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PRINCETON UNIVERSITY

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Department of Economics & Bendheim Center for Finance, Princeton University Julis Romo Rabinowitz Building Princeton, NJ, 08544

Graduate Studies

Princeton University, 2015 – Present (Expected May 2022)

Ph.D. in Economics

Thesis Title: "Essays on the Role of Financial Institutions in Capital Markets"

Princeton University, 2015 – 2017

M.A. in Economics

References

Professor Motohiro Yogo Department of Economics Bendheim Center for Finance Princeton University (609) 258-4467, myogo@princeton.edu

Professor Wei Xiong Department of Economics Bendheim Center for Finance Princeton University (609) 258-0282, wxiong@princeton.edu

Professor Markus Brunnermeier Department of Economics Bendheim Center for Finance Princeton University markus@princeton.edu

Undergraduate Studies

University of Bonn, 2012 - 2015

B.S. in Economics

Summa Cum Laude, Rank: 1/378

Research & Teaching Fields

Primary Field: Finance, Empirical Asset Pricing

Secondary Fields: Market Microstructure, Applied Machine Learning

Teaching Experience

Princeton University, Teaching Assistant

Fall 2017 ECO342, Money & Banking, with Professor Markus Brunnermeier

Fall 2017, 2018, 2019 ECO464/FIN519, Corporate Restructuring, with Professor O. Griffith Sexton

Princeton University, Advisor for Undergraduate Research

2017 to present Junior Independent Work, with Professors Will Dobbie, Christopher Neilson,

Adrien Matray, and Jonathan Payne

University of Bonn, Undergraduate Teaching Assistant

Spring 2013 Corporate Finance, with Professor Hendrik Hakenes

German Red Cross, High School Teacher, Koforidua, Ghana

Fall 2011 Computer Science, International Youth Voluntary Service Program (IJFD)

Research Experience & Other Employment

Summer 2018	Ph.D. Research Intern at Bundesbank (German Central Bank)
Summer 2017	Visiting Researcher at Bundesbank
Summer 2013	Consulting Intern at Ernst & Young (EY), Germany

Professional Activities

Referee for Econometrica, The Review of Economic Studies

Honors & Awards

2021 2019 - 2020 2015 - 2021 2015 - 2017 2013 - 2014	The Ben Bernanke Prize in Financial and Monetary Economics Griswold Center for Economic Policy Studies Fellowship Princeton University Graduate Fellowship German National Academic Foundation Fellowship Cusanuswerk Foundation Fellowship
2013 - 2014 2013 - 2014 2012 - 2015	Cusanuswerk Foundation Fellowship University of Bonn Exchange Program Scholarship Konrad Adenauer Foundation Fellowship

Job Market Paper

"In Good Times and in Bad: High-Frequency Market Making Design, Liquidity, and Asset Prices," with P. Tremacoldi-Rossi, The Ben Bernanke Prize in Financial and Monetary Economics

How do liquidity provision obligations and incentives affect the behavior of algorithmic market makers and as a consequence, asset prices and market quality? We exploit two market maker programs as natural experiments using unique message-level trade and quote data from the Brazilian stock exchange that reveal market participants' identities. We find the combination of obligations and incentives improves and stabilizes liquidity which attracts volume and lifts asset prices. In normal times, these positive effects are driven by the program incentives, while tight obligations constrain market makers and decrease market quality. In crisis, however, the results flip: stocks with larger incentives experience worse liquidity dry-ups because voluntary liquidity providers withdraw; in contrast, tight obligations mitigate liquidity dry-ups because mandatory intermediaries step in as the liquidity providers of last

resort. Finally, which market makers are assigned to which stocks is consequential: market makers' cross-asset hedging behavior causes excess co-movement of returns, liquidity, and volume, highlighting a trade-off between liquidity and excess co-movement. Overall, our results suggest that exchanges and regulators should combine incentives with countercyclical liquidity provision obligations.

Research Papers

"Interacting Anomalies," with K. Müller, more results and data on the project website Revise and Resubmit, Review of Asset Pricing Studies

An extensive literature studies interactions of stock market anomalies using double-sorted portfolios. But given hundreds of known candidate anomalies, examining selected interactions is subject to a data mining critique. In this paper, we conduct a comprehensive analysis of all possible double-sorted portfolios constructed from 102 underlying anomalies. We find hundreds of statistically significant anomaly interactions, even after accounting for multiple hypothesis testing. An out-of-sample trading strategy that invests in the top backward-looking double-sort strategy generates equal-weighted (value-weighted) monthly average returns of 4% (2.7%) at an annualized Sharpe ratio of 2 (1.38), on par with state-of-the-art anomaly-based machine learning strategies.

