SPRING 2017

SEE FAR

EXECUTIVE SUMMARIES

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In May 2012, Wells Fargo Advisors awarded a gift to Washington University in St. Louis to support Olin Business School. Olin's newly named Wells Fargo Advisors Center for Finance and Accounting Research (WFA-CFAR) will be a catalyst for enhancing finance and accounting research and education, which benefits faculty members, students, and businesses. To that end, initiatives housed under the WFA-CFAR umbrella include:

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Managing Editor
Jennifer Schmich

Writer
Sue Wadlow

Design
Jenny Anderson Graphic Design

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Wells Fargo Advisors Center for
Finance and Accounting Research
Olin Business School
Washington University in St. Louis
Campus Box 1133
One Brookings Drive
St. Louis, MO 63130-4899

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. This is no small task. Taking a paper originally written for a highly technical academic audience and converting it into something more accessible takes a great deal of skill and hard work, as we discovered while putting together this issue and our past issues. But perhaps that is why the task is so worthwhile. I firmly 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 10 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.

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 Jennifer Schmich at **schmich@wustl.edu** with your insights.

Sincerely yours,

Anjan Thakor

John E. Simon Professor of Finance, Director of Doctoral Programs, Director of the WFA Center for Finance and Accounting Research, Olin School of Business, Washington University in St. Louis

Paper: "The Marginal Propensity to Consume Out of Credit: Evidence from Random Assignment of 54,522 Credit Lines"

Author: Deniz Aydin, Washington University in St. Louis

The paper is a revised version of the first chapter of Aydin's doctoral dissertation at Stanford.

Isolating the Effect of Clogged Credit Arteries on the Heart of Consumer Spending

DENIZ AYDIN, Washington University in St. Louis

Consumer spending accounts for two-thirds of GDP, and cutbacks in expenditures are a factor in every recession, with the Great Recession that started in 2008 being no exception. But what explains the particularly large drop in consumption during the Great Recession? Given the confluence of a large number of simultaneous developments—that consumption, income, and home prices fell simultaneously during the financial crisis, accompanied by a rise in uncertainty about economic policy responses and risk aversion by market participants—it is difficult to identify the most significant proximate cause. In a new working paper, Olin Business School Finance Professor Deniz Aydin, investigates whether clogged credit pipelines to U.S. households might have played a role. Aydin tested his hypothesis using a field experiment of unique size and randomized nature, where credit lines were deliberately varied to 50,000 consumers.

The Great Recession that started in 2008 produced the largest decline in economic activity the U.S. had witnessed since the Great Depression of the late 1920s, and the biggest driver of U.S. GDP is domestic household consumption. For example, declines in credit-sensitive consumer durables and residential investment accounted for 57 percent of the total decline in real GDP between 2007 and 2009. Employment supported by consumer spending also declined by an estimated 3.2 million jobs between 2007 and 2010. What caused this large decline in spending? Could a tightening of borrowing constraints cause a sufficiently large drop in consumption to put the economy in a recession? And if consumption is so sensitive to credit, then why hasn't it rebounded to precrisis levels now that the stock market and housing markets have recovered? Finally, how can we design crisis-mitigating "macroprudential" policies that take into account what we have learned in the recession to mitigate the collapse of spending and aggregate activity? Understanding the reason for the extended slump is essential in formulating policy to offset it.

Randomized Trials and Finance as a Laboratory Science

The simplest way to study these questions is to analyze how household expenditures change as the aggregate supply of credit changes. However, it is extremely difficult to isolate the effect of credit because it is typically commingled with many other forces. For instance, credit supply contraction is often contemporaneous with declines in wealth, income, and consumer confidence and increases in risk, risk aversion, and uncertainty. Therefore even if consumption drops when credit supply contracts, the two events may have little direct causal relationship, with a factor not considered driving them both. For example, both the drop in credit and the

"As little as 5 percent of all the bank's customers in the study had maxed out their credit card at any point in time ...Therefore, not only are strict credit constraints temporary for the typical consumer, but also those who remain at their credit limit month after month represent only a sliver of the population."

drop in consumption may be due to an entirely different factor, such as the collapse in stock market wealth.

