

Bank of Canada Monthly Research Update

May 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

- Ahnert, Toni & Co-Pierre Georg, “Information Contagion and Systemic Risk”, Journal of Financial Stability
- Anand, Kartik et al., “The Missing Links: a Global Study on Uncovering Financial Network Structures from Partial Data”, Journal of Financial Stability
- Basso, Leonardo, Nicolas Figueroa & Jorge Vasquez, “Monopoly Regulation under Asymmetric Information: Prices vs. Quantities”, RAND Journal of Economics
- Dahlhaus, Tatjana, Justin-Damien Guénette & Garima Vasishtha, “Nowcasting BRIC+M in Real Time”, International Journal of Forecasting
- Feunou, Bruno, Mohammad Jahan-Parvar & Cedric Okou, “Downside Variance Risk Premium”, Journal of Financial Econometrics

STAFF WORKING PAPERS

- Alexander, Patrick & Ian Keay, “The Welfare Effects of Protection: A General Equilibrium Analysis of Canada’s National Policy”, Bank of Canada Staff Working Paper 2017-18
- Froni, Claudia, Francesco Ravazzolo & Barbara Sadaba, “Assessing the Predictive Ability of Sovereign Default Risk on Exchange Rate Returns”, Bank of Canada Staff Working Paper 2017-19
- Lepetyuk, Vadym, Lilia Maliar & Serguei Maliar, “Should Central Banks Worry About Nonlinearities of their Large-Scale Macroeconomic Models?”, Bank of Canada Staff Working Paper 2017-21
- Xu, Shaofeng, “Volatility Risk and Economic Welfare”, Bank of Canada Staff Working Paper 2017-20

STAFF DISCUSSION PAPERS

- Bourque, Jérôme & Philippe Muller, “Methodology for Assigning Credit Ratings to Sovereigns”, Bank of Canada Staff Discussion Paper 2017-7
- Chen, David Xiao, Philippe Muller & Hawa Wagué, “Multilateral Development Bank Credit Rating Methodology: Overcoming the Challenges in Assessing Relative Credit Risk in Highly Rated Institutions Based on Public Data”, Bank of Canada Staff Discussion Paper 2017-6

ABSTRACTS

Information Contagion and Systemic Risk

We examine the effect of ex-post information contagion on the ex-ante level of systemic risk defined as the probability of joint bank default. Because of counterparty risk or common exposures, bad news about one bank reveals valuable information about another bank, triggering information contagion. When banks are subject to common exposures, information contagion induces small adjustments to bank portfolios and therefore increases overall systemic risk. When banks are subject to counterparty risk, by contrast, information contagion induces a large shift toward more prudential portfolios, thereby reducing systemic risk.

The Missing Links: a Global Study on Uncovering Financial Network Structures from Partial Data

Capturing financial network linkages and contagion in stress test models are important goals for banking supervisors and central banks responsible for micro- and macroprudential policy. However, granular data on financial networks is often lacking, and instead the networks must be reconstructed from partial data. In this paper, we conduct a horse race of network reconstruction methods using network data obtained from 25 different markets spanning 13 jurisdictions. Our contribution is two-fold: first, we collate and analyze data on a wide range of financial networks. And second, we rank the methods in terms of their ability to reconstruct the structures of links and exposures in networks.

Monopoly Regulation under Asymmetric Information: Prices vs. Quantities

We compare two instruments to regulate a monopoly that has private information about its demand or costs: fixing either the price or quantity. For each instrument, we consider sophisticated (screening) and simple (bunching) mechanisms. We characterize the optimal mechanisms and compare their welfare performance. With unknown demand and increasing marginal costs, the sophisticated price mechanism dominates that of quantity, whereas the sophisticated quantity mechanism may prevail when marginal costs decrease. The simple price mechanism dominates that of quantity when marginal costs decrease, but the opposite may arise if marginal costs increase. With unknown costs, both instruments are equivalent.

Nowcasting BRIC+M in Real Time

Given the growing importance of emerging market economies (EMEs) in driving global GDP growth, timely and accurate assessment of current and future economic activity in EMEs is important for policy-makers not only in these countries but also in advanced economies. This paper uses state-of-the-art dynamic factor models (DFMs) to nowcast real GDP growth for Brazil, Russia, India, China, and Mexico ("BRIC+M"). The DFM framework is particularly suitable for EMEs as it enables us to efficiently handle data series characterized by different publication lags, frequencies, and sample lengths. It also allows us to extract model-based "news" from a data release and assess the impact of "news" on nowcast revisions. Overall, we find that the DFMs generally display good directional accuracy and provide reliable nowcasts for GDP growth. Further, "news" pertaining to domestic indicators is the main driver of changes in nowcast revisions, while the role of exogenous variables is relatively minor.

Downside Variance Risk Premium

We propose a new decomposition of the variance risk premium (VRP) in terms of upside and downside VRPs. These components reflect market compensation for changes in good and bad uncertainties. Empirically, we establish that the downside VRP is the main component of the VRP. We find a positive and significant link between the downside VRP and the equity premium, and a negative but statistically insignificant link between the upside VRP and the equity premium. The opposite relationships between these two components and the equity premium explains the stronger link found between the downside VRP and the equity premium compared with the well-established relationship between VRP and the equity premium. A simple equilibrium consumption-based asset pricing model, fitted to the U.S. data, supports our decomposition.

