SPRING 2023

SEE FAR

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Foster finance and accounting research with higher purpose and help individuals and organizations become purpose-driven.

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A Message from the Director

I am pleased to continue our magazine, *SEE FAR*. Apart from the obvious attempt to "capitalize" on the WFA-CFAR name, the name also captures the essence of our research: looking to the future rather than concentrating exclusively on current events and thinking, and focusing on big-picture issues that have far-reaching consequences.

All the articles in *SEE FAR* are based on finance and accounting research that has been previously published in an academic journal or as a monograph, or is currently a working paper that will be published in the future. The original papers have been rewritten as executive summaries for *SEE FAR* so that they are accessible to a broad audience, rather than solely to those in academia. While this is not an easy task, I believe that this will not only help us build a bridge between the research of Olin Business School faculty and those in the world of practice, but also will add to the knowledge people use on a daily basis. The intellectual capital generated by our faculty members' research is quite impressive – Olin consistently ranks among the top schools in terms of our research output. For this reason, it is important that WFA-CFAR research is made available to as many of our stakeholders as possible.

This publication serves as one way we support our mission to disseminate cutting-edge faculty research in accounting and finance. Another important way is through sponsoring academic conferences. With the return to in-person events this year, we were happy to be able to host our annual Conference on Corporate Finance on our St. Louis campus again this past fall. We have also been able to sponsor several other research events, including a one-day conference on labor and finance, a meeting of the Finance Theory Group, and a joint workshop between Olin Business School and the St. Louis Fed. These conferences and seminars provide an opportunity to highlight not only research from our own faculty, but from leading scholars across the country and around the globe.

I hope that you enjoy reading the summaries in this issue. I would like to thank my faculty colleagues who participated in helping us create this issue by providing their papers and working with us to convert them into what you will read on the following pages. I look forward to any feedback you have to help us improve this magazine. Please contact WFA-CFAR Program Manager Kristen Jones at **kristen.jones@wustl.edu** with your insights.

Sincerely yours,

Mark Leary
Co-Vice Dean of Faculty and Research, Interim Director of WFA–CFAR and Professor of Finance, Olin School of Business, Washington University in St. Louis

Journal: Working Paper

Paper: “The Political Polarization of Corporate America”

Authors: Vyacheslav Fos, Elisabeth Kempf, Margarita Tsoutsoura

Date: June 2022

The Political Polarization of Corporate America

MARGARITA TSOUTSOURA, Olin Business School, Washington University in St. Louis

The United States is increasingly divided along partisan lines. Pew Research Center (2017) shows that party identification is now a more significant predictor of Americans’ fundamental political values than any other social or demographic divide. Social groups, such as families and neighborhoods, are becoming increasingly politically homogeneous. In contrast, the workplace has long been considered the social context best positioned to provide opportunities for regular interactions and conversations across partisan lines (*Mutz and Mondak, 2006; Hertel-Fernandez, 2020*).

To better understand polarization in the workplace, we study political polarization among important decision-makers in the firm: top executives. Top executives are responsible for designing and executing the most important corporate decisions. Therefore, political polarization in executive teams may have important implications for firm outcomes.

We combine data on the top-5 earning executives in U.S. S&P 1500 firms with information on party affiliations from voter registration records. We use voter registration records from California, Colorado, Illinois, Massachusetts, North Carolina, New Jersey, New York, Ohio, and Texas, spanning the period from 2008 to 2020. We restrict our sample to these locations because other states either do not share voter registration records or do not track voters’ party affiliations over time.

We observe that U.S. executives are predominantly Republican. Among executives that we can link to a political party in the voter records, 69% are Republican and 31% are Democrat. The share of Republican executives is substantially higher in the voter registration data compared to the political contributions data, as many executives donate to both parties. The share of Republican executives increases from 63% in 2008 to 75% in 2016 and then declines to 68% in 2020.

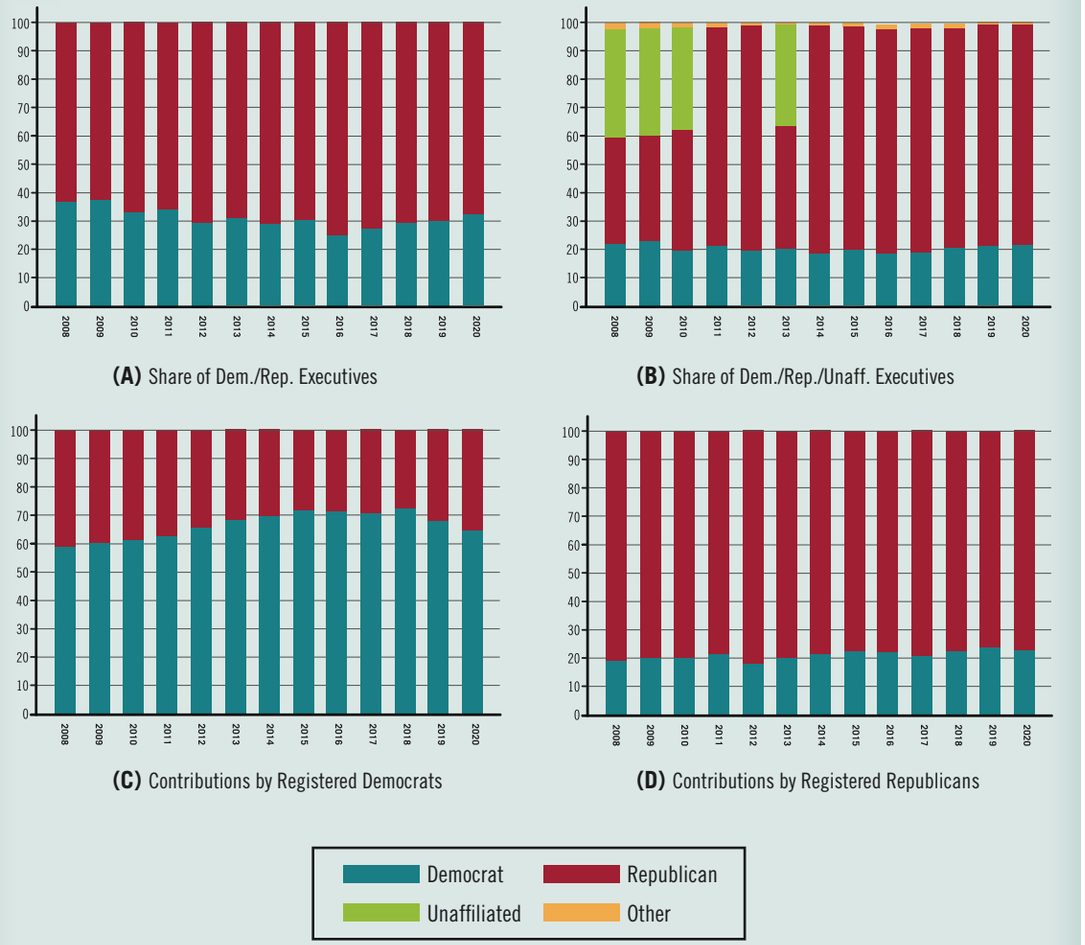

Figure 1: Distribution of Party Affiliation

Panels A and B show the distribution of party affiliation from voter registration records over time for our sample of matched executives. Panel A shows the distribution after restricting the sample to Democratic and Republican executives. Panel B adds unaffiliated executives and executives affiliated with other parties. Panels C and D show the distribution of party affiliation inferred from political contributions, separately for executives who are identified as Democrats (Panel C) and Republicans (Panel D) in the voter registration data. We infer party affiliation from political contributions, using the cumulative contributions made by the executive to the Democratic and Republican Party, respectively.

Trends in the Partisanship of Executive Teams

We show executive teams became more partisan between 2008 and 2020. We define partisanship as the degree to which a single party dominates political views within the same executive team. More specifically, we measure the partisanship of executive teams as the probability that two randomly drawn executives from the same team are affiliated with the same political party. Based on this measure, we find a 7.7-percentage-point increase in the average partisanship of executive teams over our sample period. As a reference point, this increase is almost three quarters of the decrease in gender homogeneity that we observe over the same

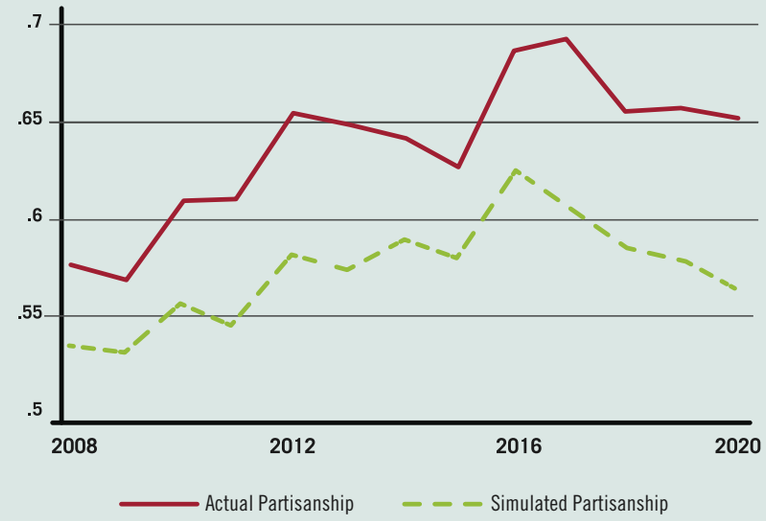

Figure 2: Partisanship: Actual vs. Simulation (by Year)

The figure plots, for each calendar year, the actual partisanship of executive teams in the data (solid line) and the average simulated partisanship of executive teams (dashed line) across 1,000 simulations. For the simulation, executives are randomly assigned a political party, using the distribution of party affiliation in the full sample of executives in a given calendar year as inputs.

time period. The years with the highest annual increase in partisanship are 2010, 2012, and 2016, that is around presidential elections and the passage of the controversial Affordable Care Act ("Obamacare").

What drives the increase in the political polarization of executive teams? One possibility is that the increase in partisanship is a reflection of changes in the share of Republicans and Democrats in the overall population of executives. Alternatively, the increase in partisanship could result from an increased tendency of executives to match with like-minded partisan executives. Using Monte Carlo simulations to generate measures of randomly occurring partisanship, we document that 61% of the increase in partisanship is driven by an increased tendency of executives to match with other executives who share their political views. This increase in the tendency to match on political affiliation is particularly stark in the last few years of our sample period (post 2016), as can be seen in *Figure 2*. The remaining 39% is driven by the executive population as a whole becoming more politically homogeneous (i.e. Republican). Most of the changes in team partisanship are driven by executive turnovers, rather than by within-person changes in party affiliation. Further decomposing the increase in assortative matching, we find that a substantial part of the effect is driven by executives increasingly sorting on political ideology into states and industries.

Political Alignment and Executive Departure

We also study the role of political views in shaping executive team formation at a more granular level. Specifically, we test whether political alignment with other team members influences departure decisions of corporate executives. We find that, within a given firm-year, executives who are politically misaligned with the majority of the team have a 3.2-percentage-point higher probability of leaving the firm, relative to executives whose views are aligned with the

“We find that, within a given firm-year, executives who are politically misaligned with the majority of the team have a 3.2-percentage-point higher probability of leaving the firm, relative to executives whose views are aligned with the rest of the team.”

rest of the team. This effect corresponds to a 24% increase in the likelihood of departure relative to the unconditional turnover probability of 13%. We observe again an increase in this effect over time.

An important remaining question is whether the departure of politically misaligned executives is good or bad for shareholders. From a theoretical perspective, the implications of reduced political diversity on shareholder value are ambiguous. On the one hand, greater political homogeneity may be bad for shareholders if it leads to group think or inefficient hiring and firing decisions. On the other hand, if partisan disagreement leads to deadlock in politically diverse teams, greater political homogeneity may be in the interest of shareholders. To provide some initial evidence on this important question, we study abnormal stock returns around the departures of politically aligned and misaligned executives. Departures of misaligned executives are associated with substantially larger losses for shareholders. The incremental losses to shareholders around executive departures amount to $238 million for executives who are politically misaligned. We also find evidence that departures of misaligned CEOs are more likely to be involuntary.

The large, negative stock price reaction to the departures of misaligned executives suggests that these departures may not necessarily be in the financial interest of shareholders. In other words, shareholders of public U.S. firms may have good reasons to be concerned about the trend toward greater partisanship. Shareholder proposals and discussions about ideological diversity at annual shareholder meetings, such as the one at Apple’s annual shareholder meeting in 2019 (*Sherr, 2019*) may thus become a more common phenomenon.

