The Implications of Instant Payment Systems on the Banking System

Yiming Ma (Columbia Business School) Yao Zeng (Wharton)

1 Motivation

There has recently been a significant transformations in the global payments landscape. Notably, instant payment systems have garnered considerable attention due to their shared functionalities with Central Bank Digital Currencies (CBDCs) (e.g., Duffie, 2019, Brunnermeier and Payne, 2022). Instant payment systems can be thought of as an intermediated form of CBDCs because they are implemented by the central bank to provide an accessible, secure, and immediate means of payment to retail customers and merchants with bank accounts, resembling banks' access to the interbank payment system through central bank reserves. However, instant payment systems do not involve placing assets onto central banks' balance sheets. By keeping deposits on bank balance sheets, instant payment systems can avoid the risk of disintermediating the banking system, which has been a major concern for direct CBDCs. For the above reasons, instant payment systems have been increasingly adopted by major central banks, including UPI by the Reserve Bank of India in 2016, Pix by the Central Bank of Brazil in 2020, and FedNow by the U.S. Federal Reserve in July 2023.

Despite the rapid growth, however, there is no systematic analysis on the impact of instant payments on the fundamental roles of the banking system. Most papers have focused on the effect of new payment technologies on consumers.[1] While instant payments indeed facilitate faster and more convenient transfers for depositors, we note that they also fundamentally alter the functionalities of bank deposits.

With instant payments, deposits can be used to make payments without allowing banks the ability to delay payments within the same business day as in the case with Fedwire or over several business days as in the case of ACH transfers. This inability to delay and net payments alters the nature of bank deposits, which serve as a crucial and stable source of funding for banks.

Therefore, our proposed project seeks to understand how instant payment systems alter the nature of deposits and how these changes will impact the banking system. We combine empirical evidence from the implementation of instant payment systems, including FedNow in the US and Pix Brazil, with a theoretical framework to shed light on the implications of instant payment systems for the banking sector, with a focus on banks' demand for liquidity and fragility. We believe that our proposed analysis and the potential findings will not only constitute a novel contribution to the academic literature but also provide important guidance for policymakers in the design and implementation of instant payment systems going forward.

[1] For example, Jack and Suri (2014), Higgins (2020), and Ghosh, Vallee, and Zeng (2022).

2 Research Questions

Specifically, our project seeks to address the following questions:

1. On banks' liability side, how does the introduction of instant payment systems affect banks' funding volatility? Does it increase banks' exposure to payment shocks? How does it change the stickiness of deposits?

2. On banks' asset side, what is the effect of instant payment systems on banks' demand for liquid assets and on banks' capacity to lend to firms and to intermediate in credit markets?

3. How do instant payment systems change bank profitability? And how do the changes in profitability interact with agency frictions to influence banks' risk-taking?

4. Taken together, what is the aggregate effect of instant payments on the liquidity demand and fragility of the banking sector at large?

3 Research Design and Data

Our proposed project has two complementary parts. The first part is focused on FedNow in the US and the second part is focused on Pix in Brazil, both of which are among the most promiment instant payment systems. We expect them to evolve into two academic papers.

The first part of the project focuses on the US and will examine the effect of FedNow on the US banking sector. It leverages administrative data from the Federal Reserve System regarding the usage of FedNow, which is available since its implemention in July 2023. Our data access will be through our collaborators at the New York Fed, including Gabriele LeSpada and Thomas Eisenbach, who will match the FedNow data with data on existing payment systems like Fedwire and other public and administrative datasets on banks such as the Y-9C and Y-14M.

Based on the novel administrative data, we will empirically uncover the impact of FedNow on the banking system, develop a theoretical framework to rationalize the empirical findings, and quantitatively estimate our model to provide system-wide predictions and counterfactuals.

The key components of our conceptual framework is shared between the two parts of the proposed project. We have already developed this framework as part of our on-going work based on the Central Bank of Brazil's Pix, which constitutes the second part of our proposed project. Pix is conceputually similar to FedNow, has witnessed widespread adoption since its implementation in November 2020, and has been perceived as a pioneer of modern instant payment systems.

This part of the project is joint with Rodrigo Gonzalez of the Central Bank of Brazil. We empirically uncover the effects of Pix adoption on the banking system, develop a conceptual framework to rationalize the empirical findings and then formally test our model predictions. Our empirical findings are based on a transaction-level dataset on Pix usage. We have merged this Pix data with other administrative datasets, including ESTBAN, the Brazilian counterpart of Call Reports and SCR, an administrative firm credit registry covering all business loans. The merged dataset alllows us to

gain a comprehensive and in-depth understanding of the changes in the banking system following the adoption of Pix.

We have gotten a head start on this part of the project because the much earlier adoption of Pix relative to FedNow meant that the data became available earlier. Given the similarity between Pix and FedNow, we believe that our preliminary findings from the Brazilian context provides invaluable insights for our analysis of FedNow. We first plan on examining to what extent the findings from the Brazilian context materialized in the US and then explore additional results specific to the US context. In the remainder of this proposal, we will summarize our findings on Pix and then discuss our proposed analysis for the US context. A very preliminary draft of our on-going work on Pix can also be found here **here**.