The Welfare Effects of Protection: 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 the welfare effects of tariffs can potentially be

positive, even for small open economies, due to their impact on the terms of trade. We apply these theoretical insights in a reassessment of the welfare consequences of the National Policy for Canada using newly compiled granular trade and production data from 1870 to 1913, and newly estimated historically contemporaneous import demand elasticities. Our results suggest that the National Policy's tariff changes actually improved Canadian welfare by between 0.13% to 0.20% of gross domestic product, although a multilateral move to free trade would have resulted in an even better welfare outcome for Canadians.

Assessing the Predictive Ability of Sovereign Default Risk on Exchange Rate Returns

Increased sovereign credit risk is often associated with sharp currency movements. Therefore, expectations of the probability of a sovereign default event can convey important information regarding future movements of exchange rates. In this paper, we investigate the possible pass-through of risk in the sovereign debt markets to currency markets by proposing a new risk premium factor for predicting exchange rate returns based on sovereign default risk. We compute it from the term structure at different maturities of sovereign credit default swaps and conduct an out-of-sample forecasting exercise to test whether we can improve upon the benchmark random walk model. Our results show that the inclusion of the default risk factor improves the forecasting accuracy upon the random walk model at short forecasting horizons.

Should Central Banks Worry About Nonlinearities of their Large-Scale Macroeconomic Models?

How wrong could policymakers be when using linearized solutions to their macroeconomic models instead of nonlinear global solutions? This question became of much practical interest during the Great Recession and the recent zero lower bound crisis. We assess the importance of nonlinearities in a scaled-down version of the Terms of Trade Economic Model (ToTEM), the main projection and policy analysis model of the Bank of Canada. In a meticulously calibrated "baby" ToTEM model with 21 state variables, we find that local and global solutions have similar qualitative implications in the context of the recent episode of the effective lower bound on nominal interest rates in Canada. We conclude that the Bank of Canada's analysis would not improve significantly by using global nonlinear methods instead of a simple linearization method augmented to include occasionally binding constraints. However, we also find that even

minor modifications in the model's assumptions, such as a variation in the closing condition, can make nonlinearities quantitatively important.

Volatility Risk and Economic Welfare

This paper examines the effects of time-varying volatility on welfare. I construct a tractable endogenous growth model with recursive preferences, stochastic volatility, and capital adjustment costs. The model shows that a rise in volatility can decelerate growth in the absence of any level shocks. In contrast to level risk, which is always welfare reducing for a risk-averse household, volatility risk can increase or decrease welfare, depending on model parameters. When calibrated to U.S. data, the model finds that the welfare cost of volatility risk is largely negligible under plausible model parameterizations.

Methodology for Assigning Credit Ratings to Sovereigns

The investment of foreign exchange reserves or other asset portfolios requires an assessment of the credit quality of investment counterparties. Traditionally, foreign exchange reserve and asset managers have relied on credit rating agencies (CRAs) as the main source for credit assessments. The Financial Stability Board issued principles to reduce reliance on CRA ratings in standards, laws and regulations, in support of financial stability. Moreover, best practices in the asset management industry suggest that investors should understand the credit risks they are exposed to and, more broadly, that internal credit assessments be relied upon to inform investment decisions. In support of efforts by market participants to establish stronger internal credit assessment practices, as well as to solicit feedback, this paper provides a detailed technical description of the methodology developed to assign internal credit ratings to sovereigns, using publicly available data only. This methodology proposes three key innovations: (i) a quantitative approach to assess political risks, (ii) a framework to assess the government's potential contingent liabilities related to the banking sector, and (iii) a framework to determine the presence of asset price imbalances in the country. The methodology presented relies on fundamental credit analysis that produces a forward-looking and "through-the-cycle" assessment of the investment entity's capacity and willingness to pay its financial obligations, resulting in an opinion on the relative credit standing or likelihood of default. The methodology presented is currently used to assess eligibility and inform investment decisions in

the management of Canada's foreign exchange reserves. The methodology is a key component of the joint Bank of Canada and Department of Finance Canada initiative to develop internal credit assessment capabilities.

Multilateral Development Bank Credit Rating Methodology: Overcoming the Challenges in Assessing Relative Credit Risk in Highly Rated Institutions Based on Public Data

The investment of foreign exchange reserves or other asset portfolios requires an assessment of the credit quality of counterparties. Traditionally, foreign exchange reserve managers and other investors have relied on credit rating agencies (CRAs) as the main source for credit assessments. The Financial Stability Board issued a set of principles in support of financial stability to reduce reliance on CRA ratings in standards, laws and regulations. To support efforts to end mechanistic reliance on CRA ratings and instead establish stronger internal credit assessment practices, this paper provides a detailed technical description of a methodology developed to assign an internal credit rating to multilateral development banks (MDBs), using only publicly available data. The methodology relies on fundamental credit analysis that produces a forward-looking assessment of the investment entity's capacity and willingness to pay its financial obligations, resulting in an opinion on the relative credit standing or likelihood of default. This methodology proposes four key innovations: (i) a simple way of estimating the capital adequacy ratio, (ii) new metrics to evaluate the liquidity and funding profile of an MDB, (iii) a straightforward approach to evaluating the exceptional support from shareholders, and (iv) a new criterion related to corporate governance, which provides a high level of objectivity in assessing some of the qualitative indicators. The methodology is a key component of the joint Bank of Canada and Department of Finance Canada initiative to develop internal credit assessment capabilities and is currently used to assess eligibility and inform investment decisions in the management of Canada's foreign exchange reserves.