BANK OF CANADA
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Bank of Canada Monthly Research Update

July 2018

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

Bruneau, Gabriel & Christensen, Ian & Meh, Césaire, "Housing Market Dynamics and Macroprudential Policy", Canadian Journal of Economics, Volume 51(3), 864-900

Shukayev, Malik & Ueberfeldt, Alexander, "Monetary policy tradeoffs between financial stability and price stability", Canadian Journal of Economics, Volume 51(3), 901-945

Brouillette, Dany & Kostyshyna, Olena & Kyui, Natalia, "Downward nominal wage rigidity in Canada: Evidence from micro-level data", Canadian Journal of Economics, Volume 51(3), 968-1002

Wagner, Joel, "Downward Nominal Wage Rigidity in Canada: Evidence Against a 'Greasing Effect'", Canadian Journal of Economics, Volume 51(3), 1003-1028

Dorich, José & Labelle St-Pierre, Nicholas & Lepetyuk, Vadym & Mendes, Rhys R., "Could a higher inflation target enhance macroeconomic stability?", Canadian Journal of Economics, Volume 51(3), 1029-1055

Henry, Christopher S. & Huynh, Kim P. & Nicholls, Gradon, "Bitcoin awareness and usage in Canada", Journal of Digital Banking, Volume 2(4), 311-337

Forthcoming

Allen, Jason & Usher, Andrew, "Investment Dealer Collateral and Leverage Procyclicality", Empirical Economics

Alpanda, Sami & Kabaca, Serdar, "International Spillovers of Large-Scale Asset Purchases", Journal of the European Economic Association

Chen, Heng & Shen, Rallye, "Variance Estimation for Survey-Weighted Data Using Bootstrap Resampling Methods: 2013 Methods-of-Payment Survey Questionnaire", Advances in Econometrics

Chu, Ba M. & Huynh, Kim P. & Jacho-Chavez, David T. & Kryvtsov, Oleksiy, "On the Evolution of the United Kingdom Price Distributions", Annals of Applied Statistics

Sadaba, Barbara & Pozzi, Lorenzo, "Detecting scapegoat effects in the relationship between exchange rates and macroeconomic fundamentals: a new approach", Macroeconomic Dynamics

Schroth, Josef, "Managerial Compensation and Stock Price Manipulation", Journal of Accounting Research

Witmer, Jonathan, "Strategic complementarities and money market fund liquidity management", Journal of Financial Intermediation

STAFF WORKING PAPERS

Matveev, Dmitry, "Time-Consistent Management of a Liquidity Trap with Government Debt", Bank of Canada Staff Working Paper 2018-38

Imura, Yuko & Shukayev, Malik, "The Extensive Margin of Trade and Monetary Policy", Bank of Canada Staff Working Paper 2018-37

Davoodalhosseini, Mohammad, "Central Bank Digital Currency and Monetary Policy", Bank of Canada Staff Working Paper 2018-36

Gao, Jeffery & Jin, Jianjian & Thompson, Jacob, "The Impact of Government Debt Supply on Bond Market Liquidity: An Empirical Analysis of the Canadian Market", Bank of Canada Staff Working Paper 2018-35

Chiu, Jonathan & Koeppl, Thorsten, "Incentive Compatibility on the Blockchain", Bank of Canada Staff Working Paper 2018-34

Goldsein, Itay & Witmer, Jonathan & Yang, Jing, "Following the Money: Evidence for the Portfolio Balance Channel of Quantitative Easing", Bank of Canada Staff Working Paper 2018-33

Priftis, Romanos & Zimic, Srecko, "Sources of Borrowing and Fiscal Multipliers", Bank of Canada Staff Working Paper 2018-32

Bernier, Maria & Rai, Naveen & Suchanek, Lena, "Does Outward Foreign Investment Matter for Canadian Productivity? Evidence from Greenfield Investments", Bank of Canada Staff Working Paper 2018-31

Beers, David & Mavalwalla, Jamshid, "The BoC-BoE Sovereign Default Database Revisited: What's New in 2018?", Bank of Canada Staff Working Paper 2018-30

Felt, Marie-Hélène, "A Look Inside the Box: Combining Aggregate and Marginal Distributions to Identify Joint Distributions", Bank of Canada Staff Working Paper 2018-29

