

## RESEARCH AND INTERESTS

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I am interested in the industrial organization and regulation of financial markets. My research currently focuses on equity market structure and banking. I am also interested in applied statistical learning in financial economics and advances in causal inference.

## EMPLOYMENT

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2018–Present: Counsel to [Commissioner Robert J. Jackson Jr.](#)  
Securities and Exchange Commission, Washington, D.C.

- I cover issues related to market structure, pilot programs, data, research and analytics.

2016–2018: Financial Economist Fellow  
Securities and Exchange Commission, Washington, D.C.  
[Division of Economic and Risk Analysis](#)

- I studied the economic implications of rulemaking on financial markets.
  - I conducted [independent research](#) suggesting that ‘speed bumps’ may improve market quality, (see coverage in [Wall Street Journal](#)).
- I was involved in modernizing the Commission’s technology infrastructure through data science and cloud initiatives (see [SEC Strategic Plan 2018–2022](#)).
- I coordinated with SROs to acquire and construct regulatory databases.

## EDUCATION

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2010–2016 [Rice University](#)

- Ph.D, M.A. [Finance](#). Jones Graduate School of Business.

2006–2010 [University of Washington](#)

- B.S. [Applied and Computational Mathematical Sciences](#).
- B.S. [Economics](#) *Cum Laude*.

## WORKING PAPERS

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[Loan Syndication Networks](#) *with Jeffrey Harris, and Ioannis Spyridiopoulos*

We document a positive relationship between lender network centrality and the ability to offer competitive bids in syndicated lending markets. Better connected lenders are more likely to syndicate loans as lead arrangers, and provide lower costs of borrowing. We exploit exogenous variation in network structure resulting from bank mergers to provide evidence that greater connectivity reduces firms’ costs of borrowing. The effects are larger for borrowers with higher levels of information asymmetry—consistent with recent theory suggesting that superior networking facilitates information sharing and coordination.

## Intentional Access Delays, Market Quality, and Price Discovery: Evidence from IEX Becoming an Exchange

- Covered in the [Wall Street Journal \(1\) \(2\)](#), [Globe and Mail](#), [Traders Magazine](#), [TabbFORUM](#), [Financial Times](#)

This paper exploits cross-sectional variation in trading activity and the staggered securities phase-in when the Investors Exchange (IEX) becomes a national securities exchange to study the effects of intentional access delays on market quality and price discovery. Market quality improves after IEX becomes an exchange for securities with high historical IEX market share. Price discovery improves overall, although IEX's contribution to price discovery remains small. Intermarket Sweep Order activity decreases overall, coinciding with improvements in price discovery. In a second natural experiment where IEX's ECN goes dark in 28 symbols there is no change in market quality or price discovery. The findings in this paper suggest that protected markets with symmetric speed bumps may be a feasible solution to deemphasize speed in lieu of regulatory intervention.

[A comparison of some structural models of private information arrival](#) *with Jefferson Duarte, and Lance Young*

- **Forthcoming in Journal of Financial Economics**
- Presented at Rice University (2015), Texas A&M (2015\*), Multinational Finance Society Conference (MFS, 2015\*) **Best Paper Award**, China International Finance Conference (CICF, 2015\*), Society of Financial Econometrics Conference (SoFiE, 2015\*), Instituto Tecnológico Autónomo de México Conference (ITAM, 2015\*), American Finance Association Conference (AFA, 2016), University of Washington (2016\*), University of Virginia (McIntire) (2017\*), Southern Methodist University (2017\*).
- **Data and Previous Refereed Versions**

We show that the PIN and the Duarte and Young (2009) (APIN) models do not match the variability of noise trade in the data and that this limitation has severe implications for how these models identify private information. We examine two alternatives to these models, the Generalized PIN model (GPIN) and the Odders-White and Ready (2008) model (OWR). Our tests indicate that measures of private information based on the OWR and GPIN models are promising alternatives to the APIN's *Adj.PIN* and *PIN*

[Financial Integration and Credit Democratization: Linking Banking Deregulation to Economic Growth](#) *with Elizabeth Berger, Alexander Butler, and Morad Zekhnini*

- **Revise and Resubmit Journal of Financial Intermediation**
- Presented at Rice University (2012\*), Financial Management Association Conference (FMA 2013), Securities and Exchange Commission (SEC, 2014\*), Fordham University (2014\*), University of Cincinnati (2014\*), University of Kentucky (2014\*), Yale School of Management (2015\*).

We document a positive effect of financial integration on economic growth. Using US state-by-state financial deregulations, we find that economic growth occurred in states where bank deregulation solved a capital immobility problem. We use a matching method that constructs synthetic counterfactual states to identify the channels that link bank deregulation to financial

integration, and thereby to economic growth. Our results reveal a correlation between financial integration and subsequent banking sector changes including improved bank efficiency, better lending and borrowing rates, and an expansion in loan recipients. We show that financial integration democratizes lending and spurs economic growth.

## WORK IN PROGRESS

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Information Diffusion in Institutional Investor Networks

## POLICY WORK

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[Rule 610T: Transaction Fee Pilot](#)

- Advised on market structure, routing practices, and pilot design.

[Disclosure of Hedging by Employees, Officers and Directors](#)

- Advised and conducted original research on existing hedging disclosures, use of derivative hedges, and stock performance.

[Bats Market Close: Off-Exchange Closing Volume and Price Discovery](#)

- First SEC economic analysis to use regulatory audit trail and TRF data.
- Led to NYSE cutting its top tier MOC fees by two-thirds.

We analyze the correlation among closing price discovery and closing price efficiency—two established metrics from the academic finance literature—with off-exchange trading activity at the close. We analyze equity securities trading and quotation data during the first quarter of 2017 to determine the amount of closing auction volume, the amount of off-exchange Market-on-Close (MOC) activity, and estimates of closing price discovery and efficiency.

[Tick Size Pilot Program and Market Quality](#) *with Paul Hughes, John Ritter, Patti Vegella, and Hao Zhang*

## SKILLS

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Data analysis, financial econometrics, high performance scientific computing, parallel computing, data visualization, causal inference.

Python, R, SAS, STATA, SQL, bash, git