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Bank of Canada
Monthly Research Update

July 2019

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

Allen, Jason & Thompson, James, "Variable pay: Is it for the worker or the firm?", Journal of Corporate Finance, Vol 58: 551-566, October 2019

Allen, Jason & Clark, Robert & Houde, Jean-François, "Search Frictions and Market Power in Negotiated-Price Markets", Journal of Political Economy, Vol 127: 1550-1598, August 2019

Bulusu, Narayan & Guérin, Pierre, "What drives interbank loans? Evidence from Canada", Journal of Banking & Finance, Vol 106: 427-444, September 2019

Ichihashi, Shota, "Limiting Sender's information in Bayesian persuasion", Games and Economic Behaviour, Vol 117: 276-288, September 2019

Davoodalhosseini, Mohammad, "Constrained Efficiency with Adverse Selection and Directed Search", Journal of Economic Theory, Vol 183: 568-593, September 2019

Van Oordt, Maarten & Zhou, Chen, "Estimating Systematic Risk under Extremely Adverse Market Conditions", Journal of Financial Econometrics, Vol 17(3): 432-461, Summer 2019

Forthcoming

Chen, Heng & Dunbar, Geoff & Shen, Rallye, "The Mode is the Message: Using Paradata to Identify Survey Design Effects", Advances in Econometrics, Vol 41: Essays in Honor of Cheng Hsiao

Jain, Monica & Sutherland, Christopher, "How Do Central Bank Projections and Forward Guidance Influence Private-Sector Forecasts?", International Journal of Central Banking

Jiang, Janet & Arifovic, Jasmina, "Strategic Uncertainty and the Power of Extrinsic Signals - Evidence from an Experimental Study of Bank Runs", Journal of Economic Behaviour and Organization

Sekkel, Rodrigo & Champagne, Julien & Poulin-Bellisle, Guillaume, "Introducing the Bank of Canada Staff Economic Projections Database", Journal of Applied Econometrics

Steingress, Walter, "Market size Market Size and Entry in International Trade: product versus firm fixed costs", Review of International Economics

STAFF WORKING PAPERS

Garratt, Rod & Van Oordt, Maarten, "Privacy as a Public Good: A Case for Electronic Cash", Bank of Canada Staff Working Paper 2019-24

Swarbrick, Jonathan, "Lending Standards, Productivity and Credit Crunches", Bank of Canada Staff Working Paper 2019-25

Garratt, Rod, "An Application of Shapley Value Cost Allocation to Liquidity Savings Mechanisms", Bank of Canada Staff Working Paper 2019-26

Evans, George & Hommes, Cars & McGough, Bruce & Salle, Isabelle, "Are Long-Horizon Expectations (De-)Stabilizing? Theory and Experiments", Bank of Canada Staff Working Paper 2019-27

Danielsson, Jon & Ergun, Lerby & de Haan, Laurens & de Vries, Casper G., "Tail Index Estimation: Quantile-Driven Threshold Selection", Bank of Canada Staff Working Paper 2019-28

STAFF DISCUSSION PAPERS

Johal, Jesse & Roberts, Joanna & Sim, John, "Canadian Securities Lending Market Ecology", Bank of Canada Staff Discussion Paper 2019-5

Gervais, Olivier, "How Oil Supply Shocks Affect the Global Economy: Evidence from Local Projections", Bank of Canada Staff Discussion Paper 2019-6

Engert, Walter & Fung, Ben & Segendorf, Björn, "A Tale of Two Countries: Cash Demand in Canada and Sweden", Bank of Canada Staff Discussion Paper 2019-7

ABSTRACTS

Variable pay: Is it for the worker or the firm?

Why do firms pay their workers with variable pay? The standard explanation appeals to a problem that the worker faces, e.g., agency. We develop a model of variable pay endogenously driven by the capital structure problem of the firm, and not a worker related problem. If workers face a low probability of job termination, firms use more variable pay, and more leverage. This can have important implications for understanding compensation practices in organizations. We provide empirical evidence consistent with firms using variable pay to increase leverage.

Search Frictions and Market Power in Negotiated-Price Markets

We provide a framework for empirical analysis of negotiated-price markets. Using mortgage market data and a search and negotiation model, we characterize the welfare impact of search frictions and quantify the role of search costs and brand loyalty for market power. Search frictions reduce consumer surplus by $12/month/consumer, 28 percent of which can be associated with discrimination, 22 percent with inefficient matching, and 50 percent with search costs. Banks with large consumer bases have margins 70 percent higher than those with small consumer bases. The main source of this incumbency advantage is brand loyalty; however, price discrimination based on search frictions accounts for almost a third.