On what then, should decision makers at corporations or policy makers in the government base their analysis? To overcome the difficulty with spurious inference, governments and large corporations—like Amazon, Bank of America, and Walmart—frequently implement controlled experiments or randomized trials. A randomized trial, like a medical trial, applies the scientific method to evaluate the effect of an intervention. Consumers are randomly divided into treatment and control groups, with everything but the presumed cause held constant. Then outcomes such as sales, profitability, retention, etc., between these groups are compared. If the treated group does statistically better than the untreated group, then the intervention is deemed to be effective. Randomization ensures that the conclusions are causal inferences in the sense that the observed difference in outcome between treatment and control is only due to the intervention. Such experiments—like clinical trials in medicine—are the gold standard for causal inferences (that go beyond simply documenting correlations), and have been the primary building block of the scientific method for centuries.

To investigate the effect of credit on consumption behavior, Aydın designed a randomized trial where the credit lines of 54,522 preexisting cardholders were deliberately varied. The subject pool consisted of consumer cardholders that had been preapproved by the bank for a credit line increase. From this pool, 13,438 were randomly selected using a random number generator. This was the control group, and these consumers were withheld from credit line increases for nine months. The typical cardholder in the treatment group had their credit card limits extended by a median 120 percent of monthly income. The increases in limits were initiated by the issuer and were unannounced. Other features of the contract, such as the interest rate, remained unchanged. Therefore, the intervention can be classified as an unexpected, and by construction, exogenous shock to only credit availability.

How Commonly Used Models Fare

The most commonly used macroeconomic model, the renowned University of Chicago economist Milton Friedman's permanent income hypothesis, assumes that credit has no effect on consumer behavior. It assumes that individuals, just like university endowments, spend the annuity value of their wealth. A shock to credit entails no wealth effects, therefore should have no effect on real economic activity.

On the contrary, the controlled credit supply experiment found that credit availability has a precisely measured and economically large effect on spending and the use of credit. It showed that consumer borrowing increased by 17 cents on the dollar after nine months. The important policy parameter with respect to spending, the marginal propensity to consume out of credit, averaged across the treatment group is bounded below at 10 cents after nine months. Therefore, the findings indicate that the sensitivity of spending to credit is surprisingly large and potentially quantitatively large enough to generate aggregate fluctuations.

The study also showed substantial heterogeneity in the marginal propensity to consume (MPC) out of credit by balance sheet position, age, income, and other demographics. Strikingly, the effect of credit is not confined to a small fraction of credit-constrained or hand-to-mouth consumers who are up against their credit limits. While proximity to the credit limit is positively correlated with the MPC out of credit, this propensity remains large even for those who are far from the limit. Indeed, a large component of the average response is driven by consumers who utilize only a small fraction of their credit lines, but increase their borrowing on the margin.

Economists are aware that a substantial fraction of the population lives hand to mouth, and relies heavily on borrowing for their subsistence. However, these constrained consumers are not the only group affected by fluctuating credit conditions. Even unconstrained consumers benefit from relaxed credit constraints as this reduces their need to save for a rainy day. If you were utilizing only 30 percent of your $6,000 credit line, would you increase borrowing and spending if your limit were increased to $10,000? Aydin's research shows surprisingly that the answer is yes.

The findings are consistent with models economists call "precautionary savings" models of consumption behavior. These models highlight the inclination of consumers to construct liquidity safeguards against future contingencies: unemployment, loss of home equity, etc. As a result of this, consumers will try to avoid borrowing to the absolute limit. Instead, they will leave credit availability for a rainy day. Therefore they consume less than what they would consume if they were not constrained, in order to build a precautionary buffer. In this class of models, credit constraints need not bind to change consumption dynamics. When the credit limit is relaxed, the consumer will increase spending until the precautionary savings are drained, although not constrained in the first place.

