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Education

- Ph.D., Economics, University of Toronto 2016 - 2021
Primary field: Macroeconomics
Secondary fields: International Economics, Machine Learning Forecasting
GPA 4.0/4.0. Passed comprehensive exams with Distinction in Macroeconomic Theory
- Recognised Research Student, Centre for Study of African Economies, University of Oxford 2018
- Visiting graduate student, Economics, University of Groningen 2016
GPA 4.0/4.0
- Visiting graduate student, Economics, University of Toronto 2015
GPA 4.0/4.0
- M.Sc., Economics, Utrecht University 2014-2016
Graduated top of class, with Highest Cum Laude Honors. GPA 4.0/4.0. Thesis on risk preferences. Grade: 9.5/10.
- Visiting student, International Relations, University of Amsterdam 2013-2014
GPA 4.0/4.0
- B.Sc., Double major (Economics & Energy Science), Utrecht University 2010-2014
Minors: International Relations; Public Administration.
Graduated in top 5%, with Highest Cum Laude Honors. GPA 4.0/4.0.

Research Interests

International Macroeconomics, International Trade, Economic Growth, Machine Learning and Macro-Forecasting

Working Papers

"Catch-Up Growth and Inter-Industry Productivity Spillovers in Open Economies"

Countries tend to export more skill-intensive products as they become more productive. This paper proposes a tractable quantitative framework to examine the role of inter-industry productivity spillovers in this development process. I document that a country's comparative advantage tends to increase in industries that employ occupations that are used most intensively in current exports. The model rationalizes these findings by incorporating occupation-specific dynamic scale economies into a multi-sector gravity framework. I estimate the model using cross-sector heterogeneity in foreign demand shocks and find that scale economies are relatively large in high-skilled production. As a result, productivity spillovers tend to be larger in richer countries, and access to foreign markets allows developing countries to shift labor into sectors that contribute more to aggregate productivity growth. Counterfactual exercises suggest that spillovers play a quantitatively substantial role in accounting for slow cross-country convergence and increase the gains from trade, especially in economies with a comparative advantage in manufacturing.

"Deus ex Machina? A Framework for Macro Forecasting with Machine Learning", with Brett Rayner (International Monetary Fund). IMF Working Paper 20/45.

We develop a framework to nowcast (and forecast) economic variables with machine learning techniques. We explain how machine learning methods can address common shortcomings of traditional OLS-based models and use several machine learning models to predict real output growth with lower forecast errors than traditional models. By combining multiple machine learning models into ensembles, we lower forecast errors even further. We also identify measures of variable importance to help improve the transparency of machine learning-based forecasts. Applying the framework to Turkey reduces forecast errors by at least 30 percent relative to traditional models. The framework also better predicts economic volatility, suggesting that machine learning techniques could be an important part of the macro forecasting toolkit of many countries.

"The More the Merrier? A Machine Learning Algorithm for Optimal Pooling of Panel Data", with Brett Rayner (International Monetary Fund). IMF Working Paper 20/44.

We leverage insights from machine learning to optimize the tradeoff between bias and variance when estimating economic models using pooled datasets. Specifically, we develop a simple algorithm that estimates the similarity of economic structures across countries and selects the optimal pool of countries to maximize out-of-sample prediction accuracy of a model. We apply the new algorithm by nowcasting output growth with a panel of 102 countries and are able to significantly improve forecast accuracy relative to alternative pools. The algorithm improves nowcast performance for advanced economies, as well as emerging market and developing economies, suggesting that machine learning techniques using pooled data could be an important macro tool for many countries.

"The Millennial Boom, the Baby Bust and the Housing Market", with Judd Cramer (Harvard University)
Media Coverage: VoxEU

As baby boomers have begun to downsize and retire, their preferences now overlap with millennial's predilection for urban amenities and smaller living spaces. This confluence in tastes between the two largest age segments of the U.S. population has meaningfully changed the evolution of home prices in the United States. Utilizing a Bartik shift-share instrument for demography-driven demand shocks, we show that from 2000 to 2018 (i) the price growth of four- and five-bedroom houses has lagged the prices of one- and two-bedroom homes, (ii) within local labor markets, the relative home prices in baby boomer-rich zip codes have declined compared with millennial-rich neighborhoods, and (iii) the zip codes with the largest relative share of smaller homes have grown fastest. These patterns have become more pronounced during the latest economic cycle. We show that the effects are concentrated in areas where housing supply is most inelastic. If this pattern in the housing market persists or expands, the approximately \$ 16.5 trillion in real estate wealth held by households headed by those aged 55 or older will be significantly affected. We find little evidence that these upcoming changes have been incorporated into current prices.

Work in Progress

"International Shock Transmission Through Firm's Internal Networks: Evidence from the GFC", with Marina M. Tavares

How do firms transmit shocks within and across countries? This paper examines and quantifies the role of internal capital markets of multi-establishment firms in propagating financial shocks. We construct a novel comprehensive firm-level balance sheet data with ownership linkages and bank-firm relationships. First, we document that foreign subsidiaries with financially vulnerable parents experienced larger reductions in sales, investment and employment growth during the Great Financial Crisis (GFC). We then exploit exogenous variation in bank health to establish that credit supply shocks to US multinationals had a substantial negative impact on subsidiaries in Europe during the GFC. To account for these patterns, we develop a heterogeneous firm model of multinational production in which financial shocks propagate to other subsidiaries through a common financing constraint. We use the model to study the effect of the 2008 US credit crunch on economic activity, employment losses, and productivity growth in Europe.