What drives interbank loans? Evidence from Canada

We find that collateral reallocation costs are a significant driver of the dynamics of overnight interbank loans. The cost of negotiating and settling collateralized over-the-counter trades incentivizes the temporary use of unsecured loans to meet changes in short-term liquidity needs, as well as greater uptake of central bank overnight lending facilities. This friction also leads to repos adjusting gradually in response to persistent changes in liquidity demand.

Limiting Sender's information in Bayesian persuasion

I study how the outcome of Bayesian persuasion depends on Sender's information. I consider a game in which, prior to Sender's information disclosure, Designer can restrict the most informative signal that Sender can generate. In the binary action case, I consider arbitrary preferences of Designer and characterize all equilibrium

outcomes. As a corollary, I derive an information restriction that maximizes Receiver's payoffs: Whenever Designer can increase Receiver's payoffs by restricting Sender's information, the Receiver-optimal way coincides with an equilibrium of a hypothetical game in which Receiver persuades Sender.

Constrained Efficiency with Adverse Selection and Directed Search

This paper studies constrained efficiency in Guerrieri et al.'s (2010) model of adverse selection and directed search. Buyers post contracts, and sellers with private information about their type direct their search toward their preferred contract. Buyers and sellers then match bilaterally and trade. If the Guerrieri-Shimer-Wright equilibrium fails to achieve the first best, then the planner subject to the frictions of the environment achieves strictly higher welfare than the equilibrium, i.e., the equilibrium is not ex-ante constrained efficient. Under certain conditions, the planner achieves an allocation that even Pareto dominates the equilibrium, i.e., the equilibrium is not interim constrained efficient. Under other conditions, the planner can completely undo the effects of adverse selection and achieves the first best. Cross-subsidization is the key to these results.

Estimating Systematic Risk under Extremely Adverse Market Conditions

This paper considers the problem of estimating a linear model between two heavy-tailed variables if the explanatory variable has an extremely low (or high) value. We propose an estimator for the model coefficient by exploiting the tail dependence between the two variables and prove its asymptotic properties. Simulations show that our estimation method yields a lower mean-squared error than regressions conditional on tail observations. In an empirical application, we illustrate the better performance of our approach relative to the conditional regression approach in projecting the losses of industry-specific stock portfolios in the event of a market crash.

The Mode is the Message: Using Paradata to Identify Survey Design Effects

Changes in survey mode (e.g., online, offline) may influence the values of survey responses, and may be particularly problematic when comparing repeated cross-sectional surveys. This paper identifies mode effects by correcting for both unit non-response and sampling selection using the sample profile data (predata) — the

individual's number of previous survey invitations, the number of completed past surveys, and the reward points balance. The findings show that there is statistically significant evidence of mode effects in recall and subjective questions, but not for factual ones.

How Do Central Bank Projections and Forward Guidance Influence Private-Sector Forecasts?

We construct a 23-country panel data set to consider the effect of central bank projections and forward guidance on private-sector forecast disagreement. We find that central bank projections and forward guidance matter mainly for private-sector forecast disagreement surrounding upcoming policy rate decisions and matter less for private-sector macroeconomic forecasts. Further, neither central banks' provision of policy rate path projections nor their choice of policy rate assumption used in their macroeconomic projections appear to matter much for private-sector forecast disagreement.

Strategic Uncertainty and the Power of Extrinsic Signals - Evidence from an Experimental Study of Bank Runs

A "sunspot" is a variable that has no direct impact on the economy's fundamental condition, such as preferences, endowments or technologies, but may nonetheless affect economic outcomes through the expectations channel as a coordination device. This paper investigates how people react to sunspots in the context of a bank-run game in a controlled laboratory environment. The sunspot variable is a series of random public announcements predicting withdrawal outcomes. The treatment variable is the coordination parameter, defined as the minimum fraction of depositors required to wait so that waiting entails a higher payoff than withdrawing. We conduct treatments with a high, low and intermediate value of the coordination parameter. Although theory predicts that sunspot equilibria exist in all treatments, strong responses to sunspots only occur in the treatment featuring the intermediate value of the coordination parameter where strategic uncertainty is high. The policy implication is that people tend to respond strongly to public announcements during times of uncertainty. In those situations, communication to the public must be treated with extra care.

Introducing the Bank of Canada Staff Economic Projections Database

We present a novel database of real-time data and forecasts from the Bank of Canada's staff economic projections. We then provide a

forecast evaluation for GDP growth and CPI inflation since 1982: we compare the staff forecasts with those from commonly used time-series models estimated with real-time data and with forecasts from other professional forecasters and provide standard bias tests. Finally, we study changes in the predictability of the Canadian economy following the announcement of the inflation-targeting regime in 1991. Our database is unprecedented outside the United States, and our evidence is particularly interesting, as it includes over 30 years of staff forecasts, two severe recessions and different monetary policy regimes. The database will be made available publicly and updated annually.

