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Bank of Canada
Monthly Research Update

November 2017

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

Forthcoming

Alexander, Patrick, "A general equilibrium analysis of Canada's national policy", Explorations in Economic History

Bailliu, Jeannine & Kruger, Mark & Toktamyssov, Argyn & Welbourn, Wheaton, "How fast can China grow? The Middle Kingdom's prospects to 2030", Pacific Economic Review

Champagne, Julien & Poulin-Bellisle, Guillaume & Sekkel, Rodrigo, "The Real-Time Properties of the Bank of Canada's Staff Output Gap Estimates", Journal of Money, Credit and Banking

Feunou, Bruno & Okou, Cedric, "Good Volatility, Bad Volatility, and Option Pricing", Journal of Financial and Quantitative Analysis

STAFF WORKING PAPERS

Baumeister, Christiane & Kilian, Lutz & Zhou, Xiaoqing, "Is the Discretionary Income Effect of Oil Price Shocks a Hoax?", Bank of Canada Staff Working Paper 2017-50

Carter, Thomas J., "Optimal Interbank Regulation", Bank of Canada Staff Working Paper 2017-48

Chen, Heng & Huynh, Kim & Shy, Oz, "Cash Versus Card: Payment Discontinuities and the Burden of Holding Coins", Bank of Canada Staff Working Paper 2017-47

Ellwanger, Reinhard, "On the Tail Risk Premium in the Oil Market", Bank of Canada Staff Working Paper 2017-46

Shcherbakov, Oleksandr & Wakamori, Naoki, "Identifying the Degree of Collusion Under Proportional Reduction", Bank of Canada Staff Working Paper 2017-51

Steingress, Walter, "The Causal Impact of Migration on US Trade: Evidence from Political Refugees", Bank of Canada Staff Working Paper 2017-49

STAFF DISCUSSION PAPERS

Cunningham, Rose & Friedrich, Christian & Hess, Kristina & Kim, Min Jae, "Understanding the Time Variation in Exchange Rate Pass-Through to Import Prices", Bank of Canada Staff Discussion Paper 2017-12

Engert, Walter & Fung, Ben, "Central Bank Digital Currency: Motivations and Implications", Bank of Canada Staff Discussion Paper 2017-16

Kozicki, Sharon & Vardy, Jill, "Communicating Uncertainty in Monetary Policy", Bank of Canada Staff Discussion Paper 2017-14

Kruger, Mark & Steingress, Walter & Thanabalasingam, Sri, "Product Sophistication and the Slowdown in Chinese Export Growth", Bank of Canada Staff Discussion Paper 2017-15

Mendes, Rhys R. & Murchison, Stephen & Wilkins, Carolyn A., "Monetary Policy Under Uncertainty: Practice Versus Theory", Bank of Canada Staff Discussion Paper 2017-13

ABSTRACTS

A general equilibrium analysis of Canada's national policy

In this paper, we study the impact of Canada's adoption of protectionist trade policy in 1879 on Canadian welfare. Under the National Policy, the Canadian average weighted tariff increased from 14% to 21%. The conventional view is that this was a distortionary policy that negatively affected Canadian welfare. We argue that this view is incomplete because it ignores general equilibrium effects. Using a multi-industry general equilibrium model with differentiated goods, we show that tariffs' impact on welfare can potentially be positive, even for small open economies, due to their impact on domestic terms of trade and government revenues. We apply these theoretical insights in a reassessment of the static impact that the National Policy had on Canadian welfare in 1879, using newly compiled granular trade and production data, and newly estimated historically contemporaneous import demand elasticities. Our results suggest that, although a multilateral move to free trade would have resulted in the best welfare outcome for Canadians, the National Policy's tariff increases actually improved Canadian welfare by approximately 0.15% of GDP in 1879 – an amount equivalent to approximately $2.3 billion 2016 USD.