STAFF DISCUSSION PAPERS

Mordel, Adi, "Prudential Liquidity Regulation in Banking—A Literature Review", Bank of Canada Staff Discussion Paper 2018-8

Barnett, Russell & Zmitrowicz, Konrad, "Assessing the Impact of Demand Shocks on the US Term Premium", Bank of Canada Staff Discussion Paper 2018-7

ABSTRACTS

Housing Market Dynamics and Macroprudential Policy

We perform an analysis to determine how well the introduction of a countercyclical loan-to-value (LTV) ratio can reduce household indebtedness and housing price fluctuations compared with a monetary policy rule augmented with house price inflation. To this end, we construct a New Keynesian model in which a fraction of households borrow against the value of their houses and we introduce news shocks on housing demand. We estimate the model with Canadian data using Bayesian methods. We find that the introduction of news shocks can generate a housing market boom-bust cycle, the bust following unrealized expectations on housing demand. Our study also suggests that a countercyclical LTV ratio is a useful policy to reduce the spillover from the housing market to consumption, and to lean against news-driven boom-bust cycles in housing price and credit generated by expectations of future macroeconomic developments.

Monetary Policy Tradeoffs Between Financial Stability and Price Stability

We analyze the impact of interest rate policy on financial stability in an environment where banks can experience runs on their short-term liabilities, forcing them to sell assets at fire-sale prices. Price adjustment frictions and a state-dependent risk of financial crisis create the possibility of a policy tradeoff between price stability and financial stability. Focusing on Taylor rules with monetary policy possibly reacting to banks' short-term liabilities, we find that the optimized policy uses the extra tool to support investment at the expense of higher inflation and output volatility.

Downward nominal wage rigidity in Canada: Evidence from micro-level data

We assess the importance of downward nominal wage rigidity (DNWR) in Canada using employer-level administrative data from the major wage settlements (MWS) and household-based survey data

from the Survey of Labour Income Dynamics (SLID). MWS data cover large unionized firms in Canada, while SLID is a rich rotating panel representative of the employed population in Canada. Combining both sources of information allows for an extensive analysis of DNWR in the Canadian labour market. We find large shares of wage freezes and smaller shares of wage cuts in both MWS and SLID. Shares of freezes are higher at lower CPI inflation rates, based on provincial data. These observations are consistent with the presence of DNWR. DNWR in Canada appears to be larger than in other countries such as the United States, the United Kingdom and European countries. The incidence of DNWR is heterogeneous across firms' and workers' characteristics. Wages report less DNWR over longer horizons.

Downward Nominal Wage Rigidity in Canada: Evidence Against a "Greasing Effect"

The existence of downward nominal wage rigidity (DNWR) has often been used to justify a positive inflation target. It is traditionally assumed that positive inflation could "grease the wheels" of the labour market by putting downward pressure on real wages, easing labour market adjustments during a recession. A rise in the inflation target would attenuate the long-run level of unemployment and hasten economic recovery after an adverse shock. Following Daly and Hobijn (2014), we re-examine these issues in a model that accounts for precautionary motives in wage-setting behaviour. We confirm that DNWR generates a long-run negative relation between inflation and unemployment, in line with previous contributions to the literature. However, we also find that the increase in the number of people bound by DNWR following a negative demand shock rises with inflation, offsetting the beneficial effects of a higher inflation target. As an implication, contrary to previous contributions that neglected precautionary behaviour, the speed at which unemployment returns to pre-crisis levels during recessions is relatively unaffected by variations in the inflation target.

Could a Higher Inflation Target Enhance Macroeconomic Stability?

Recent international experience with the effective lower bound on nominal interest rates has rekindled interest in the benefits of inflation targets above 2 per cent. We evaluate whether an increase in the inflation target to 3 or 4 per cent could improve macroeconomic stability in the Canadian economy. We find that the magnitude of the benefits hinges critically on two elements: (i) the availability and effectiveness of unconventional monetary policy (UMP) tools at the effective lower bound and (ii) the level of the real neutral interest rate. In particular, we show that when the real neutral rate is in line with the central tendency of estimates, raising the inflation target yields some improvement in macroeconomic outcomes. There are only modest gains if effective UMP tools are available. In contrast, with a deeply negative real neutral rate, a higher inflation target substantially improves macroeconomic stability regardless of UMP.