> "Economists … cannot perform the controlled experiments of chemists or biologists because they cannot easily control other important factors. Like astronomers or meteorologists, they generally must be content largely to observe." Samuelson and Nordhaus' (1985) *Introductory Economics* textbook.

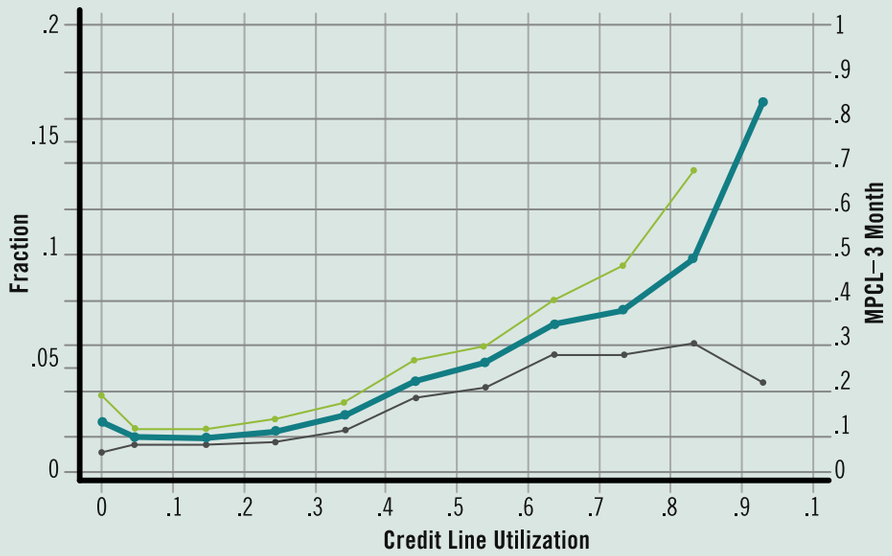
The research also revealed startling patterns that overturn conventional wisdom on the effect of credit on consumers. For example, a significant fraction of the increases in borrowing that result from increased credit supply are direct expenditures on durables and services with investment features. Consumers accumulate debt in the wake of positive income shocks, and then pay down the incremental debt over time. In other words, credit is equally used by productive consumers who invest, rather than by those who are under financial distress.

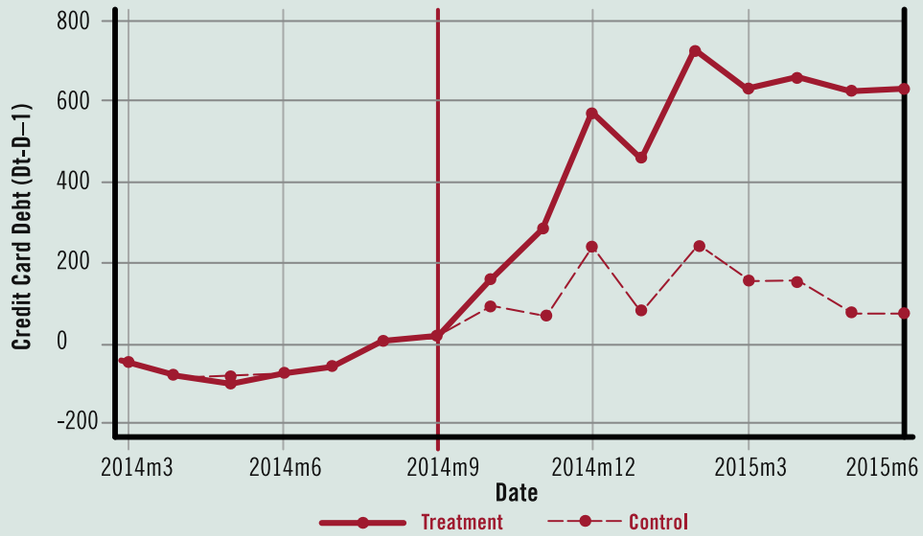
A final surprising finding is that only a tiny fraction of consumers have a strictly binding constraint at any given point in time. For example, as little as 5 percent of all the bank's customers in the study had maxed out their credit card at any point in time, and among the small fraction of consumers who used more than 90 percent of their available credit at a given point in time, average utilization dropped to 60 percent after three months. Therefore, not only are strict credit constraints temporary for the typical consumer, but also those who remain at their credit limit month after month represent only a sliver of the population. This again is

in contrast to conventional wisdom, which suggests that among banked individuals, a large fraction of credit card users are persistently over-indebted and severely financially constrained.

