policy Report. More specifically, global potential output growth is expected to decline from 3.3 percent in 2019 to 2.1 percent in 2020 and then recover gradually to 2.7 percent by 2022. While growth is expected to decline in all regions, the negative effects of COVID-19 on trend labour productivity growth in emerging market economies are the largest contributor to the overall expected slowdown in global growth. This also reflects Bank of Canada staff's assessments of ongoing headwinds from aging, trade tensions and structurally low trend total factor productivity growth

across all regions. A partial recovery in all regions is expected to be driven mainly by the gradual recovery in trend total factor productivity growth and trend labour input growth. In the US, potential output growth is expected to decline sharply in 2020, mostly due to a decline in the trend participation rate and a reduction in the growth rate of immigration. By 2022, US potential output growth is expected to partially recover due to an improvement in trend total factor productivity growth and a modest recovery in trend labour input growth.

Has the Inflation Process Changed? Selective Review of Recent Research on Inflation Dynamics

For most of 2011–19, inflation in Canada and advanced economies registered below inflation targets. This has spurred a debate on whether “lowflation” is a temporary phenomenon or rather a sign of a fundamental change in inflation behaviour—in Canada and globally. So far, we know little. Global factors—changes in the price of oil and shifts in trade due to globalization—can only explain a portion of the fluctuations in domestic inflation. Emerging survey data are showing that inflation expectations of managers and households behave very differently from model expectations based on full information and rational behaviour. Recent surveys using randomized control trials reveal that changes in monetary or fiscal policies may lead to unexpected responses of inflation expectations and firm behaviour. Changes in the markets for consumer goods raise the need for us to rethink the methods for measuring inflation. We discuss the questions that these observations bring up for central bankers.

UPCOMING EVENTS

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

Ludwig Straub (Harvard University)
Organizer: FMD/FSD EFR Seminar Series
Date: 3 December 2020

Carlos Garriga (Federal Reserve Bank of St. Louis)
Organizer: EFR CEA/INT Speaker Series
Date: 4 December 2020

Farewell reception for Senior Deputy Governor Wilkins
Organizer: Events
Date: 9 December 2020

Pierre Mabilie (INSEAD)
Organizer: FMD/FSD EFR Seminar Series
Date: 17 December 2020

Todd Clark (Federal Reserve Bank of Cleveland)
Organizer: EFR CEA/INT Speaker Series
Date: 18 December 2020