

Bank of Canada Monthly Research Update

December 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

Wei, Shang-Jin & Xie, Yinxi, “[Monetary Policy in an Era of Global Supply Chains](#)”, *Journal of International Economics*, Vol 124: 103299, May 2020

Couture, Lydia & Houle, Stephanie, “[Survival and Performance of Start-ups by Gender of Ownership: A Canadian Cohort Analysis](#)”, *Statistics Canada Analytical Studies Branch Research Paper Series*, Vol 11F0019M No. 450, October 2020

Forthcoming

Schroth, Josef, “[Macroprudential Policy with Capital Buffers](#)”, *Journal of Monetary Economics*

van Oordt, Maarten & Stork, Philip & de Vries, Casper, “[On Agricultural Commodities' Extreme Price Risk](#)”, *Extremes*

Cao, Shutao & Meh, Cesaire & Rios-Rull, Jose-Victor & Terajima, Yaz, “[The Welfare Cost of Inflation Revisited: The Role of Financial Innovation and Household Heterogeneity](#)”, *Journal of Monetary Economics*

Anderson, Lisa & Andrews, Emad & Devani, Baiju & Mueller, Michael & Walton, Adrian, “[Speed Segmentation on Exchanges: Competition for Slow Flow](#)”, *Journal of Financial Markets*

STAFF WORKING PAPERS

Chiu, Jonathan & Davoodalhosseini, Mohammad & Jiang, Janet Hua & Zhu, Yu, “[Safe Payments](#)”, *Bank of Canada Staff Working Paper 2020-53*

Birinci, Serdar & Karahan, Fatih & Mercan, Yusuf & See, Kurt, “[Labor Market Policies During an Epidemic](#)”, *Bank of Canada Staff Working Paper 2020-54*

Ergun, Lerby & Uthemann, Andreas, “[Strategic Uncertainty in Financial Markets: Evidence from a Consensus Pricing Service](#)”, *Bank of Canada Staff Working Paper 2020-55*

Felt, Marie-Hélène, “[Losing Contact: The Impact of Contactless Payments on Cash Usage](#)”, *Bank of Canada Staff Working Paper 2020-56*

Exler, Florian & Livshits, Igor & MacGee, James (Jim) C. & Tertilt, Michèle, “[Consumer Credit with Over-optimistic Borrowers](#)”, Bank of Canada Staff Working Paper 2020-57

Shao, Lin & Tang, Rongsheng, “[Allocative Efficiency and Aggregate Productivity Growth in Canada and the US](#)”, Bank of Canada Staff Working Paper 2021-1

Huynh, Kim P. & Nicholls, Gradon & Zhu, Julia, “[Cash Use and Financial Literacy](#)”, Deutsche Bundesbank International Cash Conference 2019: Cash in the age of payment diversity, December 2020

Hodobod, Alexander & Hommes, Cars & Huber, Steffi & Salle, Isabelle, “[Is COVID-19 a consumption game changer? Evidence from a large-scale multi-country survey](#)”, COVID ECONOMICS, Vetted and Real-Time Papers, Vol 58: 40-76, November 2020

STAFF DISCUSSION PAPERS

Bootsma, James & Carter, Thomas J. & Chen, Xin Scott & Hajzler, Christopher & Toktamyssov, Argyn, “[2020 US Neutral Rate Assessment](#)”, Bank of Canada Staff Discussion Paper 2020-12

Karibzhanov, Iskander, “[Towards a HANK Model for Canada: Estimating a Canadian Income Process](#)”, Bank of Canada Staff Discussion Paper 2020-13

Cheung, Calista & Frymire, Luke & Pichette, Lise, “[Can the Business Outlook Survey Help Improve Estimates of the Canadian Output Gap?](#)”, Bank of Canada Staff Discussion Paper 2020-14

Amirault, David & Rai, Naveen & Martin, Laurent, “[A Reference Guide for the Business Outlook Survey](#)”, Bank of Canada Staff Discussion Paper 2020-15