"High-Frequency Trading and Price Informativeness," with J. Gider and C. Westheide

We study how the informativeness of stock prices changes with the presence of high-frequency trading (HFT). Our estimate is based on the staggered start of HFT participation in a panel of international exchanges. With HFT presence, market prices are a less reliable predictor of future cash flows and investment, even more so for longer horizons. Further, firm-level idiosyncratic volatility decreases, and the holdings and trades by institutional investors deviate less from the market-capitalization weighted portfolio as a benchmark. Our results document that the informativeness of prices decreases subsequent to the start of HFT. These findings are consistent with theoretical models of HFTs ability to anticipate informed order flow, resulting in decreased incentives to acquire fundamental information.

"Identifying the Price Impact of Fire Sales Using High-Frequency Surprise Mutual Fund Flows"

This paper proposes a new method to isolate a plausibly exogenous component of mutual fund flows to estimate the price impact of fire sales. The method addresses a potential reverse causality problem: instead of mutual fund outflows inducing fire sales, which drive down prices, poor stock returns reduce mutual fund returns, which in turn trigger outflows. The solution is to construct a new instrument from high-frequency surprise flows. Using surprise flows to reexamine important findings in the literature, I find equity markets are deeper and less distortive than suggested.

"Payout-Induced Trading, Asset Demand Elasticities, and Market Feedback Effects"

This paper uses the reinvestment of corporate payouts by financial institutions as a nonfundamental shock to asset prices to estimate the slope of the demand curve for stocks and the real effects of stock returns on corporate financing and investment. Exploiting the separation of announcement and payment at the daily frequency, I find dividends in particular generate payment date price pressure but no announcement date news spillover effects, suggesting that dividend-induced trading is plausibly exogenous to fundamentals. Using dividend-induced trading as a natural experiment for stock returns, I estimate an asset demand elasticity of 1.25 and document a releveraging market feedback effect on investment, where firms respond to an exogenous stock price increase by issuing debt and use the funds to invest.

Research Papers in Progress

"Risk and Return in the Residential Real Estate Market," with M. Büchner and B. Kelly We examine the cross-section of property-level real estate returns using proprietary data from Zillow containing the universe of US housing transactions from 1996 to 2020. We find many property characteristics predict returns, even after accounting for multiple hypothesis testing. Several signals mirror well-known anomalies in the stock market, such as value, size, momentum, long-term return reversal, and profitability. In addition, there are real estate-specific predictors: home age, the return realized by the last owner, local income per capita, housing supply growth, property taxes, and variables related to idiosyncratic risks. Further, using machine learning techniques, we document that real estate returns are highly predictable. Out-of-sample, houses in the top decile of predicted returns outperform homes in the bottom decile by around 10% annually, even holding location, time, and size constant to account for investors' constraints. Finally, observable factor models fail to price real estate assets. However, instrumented principle component analysis (IPCA) explains this puzzle: a model with two latent risk factors prices the cross-section of housing returns.

"Real Estate Investing, Climate Risk, and Inequality"

Whose real estate investments are most exposed to climate risk? How do real estate investors respond to climate change news? And how do housing prices react to climate change news? I measure climate risk exposure as the expected annual loss to buildings using census-tract level climate risk data from FEMA. Further, I combine proprietary data from Zillow containing the universe of US real estate transactions from 1996 to 2020 with HMDA data which allows me to observe demographic information of buyers and sellers. I find the top of the wealth distribution is most exposed to climate risk. However, in response to climate change news, the wealthy disproportionately sell exposed homes. These sales are absorbed by firms. Lastly, prices of exposed homes decline after climate change news.

"Cryptocurrencies, Return Chasing, and Return Predictability," with S. Nagel and Z. Wang We combine the full information from the bitcoin blockchain with addresses of real entities and address clustering algorithms to construct a partially deanonymized bitcoin transaction history. We find that unsophisticated investors chase past bitcoin returns and that bitcoin purchases of sophisticated investors predict bitcoin returns.

Skills & Interests

Software Python, Stata, LATEX, big data (Dask), machine learning (Tensorflow, Scikit-learn),

blockchain analysis (BlockSci)

Languages German (native), French (proficient)

Interests Scuba diving, rock climbing, kiteboarding, golf, soccer, virtual reality, traveling