Conclusion

This paper establishes a new stylized fact, namely, that executive teams in U.S. firms are becoming increasingly partisan, leading to a political polarization of corporate America. This trend implies the growing tendency of U.S. individuals to socialize and form relationships and friendships with politically like-minded individuals extends also to the highest-level decision makers in the workplace. The rise in partisanship is explained by both an increasing share of Republican executives and, to a larger degree, by increased matching of executives with politically like-minded individuals. Finally, we also explore the potential implications of executives’ matching on political affiliation for shareholder value. Stock price reactions to executive departures are substantially more negative for executives who are misaligned with the political views of the team’s majority than for executives who are aligned with the majority. Hence, some aspects of the rising polarization among U.S. executives may have negative consequences for firms’ shareholders.

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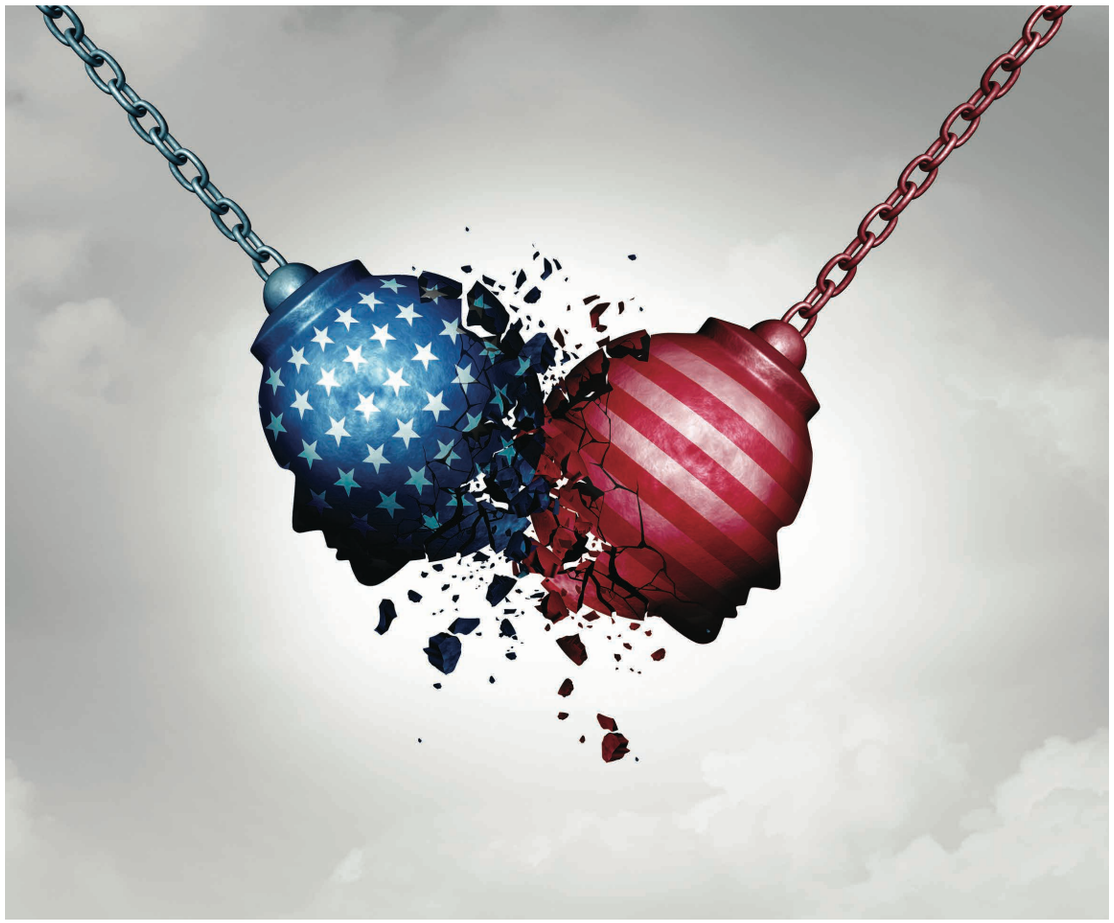

Journal: *Journal of Financial Economics*

Paper: "On the Fast Track: Information Acquisition Costs and Information Production"

Authors: Deqiu Chen, Yujing Ma, Xiumin Martin, Roni Michaely

Date: June 2021

On the Fast Track: Information Acquisition Costs & Information Production

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The past years have witnessed a revolution of information technology communication, ranging from personal and mainframe computers, to broad-band internet and WIFI. These advances have certainly reduced the cost of some forms of information collection. Other forms, such as face-to-face interactions, are still subject to constraints of time and distance. In this paper, we study the implications of information collection costs for information production. In particular, does lowering the cost of collecting information actually lead agents to collect more and better quality information? If so, what are the implications for financial market efficiency? And can information technology replace human face-to-face interaction? A vivid example is that the COVID-19 pandemic has fundamentally changed how people interact and communicate. We tackle these questions through the lens of financial analysts, who play an important role in information production to financial markets. In particular, we take advantage of the massive high-speed rail (HSR) construction in China in the past one and a half decades. We examine how the introduction of HSRs, which drastically eased travel between cities in China, affects analysts' information collection and production, and the resulting impact on price efficiency.

We conducted empirical tests and a large-scale survey of financial analysts to answer the question. We next summarize the key empirical and survey findings. We end with a discussion of the implications of our findings for businesses and policy makers.

01 Does HSR introduction affect analyst information production and price efficiency?

Prior research (*Brown et al. 2015*) shows that corporate site visits represent a major channel for analysts to collect corporate

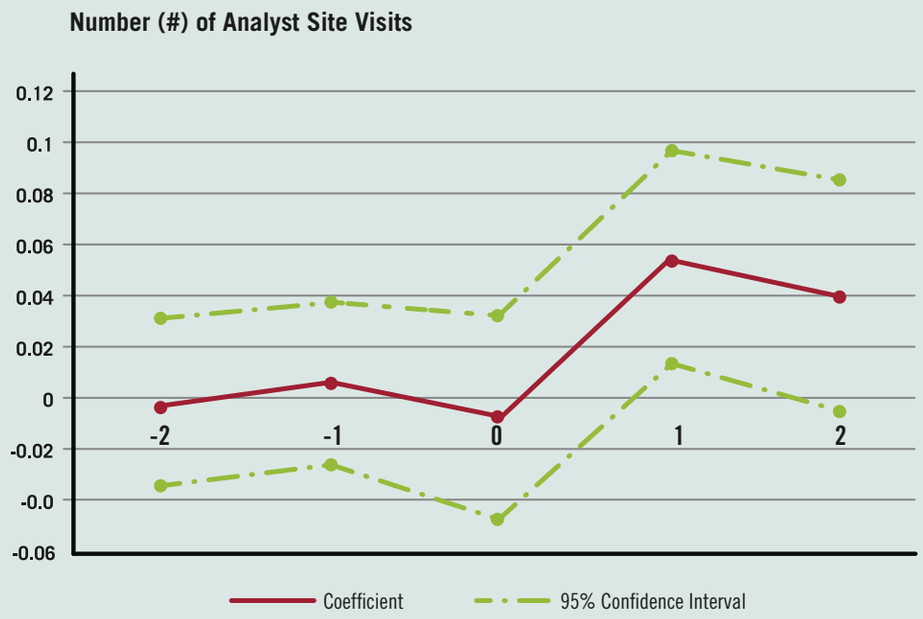

Figure 1: Change in Analyst Site Visits Around the Introduction of a High-Speed Rail Connection

The figure displays point estimates from an ordinary least square (OLS) regression. The dependent variable is *the number of Analyst Site Visits* in logs. Point estimates are reported for two years before, one year before, the year of, one year after, and two or more years after the introduction of HSR between a firm and its broker. 95% confidence intervals, adjusted for clustering at the firm level, are also plotted.

clients' information. We therefore first analyze the impact of HSR introduction connecting a firm-city to its broker-city in the prior year on analysts' corporate site visits. As indicated in *Figure 1*, we find connected analysts significantly increased the number of site visits, by 4.9% annually, following HSR introduction. These results cannot be explained by expected higher growth of the firm's city, the centrality of the analyst's city, nor to firm–and broker–specific shocks. We also show connected analysts increase the likelihood of initiating coverage of a firm to which they are connected post HSR introduction. Our evidence suggests information-cost reduction improves analysts' information production at both the intensive margin (gathering more information about a particular firm) and extensive margin (gathering information about more firms).

Our survey evidence, summarized in *Figure 3* (*page 15*), echoes these findings: 96% of respondents agreed they would visit a portfolio company more frequently after the introduction of an HSR route connecting them to the firm. The impact is particularly acute for cities that are harder to reach and for analysts who are more time constrained. Our results also suggest face-to-face interaction still represents an important source of information, and reductions in information-acquisition costs (travel time) significantly increase the amount of information that agents collect.

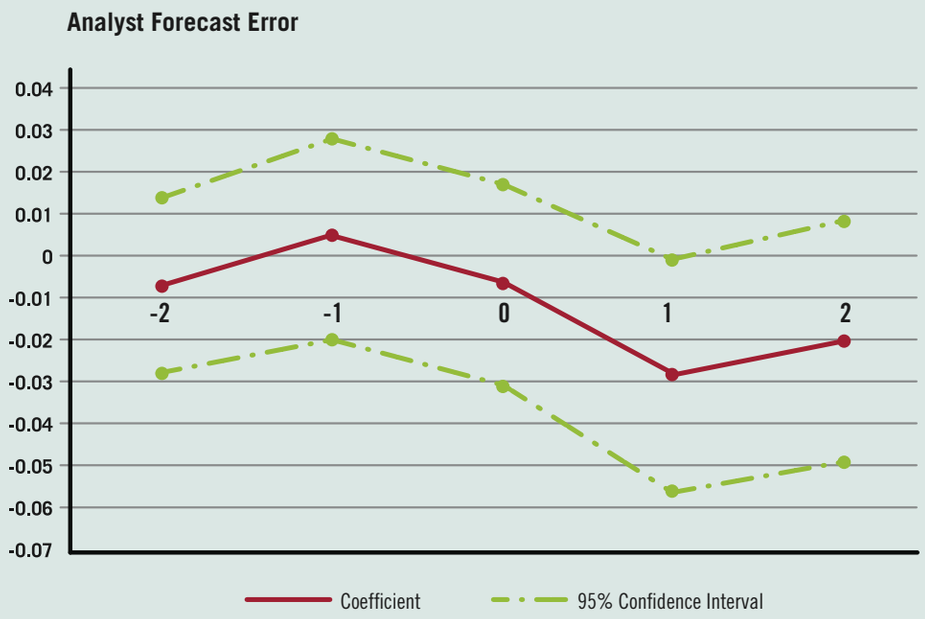

Figure 2: Change in Analyst Forecast Error Around the Introduction of a High-Speed Rail Connection

The figure displays point estimates from an ordinary least square (OLS) regression. The dependent variable is *Analyst-Forecast Error* in logs, which is the absolute difference between the EPS forecast and actual EPS divided by the share price at the beginning of the year and multiplied by 100 (in logs). Point estimates are reported for two years before, one year before, the year of, one year after, and two or more years after the introduction of HSR between a firm and her broker. 95% confidence intervals, adjusted for clustering at the firm level, are also plotted.

02 We test whether HSR introduction affects analysts' information quality, measured by their earnings forecast accuracy.

As shown in *Figure 2*, the HSR introduction connecting a firm-analyst pair significantly increases forecast accuracy by 2.1%. Our survey evidence corroborates these findings: 82% of survey respondents agreed or strongly agreed the HSR introduction has helped them make better earnings forecasts. Only 8% thought it would not be likely to have an impact. In sum, the combined evidence suggests reductions in information-acquisition costs result in more information gathering and higher information quality.