Johnson, Grahame & Kozicki, Sharon & Priftis, Romanos & Suchanek, Lena & Witmer, Jonathan & Yang, Jing, “[Implementation and Effectiveness of Extended Monetary Policy Tools: Lessons from the Literature](#)”, Bank of Canada Staff Discussion Paper 2020-16

ABSTRACTS

Monetary Policy in an Era of Global Supply Chains

We study the implications of global supply chains for the design of monetary policy, using a small-open economy New Keynesian model with multiple stages of production. Within the family of simple monetary policy rules with commitment, a rule that targets separate producer price inflation at different production stages, in addition to output gap and real exchange rate, is found to deliver a higher welfare level than alternative policy rules. As an economy becomes more open, measured by export share, the optimal weight on the upstream inflation rises relative to that on the final stage inflation. If we have to choose among aggregate price indicators, targeting PPI inflation yields a smaller welfare loss than targeting CPI inflation alone. As the production chain becomes longer, the optimal weight on PPI inflation in the policy rule that targets both PPI and CPI inflation will also rise. A trade cost shock such as a rise in the import tariff can alter the optimal weights on different inflation variables.

Survival and Performance of Start-ups by Gender of Ownership: A Canadian Cohort Analysis

This paper provides an overview of women-owned start-ups in Canada. The recently developed data on the gender of business owners, as well as longitudinal data on firm entry by cohort for Canadian private corporations, make it possible — for the first time — to examine the entry and performance of women-owned start-ups from 2005 to 2013. In this paper, the annual number, size and industry concentration of new majority women-owned firms are examined and compared with majority men-owned and equally owned entrants. Subsequently, the survival rate and performance of surviving new private corporations by gender are examined.

Macroprudential Policy with Capital Buffers

Financial regulation imposes equity buffers on banks by restricting dividends. This paper studies constrained-efficient dividend policy when banks fund loans with equity and debt. In the model, bank shareholders consider equity costly and a bank's access to debt depends on its shareholder value. In response to loan losses banks cut dividends, but eventually defer dividends too much. They do not internalize that a commitment to higher dividends (and fewer loans) during recoveries from financial crises would increase shareholder

value and access to debt during crises. Constrained-efficient dividends, while restricted during normal times and zero during crises, are higher during recoveries.

On Agricultural Commodities' Extreme Price Risk

Price risk is among the most substantial risk factors for farmers. Through a two-sector general equilibrium model, we describe how fat tails in agricultural prices may occur endogenously as a result of productivity shocks. Using thirty years of daily futures price data, we show that the returns of all agricultural commodities in our sample closely follow a power law in the tail of their distributions. We apply Extreme Value Theory to estimate the size and likelihood of the highest losses a farmer may encounter. Back-testing verifies the validity of these risk measurement methods.

The Welfare Cost of Inflation Revisited: The Role of Financial Innovation and Household Heterogeneity

The money-consumption ratio increases with age and decreases with consumption, and the recent era of low interest rates has seen a large increase in the aggregate money-consumption ratio. We estimate an overlapping generations model with money for transaction purposes for the age effects and the extent of financial innovation using aggregate and household-level money holdings. We then assess the welfare cost of a 3 percentage point increase in inflation, incorporating the cost from the redistribution of non-money nominal wealth. We find that the welfare costs are 13% of one-year consumption and are borne mostly by the poor and the old.

Speed Segmentation on Exchanges: Competition for Slow Flow

In 2015, TSX Alpha, a Canadian stock exchange, implemented a speed bump for marketable orders and an inverted fee structure as part of a redesign. We find no evidence that this redesign impacted market-wide measures of trading costs or contributed appreciably to segmenting retail order flow away from other Canadian venues with a maker-taker fee structure. This suggests that Alpha attracts already-segmented flow from venues with fee structures other than maker-taker. Some heavy users of Alpha trade off improvements in fill rates and execution size against mildly larger effective spreads and price impacts. These heavy users also utilize larger market orders and fewer spray orders.