4 Preliminary Results and Future Work

4.1 Preliminary Results on Brazil's Pix

Our findings from the Brazilian context suggest that instant payments have the unintended consequence of increasing banks' demand for liquidity and exacerbating their risk-taking incentives through reduced profitability. Economically, our findings arise because depositors' benefit of immediate payment availability inadvertently implies a loss in banks' autonomy in managing the timing of their payments. This reduced capacity to delay and net payments renders banks more exposed to the volatility of payment shocks, which induces them to hold a larger proportion of liquid asset buffers and a smaller fraction of illiquid assets. Banks are effectively becoming "narrower" in liqudity transformation and less profitable per unit funding. To make up for the lost profitability, banks are more incentivized to take on credit risk due to a classic asset substitution problem, leading to potentially heightened financial stability risks despite a lower capacity for liquidity transformation.

We begin by showing that banks with higher Pix usage experienced a rise in the ratio of demandable deposits and a decline in the ratio of time deposits. These findings are consistent with Pix making demandable deposits more attractive because they can be used in instant payments without the restrictions of time deposits.

From the perspective of the bank, however, a rise in the share of demandable deposits coupled with depositors' ability to send payments without delay may imply a rise in funding volatility. Indeed, we find that banks with more Pix usage also increased their ratio of liquid assets by more, especially in the form of government bonds. This observation is consistent with banks setting aside more government bonds as precuationary liquidity buffers because they are more exposed to payment shocks with instant payment systems. This finding also implies an increase the demand for liquid assets by the banking system in the presence of instant payment systems.

Finally, we find that banks with more Pix usage take on more credit risk in their portfolios. Our results on risk-taking are robust both in terms of the ratio of loan loss provisions as well as the ratio of loans in default where one or more payments are late by at least 90 days. This finding implies that the adoption of instant payments may render banks more fragile through increased risk-taking incentives.

4.2 Theoretical Framework

To rationalize our stylized facts and to further provide testable predictions, we present a model of banking that relates the role of deposits as a means of payment to bank lending, which applies to any general instant payment systems including both Pix and FedNow. Our model makes three main predictions about the effects of fast payment systems on the bank's liquidity transformation and its risk-taking behaviors. First, as instant payment services improve the convenience of deposits through removing banks' ability to delay payments, they also expose banks to more uncertainty in deposit flows.

Second, in response to the higher volatility in deposit funding, the bank strategically increases its liquid asset holdings ahead of time to reduce the potential sell off of illiquid loans when hit with payment shocks. In other words, the instant nature of payments increases the bank's own demand for liquidity, which constrains its capacity for liquidity transformation, and ultimately results in a "narrower" bank.

Third, as the bank transforms less liquidity, the classic asset substitution problem arises from the agency conflict between debt and equity holders at the bank. The lower return on liquid asset holdings and the higher cost of wholesale funding cut into the bank's profits per equity share. Consequently, the bank takes on more credit risk in its lending than in a first-best scenario without agency conflicts.

4.3 Identification

To verify the model predictions on the impact of Pix usage on the banking system, we need to overcome the identification challenge that Pix usage may be correlated with observable and unobservable bank characteristics. To this end, we construct a novel instrument for Pix usage using transaction timeouts. The idea is that the availability of Pix is only relevant if Pix payments are successfully sent by the sending bank and then successfully received by the receiving bank. If either fails to process the payment within a given time period, the payment attempt is deemed as timeout by the Pix system. We construct our timeout instrument for a given bank i in month t only using variation in timeouts induced by other banks. These passive timeouts reduce the attractiveness of bank i's Pix service without being in the control of bank i.

Our estimation results using instrumented Pix usage confirm the model predictions and are consistent with the empirical observations that the adoption of instant payments increased banks' funding volatility, increased their demand for liquid assets, and exacerbated their risk taking incentives. We expect to use a similar identification strategy for planned work on FedNow.

4.4 Planned Work on FedNow

We expect that the implementation of FedNow will lead to similar effects on the banking system in the U.S. This is not only because of the similarities in the functionalities between FedNow and Pix but also because of the similarities in the previous payment infrastructure in Brazil and the U.S.. Prior to Pix, Brazilian banks were able to delay payments within the same business day under TED similar to U.S. banks' ability to delay payments within the same business day under Fedwire. Further,

Brazilian banks were able to delay payments overnight under DOC similar to U.S. banks' ability to delay payments over a few business days with ACH payments. As a result, the loss of the ability to delay and net payments will likely also impact U.S. banks following the implementation of FedNow.

A loss in banks' ability to delay and net payments will also likely increase U.S. banks' demand for liquidity. Although the supply of outstanding reserves is large in absolute terms, it has been shown that U.S. banks remain reliant on using incoming payments to meet outgoing payments on Fedwire (Afonso, Duffie, Rigon and Shin, 2022). Thus, when banks can no longer delay outgoing payments until there are sufficient incoming payment, banks may have to set aside more liquid assets to meet unexpected payment shocks. The increase in the banking system's demand for liquid assets may arise through an increased demand for reserves or government bonds, which are important parameters for QE and bank liquidity regulation.

Regarding the effect on risk-taking, we expect that the result for U.S. banks may or may not resemble the one for Brazilian banks. The deciding factor will be how FedNow impacts banks' profitability, which will depend on the fees from other payment methods that are forgone as well as other induced changes in the asset and liability composition of banks.

In addition to observing the effect of FedNow on banks' funding volatility, liquid assets, and risk-taking, we will further calibrate our conceptual framework using realistic parameters from the U.S. context. In this way, we can quantify the impact of FedNow on the banking systems' aggregate demand for liquidity and funding fragility. We will also be able to conduct counterfactual analysis on how increased adoption of FedNow going forward may amplify the banking systems' aggregate demand for liquidity and funding fragility. These estimates will be relevant for policymakers in monitoring and safeguarding the stability of the banking system with instant payment systems.