Market Size and Entry in International Trade: product versus firm fixed costs

This paper develops a theoretical framework to infer the nature of fixed costs from the relationship between entry patterns in international markets and destination market size. If fixed costs are at the firm level, firms take advantage of an intrafirm spillover by expanding firm-level product range (scope). Few firms enter with many products and dominate international trade. If fixed costs are at the product level, an interfirm spillover reduces the fixed costs to export for all firms producing the product. Using cross-country data on firm and product, I find empirical evidence consistent with product-level costs. More firms than products enter in larger markets, offering their consumers lower prices and a greater variety of goods within the product category.

Privacy as a Public Good: A Case for Electronic Cash

Cash gives users a high level of privacy when making payments, but the use of cash to make payments is declining. People increasingly use debit cards, credit cards or other methods to pay. These payment methods do not provide the same level of privacy as cash. Meanwhile, providers of such payment methods are increasingly seeking ways to earn money from the payments data of their clients.

We identify an economic mechanism that explains why people may choose too little privacy when considering how to pay. People do not bear the full costs of failing to protect their privacy. Data revealed by one person when they do not protect their privacy can be used to make inferences about the purchasing habits of another individual, even if that individual has taken steps to protect their own data. Economists call this mechanism an externality.

It is easy to imagine a scenario where, because of this externality, people have very little privacy when making payments, even though privacy is highly valued in society. When left to market forces, this externality could also result in a faster decline in the use of cash than what would be optimal. Is it possible to reverse the trend toward less privacy in payments? Perhaps introducing a widely accepted electronic cash that offers the convenience of digital payments and the privacy of cash could help.

Lending Standards, Productivity and Credit Crunches

We propose a macroeconomic model in which adverse selection in investment drives the amplification of macroeconomic fluctuations, in line with prominent roles played by the credit crunch and collapse of the asset-backed security market in the financial crisis. Endogenous lending standards emerge due to an informational asymmetry between borrowers and lenders about the riskiness of borrowers. By using loan approval probability as a screening device, banks ration credit following financial disturbances, generating large endogenous movements in total factor productivity, explaining why productivity often falls during crises. Furthermore, the mechanism implies that financial instability is heightened when interest rates are low.

An Application of Shapley Value Cost Allocation to Liquidity Savings Mechanisms

Liquidity demands in real-time gross settlement payment systems can be enormous. To reduce the liquidity requirement, central banks around the world have implemented liquidity savings mechanisms (LSMs). The most effective LSMs are those that economize on liquidity needs by matching offsetting payments that have been submitted to a central queue and settling these payments using only the liquidity needed to cover the net obligations.

Are Long-Horizon Expectations (De-)Stabilizing? Theory and Experiments

Most models in finance assume that agents make trading plans over the infinite future. We consider instead that they are boundedly rational and may only form forecasts over a limited horizon. We explore how participants in financial markets trading over finite horizons affect the level and the volatility of the price.

In our theoretical model, agents with different planning horizons may hold different expectations over those horizons and trade the asset accordingly. We derive testable implications in the lab under various theories of expectation formation over those horizons. Then we design a laboratory experiment to test these theoretical implications against human behaviour.

Our experiment confirms most of our theoretical hypotheses. Short-horizon trading favors deviations of the asset price from fundamentals. By contrast, a modest share of long-horizon traders is enough for the price to stabilize around its fundamental value. This is because short-horizon traders tend to coordinate their price forecasts using non-fundamental factors, such as recent price trends, in choosing their trading strategies. Long-horizon traders hold more heterogeneous views about future price developments, which prevents such trend-chasing behaviour.

Tail Index Estimation: Quantile-Driven Threshold Selection

The most extreme events, such as economic crises, are rare but often have a great impact. It is difficult to precisely determine the likelihood of such events because the sample is small. A common statistical technique is to average the logarithmic distance between a threshold, the least extreme of all the extreme events, and extreme events, i.e., Hill's estimator. The choice of the threshold is important for modelling these events accurately.

We develop a new method for determining the optimal threshold by using various thresholds as an input to model the tail. For the various thresholds, we document the largest difference between the extreme observations a model produces and the extreme observations in the sample. The threshold that produces the smallest difference is the optimal threshold for modelling these tail events. In simulation exercises, we show that this new method outperforms various existing methods.