03 We study whether acquisition costs affect price efficiency.

Because the introduction of an HSR connection reduces information-acquisition costs and leads to more frequent information collection and better information at the hands of analysts, we expect the market reaction to analyst-forecast revisions to be stronger, analyst stock recommendations to be more profitable, and analysts' information to be reflected in prices faster, increasing price efficiency. Indeed, we find a significant increase of 1.7% in investors' reaction to forecast revisions and an increase of 1.9% to stock recommendations, post HSR introduction (measured by three-day abnormal returns). We also find the market reaction to a firm's earnings announcements

The Impact of Direct HSR Connection

Questions:

- Conducting more site visits in person
- Obtaining more firm-specific information
- Better understanding strategies/ operation/performance
- Better understanding key challenges/ issues facing companies
- Better understanding corporate culture/employees' morale
- Increase frequency of visit
- Increase flexibility to visit when most useful
- Better understand current state of company
- Talk to non-management employees
- Make more accurate earnings forecasts
- Help forecast the company's long-term growth

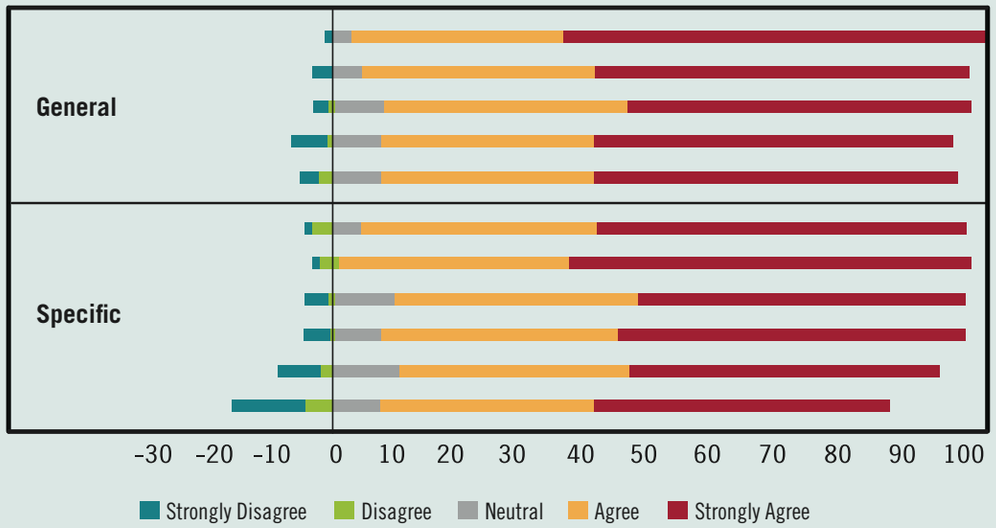

Figure 3: Survey Responses Among Remote Respondents

This figure shows the distribution of survey responses among remote analysts. Remote analysts are those employed by a broker located in cities other than Beijing, Shanghai, Shenzhen, or Guangzhou. On the horizontal axis, positive (negative) percentages refer to "strongly agree," "agree," and "neutral" ("disagree" and "strongly disagree") responses.

declines significantly following the increase in the intensity of the firm's brokers who are connected to the firm by HSR, consistent with more timely incorporation of information in stock prices due to more frequent site visits. Taken in tandem, our evidence of stronger market reaction to analyst research and weaker market reaction to earnings announcements post HSR introduction suggests reductions in information-acquisition costs result in prices impounding information faster, thereby improving price efficiency.

Finally, we study the type of information that analysts gather during their site visits. Our findings suggest that collecting soft information is the main benefit of these visits. Soft information is subjective and contextual, often depending on face-to-face interaction; thus, its collection should be more sensitive to HSR introduction (*see Liberti and Petersen, 2019, for a detailed discussion*). Using several measures of the importance of soft information, we find HSR indeed has a stronger effect on both analyst site visits and analyst-forecast accuracy among firms for which soft information matters more. Second, we use the survey to examine the role of soft information during site visits. Roughly 87% of survey respondents agree that the introduction of HSR helps them better understand items that can be categorized as soft information: corporate culture, employee morale, and firm strategies. These results corroborate the notion that analysts acquire a significant amount of soft information through face-to-face interaction with firms, when soft information plays an important role in assessing future performance.

What Are the Implications for Businesses and Policy Markers?

We find reducing the cost of information gathering spurs information collection and improves the quality of information production. More importantly, the effect is more pronounced for firms whose soft information is essential for valuation. The evidence suggests that even in an era when ICT has significantly affected information collection, human interaction is still valuable. As a byproduct, our findings suggest that the COVID-19 pandemic might have an adverse effect on analysts (soft) information production: Since analysts are more likely to withdraw from personal interaction with firms' management and employees during the pandemic, the amount of soft information they obtain is likely to decline.

Our findings also provide insights for policymakers. When financial markets, as in China, are not fully developed, an investment in infrastructure (e.g., railways, highways, faster internet network, and faster and more efficient telecommunications) has a meaningful positive externality on informational market efficiency. Although some macro-level evidence suggests that construction of transportation infrastructure promotes economic growth (*Duranton and Turner, 2012; Donaldson and Hornbeck, 2016*), the micro-level firm evidence has been limited, particularly in the context of financial markets. Thus, our paper fills that void by providing evidence that building infrastructure promotes informational efficiency in financial markets.

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Journal: Working Paper

Paper: The “Actual Retail Price” of Equity Trades

Authors: Christopher Schwarz, Brad Barber, Xing Huang, Philippe Jorion, Terrance Odean

Date: August 2022

The “Actual Retail Price” of Equity Trades

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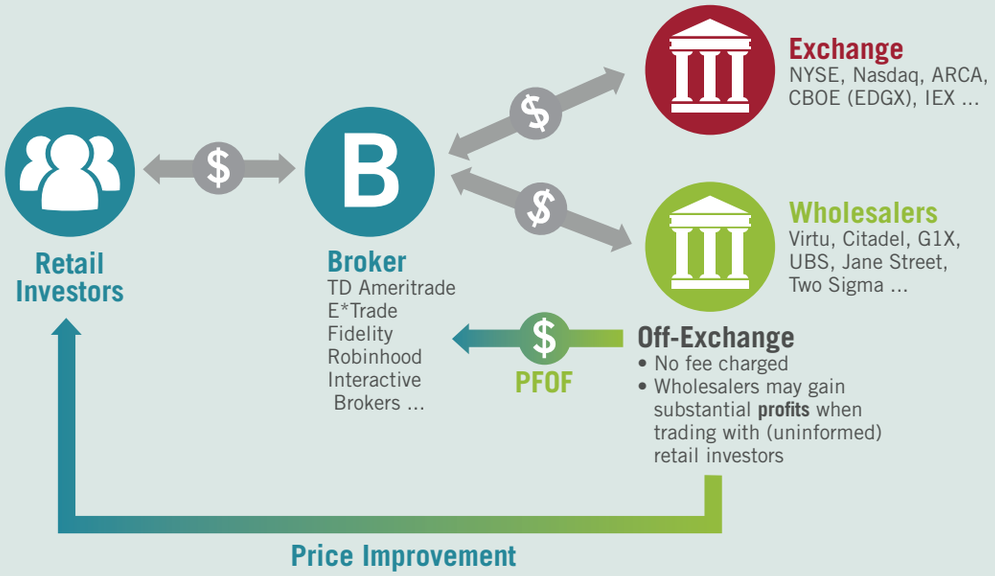
Zero commissions have transformed the landscape for retail investors, making affordable investments accessible to the masses. This trend began in 2015 when Robinhood introduced commission-free trading to “democratize finance for all,” and was followed by other major retail brokers in late 2019. The removal of commissions has drawn a significant number of retail investors into the market and led to a dramatic increase in retail trading. However, it is important to note that “zero-commission” trading is not the same as “free” trading. Even with zero commissions, trading still systematically generates transaction costs due to the usual gap between buying and selling prices (i.e., the bid-ask spread), which can be difficult to observe in the new trading environment. To better understand this new landscape and the behavior of the new breed of retail investors, we conducted a large-scale trading experiment to decipher the “actual retail price” of equity trades. Our analysis reveals a wide and unexpected dispersion in execution prices when we place simultaneous market orders with the same size on the same stock through different brokers.

Current Trading Environment

Let’s begin by providing some background on the current trading environment. In simple terms, retail brokers such as TD Ameritrade traditionally sent their clients’ orders to national securities exchanges such as the NYSE or Nasdaq. However, this is no longer the mainstream approach. Instead, orders are sent to market makers, also known as wholesalers, such as Citadel to be matched off exchange. These wholesalers commit to providing retail brokers with liquidity at the current national best offer (when the investor is buying) or national best bid (when the retail investor is selling), or better. Retail order flow is typically less informed, making it more profitable for wholesalers to pro-vide liquidity. In order to attract retail order flow, wholesalers are willing to share a portion of their profit in form of *Payments For Order Flow* (PFOF) to the retail broker who sent them the orders, and a portion to the retail investors as price improvement. The practice of payments for order flow (PFOF) has raised concerns

Figure 1: Illustration of the Current Market Structure



about potential conflicts of interests between brokers and retail investors, A higher PFOF may be associated with a lower quality of execution, which could be a potential primary driver for the large dispersion we discovered across brokers.

Our Trading Experiment

We run a controlled trading experiment to identify variation in price execution across brokers by opening six individual accounts at five brokers. Importantly, there is a fair amount of variation in PFOF across these brokers. All five selected brokers offer zero commissions accounts. Three brokers (TD Ameritrade, Robinhood and E*Trade) collect PFOF for equity market orders and route nearly all their trades to the same six market centers, which are off-exchange wholesalers. PFOF per share varies across these three brokers. Fidelity has zero commissions and accepts no PFOF yet still routes nearly all trades to these six wholesalers. Interactive Brokers offers accounts with and without commissions, the latter with PFOF. Additionally, Interactive Brokers routes orders to trading venues that differ from these six wholesalers.

Figure 2: The Timeline of Accounts Traded in the Experiment

Our experiment generated approximately 85,000 trades over the period from December 21, 2021, to June 9, 2022, period. To ensure a sample that is representative of the underlying stock population, we selected a stratified sample of the stocks using 128 bins sorted by various factors. We placed orders that were identical in type (market orders), ticker (stock), size (dollars and shares traded), and submission time at different brokers. All trades were intraday, i.e., we bought equities after the market opens and then sold them within 30 minutes, spread throughout the day.

The "Actual Retail Price" Varies Across Brokers

We then compare execution prices across brokers and venues across this large sample. Since we placed the trades, we know whether each trade is a purchase or sale, which is crucial to measure price improvement. *Table 1* shows the comparison of price improvements across brokers. We present the percentage of trades that have price improvement, the price improvement measured as the differences between the execution price and the best bid or offer, either in dollars or relative to the NBBO spread, as well as round-trip trading costs[1].

We find significant variations in "actual retail price" of equity trades across different brokers. Although we anticipated that trading would not be entirely "free," we were taken aback by the broad range of execution prices we encountered while conducting identical trades simultaneously. In *Table 1*, we present our findings for six brokerage accounts, which demonstrate that the average round-trip cost varied from −0.07% to −0.46%; the average price improvement ranged from $0.03 to $0.08 per share. Such dispersion is both statistically significant and economically meaningful.

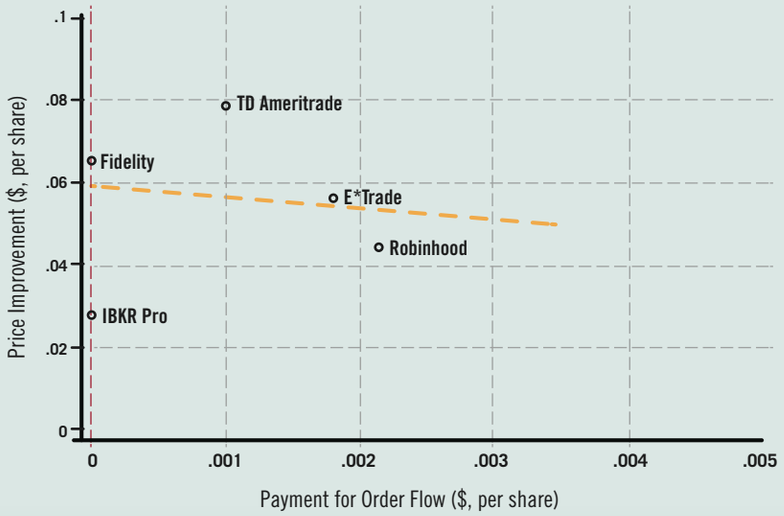
TABLE 1: Comparison of Price Improvement

	Freq of PI	PI(%NBBO)	PI($)	Round-trip
Midpoint (Benchmark)	100%	50%	$0.0836	0%
Broker/Account:				
TD Ameritrade	99.4%	47.2%	$0.0784	-0.072%
E*Trade	96.2%	36.1%	$0.0560	-0.197%
Fidelity	92.9%	35.8%	$0.0654	-0.234%
Robinhood	85.0%	26.8%	$0.0444	-0.314%
Interactive Broker (IBKR) Lite	63.4%	19.5%	$0.0356	-0.444%
Interactive Broker (IBKR) Pro	76.4%	18.8%	$0.0278	-0.462%
NBBO (Worst Possible)	0%	0%	$0	-0.619%

Among the brokers we analyze, TD Ameritrade stands out for its outstanding price improvement, with 99.4% of its trades inside the NBBO and a price improvement of 47.2% of the spread. To put this in perspective, a roundtrip trade would only cost 5.6% (=2 x (50% – 47.2%)) of the quoted spread, making TD Ameritrade's execution quality highly desirable. In dollar terms, TD Ameritrade provides an average price improvement of 7.8 cents, close to the maximum amount of 8.4 cents. In contrast, Interactive Brokers (IBKR) Pro has price improvement on only 76% of

[1] Round trip trading costs are defined as the difference between the actual return of the trade and the return that would have been realized if both buy and sell trades were executed at the NBBO midpoint.