Bitcoin awareness and usage in Canada

Bitcoin, digital currencies and FinTech have been the subject of vigorous discussion. There has, however, been limited empirical evidence of its adoption and usage. This paper proposes a methodology to collect a nationally representative sample via the Bitcoin Omnibus Survey (BTCOS) in order to track the ubiquity and usage of Bitcoin in Canada. The paper reveals that about 64 per cent of Canadians have heard of Bitcoin, but only 2.9 per cent own it. Awareness of Bitcoin is strongly associated with men, and those with college or university education; additionally, Bitcoin awareness is more concentrated among unemployed individuals. On the other hand, Bitcoin ownership is associated with younger age groups and a high school education. Furthermore, the current authors have constructed a test of Bitcoin characteristics to attempt to gauge the level of knowledge held by respondents who were aware of Bitcoin, including actual owners. Knowledge is positively correlated with Bitcoin adoption. This paper attempts to reconcile the difference in awareness and ownership by deconstructing the transaction and store-of-value motive for holding Bitcoin. The paper concludes with some suggestions to improve future digital currency surveys, in particular to achieve precise estimates from the hard-to-reach population of digital currency users.

Investment Dealer Collateral and Leverage Procyclicality

This paper introduces a novel data set to examine the relationship between leverage and asset growth in the Canadian investment broker-dealer sector over the period of 1992 to 2010. Investment dealers have highly procyclical leverage, in that leverage growth is highly correlated with asset growth. This is largely due to collateralized borrowing, whereby increases in asset values lead to increases in collateral (margin deposits), allowing investment dealers to borrow against these deposits, and purchase more assets. Of course, decreases in collateral value have the opposite effect and margins can be destabilizing if investment broker-dealers are forced to de-leverage.

International Spillovers of Large-Scale Asset Purchases

This paper evaluates the international spillover effects of large-scale asset purchases (LSAPs) using an estimated two-country dynamic stochastic general-equilibrium model with nominal and real rigidities and portfolio balance effects. Portfolio balance effects arise from imperfect substitutability between short- and long-term bond portfolios in each country, as well as between domestic and foreign bonds within these portfolios. We show that LSAPs in the US lower long-term yields and stimulate economic activity not only in the US, but also in the rest of the world (ROW) economy. This occurs despite the currency appreciation in the ROW and the resulting deterioration in their trade balance. The key for this result is the decline in the ROW term premia through the portfolio balance channel, as the relative demand for ROW long-term bonds increases following an LSAP in the US. Our model indicates that US asset purchases that generate the same output effect as US conventional monetary policy have larger international spillovers due to stronger portfolio balance effects. We also show that international openness in financial markets reduces the stimulatory effects of LSAPs in the originating country, while increasing their international spillover effects.

Variance Estimation for Survey-Weighted Data Using Bootstrap Resampling Methods: 2013 Methods-of-Payment Survey Questionnaire

Sampling units for the 2013 Methods-of-Payment survey were selected through an approximate stratified two-stage sampling design. To compensate for non-response and non-coverage and ensure consistency with external population counts, the observations are weighted through a raking procedure. We apply bootstrap resampling methods to estimate the variance, allowing for randomness from both the sampling design and raking procedure. We find that the variance is smaller when estimated through the bootstrap resampling method than through the naive linearization method, where the latter does not take into account the correlation between the variables used for weighting and the outcome variable of interest.

On the Evolution of the United Kingdom Price Distributions

We propose a functional principal components method that accounts for stratified random sample weighting and time dependence in the observations to understand the evolution of distributions of monthly micro-level consumer prices for the United Kingdom (UK). We apply the method to publicly available monthly data on individual-good prices collected in retail stores by the UK Office for National Statistics for the construction of the UK Consumer Price Index from March 1996 to September 2015. In addition, we conduct Monte Carlo simulations to demonstrate the effectiveness of our methodology. Our method allows us to visualize the dynamics of the price distribution and uncovers interest patterns during the sample period. Further, we demonstrate the efficacy of our methodology with an out-of-sample forecasting algorithm which exploits the time dependence of distributions. Our out-of-sample forecasts compares favorably with the random walk forecast.