References

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BOLTON, PATRICK, YE LI, NENG WANG, and JINQIANG YANG (2021). "Dynamic Banking and the Value of Deposits." Working Paper.

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Conflict of Interest Statement

Yiming Ma (co-investigator)

I have nothing to disclose.

Yao Zeng (co-investigator)

I have nothing to disclose.

The Relevance of the Research Project to Public Policy Issues

Yao Zeng and Yiming Ma

This proposed study generates important public policy implications on the adoption of instant payment systems and more broadly on the development of central bank digital currencies (CBDCs). At a high level, we demonstrate that fast payment technologies may be a double-edged sword for the banking system: they enhance the convenience of bank deposits but also subject banks to inherently more volatile deposit funding. The more volatile payment shocks induced by instant payments have three important policy implications. First, they increase banks' demand for liquid assets, which may raise the optimal supply of central bank reserves required for a well-functioning banking system. This implies an intricate link between instant payments and unconventional monetary policy. Second, banks' increased demand for holding liquid assets may come at the expense of their capacity for credit intermediation given the constraints that banks face in expanding their balance sheet. Third, a reduction in banks' credit intermediation capacity may incentivize risk-taking to make up for lost profitability. This profitability channel calls for monitoring of banks' credit risk exposures following the introduction of instant payment systems. Taken together, our work advocates for a careful calibration in the design of instant payment systems that optimally trades off the benefits against the costs.

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Academic Appointments

2023 – Present Associate Professor
2018 – 2023 Assistant Professor
Finance Division, Columbia Business School, New York, NY

Other Affiliations

2023 – Present Affiliate, Briger Family Digital Finance Lab
2018 – Present Member, Finance Theory Group
2022 – Present Consultant, New York Fed
2018 – Present Consultant, DG Monetary Policy, European Central Bank
2014 – 2020 Visiting Researcher, Deutsche Bundesbank

Education

2013 – 2018 **Stanford Graduate School of Business, Stanford, CA**
Ph.D. in Finance
Dissertation Committee: Arvind Krishnamurthy, Amit Seru, Ali Yurukoglu, and Jeffrey Zwiebel

2009 – 2013 **Yale University, New Haven, CT**
B.A. in Economics & Mathematics and Global Affairs (with distinction in both majors)

Research Interests

Bank and Non-bank Intermediaries, Financial Stability, Monetary Policy, Structural Estimation

Working Papers

Stablecoin Runs and the Centralization of Arbitrage
joint with Yao Zeng (Wharton) and Anthony Lee Zhang (Chicago Booth)

Steering a Ship in Illiquid Waters: Active Management of Passive Funds
joint with Naz Koont (Columbia GSB), Lubos Pastor (Chicago Booth) and Yao Zeng (Wharton)

Review of Financial Studies, R&R

Bank Debt, Mutual Fund Equity, and Swing Pricing in Liquidity Provision
joint with Kairong Xiao (Columbia GSB) and Yao Zeng (Wharton)

Review of Financial Studies, R&R

Passthrough of Treasury Supply to Bank Deposit Funding
joint with Wenhao Li (USC Marshall) and Yang Zhao (Stanford GSB)

Journal of Financial Economics, R&R

Arthur Warga Award for Best Paper in Fixed Income at SFS Cavalcade North America

Accepted and Published Papers

The Reserve Supply Channel of Unconventional Monetary Policy
joint with William Diamond (Wharton) and Zhengyang Jiang (Kellogg)

Journal of Financial Economics, Accepted

Monetary Policy Transmission in Segmented Markets
joint with Jens Eisenschmidt (ECB) and Anthony Lee Zhang (Chicago Booth)

Journal of Financial Economics, Forthcoming

Mutual Fund Liquidity Transformation and Reverse Flight to Liquidity
joint with Kairong Xiao (Columbia GSB) and Yao Zeng (Wharton)

Review of Financial Studies, 35(10): 4674-711, October 2022

Intermediation in the Interbank Lending Market
joint with Ben Craig (Cleveland Fed)

Journal of Financial Economics, 145(2): 179-207, August 2022

Finance Theory Group Best Paper Award

AQR Top Finance Graduate Award

Awards

2024	RFS Referee of the Year Award
2023	Columbia Center for Digital Finance and Technologies Inaugural Grant
2020	Arthur Warga Award for Best Paper in Fixed Income at SFS Cavalcade North America
2020	Lindau Nobel Laureate Meetings Young Economist
2018	Finance Theory Group Best Paper Award
2018	AQR Top Finance Graduate Award
2017	Shultz Fellow
2016	AFA Doctoral Student Travel Grant
2013	Yale University Head Ambassador
2011	FIELDS Scholar
2009	Hong Kong Government Scholarship
2009	Sir Edward Youde Memorical Medal

Seminars and Conferences

(* indicates conference presentation by a coauthor)

2023-2024 Baruch College (scheduled), Bundesbank (scheduled), CKGSB, Columbia Business School, Dartmouth Tuck School of Business, European Central Bank (scheduled), HEC Paris (scheduled), HEC Lausanne and Swiss Finance Institute (scheduled), Michigan State, Mannheim (scheduled), ITAM Business School, Oxford, UCLA Anderson

NBER Long Term Asset Management, WFA (scheduled), Chicago Booth Treasury Markets Conference, ECB Money Markets Conference, Chicago Booth Treasury Market Conference (scheduled), 2023 WBS Gillmore Centre Conference on DeFi & Digital Currencies*, Center for Digital Finance and Technologies Annual Summit, Central Bank Conference on the Microstructure of Financial Markets*, CEPR Asset Pricing Summer Symposium in Gerzensee (scheduled), Insead Finance Symposium (scheduled), New York Fed ECB Conference on Non-Bank Financial Intermediation (scheduled), Wharton Roundtable (schedule)