Policy Implications Looking Ahead

Economists have long studied how financial shocks, such as a banking crisis, affect macroeconomic outcomes. The focus of this literature, trailblazed by a paper written by the ex-Fed chairman Ben Bernanke in 1989, is the investment channel, and when financial institutions suffer losses, they may cut lending to private enterprises, which later cut investments and dampen economic activity. The policy intervention in such a scenario is to recapitalize the banks to get them lending again.





The findings of this research revert focus on the household sector of the economy, in particular the aggregate demand of households—that large fluctuations in economic activity can occur if consumer spending drops due to a tightening of borrowing constraints.

It also sheds light on the lackluster performance of consumer spending during the recovery—that spending remained below the prerecession level for almost half a decade. If the big decline in household spending was due to liquidity problems, then why has it taken so long for consumption to jump back up again, given that interest rates are at all-time lows and banks are lending again? Why is the recovery not unleashing pent-up demand? This study points to two possible answers.

First, the findings indicate that a significant portion of consumer-spending sensitivity to credit is driven by purchases of durable goods such as furniture, home improvement, and appliances, etc. Consumers purchase such goods infrequently and only if they anticipate enough future income to justify the purchase. If credit were exclusively used for essentials like food and healthcare, then we would expect consumers to spend significantly more after the recovery, when credit supply pipelines are unclogged. However, if consumers binged on durables before the recession, then there would be a hangover effect, with consumers waiting before spending again.

Second, the research speaks to the issue of precaution. The experimental findings indicate that consumers are prudent: they tend to delay spending to save borrowing capacity for a rainy day and always keep a buffer of credit availability. The primary factor affecting the behavior of a prudent consumer is uncertainty about the future. The magnitude of their buffer stocks will depend on uncertainty with respect to their income and employment prospects, as well as uncertainty about government policy. It follows that uncertainty with respect to either can have a very large effect on consumer spending and thereby exacerbate the economy's downward plunge.

Hall, Robert E. "The Long Slump." The American Economic Review (2011).

Pence, Karen M. "Is a Household Debt Overhang Holding Back Consumption?" Brookings Papers on Economic Activity (2012).