Detecting scapegoat effects in the relationship between exchange rates and macroeconomic fundamentals: a new approach

This paper presents a new testing method for the scapegoat model of exchange rates. A number of steps are implemented to determine whether macro fundamentals are scapegoats for the evolution of exchange rates. Estimation is conducted using a Bayesian Gibbs sampling approach applied to eight countries (five developed, three emerging) versus the US over the period 2002Q1-2014Q4. The macro fundamentals that we consider are real GDP growth, the inflation rate, the long-run nominal interest rate and the current account to GDP ratio. We calculate the posterior probabilities that these macro fundamentals are scapegoats. For the inflation rate, these probabilities are considerably higher than the imposed prior probabilities of 1/2 in five out of eight countries (in particular, the Anglo-Saxon economies).

Managerial Compensation and Stock Price Manipulation

This paper studies the role of optimal managerial compensation in reducing uncertainty about manager reporting objectives. It is shown that, paradoxically, firm owners allow managers with higher propensity to manipulate the short-term stock price to push for higher-powered and more short-term focused equity incentives. Such managers also work harder, and manipulate more, but may not generate higher firm profits. The model is consistent with existing empirical findings about the relationship between manipulation and equity pay, suggesting that heterogeneity in manager manipulation propensities may be an important driver of heterogeneity in pay. Novel testable predictions are developed.

Strategic complementarities and money market fund liquidity management

I use a unique institutional feature of money market funds to identify whether funds hold additional liquidity to guard against and prevent potential investor runs. Specifically, some funds are used as a cash management vehicle for related entities, such as other funds in the fund family. These "internal" funds should experience less outflows during market stress, and should thus have less need to hold this additional liquidity. Indeed, these "internal" prime money market funds do hold lower liquidity than other prime funds. This effect is most pronounced at quarter ends, when there is an exogenous reduction in cash demand from non-US bank dealers.

Time-Consistent Management of a Liquidity Trap with Government Debt

This paper studies optimal discretionary monetary and fiscal policy when the lower bound on nominal interest rates is occasionally binding in a model with nominal rigidities and long-term government debt. At the lower bound it is optimal for the government to temporarily reduce debt. This decline stimulates output, which is inefficiently low during liquidity traps, by lowering expected real interest rates following the lift-off of the nominal rate from the lower bound. Away from the lower bound, the long-run level of government debt increases with the risk of reaching the lower bound. The accumulation of debt pushes up inflation expectations so as to offset the opposite effect due to the lower bound risk.

The Extensive Margin of Trade and Monetary Policy

This paper studies the effects of monetary policy shocks on firms' participation in exporting. We develop a two-country dynamic stochastic general equilibrium model in which heterogeneous firms make forward-looking decisions on whether to participate in the export market and prices are staggered across firms and time. We show that while lower interest rates and a currency depreciation associated with an expansionary monetary policy help to increase the value of exporting, the inflationary effects of the policy stimulus weaken the competitiveness of some firms, resulting in a contraction in firms' export participation. In contrast, positive productivity shocks lead to a currency depreciation and an expansion in export participation at the same time. We show that, overall, the extensive margin is more sensitive to firms' price competitiveness with other firms in the export market than to exchange rate movements or interest rates.

Central Bank Digital Currency and Monetary Policy

Many central banks are contemplating whether to issue a central bank digital currency (CDBC). CDBC has certain potential benefits, including the possibility that it can bear interest. However, using CBDC is costly for agents, perhaps because they lose their anonymity when using CBDC instead of cash. I study optimal monetary policy when only cash, only CBDC, or both cash and CBDC are available to agents. If the cost of using CBDC is not too high, more efficient allocations can be implemented by using CBDC than with cash, and the first best can be achieved. Having both cash and CBDC available may result in lower welfare than in cases where only cash or only CBDC is available. The welfare gains of introducing CBDC are estimated as up to 0.64% for Canada.

The Impact of Government Debt Supply on Bond Market Liquidity: An Empirical Analysis of the Canadian Market

This paper finds that Government of Canada benchmark bonds tend to be more illiquid over the subsequent month when there is a large increase in government debt supply. The result is both statistically and economically significant, stronger for the long-term than the short-term sector, and is robust when other macro factors are controlled for. The result is consistent with the interpretation that risk-averse dealers tend to provide less liquidity to the market when facing increased duration risks brought by large debt issuance. The fact that the newly issued bonds are much less liquid may also contribute to the impact of debt supply on market liquidity.