2022-2023 Banque de France, Boston Fed, BIS, Cornell University, European Central Bank, Georgetown, Federal Reserve Board, Stockholm School of Economics, City University of New York, Office of Financial Research, Renmin University, Peking University, Toulouse School of Economics, TMX Group, Tsinghua University, UT Dallas, University of Massachusetts Amherst, University of Florida, University of Washington Foster

NBER SI Risks of Financial Institutions, AFA, EFA, ECB Annual Research Conference, Cleveland Fed and OFR 2022 Financial Stability Conference*, FIRS, 2022 Fixed Income and Financial Institutions, Finance Theory Group Spring Meeting*, Four Corners Index Investing Jamboree*, Four Corners Conference*, Lindau Nobel Laureate Meetings, IMF-Wharton Conference on Non-Bank Financial Intermediation, MIT Junior Finance Conference, OFR Risking Scholars Conference*, Q-Group Spring Seminar*, Second Annual DeFi Academic Research Conference, Stern/Salomon Microstructure Conference 2023*, Third Conference on Non-Bank Financial Sector and Financial Stability, Vienna Financial Intermediation Conference, Workshop on Non-Bank Financial Intermediaries*

2021-2022 Columbia Business School, Indiana Kelley School of Business, London Business School, New York Fed, Virginia Darden

AFA Day Ahead Conference on Financial Markets and Institutions, Advances in Fixed Income and Macro-Finance Research Conference*, Canadian Economics Association Conference*, Chicago Junior Macro and Finance Conference, CMFSG Conference, Columbia New Empirical Methods Conference, Financial Intermediation Research Society Conference, FSB-IOSCO Conference on Vulnerabilities from Liquidity Mismatch in Open-Ended Funds, Minnesota Corporate Finance Conference, NYU Stern New York Fed Intermediation Conference*, Richmond Fed Summer Conference, Swedish House of Finance Money Market Conference, Second Conference on the Interconnectedness of Financial Systems, Texas Finance Festival*, UBC Summer Conference (cancelled)

2020-2021 Berkeley Haas, Bonn Finance, Columbia Business School, Federal Deposit Insurance Corporation, Federal Reserve Board, Harvard Business School, Imperial College London, New York Fed, UIUC Gies College of Business

AFA, Cleveland Fed Financial Stability Conference*, ECB Money Market Workshop, EFA, Journal of Finance/Fama-Miller Center Covid-19 Conference, Macro-Finance Society Meeting, Macro-Finance Junior Workshop*, Midwest Finance Association Meeting, NYU Stern Microstructure Conference*, Short-Term Funding Markets Conference, WFA

2019-2020	Chinese University of Hong Kong (Economics), Columbia Business School
	NBER Summer Institute (Corporate Finance), AFA, AFFECT Virtual Seminar, SFS Calvacade North America*, Columbia Intermediation Workshop, EFA, Short-Term Funding Markets Conference, Stanford SITE Conference on Financial Regulation, RCFS-RAPS Winter Conference, WFA, WFA Early Career Women in Finance Conference 2020
2018-2019	Cleveland Fed, Michigan Ross, Princeton University, Columbia Business School
	Columbia Junior Structural Conference, Stanford SITE Summer Workshop 2018*, UNC Junior Roundtable, WAPFIN NYU Stern 2019, WFA Early Career Women in Finance Conference 2019
2017-2018	Boston University Questrom, Chicago Booth, Columbia Business School, Copenhagen Business School, Duke Fuqua, European Central Bank, Fed Board, Foster School of Business, Harvard Economics, London School of Economics, New York Fed, Northwestern Kellogg, Stanford GSB, University of Hong Kong, UT Austin McCombs, Wharton, Wisconsin School of Business, Yale School of Management

Panels

Policy Impact

Mutual Fund Liquidity Transformation and Reverse Flight to Liquidity
joint with Kairong Xiao (Columbia GSB) and Yao Zeng (Wharton)

Replicated for a sample of global funds in the IMF Financial Stability Report

Cited by the SEC's proposed rule on Swing Pricing

Cited in the SEC's proposed rule on Money Market Fund Reforms

Cited in the Federal Reserve's November 2021 Financial Stability Report

Mentioned by Nellie Liang, Under Secretary for Domestic Finance, in her remarks at the Global Banking and Finance Conference

Mentioned by Lorie K. Logan, Executive Vice President of the Federal Reserve, in her remarks on Treasury Market Liquidity and Early Lessons from the Pandemic Shock

Mentioned by the Americans for Financial Reform Education Fund (AFREF) in a Comment on Potential Money Market Fund Reform Measures in the President's Working Group Report

Bank Debt, Mutual Fund Equity, and Swing Pricing in Liquidity Provision
joint with Kairong Xiao (Columbia GSB) and Yao Zeng (Wharton)

Cited by the SEC's proposed rule on Swing Pricing

Cited in the SEC's proposed rule on Money Market Fund Reforms

Monetary Policy Transmission in Segmented Markets
joint with Jens Eisenschmidt (ECB) and Anthony Zhang (Chicago Booth)

Mentioned by Isabel Schnabel, Member of the Executive Board of the ECB, in her speech on Shifting Tides in Euro Area Money Markets: From the Global Financial Crisis to the COVID-19 Pandemic

Conference Discussions

Julia Selgrad "Testing the Portfolio Rebalancing Channel of Quantitative Easing"