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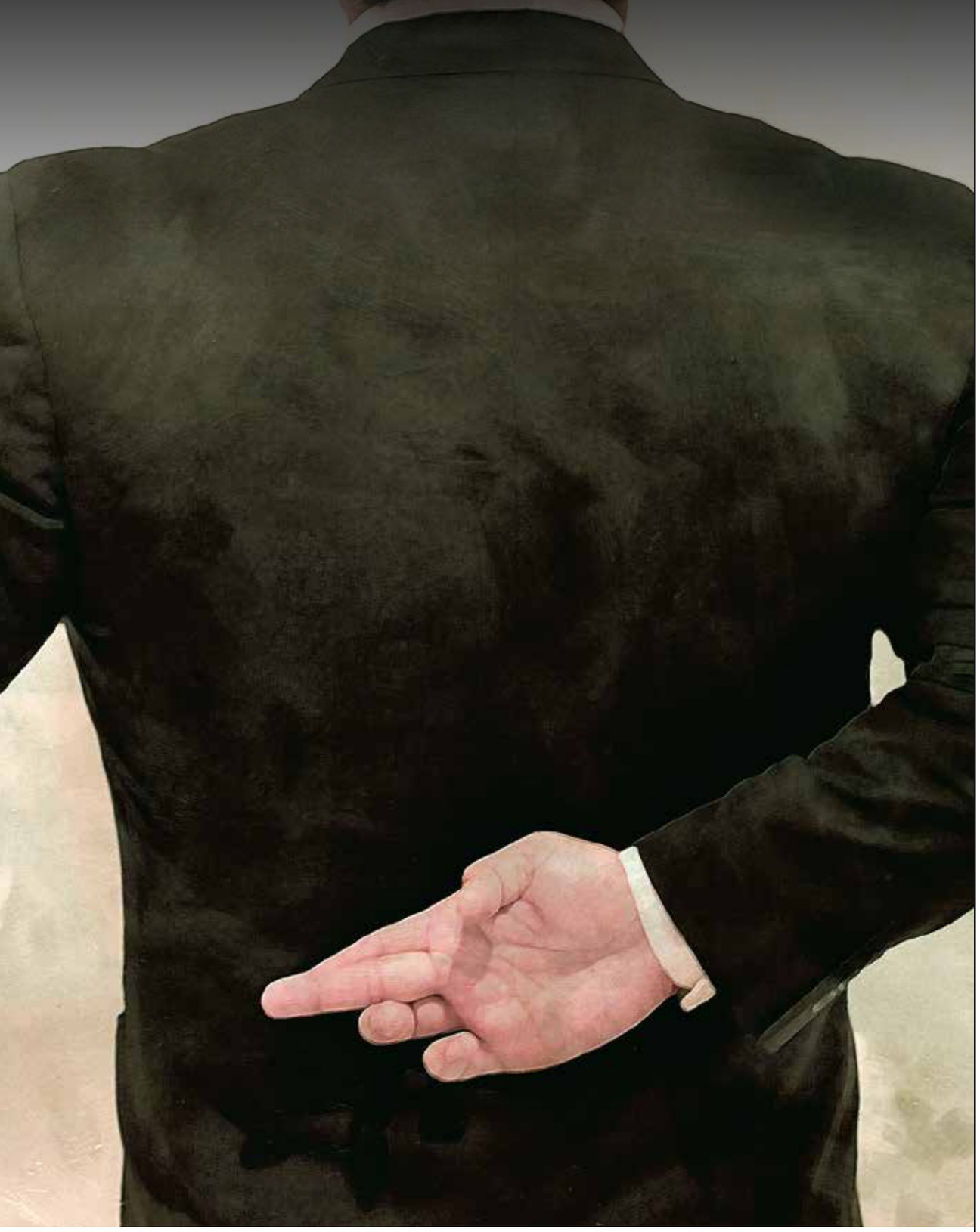


Paper: "The Strategic Underreporting of Bank Risk"

Authors: Taylor A. Begley, Washington University in St. Louis; Amiyatosh Purnanandam; and Kuncheng Zheng.

First Draft: November 18, 2014; This Draft: September 23, 2016.

When Accurate Pictures of Risk Are Most Needed, Banks Are Painting with the Most Creative Strokes

The Strategic Underreporting of Bank Risk

TAYLOR BEGLEY, Washington University in St. Louis

Professor Taylor Begley, along with colleagues Amiyatosh Purnanandam and KC Zheng, conducted research that revealed that banks significantly under-report the risk in their trading book when they have lower equity capital. Specifically, that a decrease in a bank's equity capital results in substantially more violations of its self-reported risk levels in the following quarter. The underreporting is especially high during the critical periods of high systemic risk and for banks with larger trading operations. Overall, the study shows that banks' self-reported risk measures become least informative precisely when they matter the most. This has implications for bank regulators who need to rely, to a certain extent, on self-reporting of risk by banks.