Figure 3: Price Improvements and Payments for Order Flow



its trades, and its average price improvement is only 18.8% of the spread. This results in a roundtrip trade cost of 62% (= 2 x 50% – 18.8%) of the spread, which is over ten times more expensive than TD Ameritrade (even without accounting for commissions). The average price improvement in dollar terms for Interactive Brokers (IBKR) Pro is only 2.8 cents. In between the top and bottom brokerage accounts, we find that Fidelity and E*Trade offer similar execution quality, with Robinhood and Interactive Brokers (IBKR) Lite lagging behind.

What Explains the Wide Execution Dispersion?

We consider three hypotheses to explain the wide execution dispersion across brokerage accounts. We find that the large variations in executions across brokers do not seem to be primarily driven by the variations in PFOF, nor expected by estimations based on public disclosures by brokers and market centers. Rather, our observed large execution differences are largely explained by different brokers receiving differential execution quality at the same market center for identical trades placed simultaneously.

Payments for Order Flow (PFOF). Brokers will cater to the demands of retail investors, but conflicts of interest might arise. For example, brokers have incentives to collect fees from PFOF. In theory, these payments might affect price execution. For example, market centers who pay an additional dollar in PFOF to a broker might offer a dollar less in price improvement to the broker.

Our analysis reveals that the variations in PFOF are orders of magnitude smaller than the variations in price improvement across brokers. In the cross-section, as *Figure 3* shows, even though there might be a negative relationship between PFOF and price improvements, the economic magnitude of the relationship may be too small to explain the large variations in price improvements across the brokers.

Estimation Based on Public Disclosures. Based on the information that is publicly disclosed by brokers and market centers, we calculate the expected price improvement for each broker. We take a weighted average of the stock-level execution quality of each market center (obtained from Market Center's 605 report), with the weighting based on the fraction of orders that the broker sends to each market center (obtained from each Broker's 606 report). It is important to note that the market center's 605 report does not provide execution quality information by brokers. Therefore, we implicitly assume that market centers provide the same execution to all brokers.

Figure 4: Actual Price Improvements vs. Expected Price Improvements Based on Public Disclosures

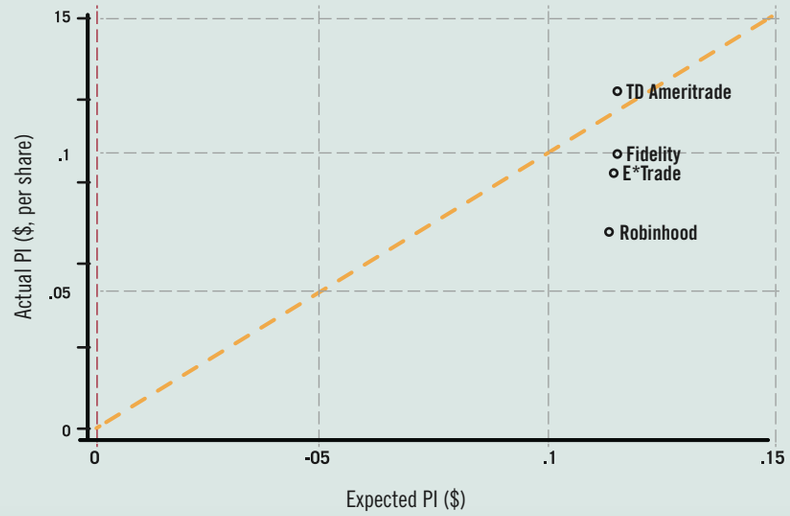
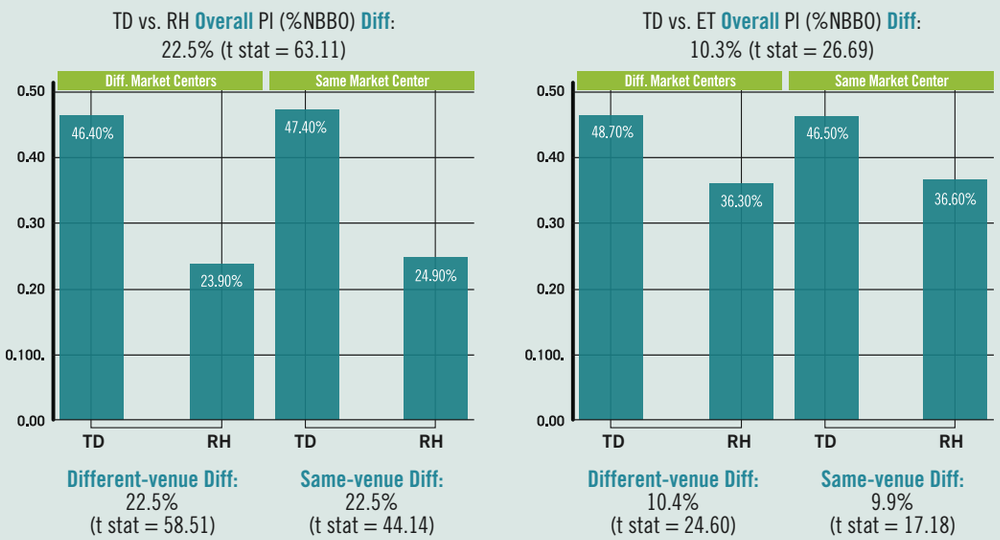


Figure 4 compares the expected price improvements to the actual price improvements. If the two were the same, we would expect all data points to fall on the 45-degree line. However, we observe that the data points are clustered closely around a vertical line, indicating that the variations in the expected price improvements are much smaller compared to the variations in the actual price improvements. In other words, market participants will not be able to anticipate the large execution variations across brokers if they only rely on public disclosures.

Differential Pricing by Market Center. To investigate whether trades from different brokers receive different executions at the same market center, we requested specific routing information

Figure 5: Differential Pricing by Market Centers



“Brokers provide voluntary disclosures that offer inconsistent and opaque information about the quality of their execution, with most claiming high rates of price improvement over an easy-to-beat benchmark (i.e., NBBO).”

for our trades.[2] We were able to receive a complete list of routing information for our trades from TD Ameritrade, E*Trade, Fidelity, and Robinhood. However, Interactive Brokers did not respond to our requests.

Figure 5 (previous page) presents the comparison between TD Ameritrade and Robinhood, as well as between TD Ameritrade and E*Trade. We split the simultaneous trades into two groups: those that are routed to different venues and those that are routed to the same venue. Our results indicate that different brokers indeed receive systematically different execution at the same venue. In both comparisons, the same-venue differences are statistically significant. Interestingly, the magnitude of the same-venue differences is similar to that of the different-venue differences, indicating that the differential pricing is a universal phenomenon rather than driven by specific market centers. Taken together, we find strong evidence that our observed wide dispersion in price execution is due to different brokers receiving differential pricing from market centers for the same trades.

Possible Explanations for Differential Pricing by Market Centers

Our results show that the primary driver for the large variations in execution prices across brokers is different brokers systematically receiving differential price execution by the same market center. We further provide possible explanations for the differential pricing by market centers as a relevant starting point for future research.

Quality of Order Flow. Some brokers may have investors who generate order flow that is more attractive to market centers. For instance, a broker’s investor clientele might produce trades that are less correlated and less concentrated, such as Robinhood, or less informed, such as Interactive Brokers, compared to their competitors. Market centers may be less likely to provide better price improvement for highly correlated trades as this could pose a higher inventory risk. Furthermore, a market with fewer informed trades could result in lower transaction costs since the market maker need not worry as much about adverse selection.

Size of Order Flow. Market centers incur significant fixed costs that they must cover to become profitable. Thus, attracting a portion of the flow from large brokers is crucial. Moreover, establishing and maintaining relationships and an order flow pipeline with a specific broker incurs additional costs. To benefit from economies of scale, market centers might compete more aggressively for order flow from brokers with large aggregate order flows. For instance, TD Ameritrade has more than double the volume of other brokers in our analysis.

Objective Function or Monitoring Quality. Different brokers might have different objective functions when routing order flow. Some brokers might be particularly sensitive to price improvements, others less so. Market centers will cater to these brokers objectives if doing so attracts more profitable order flow. In this setting, brokers who care about dimensions other than price improvement might receive systematically worse price improvement. For example, Robinhood and Interactive Brokers might value trade execution dimensions other than price improvement.

Closing Thoughts

Our trading experiment reveals an astonishing dispersion in the quality of price execution across our sample of six brokerage accounts. The average round trip cost ranged from −0.07% to −0.46% for the same simultaneous trades at different brokerages, which is a substantial dispersion. Aggregated across all retail trades, a single basis point of cost (or savings) is equivalent to approximately $2 billion annually.

Our further investigation shows that payment for order flow (PFOF) does not seem to be the primary driver of differences in price execution. The reported PFOF in dollars per share are rather small relative to the magnitude of price improvement. We then turn to market centers to unravel the drivers of variations in price execution. We find that the price differences we observe are due to different brokers getting different execution prices for the same trade, at the same time, at the same venue. We provide some potential economic reasons for the differences in price execution across brokers, including quality of order flow, size of order flow, and different broker objection functions.

Our results also suggest that the current disclosure environment under Reg NMS does not provide sufficient information for retail investors to identify such discrepancies. The SEC’s *Rule 606* broker reports were designed “to improve the ability of their customers to determine the quality of such broker-dealer services.” However, our trading experiment has revealed that these reports are inadequate for this purpose. Brokers provide voluntary disclosures that offer inconsistent and opaque information about the quality of their execution, with most claiming high rates of price improvement over an easy-to-beat benchmark (i.e., NBBO). Moreover, it’s worth noting that market centers do publish security-level price execution information in their Rule 605 reports, but these figures are averaged across trades from all brokerages. This means they do not provide individual figures for different brokers from whom they receive order flow. Since there is significant variation in price execution across retail brokers, current disclosures fail to provide meaningful information to investors. To improve the situation, we suggest expanding the scope of reports to display security-level execution statistics by brokers. This will enable investors to compare execution quality across different brokers and make informed decisions.

Our findings have reached a broad audience through reports in a variety of outlets such as the *Wall Street Journal*, *Bloomberg*, *Barron’s*, *Yahoo! Finance*, and *CNBC*. It seems that the large broker execution differences we document were not only unknown to the retail trading community, but also unknown to a large portion of the financial industry. This reaction to the release of our study also suggests that centralized and systematic public disclosure is needed for improving transparency of the “actual retail price” for equity trades.

[2] Reg NMS has a provision under Rule 606(b)(1) to “require a broker-dealer, upon request of a customer [...] to provide customer-specific disclosures, for the prior six months, regarding [...] its routing of such orders to various trading centers.”

Journal: *Journal of Financial Economics*

Paper: "Launching with a Parachute: The Gig Economy and New Business Formation"

Authors: John M. Barrios, Yael V. Hochberg, Hanyi Yi

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Launching with a Parachute: The Gig Economy and New Business Formation

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Entrepreneurship has long been associated with risk-taking, as argued by Knight in 1921. Due to moral hazard and adverse selection problems, capital markets often fail to provide sufficient capital to entrepreneurs, leaving them to finance themselves and bear the risk of failure. Providing a channel for income supplement or employment fallbacks as insurance for failed entrepreneurs should encourage more entrepreneurial entry. This paper argues that the platform-enabled gig economy, with its flexible work hours and low entry barriers, offers such insurance against the volatility of entrepreneurial income.

Recent technological advancements, specifically the advent of smartphones, have revolutionized the commercial landscape, providing consumers and workers with new ways to access retail marketplaces and flexible work opportunities. This collection of markets that match service providers to consumers on a gig (or job) basis has been dubbed "the gig economy," which includes companies like Uber, Lyft, DoorDash, and Task Rabbit. The gig economy functions through a basic business model where gig workers serve as independent contractors to an on-demand company, providing services to the company's clients through online platforms or smartphone applications.