WFA (scheduled)

Olivier Darmouni, Kerry Siani, and Kairong Xiao "Nonbank Fragility in Credit Markets: Evidence from a Two-Layer Asset Demand System"

Conference on Non-bank Financial Sector and Financial Stability (scheduled)

Adrien d'Avernas, Quentin Vandeweyer, and Damon Petersen "Central Bank's Balance Sheet and Treasury Markets Disruptions"

2024 AFA

Sriya Anbil, Alyssa Anderson, Ethan Cohen, and Romina Ruprecht "Stop Believing in Reserves"

2024 AFA

John Kuong, James O'Donovan, and Jinyuan Zhang"Monetary Policy and Fragility in Corporate Bond Funds"

2023 Wharton Conference on Liquidity and Financial Fragility

Itay Goldstein, Ming Yang, and Yao Zeng "Payments, Reserves, and Financial Fragility"

2023 NBER Summer Institute

Jacopo Magnani and Yabin Wang "Wholesale Funding Runs"

2023 FIRS

Dmitry Chebotarev "The Paradox of Conservative Haircuts"

2023 Short-term Funding Market Conference

Christopher Reilly "The Hidden Cost of Corporate Bond ETFs"

2023 AFA

Amanda Rae Heitz, Christopher Martin, and Alexander Brenden Ufier "Bank Monitoring in Construction Lending"

2023 AFA

Christopher M. James, Tao Li, Jing Lu, and Mustafa Emin "How Fragile Are Loan Mutual Funds"

2022 NBER Summer Institute Risks of Financial Institutions

Yu An, Matteo Bennetton, and Yang Song "Index Providers: Whales behind the Scenes of ETFs"

2022 EFA

Mariassunta Giannetti and Chotibhak Jotikasthira "Bond Price Fragility and the Structure of the Mutual Fund Industry"

2022 AIM Investment Conference

Ye Li and Yi Li "Payment Risk and Bank Lending"

2022 SFS Calvacade

Nicola Cetorelli, Gabriele La Spada, and Joao A. C. Santos "Monetary Policy and the Run Risk of Loan Funds"

2022 Bank of Italy & Bocconi Financial Stability and Regulation Conference

Sergei Chenenko and Viet-Dung Doan "Mutual Fund Liquidity Creation"

2022 MFA

Johannes Breckenfelder, Niklas Grimm, and Marie Hoerova "Do non-banks need access to the lender of last resort? Evidence from mutual fund runs"

2021 ECB Money Market Conference

Clemens Sialm and Qifei Zhu "Currency Management by International Fixed Income Mutual Funds"

2021 WFA

Adrien d'Avernas and Quentin Vendeweyer "Intraday Liquidity and Money Market Dislocations"

2021 EFA

Winston Wei Dou Leonid Kogan, and Wei Wu"Common Fund Flows: Flow Hedging and Factor Pricing"

2021 NBER AP

Kristian Blickle, Markus Brunnemeier, and Stephan Luck: "Micro-evidence from a System-wide Financial Meltdown: The German Crisis of 1931"

2021 AFA

Huaizhi Chen, Lauren Cohen, and Umit Gurun: "Don't Take Their Word For It: The Misclassification of Bond Mutual Funds"

2020 NBER AP

Claudia Robles-Garcia, Nikos Artavanis, Daniel Paravisini, Amit Seru and Margarita Tsoutsoura: "Deposits Withdrawals"

2020 WFA

Stefan Gissler and Borghan Narajabad: "Private Supply of Safe Assets"

2020 AFA

Haelim Anderson, Selman Erol, and Guillermo Ordoñez: "Interbank Networks in the Shadows of the Federal Reserve Act'

2019 Yale Financial Stability Conference

Franklin Allen, Xian Gu, and Oskar Kowalewski: "The Interbank Market Puzzle"

2019 WFA

Abhimanyu Gupta, Sotirios Kokas, and Alex Michaelides: "Credit Market Spillovers: Evidence from a Syndicated Loan Market"

2019 FIRS

Edward Denbee, Christian Julliard, Ye Li, and Kathy Yuan: " Network Risk and Key Players: A Structural Analysis of Interbank Liquidity"

2019 Short-term Funding Market Conference

Calebe de Roure, Loriana Pelisson, and Anjon Thakor: " P2P Lenders versus Banks: Cream Skimming of Bottom Fishing"

2019 RCFS-RAPS Winter Conference

Benjamin Bernard, Agostino Capponi, and Joseph E. Stiglitz: "Bail-ins and Bail-outs: Incentives, Connectivity, and Systemic Stability"

2018 SFS Cavalcade

Viral V. Acharya, Diane Pierret, and Sascha Steffen: "Lender of Last Resort versus Buyer of Last Resort — Evidence from the European Sovereign Debt Crisis"

2018 SFS

Conference Organizer

2020	Columbia Financial Intermediation Workshop
2019-2024	Macrofinance Workshop
2018-2024	Columbia Conference in New Empirical Methods
2024	Fall FTG Conference

Conference Program Committee

2023	EFA Session Chair
2023	CEBRA Session Chair
2023-2024	AFA Session Chair
2024	OFR Rising Scholars Conference Program Committee
2023-2024	WFA Program Committee
2023	Colorado Finance Summit Program Committee
2022	Washington University in St. Louis Corporate Finance Conference Program Committee
2020-2024	EFA Program Committee
2020-2024	FIRS Program Committee
2020-2024	NYU / NY Fed Conference on Financial Intermediation Program Committee
2020-2022	Midwest Finance Association Conference Program Committee