How fast can China grow? The Middle Kingdom's prospects to 2030

Given its size and importance for global commodity markets, the question of how fast China can grow over the medium term is an

important one. Using a Cobb–Douglas production function, we decompose the growth of trend GDP into those of the capital stock, labour, human capital and total factor productivity (TFP) and then forecast trend output growth out to 2030 using a bottom-up approach based on forecasts that we build for each one of these factors. Our paper distinguishes itself from existing work in that we construct a forecast of Chinese TFP growth based on the aggregation of forecasts of its key determinants. In addition, our analysis is based on a carefully constructed estimate of the Chinese productive capital stock and a measure of human capital (based on Chinese wage survey data) that better reflects the returns to education in China. Our results suggest that Chinese GDP growth will slow from around 7% currently to approximately 5% by 2030, consistent with a gradual rebalancing of the Chinese economy characterized by a decline in the investment rate. Moreover, our findings underscore the growing importance of TFP growth as a driver of Chinese growth.

The Real-Time Properties of the Bank of Canada's Staff Output Gap Estimates

We study the revision properties of the Bank of Canada’s staff output gap estimates since the mid-1980s. Our results suggest that the average staff output gap revision has decreased significantly over the past 15 years, in line with recent evidence for the U.S. Alternatively, revisions from purely statistical methods to estimate the gap have not experienced the same drop in magnitude. We then examine the usefulness of real-time gap estimates for forecasting inflation and find no deterioration in forecast performance when inflation projections are conditioned on real time rather than on final estimates of the gap.

Good Volatility, Bad Volatility, and Option Pricing

Advances in variance analysis permit the splitting of the total quadratic variation of a jump-diffusion process into upside and downside components. Recent studies establish that this decomposition enhances volatility predictions, and highlight the upside/downside variance spread as a driver of the asymmetry in stock price distributions. To appraise the economic gain of this decomposition, we design a new and flexible option pricing model in which the underlying asset price exhibits distinct upside and downside semi-variance dynamics driven by their model-free proxies. The new model outperforms common benchmarks, especially the alternative that splits the quadratic variation into diffusive and jump components.

Is the Discretionary Income Effect of Oil Price Shocks a Hoax?

The transmission of oil price shocks has been a question of central interest in macroeconomics since the 1970s. There has been renewed interest in this question after the large and persistent fall in the real price of oil in 2014–16. In the context of this debate, Ramey (2017) makes the striking claim that the existing literature on the transmission of oil price shocks is fundamentally confused about the question of how to quantify the effect of oil price shocks. In particular, she asserts that the discretionary income effect on private consumption, which plays a central role in contemporary accounts of the transmission of oil price shocks to the U.S. economy, makes no economic sense and has no economic foundation. Ramey suggests that the literature has too often confused the terms-of-trade effect with this discretionary income effect, and she makes the case that the effects of the oil price decline of 2014–16 on private consumption are smaller for a multitude of reasons than suggested by empirical models of the discretionary income effect. We review the main arguments in Ramey (2017) and show that none of her claims hold up to scrutiny. Our analysis highlights the theoretical basis of the discretionary income effect. We also discuss improved regression-based estimates of this effect that allow for changes in the dependence on oil and gasoline imports, and we highlight the fact that alternative estimates used by policymakers involve strong simplifying assumptions.

Optimal Interbank Regulation

Recent years have seen renewed interest in the regulation of interbank markets. A review of the literature in this area identifies two gaps: first, the literature has tended to make ad hoc assumptions about the interbank contract space, which makes it difficult to generate convincing policy prescriptions; second, the literature has tended to focus on ex-post interventions that kick in only after an interbank disruption has come underway (e.g., open-market operations, lender-of-last-resort interventions, bail-outs), rather than ex-ante prudential policies. In this paper, I take steps toward addressing both these gaps, namely by building a simple model for the interbank market in which banks optimally choose the form of their interbank contracts. I show that the model delivers episodes that qualitatively resemble the interbank disruptions witnessed during the financial crisis. Some important implications for policy then emerge. In particular, I show that optimal policy requires careful coordination between ex-post and ex-ante interventions, with the ex-ante

component surprisingly doing most of the heavy lifting. This suggests that previous literature has underemphasized the role that ex-ante interventions have to play in optimal interbank regulation.