"An Intangible Stagnation Trap: Evidence from Europe"

What is the role of weak demand in accounting for the sluggish recovery after the Global Financial Crisis? I combine European firm-level data with detailed export flows to examine how firms respond to external demand shocks during the GFC. Faced with lower demand, firms do not reduce their investment in tangible capital but invest significantly less in intangible capital. These effects are persistent: 8 years after the onset of the crisis, affected firms are significantly less productive and less intangible capital intensive. I rationalize these findings using a heterogeneous firm model in which intangibles reduce marginal costs but raise fixed costs. Firms' use of intangibles is therefore more sensitive to changes in the scale of production than tangible inputs. An aggregate demand shock can lead to a stagnation trap as lower investment depresses growth, which in turn depresses aggregate demand. The model can account for the post-crisis productivity slowdown in Europe and the lagged investment rate in Europe relative to the U.S., with considerable heterogeneity across countries.

"Misallocation in Indian Agriculture", with S. Rachapalli and Diego Restuccia

We study frictions in land rental markets and their impact on agricultural productivity across states in India. We exploit large variation in land market institutions across states and detailed micro data. We find strong evidence that states with more rental market activity

have less dispersion in marginal products of land across farmers and land is reallocated more efficiently over time. We find substantial differences across states in the extent of extensive and intensive level rental market distortions and these differences are systematically related to rental market activity across states. Rental market distortions have substantial negative effects on agricultural productivity. For instance, eliminating distortions increases agricultural productivity by 40% in some states relative to the most productive state, Punjab.

Non-Peer Reviewed Publications

2015 *Herstel van de Eurozone begint in Duitsland* , de Volkskrant

2013 *Wie zwijgt, stemt toe...*, Bureau de Helling

Research Visits

2018 University of Oxford

Honors, Scholarships and Awards

2020

Ontario Trillium Scholarship, University of Toronto (2016-2020)
Master of Financial Economics Award, University of Toronto
Department of Economics Travel Grant, University of Toronto
Program Level Fellowship, University of Toronto

2019

CEA Travel Grant (declined)

2018

WEHC Travel Grant

2017

SGS Conference Grant, University of Toronto

2016

Fulbright Scholarship (declined)
Doctoral Presidential Fellowship, Brown University (declined)
University of Toronto Fellowship (declined)
Prins Bernhard Cultuurfonds Scholarship (declined)
VSBFonds Scholarship (declined)
Dr. Hendrik Muller's Vaderlandsch Fonds Scholarship (declined)
Vreedefonds Scholarship (declined)
New School New York Provosts Scholarship (declined)
EHS Bursary, Economic History Society;
U-Fonds Grant, Utrecht University

2015

K F Heinfonds Scholarship, K F Heinfonds
Young Innovators Summer School Grant, Utrecht University

2014

Nominee Egbert Tellegen Prize, Utrecht University
Honorable mention Oxford University Press Student Prize, University of Amsterdam

2013

Winner Taste of Strategy, Boston Consulting Group

2010

Exceptional Achievement in Chemistry, KNCV & VNCI
NLT Award, Landelijk Coördinatiepunt NLT

Professional Experience

2019 PhD FIP, International Monetary Fund

2019-present Freelance Undergrad Thesis Supervisor, Utrecht University

2014-present Research Assistant

University of Toronto: Murat Celik, Margarida Duarte, Marco Gonzalez-Navarro, Burhanettin Kuruscu, Serdar Ozkan, Diego Restuccia

Utrecht University: Jan Luiten van Zanden, Mark Sanders

2013-present Teaching Assistant

University of Toronto, Department of Economics: International Monetary Economics, Money, Banking and Financial Markets, International Economics after 1945, Developmental Macroeconomics, International Trade Theory, Competing Views in Macroeconomic Theory and Policy, Economic Growth, Twentieth Century Economic History, Special Topics in Macroeconomics, Microeconomic Theory, Principles of Microeconomics

University of Toronto, Trinity College: International Economic Institutions and Policy

Utrecht University, Faculty of Geosciences: Thermodynamics and Energy Conversions

Utrecht University, School of Economics: Economics of Strategy and Organization, Energy and Environmental Economics

2014-2016 Student Representative, Education Board REBO Graduate School, Utrecht University

2013-2014 Treasurer, Students for Tomorrow, Dutch National Student Association for Sustainability

2010-2013 Teacher, Capita Selecta/Lyceo/StudentsPlus

Undergraduate: Mathematics; Microeconomics and Institutions (Utrecht University)

High School: Physics, Chemistry, Mathematics, Economics, Business

Presentations at Conferences, Workshops and Seminars

2020

RCEA 8th Biennial Conference, Waterloo (postponed)
University of Toronto

2019

Warwick Economics PhD Conference;
International Monetary Fund 3× (invited, February, August, October);
North East Universities Development Consortium, Northwestern University
University of Toronto

2018

University of Oxford
University of Toronto
World Economic History Conference, Cambridge, MA

2017

ASREC Conference, Boston

2016

REBO Research Day, Utrecht University;
Workshop *Health and Welfare in the Long Run*, University of Groningen;
Economic History Society Conference, Cambridge, UK

Skills

Additional Schooling

2015 Financial Crises: A Brief History of Time (Summer School), University of Copenhagen

2014 Debt Sustainability Analysis, International Monetary Fund (EdX); Sustainable Economics and Management (Winter School), Witten/Heidecke University

Languages

Dutch: Native proficiency

English: Full professional proficiency

German: Limited working proficiency

French: Limited working proficiency

Technical Skills

Python, R, MATLAB, ArcGIS, Stata, SPSS, L^AT_EX, EViews

References

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