Incentive Compatibility on the Blockchain

A blockchain is a digital ledger that keeps track of a record of ownership without the need for a designated party to update and enforce changes to the record. The updating of the ledger is done directly by the users of the blockchain and is traditionally governed by a proof-of-work (PoW) protocol. We formalize this protocol as a Cournot game where users compete to update the blockchain for a reward. Cheating occurs in the form of "double spending" when users try to tamper with ownership records in order to defraud their counterparties. Ruling out incentives to cheat can be summarized in the form of a “no double-spending constraint.” These constraints put restrictions on the design of a blockchain and, thus, play a role akin to incentive compatibility constraints in classic mechanism design.

Following the Money: Evidence for the Portfolio Balance Channel of Quantitative Easing

Recent research suggests that quantitative easing (QE) may affect a broad range of asset prices through a portfolio balance channel. Using novel security-level holding data of individual US mutual funds, we establish evidence that portfolio rebalancing occurred both within and across funds. Contrary to conventional wisdom, portfolio rebalancing by fund managers into riskier assets is much smaller in magnitude than into other government bonds. We find that mutual funds replaced QE securities with other government bonds that have similar characteristics. Intriguingly, this shift occurred mainly into newly issued government bonds. Such within-fund portfolio rebalancing is material. For every $100 in QE bonds sold, mutual funds replenished their portfolios with about $50 to $60 of newly issued government bonds. Thus, QE played an important role in funding treasury debt issuance during this period. Meanwhile, the rebalancing into riskier assets, such as corporate bonds, did occur, but was mainly carried out by the end investors of the funds instead of the fund managers themselves.

Sources of Borrowing and Fiscal Multipliers

This paper finds that debt-financed government spending multipliers vary considerably depending on the location of the debt buyer. In a sample of 33 countries, we find that government spending multipliers are larger when government purchases are financed by issuing debt to foreign investors (non-residents), compared with when government purchases are financed by issuing debt to home investors (residents). A theoretical model (with flexible or sticky prices) shows that the location of the government creditor produces these differential responses to the extent that private investment is crowded out in each case. Increasing international capital mobility of the resident private sector decreases the difference between the two types of financing, both in the model and in the data.

Does Outward Foreign Investment Matter for Canadian Productivity? Evidence from Greenfield Investments

This paper seeks to understand how outward foreign direct investment (FDI) affects the productivity of Canadian firms. We estimate the impact of outward greenfield investment on measures of firm-level productivity using FDI data from roughly 2,000 Canadian firms and more than 4,000 outward FDI projects over the 2003–14 period. Combining matching techniques with a difference-in-difference approach, we find that firms that invest abroad tend to see more important productivity gains one to two years after the investment, compared with firms that are otherwise similar but remain domestic, suggesting that outward investment has beneficial implications for investing firms. Further, panel regression analysis at the provincial level shows that an increase in the number of outward investment projects is found to be associated with higher productivity growth, particularly for investments in OECD countries. The result suggests that learning or technological spillover effects are particularly important when investing in countries close to the home country's technological frontier.

The BoC-BoE Sovereign Default Database Revisited: What's New in 2018?

Until recently, there have been few efforts to systematically measure and aggregate the nominal value of the different types of sovereign government debt in default. To help fill this gap, the Bank of Canada's Credit Rating Assessment Group (CRAG) has developed a comprehensive database of sovereign defaults posted on the Bank of Canada's website that now is updated in partnership with the Bank of England. Our database draws on previously published data sets compiled by various public and private sector sources. It combines elements of these, together with new information, to develop estimates of stocks of government obligations in default, including bonds and other marketable securities, bank loans, and official loans in default, valued in US dollars, for the years 1960 to 2017 on both a country-by-country and a global basis. This update of CRAG's database, and subsequent updates, will be useful to researchers analyzing the economic and financial effects of individual sovereign defaults and, importantly, the impact on global financial stability of episodes involving multiple sovereign defaults.

