

# Bank of Canada Monthly Research Update

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February 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

### Forthcoming

Allen, Jason & Clark, Robert & Houde, Jean-François, “Search frictions and market power in negotiated price markets”, *Journal of Political Economy*

Aryal, Gaurab & Grundl, Serafin & Kim, Dong-Hyuk & Zhu, Yu, “Empirical Relevance of Ambiguity in First-Price Auctions”, *Journal of Econometrics*

Brogaard, Jonathan & Garriott, Corey, “High-Frequency Trading Competition”, *Journal of Financial and Quantitative Analysis*

Priazhkina, Sofia & Page, Frank H., “Sharing market access in buyer-seller networks”, *Journal of Economic Theory*

## STAFF WORKING PAPERS

Chen, Marie & Garriott, Corey, “High-Frequency Trading and Institutional Trading Costs”, *Bank of Canada Staff Working Paper 2018-8*

Davoodalhosseini, Mohammad, “Adverse Selection with Heterogeneously Informed Agents”, *Bank of Canada Staff Working Paper 2018-7*

Mora, Patricia Palhau, “The “Too Big to Fail” Subsidy in Canada: Some Estimates”, *Bank of Canada Staff Working Paper 2018-9*

Zhou, Xiaoqing, “Home Equity Extraction and the Boom-Bust Cycle in Consumption and Residential Investment”, *Bank of Canada Staff Working Paper 2018-6*

## ABSTRACTS

### *Search frictions and market power in negotiated price markets*

This paper provides a framework for the empirical analysis of negotiated-price markets in which buying is single-source. These markets pose a challenge for empirical work since, although buyers potentially negotiate with many sellers, data-sets typically include only accepted offers. Moreover, negotiated-price markets feature search frictions, since consumers incur a cost to gather quotes, and long-term relationships between consumers and incumbent sellers, leading to the development of brand loyalty. Together, these characteristics imply that many consumers fail to consider more than one option, and while firms with extensive consumer bases have an incumbency advantage. We use data from the Canadian mortgage market and a model of search and negotiation to characterize the impact of search frictions on consumer welfare and to quantify the role of search costs and brand loyalty for market power. Our results suggest that search frictions reduce consumer surplus by almost \$12 per month per consumer, and that 28% of this reduction can be associated with discrimination, 22% with inefficient matching, and the remainder with the search cost. We also find that banks with large consumer bases have margins that are 70% higher than those with small consumer bases. The main source of this incumbency advantage is brand loyalty, however, the ability to price discriminate based on search frictions also accounts for almost a third of the advantage.

### *Empirical Relevance of Ambiguity in First-Price Auctions*

We study the identification and estimation of first-price auctions with independent private values if bidders face ambiguity about the valuation distribution and have maxmin expected utility. Using variation in the number of bidders we nonparametrically identify the true valuation distribution and the lower envelope of the set of prior beliefs. We also allow for CRRA and unobserved auction heterogeneity, and propose a Bayesian estimation method based on Bernstein polynomials. Monte Carlo experiments show that our estimator performs well, and incorrectly ignoring ambiguity induces bias and loss of revenue. We find evidence of ambiguity in timber auctions in the Pacific Northwest.

### *High-Frequency Trading Competition*

Theory on high-frequency traders (HFT) predicts that market liquidity for a security decreases in the number of HFT trading the security. We test this prediction by studying a new Canadian stock exchange, Alpha, that experienced the entry of 11 HFT firms over four years. Bid-ask spreads on Alpha converge to those at the Toronto Stock Exchange as more HFT trade on Alpha. Effective and realized spreads for nonHFT improve as HFT firms enter the market. To explain the contrast with theory, which models HFT as a price competitor, we provide evidence more consistent with HFT fitting a quantity competitor framework.