Cash Versus Card: Payment Discontinuities and the Burden of Holding Coins

Cash is the preferred method of payment for small value transactions generally less than $25. We provide insight to this finding with a new theoretical model that characterizes and compares consumers' costs of paying with cash to paying with cards for each transaction. Our novel method accounts for how much change is received in the form of banknotes and metal coins, assuming that the weight and size of coins are inconvenient to carry. We use the regression discontinuity design (RDD) approach to estimate the model using the 2013 Bank of Canada Method-of-Payments (MOP) Survey and find a significant number of cash users who switch to paying with debit or credit cards at transaction values marginally above $5 and $10. We attribute this finding to the burden of receiving coins as change associated with the currency denomination structure. Our proposed methodology is general and can be applied to other countries and institutional details.

On the Tail Risk Premium in the Oil Market

This paper shows that changes in market participants' fear of rare events implied by crude oil options contribute to oil price volatility and oil return predictability. Using 25 years of historical data, we document economically large tail risk premia that vary substantially over time and significantly forecast crude oil futures and spot returns. Oil futures prices increase (decrease) in the presence of upside (downside) fears in order to allow for smaller (larger) returns thereafter. This increase (decrease) is amplified for the spot price because of time varying-benefits from holding physical oil inventories that work in the same direction. We also provide support for view that that time variation in the relative importance of oil demand and supply shocks is an important determinant of oil price fluctuations and their interaction with aggregate outcomes. However, the option-implied tail risk premia are not spanned by traditional macroeconomic and oil market uncertainty measures, suggesting that time-varying oil price fears are an additional source of oil price volatility and predictability.

Identifying the Degree of Collusion Under Proportional Reduction

Proportional reduction is a common cartel practice in which cartel members reduce their output proportionately. We develop a method to quantify this reduction relative to a benchmark market equilibrium scenario and relate the reduction to the traditional conduct parameter. Our measure is continuous, allowing us to have an intuitive interpretation as the "degree of collusion" and nesting the earlier models in the existing literature. Furthermore, our methodology addresses Corts' (1999) critique by estimating time-varying degree of collusion from a short panel of firm-level observations, exploiting firms' ex post heterogeneity. We illustrate the method using the Joint Executive Committee railroad cartel data.

The Causal Impact of Migration on US Trade: Evidence from Political Refugees

Immigrants can increase international trade by shifting preferences towards the goods of their country of origin and by reducing bilateral transaction costs. Using geographical variation across U.S. states for the period 2008 to 2013, I estimate the respective causal impact of immigrants on U.S. exports and imports. I address endogeneity and reverse causality by exploiting the exogenous allocation of political refugees within the U.S. refugee resettlement program that prevents immigrants from choosing the destination location. I find that a 10 percent increase in recent immigrants to a U.S. state raises imports from those immigrants' country of origin by 1.2 percent and exports by 0.8 percent.

Understanding the Time Variation in Exchange Rate Pass-Through to Import Prices

In this paper, we analyze the presence of time variation in the pass-through from the nominal effective exchange rate to import prices for 24 advanced economies over the period 1995–2015. In line with earlier studies in the literature, we find substantial heterogeneity in the level of exchange rate pass-through across countries. But, in addition, we show that the dynamics of exchange rate pass-through also differ across countries. Potential explanations for this observation could be of a country-specific nature or could relate to differences in the composition or transmission of global shocks across countries. We then investigate the role of global demand shocks as potential determinants of exchange rate pass-through dynamics in seven advanced economies. We conduct this analysis by

running a set of instrumental variable regressions to quantify the contemporaneous exchange rate pass-through that arises from different shocks. Out of the global demand shocks that we examine, we find that oil demand shocks, in particular, are associated with a relatively higher exchange rate pass-through to import prices, while US fiscal policy shocks appear to have the lowest impact.