Referee Work

American Economic Review, American Economic Review: Microeconomics, Econometrica, National Science Foudation, Review of Economic Studies, Review of Financial Studies, Review of Finance, Journal of Finance, Journal of Financial Economics, Journal of Financial Intermediation, Journal of Banking and Finance, Journal of Empirical Finance, International Economic Review, International Journal of Central Banking, Management Science, Quarterly Journal of Economics

Teaching

2018 – Present	Instructor for FINCB6300 Corporate Finance (MBA), Columbia Business School
2018 – 2019	Instructor for ECONGU4280 Corporate Finance , Columbia University
2015 – 2017	TA for FIN 347 Money and Banking (MBA), Stanford GSB

Personal Information

D.O.B.	Nov 10, 1990
Gender	Female
Citizenship	Hong Kong
Languages	Mandarin (Native), Cantonese (Native), English (Fluent), German (Fluent)

Outside Activities

Consultant, DG Monetary Policy, European Central Bank
Consultant, New York Fed

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Yao Zeng

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Academic Appointments

- Assistant Professor of Finance, Wharton School, University of Pennsylvania, 2020-
  - Cynthia and Bennett Golub Faculty Scholar, University of Pennsylvania, 2023-2024
- Assistant Professor of Finance, Foster School of Business, University of Washington, 2016-2020

Education

- Ph.D. in Economics, Harvard University, 2016
  - Committee: John Campbell (chair), Emmanuel Farhi, Andrei Shleifer, Jeremy Stein (co-chair)
- M.A. in Economics, Peking University, 2010
- B.A. in Economics, Peking University, 2007
- B.Tech. in Electronic Science and Engineering, Beijing Institute of Technology, 2007

Research Interests

- Financial Economics, Money and Banking, Financial Intermediation, Financial Crises, Innovation

Publications

- "FinTech Lending and Cashless Payments," (w/ Pulak Ghosh and Boris Vallee)
  - **Journal of Finance**, forthcoming
- "Mutual Fund Liquidity Transformation and Reverse Flight to Liquidity," (w/ Yiming Ma and Kairong Xiao)
  - **Review of Financial Studies**, 35(10): 4674-4711, October 2022.
- "Silence is Safest: Information Disclosure When the Audience's Preferences are Uncertain," (w/ Philip Bond)
  - **Journal of Financial Economics**, 145(1): 178-193, July 2022.
- "Mutual Funds as Venture Capitalists: Evidence from Unicorns," (w/ Sergey Chernenko and Josh Lerner)
  - **Review of Financial Studies**, 34(5): 2362-2410, May 2021.
- "Marketplace Lending: A New Banking Paradigm?" (w/ Boris Vallee)
  - **Review of Financial Studies***,* 32(5): 1939-1982, May 2019.
- "Financing Entrepreneurial Production: Security Design with Flexible Information Acquisition," (w/ Ming Yang)
  - **Review of Financial Studies***,* 32(3): 819-863, March 2019. **Editor's Choice (lead article)**
- "Multi-Agent Inference in Social Networks: A Finite Population Learning Approach," (w/ Jianqing Fan and Xin Tong)
  - **Journal of the American Statistical Association***,* 110: 149-158, April 2015.

Papers under Review/Revision

- "Steering a Ship in Illiquid Waters: Active Management of Passive Funds," (w/ Naz Koont, Yiming Ma, and Lubos Pastor)
  - Revise and Resubmit, **Review of Financial Studies**

- "Bank Debt, Mutual Fund Equity, and Swing Pricing in Liquidity Provision," (w/ Yiming Ma and Kairong Xiao)
  - Revise and Resubmit, **Review of Financial Studies**
- "Coordination and Fragility of Liquidity Provision," (w/ Ming Yang)
  - Revise and Resubmit, **Review of Financial Studies**
- "ETF Arbitrage under Liquidity Mismatch," (w/ Kevin Pan)
  - Revise and Resubmit, **Journal of Finance**
  - Authur Warga Award for the Best Paper in Fixed Income, SFS Finance Cavalcade
  - Finalist of the ECB Research Prize in memory of Ieke van den Burg
- "A Dynamic Theory of Mutual Fund Runs and Liquidity Management"
  - Revise and Resubmit (invited submission), **Review of Financial Studies**
  - Trefftzs Award for the Best Student Paper, WFA
  - First Prize for the Best Finance Theory Job Market Paper, Finance Theory Group
  - Cubist Systematic Strategies Ph.D. Candidate Award for Outstanding Research, WFA

Working Papers

- "The Making of an Alert Depositor: How Payment and Interest Drive Deposit Dynamics," (w/ Xu Lu and Yang Song)
- "Payments, Reserves, and Financial Fragility," (w/ Itay Goldstein and Ming Yang)
- "Stablecoin Runs and the Centralization of Arbitrage," (w/ Yiming Ma and Anthony Zhang)
- "The Effect of Instant Payments on the Banking System: Liquidity Transformation and Risk-Taking," (w/ Rodrigo Gonzalez and Yiming Ma)
- "Inflation and the Velocity of Money: the Macroeconomics of Instant Payments," (w/ Ding Ding, Rodrigo Gonzalez, Lars Norden, Bernardus van Doornik)

Invited Seminars (not including presentations done by co-authors or at home institution)