A Look Inside the Box: Combining Aggregate and Marginal Distributions to Identify Joint Distributions

This paper proposes a method for estimating the joint distribution of two or more variables when only their marginal distributions and the distribution of their aggregates are observed. Nonparametric identification is achieved by modelling dependence using a latent common-factor structure. Multiple examples are given of data settings where multivariate samples from the joint distribution of interest are not readily available, but some aggregate measures are observed. In the application, intra-household distributions are recovered by combining individual-level and household-level survey data. I show that, for individuals living in couple relationships, personal cash-management practices are significantly influenced by the partner's use of cash and stored-value cards. This finding implies that, for some methods of payment at least, ignoring the partner's impact might lead to spurious regression results due to an omitted variable bias.

Prudential Liquidity Regulation in Banking—A Literature Review

Prudential liquidity requirements are a relatively recent regulatory tool on the international front, introduced as part of the Basel III accord in the form of a liquidity coverage ratio (LCR) and a net stable funding ratio (NSFR). I first discuss the rationale for regulating bank liquidity by highlighting the market failures that it addresses while reviewing key theoretical contributions to the literature on the motivation for prudential liquidity regulation. I then introduce some of the empirical literature on the firm-specific and systemwide effects of that regulation. These findings suggest that while banks respond to binding requirements by increasing long-term funding and reducing maturity mismatch, there is also evidence that risk in the financial system has gone up. In an environment where both bank liquidity and capital are regulated, it is natural to consider the interactions between them. The main conclusions from this growing literature indicate that while liquidity requirements tend to make capital constraints less binding, capital requirements appear to be more costly to comply with, and that both regulations have a non-trivial effect on financial stability. I conclude with a discussion of potential avenues to explore as the Basel III liquidity standards are being implemented in Canada.

Assessing the Impact of Demand Shocks on the US Term Premium

During and after the Great Recession of 2008–09, conventional monetary policy in the United States and many other advanced economies was constrained by the effective lower bound (ELB) on nominal interest rates. Several central banks implemented large-scale asset purchase (LSAP) programs, more commonly known as quantitative easing or QE, to provide additional monetary stimulus. Gauging the effectiveness of LSAPs is important, since the ELB may be a constraint on conventional monetary policy more frequently in the future than it was in the past. In this paper we analyze two distinct periods where we observe exogenous demand shocks for 10-year US Treasury bonds to assess their impact on the term premium. Our results show that official sector demand factors, measured by purchases of securities by the foreign official sector and the Federal Reserve's asset purchase program, are important drivers explaining movements in the term premium. They suggest that asset purchases (QE) can help provide additional monetary stimulus even once the policy rate has reached its ELB. Robustness tests also suggest that the estimated impact of official sector demand factors is the most robust driver of the term premium across alternative specifications, while the estimates on risk factors appear more sensitive to the choice of term premium specification. Based on external projections and authors' assumptions, our results suggest that the US term premium will rise gradually from an average of about -20 basis points in the fourth quarter of 2016 to around +10, 32 and 60 basis points by the end of 2017, 2018 and 2019, respectively, before stabilizing around 100 basis points in the medium term.

UPCOMING EVENTS

Michael Bauer (Federal Reserve Bank of San Francisco), 28 August 2018
Organizer: FMD

Bank of Canada – Monetary Policy Communications Conference, 12-14 September 2018
Organizer: FMD-MPAR

Dean Croushore (University of Richmond), 17 September 2018
Organizer: Julien Champagne (CEA)

Emanuel Moench (Bundesbank), 20 September 2018
Organizer: Rodrigo Sekkel (FMD)

Matthias Kehrig (Duke University), 21 September 2018
Organizer: Dmitry Matveev (CEA)

Matthias O. Paustian (Federal Reserve Board), 12 October 2018
Organizer: Romanos Priftis (CEA)

Natalia Ramondo (University of California in San Diego), 19 October 2018
Organizer: Anthony Landry (CEA)

Brent Hickman (Queen’s University), 25 October 2018
Organizer: Jason Allen (FMD)

Kevin Lim (University of Toronto), 26 October 2018
Organizer: Ben Tomlin (CEA)

Albert Queralto (Federal Reserve Board), 16 November 2018
Organizer: Martin Kuncl (CEA)

Jonathan Parker (Massachusetts Institute of Technology), 29 November 2018
Organizer: Miguel Molico (FSD)