### *Sharing market access in buyer-seller networks*

This paper presents a network formation game of buyers and sellers with market sharing. Prior to engaging in bargaining with buyers, sellers exchange access to buyers for negotiated payments to overcome search frictions. With homogeneous preferences, sharing increases market trade volume. Surprisingly, buyers benefit from sharing when sellers have stronger bargaining positions. With heterogeneous preferences, market sharing may decrease market trade volume. Also, when sellers have more bargaining power than buyers, trade volume weakly exceeds Walrasian level, thus causing overproduction by high-cost sellers. Buyers who value the good the least are squeezed out from the market as a result of sharing between sellers.

### *High-Frequency Trading and Institutional Trading Costs*

Using bond futures data, we test whether high-frequency trading (HFT) is engaging in back running, a trading strategy that can create costs for financial institutions. We reject the hypothesis of back running and find instead that HFT mildly improves trading costs for institutions. After a rapid increase in the number of HFTs, trading costs as measured by implementation shortfall decrease by 27 basis points for smaller-sized positions (\$2–\$10 million notional). For larger-sized positions there is no significant effect. We explain the improvement as being the consequence of HFT reducing effective spreads and per-trade price impacts.

### *Adverse Selection with Heterogeneously Informed Agents*

A model of over-the-counter markets is proposed. Some asset buyers are informed in that they can identify high quality assets. Heterogeneous sellers with private information choose what type of buyers they want to trade with. When the measure of informed buyers is low, there exists a unique and stable equilibrium, and interestingly, price, trading volume and welfare typically decrease with more informed buyers. When the measure of informed buyers is intermediate, multiple equilibria arise, and price, trading volume and welfare may decrease or increase with more informed buyers, depending on the equilibrium being played. A switch from one equilibrium to another can lead to large drops in liquidity, price, trading volume and welfare, like a financial crisis. The measure of informed buyers is then endogenized by allowing buyers to invest in a technology that enables them to identify high quality assets. In this case, the model features endogenous strategic complementarity in acquiring the information technology. Multiple equilibria still exist, with different measures of informed buyers, but a scheme of tax/subsidy on information acquisition sometimes leads to the unique equilibrium.

### *The “Too Big to Fail” Subsidy in Canada: Some Estimates*

Implicit government guarantees of banking-sector liabilities reduce market discipline by private sector stakeholders and temper the risk sensitivity of funding costs. This potentially increases the likelihood of bailouts from taxpayers, especially in the absence of effective resolution frameworks. Estimates of “too big to fail” (TBTF) implicit subsidies are useful to understand bank agents’ incentives, measure potential resolution costs and assess the credibility of regulatory reform. Given the implicit nature of the subsidy, I propose a framework that adopts two empirical approaches to assess the quantum of the subsidies accruing to systemic banks in Canada. The first is based on credit rating agencies’ assessment of public support and the second relies on a contingent claims analysis. Results suggest more progress on resolution is needed, such as the implementation of a credible statutory bail-in regime for senior obligations, to increase market discipline and help address TBTF externalities. That said, Canada being an early adopter of Basel III might help explain the significant reduction in the government’s contingent liability since the peak years of the crisis.

### *Home Equity Extraction and the Boom-Bust Cycle in Consumption and Residential Investment*

The consumption boom-bust cycle in the 2000s coincided with large fluctuations in the volume of home equity borrowing. Contrary to conventional wisdom, I show that homeowners largely borrowed for residential investment and not consumption. I rationalize this empirical finding using a calibrated two-goods, multiple-assets, heterogeneous-agent life-cycle model with borrowing frictions. The model replicates key features of the household-level and aggregate data. The model offers an alternative explanation of the consumption boom-bust cycle. This cycle is caused by large fluctuations in the number of borrowers and hence in total home equity borrowing, even though the fraction of borrowed funds spent on consumption is small.

## UPCOMING EVENTS

Todd Walker (Indiana University Bloomington), 23 March 2018  
Organizer: José Dorich (CEA)

Jesper Linde (Sveriges Riksbank), 28 March 2018  
Organizer: Thomas Carter (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)

Martin Ellison (University of Oxford), 15 June 2018  
Organizer: Daniela Hauser (CEA), INT

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