Safe Payments

We use a simple model to study whether private payment systems based on bank deposits can provide the optimal level of safety. In the model, bank deposits backed by projects are subject to default risk that can be mitigated by a depositor's ex ante and ex post monitoring. Safe payment instruments issued by a narrow bank can also be used as a back-up payment system when the risky bank fails. Private adoption of safe payment instruments is generally not socially optimal when buyers do not fully internalize the externalities of their adoption decision on sellers, or when the provision of deposit insurance distorts their adoption incentives. Using this framework, we discuss the optimal subsidy policy conditional on the level of deposit insurance.

Labor Market Policies During an Epidemic

We study the positive and normative implications of labor market policies that counteract the economic fallout from containment measures during an epidemic. We incorporate a standard epidemiological model into an equilibrium search model of the labor market to compare unemployment insurance (UI) expansions and payroll subsidies. In isolation, payroll subsidies that preserve match capital and enable a swift economic recovery are preferred over a cost-equivalent UI expansion. When considered jointly, however, a cost-equivalent optimal mix allocates 20 percent of the budget to payroll subsidies and 80 percent to UI. The two policies are complementary, catering to different rungs of the productivity ladder. The relatively small proportion allocated to payroll subsidies is sufficient to preserve high-productivity jobs but this also leaves room for social assistance to workers who face inevitable job losses.

Strategic Uncertainty in Financial Markets: Evidence from a Consensus Pricing Service

This paper measures valuation and strategic uncertainty in an over-the-counter market. The analysis uses a novel data set of price estimates that major financial institutions provide to a consensus pricing service. We model these institutions as Bayesian agents that learn from consensus prices about market conditions. Our uncertainty measures are derived from their beliefs through a structural estimation. The main contribution of the consensus pricing service is to reduce strategic uncertainty in the most opaque market segments. This stresses the importance of public data, such as financial

benchmarks, for a shared understanding of market conditions in markets with limited price transparency.

Losing Contact: The Impact of Contactless Payments on Cash Usage

I investigate the impact of contactless credit cards (CTCs) on cash use in Canada, using panel data between 2010 and 2017. I show that ignoring unobserved heterogeneity would lead to overstating the impact of CTCs on cash usage in a linear model. Using finite mixture modelling, I provide evidence of the differential impacts of CTCs on the extensive versus intensive margins of cash usage. I use a two-part model, with an exclusion restriction for better identification, to model both margins separately. I obtain that CTC use negatively influences the intensive margin of cash usage but not its extensive margin. There is no clear evidence of an S-curve pattern in the impact of CTCs on cash usage over the sample period.

Consumer Credit with Over-optimistic Borrowers

There is active debate over whether borrowers' cognitive biases create a need for regulation to limit the misuse of credit. To tackle this question, we incorporate overoptimistic borrowers into an incomplete markets model with consumer bankruptcy. Lenders price loans, forming beliefs—type scores—about borrowers' types. Since over-optimistic borrowers face worse income risk but incorrectly believe they are rational, both types behave identically. This gives rise to a tractable theory of type scoring as lenders cannot screen borrower types. Since rationals default less often, the partial pooling of borrowers generates cross-subsidization whereby over-optimists face lower than actuarially fair interest rates. Over-optimists make financial mistakes: they borrow too much and default too late. We calibrate the model to the US and quantitatively evaluate several policies to address these frictions: reducing the cost of default, increasing borrowing costs, imposing debt limits, and providing financial literacy education. While some policies lower debt and filings, they do not reduce overborrowing. Financial literacy education can eliminate financial mistakes, but it also reduces behavioral borrowers' welfare by ending cross-subsidization. Score-dependent borrowing limits can reduce financial mistakes but lower welfare.