- 2025 UMass Amherst
- 2024 Carnegie Mellon University, University of Rochester, Iowa State University, London School of Economics, Copenhagen Business School, New York Fed, Philadelphia Fed
- 2023 University of Wisconsin, Penn State University, Baruch College, Texas A&M University, Georgia State University, University of Texas at Dallas, UC Irvine, Rutgers University, University of British Columbia, Bank for International Settlements
- 2022 Dartmouth College, University of Notre Dame, University of Southern California, Louisiana State University, Florida International University, INSEAD, Philadelphia Fed, IMF, Bank of Canada
- 2021 Cornell Johnson, Johns Hopkins University Carey, University of Toronto Rotman, University of Zurich, Toulouse School of Economics, Fed Board, Hong Kong University of Science and Technology, Luohan Academy
- 2020 Berkeley Haas, Princeton, Southern Methodist University Cox, University of Rochester Simon, Washington University in St. Louis Olin, Wharton, University College London, McGill University Desautels, Erasmus University Rotterdam, Nanyang Technological University, University of Hong Kong, Virtual Asset Management Seminar, Virtual Finance Theory Seminar
- 2019 Chicago Booth, Stanford GSB, UCSD Rady, Yale SOM, University of Oxford Saïd
- 2018 Johns Hopkins University Carey, London School of Economics, University of British

Columbia, Fed Board, San Francisco Fed, US Commodity Futures Trading Commission, UK Financial Conduct Authority, BlackRock

- 2017 University of Illinois at Urbana-Champaign Gies, Fed Board, US Securities and Exchange Commission, Bank of Canada, Chinese University of Hong Kong-Shenzhen, Peking University, Tsinghua PBC School of Finance
- 2016 Carnegie Mellon University Tepper, Chicago Booth, Columbia IEOR, Duke Fuqua, Imperial College London, London Business School, NYU Stern, Ohio State University Fisher, UCLA Anderson, University of Colorado-Boulder Leeds, University of Minnesota Carlson, University of Rochester Simon, University of Washington Foster, Yale SOM, New York Fed, AQR

Conference Presentations (* indicating co-author presentation)

- 2024 AFA*, MFA, Georgia Tech/Atlanta Fed Household Finance Conference, Boston Fed Conference on the Financial Stability Implication of Stablecoins*, NBER Long-Term Asset Management Meeting*, BIS-CEPR-SCG-SFI Conference on Financial Intermediation*, SFS Cavalcade, FIRS, WFA*, CEPR-Gerzensee Asset Pricing Summer Symposium*
- 2023 AFA, Duke-UNC Annual Decentralized Finance (DeFi) Conference, Chicago Fed Workshop on Non-Bank Financial Intermediaries*, Financial Stability Board (FSB) Stakeholder Outreach on Vulnerabilities from Liquidity Mismatch in Open-Ended Funds, Four Corners Conference on Index Investments*, OFR Rising Scholar Conference, FTG Michigan Meeting*, NYU Stern Microstructure Conference, Imperial-LSE-BoE Conference on Non-Bank Financial Sector and Financial Stability*, FIRS*, Oxford Saïd-ETH Zurich Macro-finance Conference, NBER Summer Institute Risks of Financial Institutions Meeting*, NBER Summer Institute Asset Pricing/Macro, Money and Financial Frictions Meeting, EFA*, GSU-RFS FinTech Conference, Fed Board Central Bank Market Microstructure Conference, ECB Money Market Conference*, Fed/OFR Financial Stability Conference
- 2022 AFA*, Asian Bureau of Finance and Economic Research Symposium, RCFS Winter Conference*, Bank of Canada Workshop on Platforms and Data*, Columbia SIPA/BPI Annual Conference on Bank Regulation, Financial Stability Board and International Organization of Securities Commissions Conference on Liquidity Mismatch*, UBC Summer Conference*, New York Fed FinTech Conference, Annual IMF Macro-Financial Research Conference, Fed/OFR Financial Stability Conference*, MIT Sloan Junior Finance Conference
- 2021 AFA*, Fed Board/Maryland Short-Term Funding Markets Conference*, WFA, CICF*, Entrepreneurial Finance Association Conference*, EFA*, Central Bank Research Association Annual Meeting*, World Bank Asia Economic Policy Network Conference, Texas Finance Festival, NBER Asset Pricing Meeting, CEPR-Norges Bank Banking Workshop
- 2020 AFA, RCFS/RAPS Bahamas Conference*, WFA*, NBER Summer Institute Corporate Finance Meeting*, Columbia Workshop of Financial Intermediation*, AFA AFFECT*, EFA*, Fed Board/Maryland Short-Term Funding Markets Conference*, JF/Fama Miller Center COVID-19 Conference*, MFS Chicago Workshop*, OFR/Cleveland Fed Financial Stability Conference*
- 2019 AFA*, RCFS/RAPS Bahamas Conference, Erasmus Liquidity Conference*, SFS Cavalcade, FIRS*, Financial Stability Board and International Organization of Securities Commissions Conference on ETFs and Market Liquidity, WFA, CEPR ESSFM Gerzensee Workshop*, Oxford OxFIT*, Yale Junior Finance Conference