The app-enabled gig platforms offer unprecedented flexibility, allowing gig workers to work only when they wish, and for as long as they want. The platforms also enable workers to control various aspects of their work, such as the selection of jobs, setting their hours and level of participation. In many ways, the gig economy can be seen as an extension of traditional freelance work. However, it differs in that the tech-platform company attracts clients, reducing the entry costs for providers. This can also attract workers with a wider variety of demographic, skill, and career characteristics. Because gig workers do not have to invest in establishing a company and marketing to a consumer base, their operating costs may be lower. As

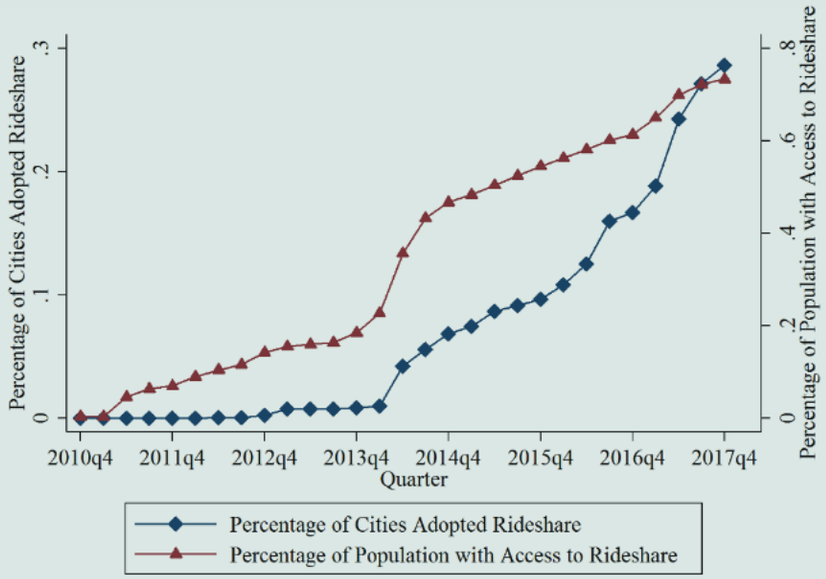

Figure 1: Ridehailing Diffusion
This figure shows the diffusion of ridehailing across the U.S. by cities and population. The sample consists of all census incorporated places in the United States. The navy (red) line graphs the percentage of cities (population) that adopted ridehailing in each quarter between the fourth quarter of 2010 and the fourth quarter of 2017.

a result, participation in the gig market is often more transitory than the traditional freelancing market.

App platforms such as Uber, Lyft, and others make it easy for prospective providers to engage in gig work, as the low barriers to entry allow gig work to substitute for other employment in times of economic downturn or provide supplemental income opportunities.

We investigate the impact of gig work opportunities on the emergence of new entrepreneurial ventures, using the rollout of ridehailing platforms as a natural experiment. Ridehailing was one of the first gig economy platforms to achieve significant scale in the U.S. Uber launched in San Francisco in 2010, followed by Lyft and Sidecar two years later. The spread of ridehailing services across the U.S. accelerated rapidly after 2013, as shown in *Figure 1*.

The introduction of ridehailing into a city represented a supply shock for flexible gig work, and we leverage this shock to design our empirical analysis. As one of the first gig platforms, ridehailing's expansion provided a unique opportunity to study the effect of gig work opportunities on new entrepreneurial ventures.

Our analysis of gig employment on entrepreneurial activity, is based on the Knightian view that an individual's decision to pursue entrepreneurship or full-time wage-employment is determined by the relative expected returns offered by these choices. The option value of accessing gig work opportunities in the event of failure or in low states of the world can enhance the expected returns of entrepreneurship and thus affect their decision to pursue it. In other words, the existence of gig opportunities may enable a potential entrepreneur to launch a business that would not provide sufficient income in the absence of supplemental gig income. Moreover, the "insurance" that the ready availability of gig opportunities provides to a would-be entrepreneur should be more valuable in situations of economic uncertainty or when uncertainty regarding the viability or longevity of their proposed business is higher.

We specifically focus on incorporated business starts as they are likely driven by different factors than other types of entrepreneurship. While gig economy work

Table 1: Gig Economy and New Business Registration

	Log (1+New Business Registration)			
	(1) >2000	(2) >2005	(3) Treat = 1	(4) >2005 & Treat=1
Treat X Post	0.0389*** (0.0112)	0.0676*** (0.0121)	0.0527*** (0.0105)	0.0594*** (0.0108)
Log Pop	0.7358 (0.0928)	0.3212*** (0.1087)	0.7164*** (0.1189)	0.1987* (0.1094)
Log Income Per Capita (lag)	0.5212*** (0.0572)	0.5094 (0.0668)	0.2297*** (0.0715)	0.0262 (0.0728)
Unemployment Rate (lag)	0.0004 (0.0018)	-0.0052** (0.0021)	-0.0125*** (0.0021)	-0.0186*** (0.0023)
Observations	195,446	139,225	114,384	81,761
R-squared	0.9590	0.9592	0.9665	0.9683
City FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
City Linear Trend	Yes	Yes	Yes	Yes

Notes: This table presents results from generalized difference-in-difference regressions. The dependent variable, *Log (1+New Business Registration)*, is the natural logarithm of one plus the number of new business registrations in a city-quarter. *Treat X Post* is a dummy variable that equals one if city C adopted at least one ridehailing service (proxy for gig economy arrival) at time t. Control variables in the regressions include the natural logarithm of population, income per capita (lagged one quarter), and unemployment rate (lagged one quarter). Standard errors, adjusted for clustering at the city level, are reported in parentheses. ***, **, and *represent statistical significance at the 1%, 5%, and 10% levels, respectively.

may entice some risk-taking entrepreneurs to start new companies, it may also offer a more stable "employment-like" opportunity for individuals engaged in ad hoc self-employment. It's worth noting that although technically all gig economy workers are self-employed, many classify themselves as "working for Uber (Lyft)" rather than reporting themselves as self-employed in surveys, as shown by Burtch et al. (2018). The impact of gig economy opportunities on new incorporated business launches, which differ significantly from low-quality self-employment, remains unexplored.

Our empirical analysis utilizes a novel dataset of new business registrations in a local region, provided by the Startup Cartography Project (SCP) (http://www.startupcartography.com). Because a new company must not only incorporate in a state jurisdiction (which may not be the state they operate in), but also register to do business with their local Secretary of State (where the business actually operates), and because such registrations provide an actual operating address for the new company, utilizing business registration data allows us to observe the full universe of newly incorporated businesses. The SCP dataset thus allows us to observe entrepreneurial entry at the micro-level.

Utilizing incorporated business registrations, rather than measures of "self-employment," allows us to capture the type of entrepreneurial

[1] Kim Soohun, Robert Korajczyk and Andreas Neuhierl: "Arbitrage Portfolios," *The Review of Financial Studies*, 34, 2021, 2813-2856. "Characteristic-based Returns: Alpha or Smart Beta?," *Journal of Investment Management*, 2022, 20, 70-89.

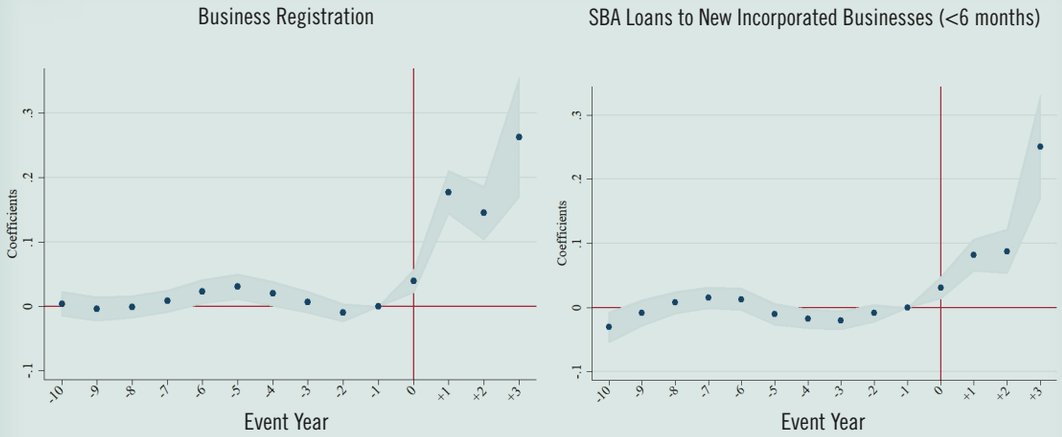

Figure 2: Difference-in-Difference Estimators
This figure displays the regression coefficient estimates for our three main outcomes and two-tailed 95% confidence intervals based on standard errors clustered at the city level. The outcome variables in Panel A is the natural logarithm of one plus new business registrations. The outcome variable in Panel B is the natural logarithm of one plus the number of SBA loans issued to newly-registered business. To map out the pattern in the counterfactual treatment effects, we regress the outcome variables on the lag and lead indicators (bunched by four quarters) of the ridehailing entry. The sample includes all rideshare cities in years after 2005 (the specifications used in the Column (4) of Table 2 and Table 5A). The control variables include the natural logarithm of population, income per capita (lagged one quarter), and unemployment rate (lagged one quarter). The vertical red line indicates the quarter of entry.

entry we are most interested in (businesses who have taken a form required for possible growth) and also avoids the concern that any increase in measures of "self-employment" may simply be capturing ridehailing workers, who by definition are contractors and therefore self-employed.

A natural concern is that ridehailing platforms did not launch in specific cities randomly. This could bias our results if, for example, ridehailing platforms specifically entered into "entrepreneurial" cities first. This does not appear to be the case. We find that the rollout timing of ridehailing platforms into cities is (as expected) predicted by per-capita income, population size, and unemployment levels, but does not appear to be predicted by the levels of entrepreneurial activity within a city.

Accordingly, our main tests utilize a difference-in-differences (D.D.) specification controlling for location and time (quarter-year) as well as location-specific linear trends. This specification allows us to capture macroeconomic changes, such as the Great Recession, technological improvements, as well as city-specific conditions such as city topology, industry mix, and so forth. The location-specific time trend captures location-specific pre-trends in our outcome variables that existed prior to the arrival of ridehailing. To capture potential time-and-city varying confounders, such as population changes or increases in employment or income, we further control for population levels and per capita income. Our results are robust to the inclusion of a variety of additional controls and hold for different pre-period lengths as well as when we restrict the sample solely to ever-treated locations.

Table 1 (previous page) employs our DD specification, where our outcome measure is the natural logarithm of one plus the number of new business registrations in the city/quarter. For brevity, we report only the coefficient on the variable of interest—*Treat X Post* in the table. We estimate four models: period to post 2005, column (3) restricts to solely ever-treated cities, and column (4) uses

Table 2: Gig Economy and Entrepreneurial Interest (Search Share)

Gig Economy and Entrepreneurial Interest (Search Share)				
	(1) >2000	(2) >2005	(3) Treat = 1	(4) >2005 & Treat=1
Treat X Post	0.1136*** (0.0121)	0.0677*** (0.0094)	0.1237*** (0.0148)	0.0619*** (0.0108)
Observations	153,853	142,017	89,269	82,401
R-squared	0.6140	0.6663	0.5875	0.6473
Controls	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
City Linear Trend	Yes	Yes	Yes	Yes

Notes: This table presents the effect of gig economy arrival on entrepreneurial intent, measured using Google search share for entrepreneurship-related phrases, such as "start a business," "how to incorporate," and "become an entrepreneur." The outcome variable is the natural log of one plus Google search share. Control variables in the regressions include the natural logarithm of population, income per capita (lagged one quarter), and unemployment rate (lagged one quarter). Standard errors, clustered at the city level, are reported in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

only ever-treated cities, but with the sample post-2005. We estimate four models: column (1) presents estimates from the full sample period, column (2) shortens the sample pre-period to post 2005, column (3) restricts to solely ever-treated cities, and column (4) uses only ever-treated cities, but with the sample post-2005.

The second pair of models are meant to assuage concerns that any results might be driven solely by differences between ever-treated and never-treated cities. Across all four models, we observe a similar pattern. The coefficient on Treat X Post ranges from 0.03 to 0.06, depending on the sample employed, consistent with the arrival of the gig economy being associated with an increase of approximately 3 to 6% in new business registrations. *Figure 2* graphs the coefficients at the annual level around the entry point; the graph shows no trend in new business registrations prior to the ridehailing entry, consistent with a causal effect of gig opportunities.