Allocative Efficiency and Aggregate Productivity Growth in Canada and the US

This paper evaluates the contribution of allocative efficiency to the aggregate productivity growth in Canada and the US. In particular, we are interested in explaining two puzzling facts: 1) the slowdown in productivity growth during the 1970s and the 2000s in the US, and 2) the widening Canada-US productivity gap since the middle of the 1980s. We extend the framework of Oberfield (2013) to derive sufficient statistics for allocative efficiency and decompose aggregate productivity in an input-output economy à la Jones (2013). The lack of improvement in allocative efficiency can explain two-thirds of the US's productivity slowdown and more than one-third of the widening Canada-US productivity gap. The allocation of capital, rather than labor, was the main driver behind the overall movement in allocative efficiency. Resources allocated to service sectors were significantly lower than the optimal level. It improved markedly over time, especially in the US before the 2000s.

Cash Use and Financial Literacy

The Bank of Canada, as the sole issuer of banknotes, monitors trends in the adoption and use of cash relative to other methods of payment. The recent 2017 Methods-of-Payment (MOP) Survey Report found that cash use at the point-of sale declined between 2009 and 2017, but that cash was still used for about one third of transactions, see Henry et al. (2018). Understanding the determinants of cash usage is important for understanding the evolution. One possibility is financial literacy, or the knowledge is required to navigate the growing array of payment methods. The 2017 MOP found that respondents with lower financial literacy, as measured by the “Big Three” test questions (Lusardi and Mitchell (2011a)), was associated with higher cash holdings and usage, higher debit card usage, and lower credit card usage. We find a variety of credit card restrictions on individuals with low financial literacy and consider its role as a possible constraining factor in the interplay between financial literacy and cash usage.

Is COVID-19 a consumption game changer? Evidence from a large-scale multi-country survey

Prospective economic developments depend on the behavior of consumer spending. A key question is whether private expenditures recover once social distancing restrictions are lifted or whether the COVID-19 crisis has a sustained impact on consumer confidence,

preferences, and, hence, spending. Changes in consumer behavior may not be temporary, as they may reflect long-term changes in attitudes arising from the COVID-19 experience. This paper uses data from a representative consumer survey in five European countries conducted in summer 2020, after the release of the first wave's lockdown restrictions. We document the underlying reasons for households' reduction in consumption in five key sectors: tourism, hospitality, services, retail, and public transports. We identify a large confidence shock in the Southern European countries and a permanent shift in consumer preferences in the Northern European countries. Our results suggest that horizontal fiscal support to all firms risks creating zombie firms and would hinder necessary structural changes to the economy.

2020 US Neutral Rate Assessment

This paper presents Bank of Canada staff's current assessment of the US neutral rate, along with a newly developed set of models on which that assessment is based. The overall assessment is that the US neutral rate currently lies in a range of 1.75 to 2.75 percent. This represents a decline of 50 basis points relative to the range judged at the time of the Bank's last neutral rate update in April 2019. Roughly half of this decline reflects an assessment of conditions prevailing in late 2019 and is thus unrelated to the COVID-19 pandemic. The other half reflects the balance of several key channels through which the COVID-19 shock is likely to influence US interest rates over the years ahead, including its impacts on potential output growth, inequality, demand for safe assets and the level of US government debt. Results from the new models specifically point to upward pressure from higher government debt being more than offset by downward pressure from lower potential output growth, higher inequality and heightened demand for safe assets.

Towards a HANK Model for Canada: Estimating a Canadian Income Process

I study individual earnings dynamics using panel data on Canadian workers. I first show that, similar to US findings, the distribution of Canadian income growth is leptokurtic. To generate such high kurtosis, I use a common continuous-time specification of the individual earnings as a stochastic process with a random (Poisson) arrival of normally distributed jumps. The fitted earnings process matches the eight targeted moments well. The estimated parameter values are consistent with the existence of both transitory and

persistent components in earnings. On the methodological side, I show how the estimation process can be accelerated significantly by parallelizing Monte Carlo simulations on graphical processing units with massive savings in computational time. My estimates represent a key first step in developing quantitatively realistic Heterogeneous Agent New Keynesian (HANK) models for the Canadian economy. HANK models are important tools for understanding consumption behaviour and analyzing the transmission mechanism for monetary policy. The estimated process in this paper may prove useful in other contexts where an empirically realistic representation of household earnings dynamics is vital.