Central Bank Digital Currency: Motivations and Implications

The emergence of digital currencies such as Bitcoin and the underlying blockchain and distribution ledger technology have attracted significant attention. These developments have raised the possibility of considerable impacts on the financial system and perhaps the wider economy. This paper addresses the question of whether a central bank should issue digital currency that could be used by the general public. It begins by discussing the possible motivations for a central bank to issue a digital currency. The paper then sets out a benchmark central bank digital currency (CBDC) with features that are similar to cash. The implications of such a digital currency are explored, focusing on central bank seigniorage, monetary policy, the banking system and financial stability, and payments. Finally, a CBDC that differs from the benchmark digital currency in a significant way is considered.

Communicating Uncertainty in Monetary Policy

While central banks cannot provide complete foresight with respect to their future policy actions, it is in the interests of both central banks and market participants that central banks be transparent about their reaction functions and how they may evolve in response to economic developments, shocks, and risks to their outlooks.

This paper outlines the various ways in which the Bank of Canada seeks to explain its economic outlook and monetary policy decisions, with an emphasis on how different sources of uncertainty factor into monetary policy communications. To help markets and others understand its reaction function, the central bank must explain what uncertainties are weighing on policy and how (or if) these uncertainties are being considered in policy formulation. Discussion of uncertainty becomes particularly important when a large shock has hit the economy or when a central bank's view or its policy stance is changing.

Market views and the views of the central bank will not always be aligned. The aim of monetary policy communications should not be

alignment but understanding—helping markets comprehend the central bank's policy objectives and providing a coherent rationale for policy decisions. In doing so, the bank must be transparent about the uncertainties influencing the outlook, their possible impacts and how these uncertainties will be factored into policy decisions. This paper outlines some recent and upcoming initiatives to achieve those objectives and improve Bank of Canada communications.

Product Sophistication and the Slowdown in Chinese Export Growth

Chinese real export growth decelerated considerably during the last decade. This paper argues that the slowdown largely resulted from China moving to a more sophisticated mix of exports: China produced more sophisticated goods over which it had pricing power instead of producing greater volumes of less sophisticated products. Indeed, we show that the share of highly sophisticated products in Chinese exports increased steadily over time and that Chinese exports became less price sensitive, suggesting increased pricing power. Further, a decomposition of China's market share gains shows that China continues to gain market share despite exporting products with higher-than-average world prices. China's continuous gain in global export market share suggests that its export machine is far from broken.

Monetary Policy Under Uncertainty: Practice Versus Theory

For central banks, conducting policy in an environment of uncertainty is a daily fact of life. This uncertainty can take many forms, ranging from incomplete knowledge of the correct economic model and data to future economic and geopolitical events whose precise magnitudes and effects cannot be known with certainty. The objective of this paper is to summarize and compare the main results that have emerged in the literature on optimal monetary policy under uncertainty with actual central bank behaviour. To this end, three examples are studied in which uncertainty played a significant role in the Bank of Canada's policy decision, to see how closely they align with the predictions from the literature. Three principles emerge from this analysis. First, some circumstances—such as when the policy rate is at risk of being constrained by the effective lower bound—should lead the central bank to be more pre-emptive in moving interest rates, whereas others can rationalize more of a wait-and-see approach. In the latter case, the key challenge is finding the right balance between waiting for additional information and not falling behind the curve. Second, the starting-point level of inflation can

matter for how accommodative or restrictive policy is relative to the same situation without uncertainty, if there are thresholds in the central bank's preferences associated with specific ranges for the target variable, such as the risk of inflation falling outside of the inflation control range. Third, policy decisions should be disciplined, where possible, by formal modelling and simulation exercises in order to support robustness and consistency in decision making over time. The paper concludes with a set of suggested areas for future research.

UPCOMING EVENTS

Bart Hobijn (Arizona State University), 15 December 2017
Organizer: Julien Champagne (CEA)

Todd Walker (Indiana University Bloomington), 23 March 2018
Organizer: Wataru Miyamoto (CEA)

Giorgio Primiceri (Northwestern University), 20 April 2018
Organizer: Joel Wagner (CEA)

Regis Barnichon (Federal Reserve Bank of San Francisco), 18 May 2018
Organizer: Julien Champagne (CEA)

Fernanda Nechio (Federal Reserve Bank of San Francisco), 25 May 2018
Organizer: Anthony Landry (CEA)