

Bank of Canada Monthly Research Update

October 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

Withey, Patrick & Johnston, Craig & Guo, Jinggang, “Quantifying the global warming potential of carbon dioxide emissions from bioenergy with carbon capture and storage”, *Renewable and Sustainable Energy Reviews*, Vol 115: 109408, November 2019

Forthcoming

Arifovic, Jasmina & Evans, George & Kostyshyna, Olena, “Are Sunspots Learnable? An Experimental Investigation in a Simple Macroeconomic Model”, *Journal of Economic Dynamics and Control*

Jiang, Janet Hua & Shao, Enchuan, “The Cash Paradox”, *Review of Economic Dynamics*, Elsevier for the Society for Economic Dynamics

STAFF WORKING PAPERS

Devereux, Michael & Dong, Wei & Tomlin, Ben, “Trade Flows and Exchange Rates: Importers, Exporters and Products”, Bank of Canada Staff Working Paper 2019-41

Chernoff, Alex, “Amazon Effects in Canadian Online Retail Firm-Product-Level Data”, Bank of Canada Staff Working Paper 2019-42

Arce, Fernando & Bengui, Julien & Bianchi, Javier, “A Macroeconomic Theory of Foreign Reserve Accumulation”, Bank of Canada Staff Working Paper 2019-43

ABSTRACTS

Quantifying the global warming potential of carbon dioxide emissions from bioenergy with carbon capture and storage

This study provides estimates of the global warming potential (GWP) of carbon dioxide emissions from bioenergy produced from forests (termed GWP_{bio}). The specific contribution of the study is twofold. First, we consider how GWP_{bio} will be impacted by the inclusion of bioenergy with carbon capture and storage (BECCS) technology. Second, we determine how the assumed baseline or reference scenario impacts GWP_{bio} , considering both bioenergy harvests from currently unmanaged land and harvest residues from currently managed forest lands. BECCS is a major component in the Intergovernmental Panel on Climate Change (IPCC) scenarios that highlight pathways to reduced climate change impacts, and results of this study will inform the viability of using BECCS in forestry to meet IPCC emissions goals. By considering multiple scenarios and using a full carbon-accounting through the inclusion of all carbon pools impacted by harvesting for bioenergy, we demonstrate the conditions under which the value of GWP_{bio} is negative, and thus BECCS acts as a negative emissions technology. Results indicate that assuming a 100-year horizon, GWP_{bio} can vary from between -0.92 and 1.57, depending on a variety of assumptions and whether BECCS is employed. Estimated GWP_{bio} values indicate that bioenergy exceeds the climate impact of fossil fuels if one focuses on unmanaged lands and does not employ BECCS. If one harvests residues from currently managed lands, bioenergy is preferable to fossil fuels without BECCS, but GWP_{bio} is positive. When considering BECCS, bioenergy will have a lower GWP than fossil fuels in all scenarios but will only produce negative emissions if residues are used from currently managed forest lands. The results of this work indicate that bioenergy from forests can only be used to meet IPCC policy goals (produce negative emissions) if BECCS is used on currently managed forest land.

Are Sunspots Learnable? An Experimental Investigation in a Simple Macroeconomic Model

We conduct experiments with human subjects in a model with a positive production externality in which productivity is a nondecreasing function of the average level of employment of other firms. The model has three steady states and a sunspot equilibrium that fluctuates between the high and low steady states. Steady states

are payoff ranked: low values give lower profits than higher values. We investigate whether subjects can learn a sunspot equilibrium. We observe coordination on the extrinsic announcements in our experimental economies. Cases of apparent convergence to the low and high steady states are also observed.

The Cash Paradox

In many industrialized countries, cash usage at points of sale has been decreasing owing to competition from alternative means of payment such as credit cards. At the same time, cash demand, measured as currency in circulation over GDP, fell only in earlier years but has remained surprisingly robust in the past two to three decades. This phenomenon, termed the “cash paradox,” poses a challenge to standard monetary models. We introduce two new features into the standard cash-credit model: the substitutability between cash and credit (as a stand-in for alternative means of payments) is uneven across different economic activities, and some agents actively manage cash flows across these activities. Calibration exercises show that the cash-flow channel is important for quantitatively capturing the diverging trends in cash usage and demand. There is also some empirical support for our model's prediction on cash velocity in the retail sector.

