

Bank of Canada Monthly Research Update

September 2016

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

Chen, Heng, Chris Henry, Kim P. Huynh, Rallye Shen & Kyle Vincent, “Measuring Consumer Cash Holdings: Lessons from the 2013 Bank of Canada Methods-of-Payment Survey”, *Survey Practice*, 2016, Volume 9, Issue 4

Forthcoming

Chang, Bo Young & Greg Orosi, “Equity Option Implied Probability of Default and Equity Recovery Rate”, *Journal of Futures Markets*

Chen, Heng, Yanqin Fan & Ruixuan Liu “Inference for the Correlation Coefficient between Potential Outcomes in the Gaussian Switching Regime Model”, *Journal of Econometrics*

Khan, Hashmat & Abeer Reza, “House Prices and Government Spending Shocks”, *Journal of Money, Credit and Banking*

STAFF WORKING PAPERS

Benedict, Craig, Mario J. Crucini & Anthony Landry, “On What States Do Prices Depend? Answers from Ecuador”, Bank of Canada Staff Working Paper 2016-43

Cao, Shutao & Danny Leung, “Financial Constraint and Productivity: Evidence from Canadian SMEs”, Bank of Canada Staff Working Paper 2016-44

Chande, Nikil & Nicholas Labelle “Using Speed and Credit Limits to Address the Procyclicality of Initial Margin at Central Counterparties” Bank of Canada Staff Discussion Paper 2016-18

Shukayev, Malik & Argyn Toktamyssov “Implementing Cross-Border Interbank Lending in BoC-GEM-FIN” Bank of Canada Staff Discussion Paper 2016-19

Poloz, Stephen S. “The Paul Storer Memorial Lecture—Cross-Border Trade Integration and Monetary Policy” Bank of Canada Staff Discussion Paper 2016-20

Xu, Shaofeng “Interpreting Volatility Shocks as Preference Shocks” Bank of Canada Staff Working Paper 2016-45

ABSTRACTS

Measuring Consumer Cash Holdings: Lessons from the 2013 Bank of Canada Methods-of-Payment Survey

This article discusses the methodology used in the 2013 Bank of Canada Methods-of-Payment Survey to measure cash and non-cash payments. Measuring cash holdings is particularly difficult due to the anonymous nature of cash and the fact that some subpopulations are difficult to recruit into the survey. We use a variety of methods in survey design, weighting, and variance estimation to estimate a measure of cash holdings while ensuring the sample is proportionally representative of the Canadian population.

Equity Option Implied Probability of Default and Equity Recovery Rate

There is a close link between prices of equity options and the default probability of a firm. We show that in the presence of positive expected equity recovery, standard methods that assume zero equity recovery at default misestimate the option-implied default probability. We introduce a simple method to detect stocks with positive expected equity recovery by examining option prices and propose a method to extract the default probability from option prices that allows positive equity recovery. We demonstrate possible applications of our methodology with examples that include large financial institutions in the United States during the 2007–09 subprime crisis.

Inference for the Correlation Coefficient between Potential Outcomes in the Gaussian Switching Regime Model

We propose estimators of sharp bounds on the correlation coefficient between potential outcomes in the Gaussian switching regime model and develop an asymptotically uniformly valid and non-conservative confidence set for the true correlation coefficient. A boundary-interior-category selection procedure is proposed to deal with discontinuity of the pointwise asymptotic distribution of estimators of the sharp bounds. Our confidence set is easy to implement: it takes the form of a closed interval and its critical values have closed-form expressions. Simulation study reveals the better finite sample performance of our confidence set than the naive confidence set ignoring the discontinuity issue.

House Prices and Government Spending Shocks

We show that DSGE models with housing and collateralized borrowing predict a fall in house prices following positive government spending shocks. By contrast, we show that house prices in the US rise persistently after identified positive government spending shocks. We clarify that the incorrect house price response is due to a general property of DSGE models -- approximately constant shadow value of housing -- and that modifying preferences and production structure cannot help in obtaining the correct house price response. Properly accounting for the empirical evidence on government spending shocks and house prices using a DSGE model therefore remains a significant challenge.