Presumably, if the increase in new business launches is driven by the existence of gig economy income fallbacks, then the intensity of ridehailing adoption in a city should be related to the documented increase in our outcome variables. We proxy for the strength of ridehailing take-up in a city using the intensity of Google searches for terms such as "Uber" and "Lyft" in the treatment cities, a proxy that has been shown to correlate strongly with adoption of the platforms. When we substitute the treatment indicator for post-ridehailing-city with our ridehailing adoption intensity proxy for the city, we find that entrepreneurial entry increases in the intensity of adoption of gig opportunities in the city.

Having established the basic positive relation between the availability of ridehailing platform gig opportunities and new business formation, we next proceed to examine the financing channel for new businesses. As documented by Guzman and Stern (2019), the vast majority of new business launches are "traditional business entrepreneurship" (TBE) of the type described by Knight (1921). In contrast to innovation-driven entrepreneurship (IDE) ventures, which are typically financed via equity by angel and

venture capital investors who bear the primary risk associated with the venture, TBE ventures are typically financed through entrepreneur wealth or through some form of debt, particularly small business lending. Thus, in the right hand panel of *Figure 2 (page 29)*, we show the effect of ridehailing introduction on SBA loans to newly incorporated firms. Specifically, we match businesses registered in the prior six months to data on SBA loans made under the SBA's 7(a) programs. Consistent with our findings of a 4-6% increase in realized business registrations, we document a corresponding increase of similar magnitude in small business lending to newly registered businesses after the arrival of the gig economy.

So far, the measures we have employed measure realized entrepreneurial activity. We next proceed to explore whether the presence of gig economy income opportunities can also be seen in indicators of interest in the possibility of launching a business. We measure entrepreneurial interest (expression of interest in entrepreneurship) using Google searches for terms related to entrepreneurship, such as "how to start a business" or "how to incorporate." By utilizing searches, as opposed to realized new venture starts, our intent is to capture an alternative measure of changes in expectations regarding the possibility of entering into entrepreneurship. Consistent with the notion that the availability of gig-work as a fallback spurs potential interest in entry into entrepreneurial activity, the D.D. specification in *Table 2 (previous page)* documents an approximate 7-12% increase in entrepreneurial interest surrounding the arrival of ridehailing platforms in a city.

If our premise holds that the availability of ridehailing platform gig opportunities facilitates new business formation by reducing the uncertainty associated with entry into entrepreneurial activity, then the availability of new gig opportunities in the form of ridehailing platforms should be more valuable in locations where ex-ante economic and entrepreneurship-related uncertainty is higher. To capture this notion, we focus on four proxies of ex-ante economic uncertainty. First, we measure the variance in wage growth across industries in the area measured over the period 2000 to 2010, at the city level, as a proxy for earnings volatility in the area. We also look at a measure that better reflects the specific uncertainty associated with launching a new business: the volatility of business income. We construct two measures: (i) the volatility of zip-level business income in the CBSA in 2010, pre-ridehailing entry; and (ii) the volatility of historical zip-level business in-come in a CBSA over the five years of 2005 to 2010. Finally, we turn to a measure that proxies for the downside risk of launching a new business: the bankruptcy rate in the county in which the city is located.

In *Table 3*, we interact our post-ridehailing variable with these proxies for uncertainty. Across all four proxies, we observe that the relation between the arrival of ridehailing platforms (and their associated gig work opportunities) and new business formation is more pronounced in locations where our proxies for uncertainty are higher ex-ante.

Specifically, we find a 3-percentage-point larger effect in cities with a standard deviation higher wage growth volatility, a 24-percentage-point-larger effect in areas with a standard deviation higher business income volatility, and a 1-percentage-point larger effect in areas with a standard deviation higher business bankruptcy rate.

Importantly, we show that the pattern of where in the city these businesses open (geographic HHI) does not change post-gig economy arrival, suggesting that we are not merely picking up an increase in business opportunities due to the opening of new neighborhoods to transportation via ridehailing. Moreover, we find that the mix of new business types (traditional business versus innovation-driven business) also does not appear to be significantly altered by the arrival of the gig economy. Finally, while our D.D. specification with city-specific linear trends is designed to explicitly control for growth patterns in the city, we provide further evidence that the effect we document is not simply a manifestation of differential overall economic growth patterns. Specifically, we show that average weekly wages do not increase following the arrival of the gig economy, while our entrepreneurial activity measures do.

Table 3: Mechanisms for Growth in Entrepreneurial Entry

Mechanisms for Growth in Entrepreneurial Entry				
Panel A: New Business Registration	**Log (1+New Business Registration)**			
	(1)	**(2)**	**(3)**	**(4)**
Treat X Post X Wage Growth Volatility	0.0293*** (0.0067)			
Treat X Post X Business Income Volatility (Cross-Sectional)		0.0293*** (0.0067)		
Treat X Post X Business Income Volatility (Time-Series)			0.0293*** (0.0067)	
Treat X Post X Business Bankruptcy Rate				0.0293*** (0.0067)
Treat X Post	0.0339*** (0.0115)	0.0240* (0.0129)	0.0215* (0.0126)	0.0374*** (0.0116)
Observations	195,446	195,446	195,446	195,446
R-squared	0.9590	0.9590	0.9591	0.9590
Controls	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
City Linear Trend	Yes	Yes	Yes	Yes
Panel B: Google Search Share	**Log (1+New Business Registration)**			
	(1)	**(2)**	**(3)**	**(4)**
Treat X Post X Wage Growth Volatility	0.0148*** (0.0056)			
Treat X Post X Business Income Volatility (Cross-Sectional)		0.0926*** (0.0126)		
Treat X Post X Business Income Volatility (Time-Series)			0.0902*** (0.0122)	
Treat X Post X Business Bankruptcy Rate				0.0118*** (0.0045)
Treat X Post	0.1111*** (0.0123)	0.0806*** (0.0140)	0.0819*** (0.0141)	0.1116*** (0.0125)
Observations	153,853	153,333	153,593	153,801
R-squared	0.6140	0.6163	0.6146	0.6140
Controls	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
City Linear Trend	Yes	Yes	Yes	Yes

Notes: This table presents the heterogeneous effects of ridehailing on new business registration (Panel A) and entrepreneurial interest (Panel B) by several measures of uncertainty. The dependent variable in Panel A, Log (1+New Business Registration), is the natural logarithm of one plus the number of new business registrations in a city-quarter. The dependent variable in Panel B, Log (1+Google Search Share), is the natural logarithm of one plus Google search share for entrepreneurship-related phrases, such as "start a business", "how to incorporate", and "become an entrepreneur". Wage growth volatility is the standardized weighted sum of the variances and covariances of wage growth in the sectors of the economy, weighted by the employment share of each individual sector as measured up until 2010. Business Income Volatility (Cross-Sectional) is the cross-zip standard deviation of IRS-measured business income in a CBSA in 2010. Business Income Volatility (Time-Series) is the cross-zip, cross-year standard deviation of IRS-measured business income in a CBSA from 2005-2010. Business Bankruptcy Rate is the county-year counts of business bankruptcy cases reported by U.S. Courts divided by the number of business filings reported by IRS, measured in 2013. All interacted variables are standardized to have a mean of 0 and standard deviation of 1. More detailed explanations of the variable constructions can be found in the Data and Sample section of the paper. Control variables in the regressions include the natural logarithm of population, income per capita (lagged one quarter), and unemployment rate (lagged one quarter). Standard errors, clustered at the city level, are reported in parentheses. . ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

We conclude our analysis descriptively in *Figure 3* by exploring heterogeneity in our out-comes across the city characteristics of education level, race, and credit constraints. We find that our effects are largest in areas with lower education levels, higher fractions of Hispanic population, lower fractions of African-American population.

When we look at credit constraints at the city level, we find a U-shaped pattern suggesting the effects are larger both when the population of a location is extremely credit-constrained and in locations where they face much lower constraints. This is consistent on the supply side with a loosening of the credit constraint and with increases in demand in less constrained areas.

Our study offers several contributions to the literature. First and foremost, our results speak to a growing literature on the factors that drive entry into entrepreneurship. Recently, there has been a great deal of concern regarding a decline in entrepreneurial entry and business dynamism, given the importance of entrepreneurial activity for economic growth. *Manso (2011, 2016)* noted that tolerance for failure is a key driver of entrepreneurial entry; here, the gig opportunities provided by the arrival of ridehailing platforms provide the safety net that makes experimentation "safe" to explore. More broadly, our paper relates to a growing literature on entrepreneurial entry barriers, including personal wealth, government regulation, tax policy, and banking systems.

Relatedly, the ridehailing entry events studied in this paper could be considered shocks to the non-pecuniary benefits of alternative employment – notably, work flexibility. We expect there to be an effect on business formation decisions if marginal entrepreneurs value the flexibility directly or as insurance. This contrasts with existing evidence on non-pecuniary benefits in entrepreneurship, which focuses on how these aspects of entrepreneurial jobs motivate or sustain entrepreneurship.

Second, our study further contributes to a growing literature on the spillovers of the gig-economy on traditional business entrepreneurship and employment effects. Our work complements several closely related studies demonstrating that the gig economy can serve as an income fallback in down states of the world such as unemployment or job loss. Our finding complements prior work by showing how gig opportunities for income fallbacks during down states of the world not only spur less reliance on unemployment benefits or lower duration of unemployment spells, but also drive entry into entrepreneurship.

Finally, our study adds to the growing body of research on the economics of the gig economy, particularly on ridehailing. Previous studies have examined the benefits of flexibility provided by gig platforms for direct service providers. Our results go beyond these findings and demonstrate that the benefits of gig economy opportunities extend beyond those who work directly for the platforms. These opportunities may offer a form of insurance against the risk and uncertainty associated with entering entrepreneurship.

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Figure 2: Heterogeneity by Demographics
This figure displays the regression coefficient estimates in Table 10 and two-tailed 95% confidence intervals based on standard errors clustered at the city level. We break out the effect of rideshare entry by the fraction of population in a city with high school degrees, the fraction of population in a city with bachelor's degrees, the fraction of Hispanic population in a city, the fraction of black and African American population, average credit score, and the fraction of subprime borrowers, i.e. borrowers with credit scores below 660. The outcome variable for all panels is the natural log of new business registrations.

A Tribute to Radha Gopalan

This year, we lost a beloved colleague, Radhakrishnan ("Radha") Gopalan, to a long battle with cancer. Radha was a prolific scholar, a brilliant mind, and a passionate educator. One of the remarkable things about Radha's research program was the breadth of his interests and ability to work with a wide variety of co-authors and produce impactful scholarship across diverse topics. He was intensely curious about many aspects of finance, spanning corporate finance, corporate governance, emerging market financial systems, mergers and acquisitions, corporate restructuring, entrepreneurial finance and household finance. He remained extremely active in research, even despite health challenges in recent years. As a tribute to Radha, we have assembled here a sampling of research summaries, written by Radha's co-authors, of his most recent work (all of these papers were written or published within the last two years).

It's Not So Bad: Director Bankruptcy Experience and Corporate Risk-Taking

TODD GORMLEY, Olin Business School, Washington University in St. Louis

Journal: *Journal of Financial Economics*, 2021

Authors: Radhakrishnan Gopalan, Todd Gormley, Ankit Kalda

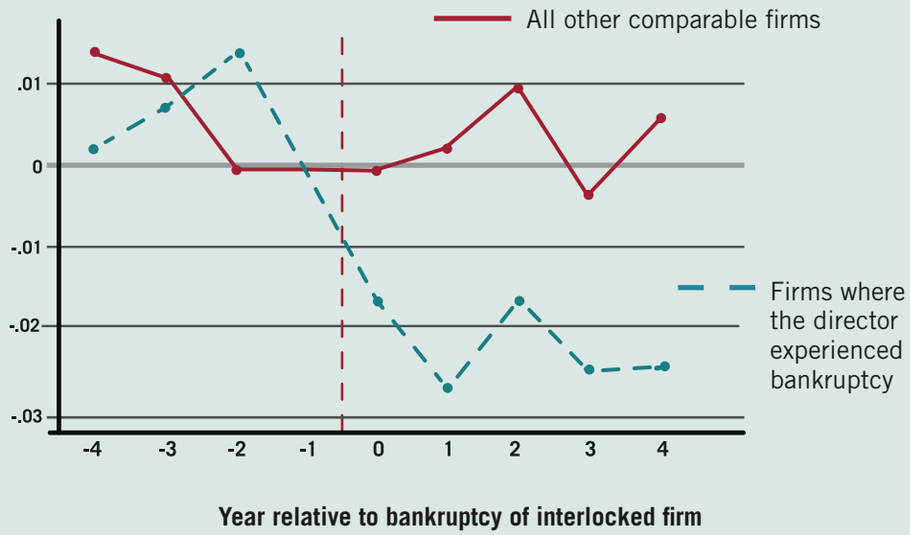
In our *Journal of Financial Economics* paper, "It's Not So Bad: Director Bankruptcy Experience and Corporate Risk-Taking," we assess whether directors' experiences result in active learning and a change in their risk attitudes. We also analyze whether the experiences of an individual director matter for their company's choices. The specific experience we focus on is corporate bankruptcy. In particular, we identify directors on the boards of firms that declare bankruptcy and evaluate whether their participation in those bankruptcies causes a shift in risk-taking at other firms where these individuals concurrently serve as directors.