Trade Flows and Exchange Rates: Importers, Exporters and Products

Using highly disaggregated transaction-level trade data, we document the importance of new firm level trade partner relationships and the addition of new products to existing relationships in driving long-run import flows. Moreover, we find that these margins are sensitive to movements in the exchange rate. We rationalize these findings in a model of international trade with endogenous matching between heterogeneous importers and exporters. Simulations of the model highlight a new channel through which exchange rate movements can affect trade—through the short-run formation of new trade relationships and the range of products traded within relationships—which can impact long-run flows.

Amazon Effects in Canadian Online Retail Firm-Product-Level Data

I use firm-product-level data for Canadian online retailers to study how product scope (the average number of product categories per firm) evolved from 1999 to 2012. During this period, product scope

dropped monotonically from 59 to 5 product categories. Using a theoretical model of multi-product firms, I show that this reduction can be rationalized by increased online competition. Consistent with the model, I find that the percentage of Canadian online retailers with revenues in a product category falls when Amazon.com expands its varieties in the category. Overall, Amazon.com's expansion accounts for 37 percent of the observed reduction in product scope.

A Macprudential Theory of Foreign Reserve Accumulation

This paper proposes a theory of foreign reserves as macroprudential policy. We study an open-economy model of financial crises in which pecuniary externalities lead to overborrowing, and show that by accumulating international reserves, the government can achieve the constrained-efficient allocation. The optimal reserve accumulation policy leans against the wind and significantly reduces the exposure to financial crises. The theory is consistent with the joint dynamics of private and official capital flows, both over time and in the cross-section, and can quantitatively account for the recent upward trend in international reserves.

UPCOMING EVENTS

Haelim Anderson (Federal Deposit Insurance Corporation)

Organizer: Jason Allen (FMD)

Date: 31 October 2019

Paul Klein (Stockholm University, Department of Economics)

Organizer: Geoffrey Dunbar (INT)

Date: 5 November 2019

Morten Ravn (University College London, Department of Economics)

Organizer: Martin Kuncl (CEA)

Date: 15 November 2019

David Evans (University of Oregon, Department of Economics)

Organizer: Narayan Bulusu (FBD)

Date: 18 November 2019

Catherine Tucker (Massachusetts Institute of Technology, Sloan

School of Management)

Organizer: Shota Ichihashi (CEA)

Date: 19 November 2019

Sacha Gelfer (Bentley University, Department of Economics)

Organizer: Lin Shao (INT)

Date: 13 December 2019

Karen Kopecky (Federal Reserve Bank of Atlanta)

Organizer: Youngmin Park (CEA)

Date: 13 March 2020

Todd Clark (Federal Reserve Bank of Cleveland)

Organizer: Luis Uzeda (CEA)

Date: 3 April 2020

Todd Schoellman (Federal Reserve Bank of Minneapolis)

Organizer: Youngmin Park (CEA)

Date: 17 April 2020

Matthias Kehrig (Duke University, Department of Economics)

Organizer: Dmitry Matveev (CEA)

Date: 24 April 2020

Nicolas Crouzet (Northwestern University, Kellogg School of Management)

Organizer: Romanos Priftis (CEA)

Date: 1 May 2020

Edouard Challe (CREST & École Polytechnique, Department of Economics)

Organizer: Dmitry Matveev (CEA)

Date: 8 May 2020

Raquel Fernandez (New York University, Department of Economics)

Organizer: Gabriela Galassi (CEA)

Date: 15 May 2020

Ufuk Akcigit (University of Chicago, Department of Economics)

Organizer: Martin Kuncl (CEA)

Date: 28 May 2020

Karel Mertens (Federal Reserve Bank of Dallas)

Organizer: Daniela Hauser (CEA)

Date: 12 June 2020

Dirk Krueger (University of Pennsylvania, Department of Economics)

Organizer: Katya Kartashova (CEA)

Date: 28 August 2020

Arlene Wong (Princeton University, Department of Economics)

Organizer: Julien Champagne (CEA)

Date: 11 September 2020

Johannes Wieland (University of California San Diego, Department of Economics)

Organizer: Julien Champagne (CEA)

Date: 25 September 2020

Leonardo Melosi (Federal Reserve Bank of Chicago)

Organizer: Romanos Priftis (CEA)

Date: 6 November 2020