- 2018 AFA, Penn-NYU Conference on Law and Finance, UNC-Chapel Hill Institute for Private Capital Spring Research Symposium*, RFS FinTech Workshop, Adam Smith Asset Pricing Workshop, NBER Asset Pricing Meeting, Texas Finance Festival, NY Fed/NYU Financial Intermediation Conference*, WFA, Stony Brook International Conference on Game Theory*, Columbia Junior Workshop in New Empirical Finance*, FTG Kellogg Meeting*, Pacific Northwest Finance Conference, Stanford Finance of Innovation Summit, Paris December Finance Meeting*
- 2017 AFA, Utah Winter Finance Conference, Southern California Private Equity Conference, SEC/Maryland/Lehigh/CFA Annual Conference on Financial Market Regulation, SFS Cavalcade, NBER Conference on Long Term Asset Management, RFS FinTech Workshop, FTG LSE Conference*, WFA, London Business School Private Equity Symposium*, UBC Summer Finance Conference*, University of Wisconsin-Madison Junior Finance Conference, University of Virginia Darden/ICI Symposium on Mutual Funds and ETFs, MIT Sloan Junior Finance Conference, NYU Stern FinTech Conference*, UNC-Chapel Hill Kenan-Flagler Roundtable for Junior Faculty in Finance
- 2016 WFA, FTG Imperial College Conference, Stanford SITE, Oxford OxFIT, UT Austin AIM Investment Conference, Wharton Conference on Liquidity and Financial Crises, Pacific Northwest Finance Conference, Fed/OFR Financial Stability Conference, FRA Annual Meeting
- 2015 AFA, FIRS, London Business School Summer Finance Symposium, Econometric Society World Congress, Society of Advancement of Economic Theory*, CICF*
- 2014 SFS Cavalcade, USC Marshall Doctoral Finance Conference, NFA, CEPR ESSFM Gerzensee Workshop*, Minnesota Junior Finance Conference*, CICF*, SAIF Summer Institute of Finance*
- 2013 WFA, Wharton Conference on Liquidity and Financial Crises*, FTG Berkeley Meeting*, Toulouse TIGER Forum*
- 2010 Society of Advancement of Economic Theory
- 2009 Tsukuba Conference of Logic, Game Theory and Social Choice

Keynote Speeches and Panels

- Financial Statements, Peterson Institute for International Economics, 2023
- Global Trends in Practical & Regulatory ETF Issues, World Federation of Exchanges, 2023
- Purdue FinTech Conference, Purdue University, 2023

Professional Activities

- Referee *AER, Econometrica, JPE, QJE, ReStud; JF, JFE, JFQA, Management Science, RAPS, RCFS, RF, RFS; JET, JME, Theoretical Economics;* among others
- Discussion NBER (2024, 2022, 2021, 2020), AFA (2024, 2023, 2022, 2020, 2019, 2018), WFA (2024, 2021, 2020, 2019, 2018), SFS Cavalcade NA (2023, 2017, 2016), FIRS (2021, 2017), among others
- Conference Organizer Wharton Conference on Liquidity and Financial Fragility (w/ V. Glode, I. Goldstein, and G. Ordonez, 2024, 2023), IMF-Wharton Conference on Financial and Real Implications of Technologies, AI, and Cyber Risks (w/ I. Goldstein, 2024), IMF- Wharton Conference on Non-bank Financial Intermediation, Financial Stability, and Policy Responses (w/ I. Goldstein, 2023), FTG Meeting (w/ P. Bond and D. Levit, 2021)

- Session Chair — WFA (2019), SFS Cavalcade (2023, 2022)
- Program Committee — WFA (2019-24), SFS Cavalcade (2020-24), EFA (2020-24), FIRS (2021-24), among others
- Policy Consulting — New York Fed, Philadelphia Fed, Financial Stability Board, Banco Central do Brasil (Central Bank of Brazil), Reserve Bank of India

Academic Honors and Awards

- Cynthia and Bennett Golub Faculty Scholar, University of Pennsylvania, 2023-24
- Columbia Center for Digital Finance and Technologies Grant ($35,000, w/ Yiming Ma), 2023
- Distinguished Referee Award, *Review of Financial Studies*, 2023
- Authur Warga Award for the Best Paper in Fixed Income, SFS Finance Cavalcade NA, 2017
- USC Marshall Trefftzs Award for the Best Student Paper, WFA, 2016
- First Prize for the Best Finance Theory Job Market Paper, Finance Theory Group (FTG), 2016
- Cubist Systematic Strategies Ph.D. Candidate Award for Outstanding Research, WFA, 2016
- Yihong Xia Best Paper Award, China International Conference in Finance (CICF), 2015
- Chiles Foundation Fellowship, Harvard University, 2015
- AFA Doctoral Student Travel Grant, AFA, 2014
- Douglas Dillon Fellowship, Harvard University, 2011
- Distinguished Student of the Nation, Ministry of Education, China, 2007
- First Prize, Chinese National College Mathematical Modeling Competition, 2005
- First Prize, Chinese National Olympiad in Mathematics, 2002

Ph.D. Dissertation Committee (* indicating chair or co-chair, with initial placement)

- Jack (Xiaoyong) Fu (in progress)
- Huiyao Chen (in progress)
- Anna Helmke* (Vanderbilt University)
- Sergey Sarkisyan (Ohio State University)
- Chuck Fang (Drexel University)
- Alvin Chen (Stockholm School of Economics)

Teaching

- Corporate Finance, Spring 2021, 2022
- Managerial Economics, Spring/Fall 2017, Spring 2019, Winter 2020
- Advanced Corporate Finance Theory, Summer 2018
- Asset Pricing (PhD-level, TA for John Campbell, and undergraduate-level, TA for Alp Simsek)
- Intermediate Macroeconomics (undergraduate-level, TA for Philippe Aghion and David Laibson)

Teaching Awards

- Wharton MBA Teaching Excellence Award, University of Pennsylvania, 2020-21, 2021-22
- Undergraduate Finance and Business Economics Faculty of the Year, University of Washington, 2017-18, 2019-20
- Derek Bok Certificate of Excellence in Teaching, Harvard University, 2013-14, 2014-15