Corporate bankruptcy can be either a liberating or a traumatic experience for a director. Suppose a quick, pre-packaged bankruptcy allows the firm to shed excess debt, obtain a fresh start, and quickly resume operations. In that case, it can be a liberating experience. On the other hand, if the bankruptcy is prolonged, contentious, and destroys significant value, the experience can be traumatic and confirm a director's view that corporate bankruptcy is costly.

Either way, bankruptcy is likely to be a significant life experience that affects the director's views regarding distress costs and the advice that the director provides to other firms. In matters of distress costs, managers and other board members could give greater weight to the guidance of an individual director with firsthand experience. If true, the learning experience of one director might influence an entire board's (and hence, a firm's) risk tolerance.

Consistent with this possibility, we find that, on average, firms take on more risk when one of their directors experiences a corporate bankruptcy at another firm

Figure 1: Change in cash holdings surrounding director bankruptcy experience



where they concurrently serve as a director. Specifically, as shown in *Figure 1*, such firms begin holding less cash and are less likely to issue equity, resulting in higher net leverage and increased distress-related events. These firms also become more likely to take up riskier projects, as reflected in the variability of cash flows, and less likely to diversify their business through acquisitions. Our findings also concentrate on firms where the affected director likely exerts more influence over the board's decisions and among non-independent directors, whose primary role is to provide advice.

Overall, our results suggest that, on average, a past corporate bankruptcy experience increases a director's willingness to take on risk in the future. While surprising at first blush, we find these shifts only present when the original bankruptcy was quick and resulted in a successful restructuring of the firm. These findings show that the type of bankruptcy experience matters and that, on average, directors update their views regarding distress costs downwards following less costly bankruptcy experiences.

The increase in risk-taking is still surprising, given past evidence that corporate bankruptcies impose costs on directors in terms of fewer future directorships. To unravel this puzzle, we examine directors' careers in the years after their bankruptcy experience. Consistent with earlier papers, we find that the average number of directorships declines following a bankruptcy. However, we find little evidence of a decline following less expensive bankruptcies suggesting that such bankruptcies impose fewer costs on directors. The lack of a negative career impact and the possibility that this experience differs from a typical director's priors can explain why directors seem to lower their expected distress costs following less costly bankruptcies.

Our paper makes several significant contributions. First, the findings show that individuals actively learn from their experiences. Our findings indicate that traits shaped by experience, including those related to risk preferences, can change over time because of additional experiences. Second, our findings contribute to the literature on corporate boards. Rather than analyze the importance of board-level characteristics, like size, we focus on individual directors and provide evidence that even one director can make a difference – i.e., directors, not just CEOs, influence a wide range of corporate outcomes. Third, our findings speak to the literature regarding the dual roles of directors as both monitors and advisors. Prior work on directors primarily focuses on their monitoring role, particularly among independent directors. Our findings, however, suggest that the advisory role of directors, particularly non-independent directors, is also important. Finally, our paper also offers a potential explanation for the long-standing "under-leverage" puzzle in finance. Our paper's findings suggest that directors without firsthand bankruptcy experience could have an inflated assessment of distress costs.

Decision-Making Delegation in Banks

JANIS SKRASTINS, Olin Business School, Washington University in St. Louis
Journal: *Management Science, forthcoming*
Authors: Jennifer Dlugosz, Yong Kyu Gam, Radhakrishnan Gopalan, Janis Skrastins

A large theoretical literature in economics highlights the importance of organizational design and structure for the behavior and performance of organizations. The extent to which decision-making is delegated in an organization can affect the quality of its decisions and its ability to respond to a changing environment. Despite the vast theoretical literature, empirical evidence on how decision-making delegation affects organizational behavior is limited, likely due to a lack of information on organizations' internal decision-making processes.

We introduce a novel measure of decision-making delegation in banks based on where branches' deposit rates are set. We highlight that local delegation of deposit rate pricing can affect the ability of bank branches to react to local shocks. We obtain our data from *RateWatch*, which conducts a weekly survey of bank branches to collect information on the interest rates they offer on deposit and loan products. Along with providing interest rate quotes, RateWatch also identifies whether a branch sets its own rate or follows rates set by another branch in its organization. We use this information to classify bank branches by whether rates are set locally, i.e., in the county where the branch is located (hereinafter, local rate setters). We then employ natural disasters as shocks to local economies and examine whether bank organizational structure (i.e., the use of local rate setting) affects how branches (and banks) respond to natural disasters.

Natural disasters result in property damage and increase uncertainty about local economic conditions. A natural disaster tends to increase loan demand (Cortés and Strahan (2017) and may also result in increased demand for liquidity from the local population, satisfied through withdrawals of deposits or drawdowns of credit lines. How do banks respond to these (local) liquidity shocks? The first best response would call for a bank to equalize the marginal cost of capital across its branches and seamlessly transfer capital through its internal capital market to

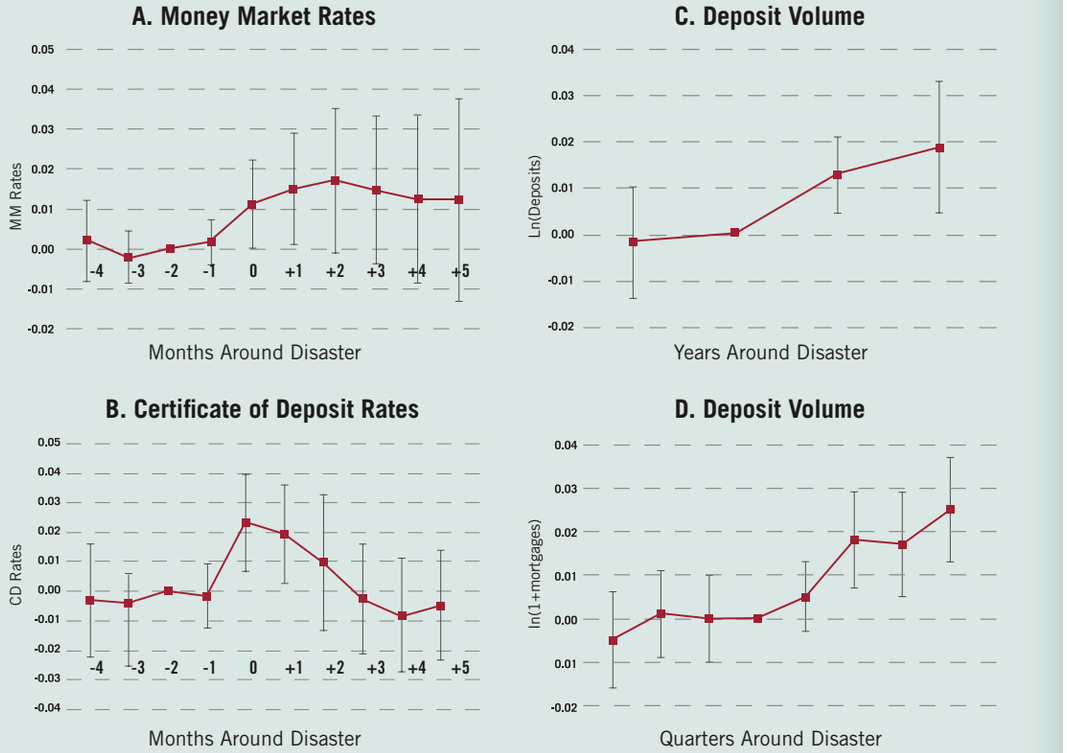


Figure 1: Deposit rates, deposit volume, and lending volume are relatively higher in branches that set rates locally following a disaster

The graph plots the point estimates and 95% confidence intervals around a natural disaster for branches that set rates locally relative to non-local rate setters in affected vs. unaffected areas. The month (-2) before the disaster is the omitted category in Panels (A) and (B), the year (-1) before the disaster in Panel (C), and the quarter (-1) before the disaster in Panel (D). The dependent variable is the MM rate in Panel (A), the CD rate in Panel (B), the log of deposit volume in Panel (C), and the log of mortgage volume in Panel (D).

branches that require more capital. However, if there are information frictions in the operation of bank internal capital markets, local liquidity could affect local lending (e.g., Bolton and Dewatripont (1994), Aghion and Tirole (1997), Stein (1997, 2002), Scharfstein and Stein (2000). At the same time, natural disasters also likely increase the importance of tailoring deposit rates to the now altered local conditions. If a branch's deposit rates are set locally, then it can alter its rates without affecting rates offered by other branches of the bank, to reflect the changed conditions. In contrast, branches that do not set their rates locally might exhibit a more limited response due to organizational rigidities or informational frictions. In summary, local rate setting may affect branch (and bank) responses to localized natural disasters.

Our empirical setting is a triple difference-in-differences specification. The treatment sample consists of branches located in a county affected by a natural disaster in a given month. The control sample consists of branches in adjacent counties that were unaffected by a disaster during our event window. We compare the behavior of branches that are local rate setters to other branches.

As seen in Panels A and B of *Figure 1*, we find that, following a disaster, local rate setters in the affected county offer rates on money market accounts ("MM") and certificates of deposit ("CD") roughly two to five percent higher than non-local rate setters. Higher deposit rates translate into higher deposit balances. After a disaster, annual deposits in affected counties are roughly one percent higher at branches whose rates are set locally as compared to branches whose rates are not set locally (Panel C of *Figure 1*). Consistent with frictions in the operation of bank internal capital markets, delegation of deposit rate setting locally also affects lending. We use mortgage lending by a bank in a county as a proxy for local lending and find that banks with more branches setting rates locally have mortgage origination volumes roughly two percent higher in affected counties (Panel D of *Figure 1*). Finally, we examine whether there are real effects on the recovery of the local area. If a sufficient number of bank branches in an area do not set their rates locally and consequently experience liquidity shortfalls, then aggregate credit supply to the area may be affected, which may in turn affect local asset prices. Consistent with this hypothesis, house price declines following natural disasters are mitigated in MSAs where rates are set locally for the majority of branches. In other words, local delegation of deposit rate setting decisions can offset some of the negative impact of natural disasters on local areas.

Local deposit rate setting is not randomly assigned. We employ an instrumental variables strategy that instruments for local rate setting at the branch level using bank mergers. Granja and Paixao (2021) show that branches acquired by banks with strong uniform deposit pricing practices quickly conform to the uniform pricing scheme after the merger, regardless of whether they were offering higher or lower rates beforehand. We find that branches that merge with a bank that employs strong uniform pricing practices are less likely to set their rates locally compared to branches involved in other mergers.

We make a number of important contributions to the literature. Our paper shows that, despite a trend towards increased financial integration in the U.S. in the aftermath of banking deregulation, local banking markets remain less than fully integrated due to frictions in the operation of bank internal capital markets. We are the first to document the effect of delegation on the liability side of the bank balance sheet – namely deposits – on banks' ability to react to local shocks. Our paper suggests that organizational structure, i.e. whether pricing decisions are made locally within a bank, also matters above and beyond any effect of bank characteristics like size or geographic scope.