Following the financial crisis, there has been a great deal of debate surrounding the risk-taking behavior and incentives of large, global banks and their potential consequences for financial system stability. In particular, there are many—investors and regulators, in particular—who would like to know how accurately we can infer a bank's riskiness based on what the bank reports. Accurately measuring the riskiness of a bank in real time, however, even based on what the bank reports, is extremely difficult for those outside the bank. Large banks' balance sheets are often composed of diverse and opaque assets, and this composition can change rapidly. As a result, much of risk measurement is delegated to the banks themselves with the idea that they have an advantage over regulators in their ability to monitor the asset portfolio and properly model its properties. Thus, the banks use internal risk models to measure and report their risk to regulators. Regulators, in turn, use the reported risk levels to set capital requirements for the bank. Banks with a higher reported risk face higher equity capital requirements.

As policy makers consider new micro- and macro-prudential regulations, it is important to understand the accuracy of self-reported risk measures generated by the internal models of large banks around the globe. To the extent that banks view equity capital as costly, banks may have incentives to under-report their risk to avoid the need to raise equity. If banks under-report their risk, their resulting lower capital levels put them and the entire financial system at greater risk of distress. Do banks systematically under-report their risk when equity is costly? If so, what are the implications for risk measurement to the broader financial sector, especially when the sector is under stress?

In a recent paper, Begley and his coauthors studied the risk reporting for the trading books of

many of the largest financial institutions in the United States, Europe, and Canada from 2002 to 2013 to examine these incentive effects. Not only does the trading book house an economically significant part of global banks' operations, but it also provides an excellent setting in which to cleanly link incentives to save equity with ex-post evidence of underreporting.

The Trading Book and Risk Measurement

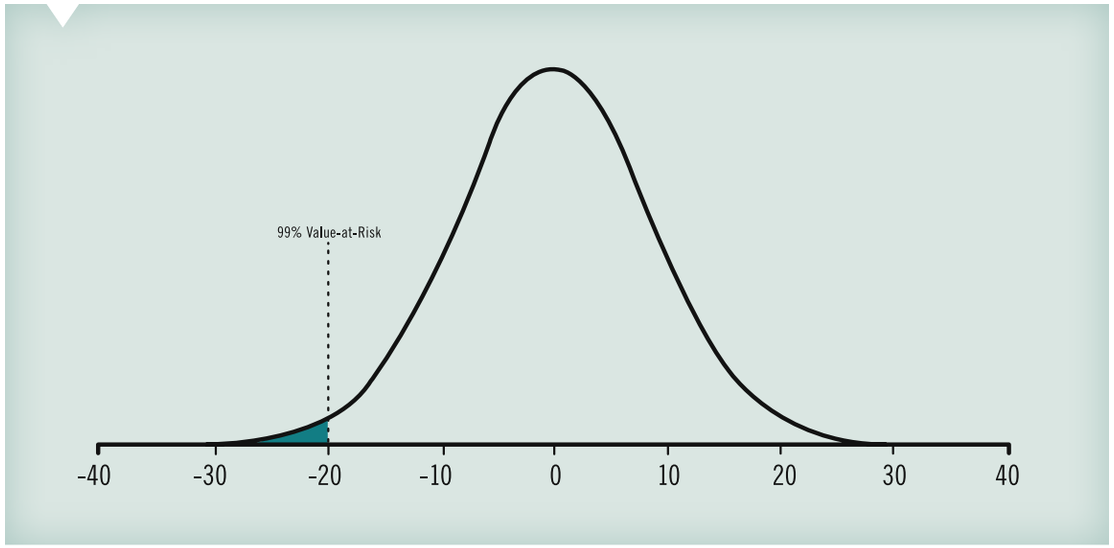
A bank's trading book, unlike its banking book, contains assets that are not intended to be held until maturity but rather are marked to market each day. The trading book primarily contains risks relating to equities, interest rates, commodities, and foreign exchange. Per Basel rules, banks measure the risk portfolio using internally developed Value-at-Risk (VaR) models set to a 99 percent confidence interval for a 10-day holding period. The output of this model ($X) is an estimate of potential loss given adverse market moves. Specifically, the model's output states that with a 99 percent probability, the trading book will not lose more than $X. Regulators use this report to directly determine the bank's capital requirements for market risk.