To demonstrate the economic relevance of choosing the proper threshold, we use daily stock return data from the Center for Research in Security Prices. We show that the various methods produce large differences in estimating the likelihood of these tail events. Furthermore, we show that using a poorly chosen threshold can change the empirical results of previous research.

For the FSRC:

We develop a new empirically driven method to find the optimal threshold for Hill's tail exponent estimator.

Canadian Securities Lending Market Ecology

This is the fourth of the Financial Markets Department's descriptions of Canadian financial industrial organization. The paper discusses the organization of the securities lending market in Canada. We outline key characteristics of securities lending contracts, participants in the securities lending market, the market infrastructures that support securities lending activities, and aggregated statistics describing the Canadian market. We also describe trading practices, risks and regulation relating to the securities lending market.

How Oil Supply Shocks Affect the Global Economy: Evidence from Local Projections

We provide empirical evidence on the impact of oil supply shocks on global aggregates. To do this, we first extract structural oil supply shocks from a standard oil-price determination model found in the literature. Impulse response functions are then estimated using local projections. This technique has recently been used to estimate the effect of monetary policy and government spending shocks. To our knowledge, however, this is the first time it is used to analyze the effect of oil supply shocks on global aggregates. While there is a high level of uncertainty around our estimates, results can be summarized with three main takeaways. Following a supply-driven decline in oil prices: (1) US business investment usually decreases, highlighting the importance of the shale oil industry, while the reaction of US gross domestic product (GDP) is often not statistically significant; (2) domestic demand in the euro area usually increases strongly; and (3) GDP among commodity exporters declines in the short term, reflecting the importance of the terms-of-trade channel, but increases in the longer term, reflecting the aggregate benefits of increased oil production.

A Tale of Two Countries: Cash Demand in Canada and Sweden

Cash use for payments has been steadily decreasing in many countries, including Canada and Sweden. This might suggest an evolution toward a cashless society. But in Canada, cash in circulation relative to GDP has been stable for decades and has even increased in recent years. By contrast, the cash-to-GDP ratio in Sweden has been falling steadily. What has caused this difference?

Are there lessons to be learned from comparing the Canadian and Swedish experiences?

UPCOMING EVENTS

Falko Fecht (Frankfurt School of Finance and Management)
Organizer: Sofia Priazhkina (FSD)
Date: 8 August 2019

Charles Martineau (University of Toronto, Rotman School of Management)
Organizer: Rodrigo Sekkel (FMD)
Date: 5 September 2019

Marc Giannoni (Federal Reserve Bank of Dallas)
Organizer: José Dorich (CEA)
Date: 6 September 2019

Ben Lester (Federal Reserve Bank of Philadelphia)
Organizer: Jean-Sébastien Fontaine (FMD)
Date: 12 September 2019

David Berger (Northwestern University, Department of Economics)
Organizer: Anthony Landry (CEA)
Date: 13 September 2019

Lucian (Luke) Taylor (University of Pennsylvania, Wharton Business School)
Organizer: Jon Witmer (FMD)
Date: 26 September 2019

Giorgio Primiceri (Northwestern University, Department of Economics)
Organizer: Joel Wagner (CEA)
Date: 27 September 2019

Domenico Giannone (Federal Reserve Bank of New York)
Organizer: Rodrigo Sekkel (FMD)
Date: 2 October 2019

Michael Koetter (Halle Institute for Economic Research)
Organizer: Radoslav Raykov (FSD)
Date: 3 October 2019

Patrick Augustin (McGill University, Desautels Faculty of Management)
Organizer: Corey Garriott (FMD)
Date: 10 October 2019

Ufuk Akcigit (University of Chicago, Department of Economics)
Organizer: Ben Tomlin (CEA)
Date: 11 October 2019

James Cloyne (University of California Davis, Department of Economics)
Organizer: Nuno Marques da Paixao (FSD)
Date: 15 October 2019

Robert Marquez (University of California Davis, Graduate School of Management)
Organizer: Thibaut Duprey (FSD)
Date: 24 October 2019

Virgiliu Midrigan (New York University, Department of Economics)
Organizer: Katsiaryna Kartashova (CEA)
Date: 25 October 2019

Haelim Anderson (Federal Deposit Insurance Corporation)
Organizer: Jason Allen (FMD)
Date: 31 October 2019

Morten Ravn (University College London, Department of Economics)
Organizer: Martin Kuncl (CEA)
Date: 15 November 2019

Catherine Tucker (Massachusetts Institute of Technology, Sloan School of Management)
Organizer: Shota Ichihashi (CEA)
Date: 19 November 2019

Sacha Gelfer (Bently University, Department of Economics)
Organizer: Lin Shao (INT)
Date: 13 December 2019