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Corporate Inversions and Governance

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Journal: *Journal of Financial Intermediation*, 2021
Authors: Felipe Cortes, Armando Gomes, Radhakrishnan Gopalan

Motivation and Research Objectives: **In an attempt to reduce their tax burden, many U.S. companies reincorporate overseas (also referred as "corporate inversions"). While such inversions may potentially afford some tax benefits, there may also be some costs (to shareholders) resulting from changes in the firm's corporate governance. Our objective is to comprehensively study the relationship between an inversion and different aspects of firm governance.**

Changes to governance resulting from the reincorporation overseas have attracted the attention of major institutional investors including public pension funds such as Calpers.[1] For example, the controversy regarding Walgreens' attempt to reincorporate to Switzerland, a country with civil law legal origin, illustrates this point. While a number of activist hedge fund shareholders, including Jana Partners LLC, were attracted to the lower taxes, another Walgreens shareholder, the CtW Investment Group, opposed the move based on concerns that it would weaken the company's corporate governance.[2]

An expatriation not only alters the tax exposure of the company but it also changes the applicable corporate law – from the relevant U.S. state law to that of the country of reincorporation. Such a change can affect the fiduciary duties of the board, increase the anti-takeover defenses, and reduce the effectiveness of derivative actions to enforce shareholder rights. Yet, after an inversion, most of the U.S. public firms continue to be traded in U.S. exchanges and are classified by the Securities and Exchange Commission (SEC) as "U.S. issuers.[3]" That is, firms that invert continue to receive the same treatment under the U.S. Federal Securities Laws. Moreover, their executive officers are subject to similar personal liability penalties as those of executives in U.S.-incorporated firms and cannot opt-out of corporate governance requirements of U.S. stock exchanges, which regulates governance best practices and board structure.

Our sample consists of 85 firms that invert over the 1996-2017 period – a total of 248 firm-year observations. Our sample includes companies such as Perrigo Plc that incorporated from Michigan to Ireland or Seagate Technologies that incorporated from Delaware to Cayman Islands, and later to Ireland. Importantly, the way U.S. public companies can change their tax domicile varies over time and across firms. In the first wave of inversions in the early 1990's U.S. companies tended to reincorporate in a new country with no material change in its business and assets. The same existing shareholders owned the shares in the new foreign parent company. These were referred as "pure" or "naked" inversions, with Tyco Intl. or Ingersoll-Rand being the leading examples. Due to changes in U.S. tax code, pure inversions became more difficult to implement, paving the way to the "restructuring inversions." These were prevalent in the early 2000's and involved a material change in either the company's ownership, business, or assets. The most common forms of restructuring inversions were via a merger where the U.S. firm merged with a foreign entity, effectively changing the country of incorporation of the surviving firm. Eaton Corp. or Actavis Plc are some examples of the latter form of inversions.

Our main results are summarized in the table below:

		Treated Firms	Control Firms	
	Observations	Post-Pre	Post-Pre	
		(1)	(2)	(1)-(2)
Spread	488	-0.300	-0.585	0.285
		0.214	(.295) *	(.114) **
Analyst Dispersion	488	0.044	0.014	0.031
		(.008) ***	(.006) **	(.010) ***
Inst. Ownership	253	-3.598	12.974	-16.573
		7.481	(4.000) ***	(8.483) **
U.S. Based Inst. Ownership	253	-7.827	9.894	-17.722
		9.896	(3.962) **	(10.660) *
Blockholder Ownership	253	-0.699	7.267	-7.966
		9.815	(4.330) *	10.728
% Equity Based Compensation	1,435	-0.026	0.076	-0.102
		0.023	(.019) ***	(.029) ***
Log(Delta/Total Comp)	1,315	-0.580	-0.139	-0.440
		(.181) ***	0.202	(.271) ***

Our main empirical analysis compares the changes in corporate governance in the firms that invert to the corresponding changes in a matched group of U.S. incorporated multinational control firms with similar characteristics. We look at three different measures of corporate governance. First, we examine changes in stock liquidity after an inversion. The potential for weaker governance can make the stock less attractive to shareholders, reduce disclosure, and translate into investors being reluctant to invest and trade in these shares. Second, we examine changes in institutional ownership. Prior literature highlights the important governance role of institutional

[1] See http://www.calstrs.com/news-release/reincorporation-efforts-gain-momentum-iss-recommendation-supporting-tyco-return-us

[2] See "Walgreens Shareholder Opposes Potential Deal to Reincorporate Abroad", New York Times, May 13, 2014 and "Walgreens Weighs Riding Tax-Inversion Wave," *Wall Street Journal*, July 14, 2014.

[3] The SEC defines a foreign-incorporated firm as an U.S. issuer if more than 50% of the outstanding voting securities are held by U.S. residents and the firm has significant business in the U.S. (see Internet Appendix for more details). Otherwise the firm is classified as a foreign issuer.

investors through the exercise of voice. Yet, institutional investors may be reluctant to hold on to the shares not only because of the decrease in liquidity but also because of the difficulty in exercising shareholder rights through the courts. Lastly, we examine changes in CEO compensation following the reincorporation. Executive compensation can serve an important governance role by linking managerial pay to value creation. Yet, boards of weakly governed firms may award excess pay to their executives and provide a weak link between pay and performance.

Firms that invert exhibit a decrease in their stock liquidity, measured by a higher bid-ask spread and greater dispersion in analyst earnings forecast. This suggests that investors perceive an extra element of opacity about these firms. Following the reincorporation, firms that invert also experience a 14% decrease in institutional shareholding. Not only is the aggregate level of institutional ownership lower but these firms also have less U.S.-based institutional investors and institutional block holdings, thus weakening outside shareholder monitoring and, in turn, also adversely affecting firm governance. Lastly, executives in firms that invert obtain a 10% lower fraction of equity-based pay and an overall compensation that is less sensitive to firm performance.

Numerous American companies are changing their incorporation to countries with a lower corporate tax rate or considering such a move. Firms that invert are large as evidenced by the fact that many of them are included in the S&P 500 index. Just since the beginning of 2014, more than 15 new merger inversions have been announced, prompting legislative action to stop the reincorporation outside the U.S. In particular, the 2017 Tax Cut and Jobs Act has significantly reduced the U.S. corporate tax rate and also shifted the U.S. to a territorial tax system, exempting overseas income of U.S. multinationals from U.S. corporate tax. While this law will go a long way towards reducing the tax benefits from an inversion, U.S. corporations continue to announce overseas reincorporation plans even after the passage of the TCJA.

In this paper, we shed light on an unexplored aspect of inversions, namely its relationship to firm governance. Our analysis indicates that firms that invert have weaker governance than comparable U.S. firms. Thus, despite enjoying the full protection offered by the U.S. Federal Securities Laws, inverted firms have weaker governance than comparable U.S. firms. Moreover, our results are also relevant for the large number of foreign-incorporated U.S. issuers listed in the U.S. capital markets, as these firms decide on the costs and benefits of continuing to be incorporated overseas.

"As a scholar, Radha was exceptional, and I was privileged to coauthor several research papers with him. His research into corporate finance, corporate governance, emerging market financial systems, mergers and acquisitions, corporate restructuring, entrepreneurial finance and household finance has been widely cited … I know I speak for many among us at Olin Business School in expressing grief over this tragic loss, and gratitude for the life of our friend, teacher, colleague, mentor and scholar."

Anjan Thakor,
Interim Dean, John M. Olin Business School
and John E. Simon Professor of Finance

Dean Thakor's full tribute is available on the Olin Blog through this link:
https://olinblog.wustl.edu/2022/12/heartbreaking-news-in-the-olin-family/

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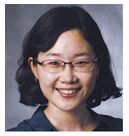
Co-Vice Dean of Faculty and Research, Interim Director of WFA-CFAR and Professor of Finance
PhD, Duke University
Research interests: empirical corporate finance, capital structure, payout policy, security issuance, financial intermediaries

Brittany Almquist Lewis
Assistant Professor of Finance
PhD, Northwestern University
Research Interests: financial intermediation and household finance



Jeongmin (Mina) Lee
Assistant Professor of Finance
PhD, University of Maryland at College Park
Research interests: financial institutions, market microstructure, information economics

Hong Liu
Fossett Distinguished Professor of Finance and Director of the Master's in Finance Program
PhD, University of Pennsylvania
Research interests: optimal consumption and investment with frictions, asset pricings, market microstructure

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PhD, University of Chicago
Research interests: asset pricing, financial intermediation, machine learning, text analysis, and information economics

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Assistant Professor of Finance
PhD, Massachusetts Institute of Technology
Research interests: asset pricing, household finance, macroeconomics

Todd T. Milbourn
Interim Deputy Dean and Hubert C. & Dorothy R. Moog Professor of Finance
PhD, Indiana University
Research interests: corporate finance, managerial career concerns, management compensation, economics of asymmetric information

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PhD, New York University
Research interests: theoretical and empirical asset pricing, derivatives, fixed-income, commodities

Andreas Neuhierl
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Research interests: econometrics, monetary policy, asset pricing, finance/investments

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Senior Lecturer in Finance
PhD, University of Southern California
Research interests: asset pricing, finance/investments

Koray Sayili
Senior Lecturer in Finance
PhD, Queen's University
Research interests: innovation policies, entrepreneurship policies, human capital, institutional investors, ESG investment

Janis Skrastins
Assistant Professor of Finance
PhD, London Business School
Research interests: empirical corporate finance, banking, financial intermediation, organizational design, emerging markets

Linda Schilling
Assistant Professor of Finance
PhD, University of Bonn
Research interests: financial intermediation, financial regulation, asset pricing, cryptocurrencies, exchange rates, coordination games, platform design, blockchain

Timothy Solberg
Professor of Practice in Finance and Academic Director of the Corporate Finance & Investments Platform
Research interests: pensions, endowments and foundations

Buddy Soubra
Professor of Practice in Finance
PhD, New York University
Research interests: finance in a world of asymmetric information

Mark P. Taylor
Donald Danforth Jr. Distinguished Professor of Finance
DSc (Higher Doctorate, University of Warwick)
MBA, Institute of Education
Research interests: economics, financial markets, international finance, international macroeconomics, macroeconomics

Anjan Thakor
Interim Dean, John M. Olin Business School and John E. Simon Professor of Finance
PhD, Northwestern University
Research interests: corporate finance, financial intermediation, economics of asymmetric information

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Associate Professor of Finance
PhD, Columbia University
Research interests: corporate finance, governance, political economy

Guofu Zhou
Frederick Bierman & James E. Spears Professor of Finance
PhD, Duke University
Research interests: investment strategies, big data, machine learning, forecasting, technical analysis, asset allocation, anomalies, asymmetric information, asset pricing tests and econometric methods

Full-time Accounting Faculty

John Barrios
Assistant Professor of Accounting
PhD, University of Miami
Research interests: accounting and disclosure, entrepreneurship, governance, labor economics, industrial organization and productivity, regulation

Jeremy Bertomeu
Associate Professor of Accounting
PhD, Carnegie Mellon University
Research interests: financial accounting, regulation

Edwige Cheynel
Associate Professor of Accounting
PhD, Carnegie Mellon University
Research interests: financial disclosure and capital markets

Thomas D. Fields
Senior Lecturer in Accounting
PhD, Northwestern University
Research interests: accounting, financial reporting

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Nicholas Dopuch Professor of Accounting
PhD, Stanford University
Research interests: accounting-based valuation, voluntary disclosure, information asymmetry, effects of accounting on firm value

Mahendra R. Gupta
Former Dean, Geraldine J. and Robert L. Virgil Professor of Accounting and Management
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Research interests: managerial accounting, strategic cost management and control

Jared Jennings
Associate Professor of Accounting
PhD, University of Washington
Research interests: information intermediaries, textual analysis, financial reporting

Zachary Kaplan
Assistant Professor of Accounting
PhD, University of Chicago
Research interests: managerial disclosure strategy, analyst forecast strategy, earnings expectations

Ronald R. King
Emeritus Professor of Accounting
PhD, The University of Arizona
Research interests: teaching and learning and the role of the modern business school

Xiumin Martin
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PhD, University of Missouri–Columbia
Research interests: financial accounting, voluntary disclosure, accounting information in assets valuation

Richard Palmer
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PhD, Southern Illinois University-Carbondale
Research interests: financial processes, change management, management control systems, auditing, fraudulent financial reporting

Jeffrey Plunket
Professor of Practice in Accounting
JD, St. Louis University
Research interests: tax accounting, holding company and financing structures, cash management, multinational tax planning

MaryJane Rabier
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PhD, University of Maryland
Research interests: financial accounting, financial reporting, voluntary disclosure, mergers and acquisitions, earnings management, human capital, corporate strategy, conference calls

Mark E. Soczek
Director, MACC and Senior Lecturer in Accounting
PhD, Northwestern University
Research interests: corporate disclosure policy, financial reporting

Fall 2022 meeting of the WFA-CFAR Advisory Board

First row from left to right: Kristen Jones, Rick Holton, Jr., Dan Winston, Marcela Manjarrez, Voin Todorovic, Anjan Thakor.
Second row from left to right: Jim Bullard, Tatiana Vdovina, Timothy Solberg, Spencer Burke.
Third row from left to right: David Levy, Mark Leary, Chris Varvares, Atul Kamra.
Not pictured: Ken Cella, Robert Holmes, Wes Jones, Mark Lewis, Joe Nadreau.

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