For example, suppose the change in value of the trading book has the probability distribution below. Here, we show a normal distribution for simplicity, but our analysis is applicable to a probability distribution of any other shape as well. In this example, 1% of the time, the portfolio will lose more than 20, so the 99 percent VaR is 20, and the market risk capital charge will be primarily based on that figure.

Regulators leave a great deal of discretion in development of these models with the banks. Differing assumptions about asset volatilities and portfolio correlation structures can lead to significant differences in reported VaR. This discretion can be used by banks to their advantage to minimize how much capital they need to keep to satisfy regulators. This incentive is likely to be particularly strong when banks have low levels of capital, and would find raising additional equity to be particularly costly at these low levels. This combination of incentives and ability to under-report risk can potentially compromise the integrity of risk-based regulations.

Regulators are aware of this potential problem and have a back-testing procedure to attempt to dull underreporting incentives. A key property of the 99 percent VaR reporting level is that for every 100 trading days, a well-functioning model should expect to exceed the reported VaR level one time. We called these events "exceptions." The Basel regulations allow for noise and unexpected shocks and deem the model to be properly functioning so long as there have not been more than four exceptions in the last year (250 trading days). Regulators view more than four exceptions as a likely indication of past underreporting, which leads to penalties in the form of higher capital charges and increased regulatory scrutiny. Importantly, though, there may be substantial time lag between the underreporting behavior and resulting detection and punishment.

The trade-off for the bank is clear: there is a benefit of underreporting risk to save equity



capital today against the potential cost of detection and higher capital charges in the future. The benefits are particularly valuable when equity capital is low or when market conditions for raising external capital are especially poor, such as during the financial crisis. This trade-off forms the backbone of our research question and empirical tests of whether banks under-report risk when equity is costly.

Facts about the Trading Book

The study first documented some key new facts about VaR model performance. Researchers constructed a quarterly data set from large financial institutions from the U.S., Canada, and Europe from 2002 to 2013. The data showed that the average number of exceptions per quarter for a given bank is 0.58. With 63 trading days in each quarter and 99 percent confidence-interval VaR model, this number is roughly equal to the statistical expectation of 0.63 (63/100). However, the research found a great deal of variation both across banks and within banks over time. The figure below presents this variation over time by plotting the average number of exceptions per bank during each quarter in the sample, along with a dashed line indicating the statistical expectation based on a 99 percent confidence interval. The average number of VaR exceptions is well below the statistical expectation during 2002 to 2006 (0.09 per bank-quarter), then increases by a considerable amount during a period of increased systemic risk in the economy of 2007 to 2009 (1.54 per bank-quarter), and finally falls again for 2010 to 2012 (0.15 per bank-quarter).

While the above facts confirm the suspicion of many market participants and commentators of increased overall VaR model exceptions during the crisis period, more needed to be done to link these results to strategic behavior. Researchers next exploited time-series variation in banks' incentives to take actions that save on their equity capital requirements to link incentives to future VaR model performance.

Equity Capital and Future Model Exceptions

It is well understood that bank managers generally are averse to raising equity capital. They view this as costly, and particularly so in times when their equity capitalization is low. Thus, when a bank's equity capital ratio is low, it has incentives to take actions that will provide it with capital relief. One action, as discussed above, is to under-report its trading book risk. Such behavior will quickly and directly lower their equity requirement. However, if the bank underreports its risk, this increases the probability that it will experience a VaR model exception. Returning to the earlier example when the true portfolio distribution had VaR of 20, the bank could reduce its market-risk capital charge by only reporting VaR of 15. However, rather than exceeding the reported risk level 1 in 100 trading days, with a report of 15 when the true VaR is 20, the bank will be expected to have an exception four times as often (i.e., 4 percent

of the mass of the distribution is less than -15 in the figure). This simple intuition motivated the main tests.