On What States Do Prices Depend? Answers from Ecuador

In this paper, we argue that differences in the cost structures across sectors play an important role in firms' decisions to adjust their prices. We develop a menu-cost model of pricing in which retail firms intermediate trade between producers and consumers. An important facet of our analysis is that the labor-cost share of retail production differs across goods and services in the consumption basket. For example, the price of gasoline at the retail pump is predicted to adjust more frequently and by more than the price of a haircut because of the high volatility in wholesale gasoline prices relative to the wages of unskilled labor, even when both retailers face a common menu cost. This modeling approach allows us to account for some of the cross-sectional differences observed in the frequency of price adjustments across goods. We apply this model to Ecuador to take advantage of inflation variations and the rich panel of monthly retail prices.

Financial Constraint and Productivity: Evidence from Canadian SMEs

The degree to which financial constraint is binding is often not directly observable in commonly used business data sets (e.g., Compustat). In this paper, we measure and estimate the likelihood of a firm being constrained by external financing using a data set of small- and medium-sized Canadian firms. Our measure separates the need for financing from the degree of constraint, conditional on the need for financing. We find that firm size, the current-debt-to-asset ratio and cash flow are robust indicators that can be used as a proxy for financial constraint. The total debt-to-asset ratio is not, however, a statistically significant indicator of financial constraint. In addition, firms with higher cash flow are less likely to need external financing

and to be constrained if they do need it. We then estimate firm-level total factor productivity by taking into account the measured likelihood of binding financial constraint. Estimates of the coefficients for labour and capital in the structural estimation of the production function can be downward-biased if financial constraint is omitted, because production inputs are negatively correlated with the likelihood of being constrained by external financing. This in turn leads to an upward bias of total factor productivity estimates, which is about 4 per cent according to our estimation.

Using Speed and Credit Limits to Address the Procyclicality of Initial Margin at Central Counterparties

This paper proposes a practical approach to address the procyclicality of initial margin at central counterparties (CCPs) that can work even in periods of extreme stress. The approach allows CCPs to limit the speed of margin increases resulting from spikes in market volatility. To maintain the desired level of risk protection, the model covers, through loss-sharing arrangements, a chosen number of the largest shares of the margin increases that are deemed procyclical. To facilitate adoption of this approach, we allow loss sharing to be capped through the allocation of bilateral credit limits. We undertake an empirical exercise to demonstrate that, even with conservative assumptions, the proposed approach can generate significant margin relief without generating losses that cannot be absorbed by clearing members.

Implementing Cross-Border Interbank Lending in BoC-GEM-FIN

BIS interbank lending data show that the Great Recession generated large and persistent changes in the international interbank lending positions of various countries. The main objective of this study is to understand the role of changes in international interbank credit flows in transmitting shocks across borders. To accomplish this task, we needed a global structural model with an international interbank market. Our search for a suitable structural model revealed that the Bank of Canada version of the global economy model (BoC-GEM-FIN) comes closest to our needs. BoC-GEM-FIN includes region-specific interbank markets, as well as some international borrowing and lending, but abstracts from the international interbank lending. This paper describes the modifications we made in order to introduce the international interbank market into BoC-GEM-FIN. The modified model is calibrated to match the changes in international interbank lending positions and the decline in the business lending of US banks

that took place after the fourth quarter of 2008. Our simulations show that the international interbank market amplifies spillover effects of demand shocks but does not systematically alter the effects of supply shocks, including those for commodities.

The Paul Storer Memorial Lecture—Cross-Border Trade Integration and Monetary Policy

In this paper we explore the nexus between cross-border trade integration and monetary policy. We first review the evidence that trade liberalization has increased the degree of integration in North America and conclude that, while robust structural inferences remain elusive, there is sufficient supporting evidence for central banks to treat the issue seriously. The paper then discusses several channels by which increased integration might affect macroeconomic models. We introduce modifications to the Bank of Canada's main policy model, ToTEM, to capture some of the impacts of integration suggested in the literature and generate stochastic simulations to compare versions of the model with low and high integration. The main conclusion is that increased integration may make it more challenging for central banks to control inflation, in the sense that doing so will require more variability in interest rates, exchange rates and the output gap.

Interpreting Volatility Shocks as Preference Shocks

This paper examines the relationship between volatility shocks and preference shocks in an analytically tractable endogenous growth model with recursive preferences and stochastic volatility. I show that there exists an explicit mapping between volatility shocks and preference shocks, and a rise in volatility generates the same impulse responses of macroeconomic aggregates as a negative preference shock.