Can the Business Outlook Survey Help Improve Estimates of the Canadian Output Gap?

The output gap is a key variable used to assess inflationary pressures in the economy, but estimates in real time are subject to uncertainty and often revised significantly. This paper assesses whether questions in the Bank of Canada's Business Outlook Survey (BOS) can provide useful signals for broader capacity pressures in the economy. The concept of capacity pressures is captured in the BOS through various questions on firms' ability to meet demand and labour shortages. In particular, we examine whether these BOS questions, as well as a summary measure of the BOS results, produce information that can be used to improve real-time output gap estimates for Canada. We find that survey data help predict the various measures of the output gap used by the Bank of Canada. This supports the Bank's practice of using information contained in the BOS to refine its assessment of the current state of the economic cycle. It further provides a framework for incorporating the survey information into quantitative estimates of the output gap.

A Reference Guide for the Business Outlook Survey

In 1997, the Bank of Canada established regional offices to enhance communication and liaison activities across the country and to gather more effective regional input for the Bank's policy deliberations. Shortly thereafter, the regional offices began conducting the Business Outlook Survey (BOS)—a quarterly face-to-face survey of senior managers at Canadian firms. The BOS has become an important part of monetary policy deliberations at the Bank of Canada and is also well known in Canadian policy and financial circles. This paper compiles more than 20 years of experience conducting the BOS and serves as a comprehensive reference manual. More specifically, it

provides a brief history of the BOS; explains and discusses the survey's sampling strategy and other elements of its design and implementation; highlights some demographic characteristics of the firms that participate; assembles a list of special topics addressed in both the quarterly BOS and the ad-hoc surveys conducted by regional offices; discusses some BOS questions not regularly published; and updates and augments an earlier assessment (Martin and Papile 2004) of the information content of BOS indicators.

Implementation and Effectiveness of Extended Monetary Policy Tools: Lessons from the Literature

This paper summarizes the literature on the performance of various extended monetary policy tools when conventional policy rates are constrained by the effective lower bound. We highlight issues that may arise when these tools are used by central banks of small open economies. Tools that have already been used by various central banks include forward guidance and balance sheet policies—such as quantitative easing, yield curve targeting, credit easing, funding-for-lending and purchases of other assets. The paper also touches on the use of negative interest rates. The evidence to date suggests that such tools have allowed central banks to ease financial conditions and thereby stimulate aggregate demand. The article also considers overt monetary financing (often referred to as “helicopter money”) as an additional tool if conditions require even more aggressive easing. We review the sequencing and pacing of the use of such tools, as well as spillover effects and financial stability concerns, as important aspects of implementation strategies.

UPCOMING EVENTS

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

Rod Garratt (UC Santa Barbara)
Organizer: EFR Core Events
Date: 18 January 2021

Daniel Xu (Duke University)
Organizer: Lin Shao
Date: 10 February 2021

John Grigsby (Northwestern)
Organizer: EFR CEA/INT Speaker Series
Date: 5 March 2021

Philipp Schnabl (NYU Stern)
Organizer: FMD / FSD EFR Seminar Series
Date: 18 March 2021

Greg Howard (University of Illinois, Urbana-Champaign)
Organizer: FMD / FSD EFR Seminar Series
Date: 25 March 2021

Matteo Maggiori (Stanford Graduate School of Business)
Organizer: Kemal Ozhan
Date: 6 April 2021

Garth Heutel (Georgia State University)
Organizer: FMD / FSD EFR Seminar Series
Date: 15 April 2021

Michael Weber (University of Chicago)
Organizer: EFR CEA/INT Speaker Series
Date: 30 April 2021