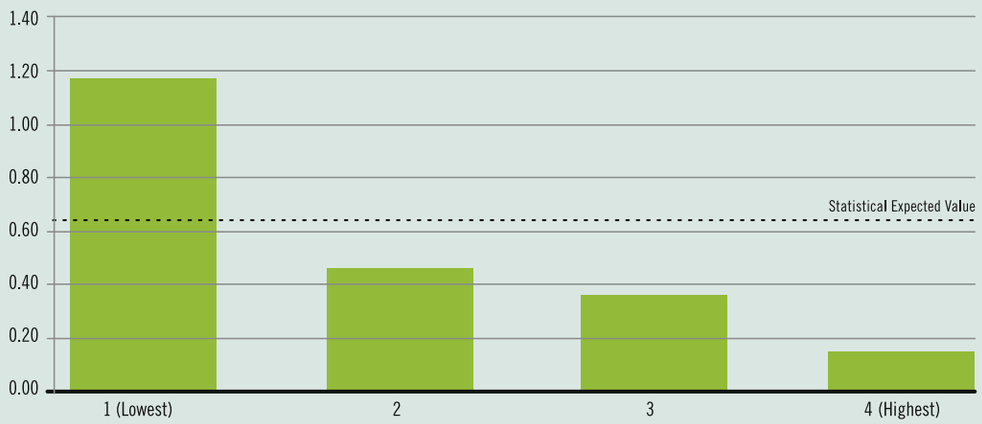
Regression analysis was used to relate a bank's equity ratio at the beginning of a quarter to the number of VaR model exceptions it has during that following quarter. All else equal, if there is no strategic relationship between its incentives to save capital and its risk reporting, we should see no systematic relationship between the two and exceptions should occur randomly one out of 100 trading days. However, if banks are indeed responding to their low level of capital by underreporting their trading book risk, we should see that lower levels of capital predict a higher number of future exceptions.

The study found that a one standard deviation decrease in a bank's equity capital ratio at the beginning of a quarter results in an increase of 1.17 exceptions the following quarter, which is more than twice the sample average of 0.54. That is, when banks have low equity capital they are substantially more likely to exceed their self-reported risk levels. Researchers were careful in the tests to control for many other factors that could potentially lead to such a relationship.

In addition to controlling for characteristics like bank size and profitability, they made sure to account for fixed differences in modeling ability across banks by only examining variation within each bank over time (i.e., they included bank fixed effects). As is clearly shown above, there is substantial time series variation in the number of exceptions, with a large increase during the market-wide shocks in the crisis period. To make sure this didn't drive the results, researchers controlled for the average number of exceptions across banks each quarter (year-quarter fixed effects). Recall that the very nature of the metric of underreporting lends strength to the tests: banks have exceptions when they exceed their self-reported risk levels, not when they simply increase their trading risk. For example, their trading book risk VaR can be $30 million or $300 million or $3 billion – the fact remains that they should only experience exceptions one in 100 trading days. In sum, the result that banks under-report their risk when they have lower equity capital is not driven by bank-specific differences in modeling ability, market-wide shocks, or general changes in trading book risk exposure.

To graphically summarize the study's main result, the observations were divided within each bank into quartiles, and researchers computed the average number of exceptions the following quarter. For example, the average number of exceptions were computed for Bank of America following quarters when its equity capitalization levels were in their lowest 25 percent during the sample period. Then researchers computed that quantity for each quartile of equity capitalization and repeated the process for each bank in the sample. The figure below presents these sample averages along with the statistical expected number of exceptions per quarter if the models performed perfectly (0.63 exceptions). Reinforcing the regression results, the figure below highlights that when banks were most undercapitalized,

Mean Number of Value-at-Risk Exceptions Next Quarter



they were also most likely to under-report their trading-book risk.

Ruling Out Time-Varying Model Quality

One lingering concern is that of time-varying model quality. Specifically, banks' ability to model risk may change over time and deteriorate in periods following drops in equity capital. For example, they may have a stale model that has not been updated to account for changes in market conditions or asset price behavior. Thus, when low equity capital predicts future exceptions, this alternative story would suggest that this relationship is driven by a change in model quality and not to strategic behavior.

Given that the constituents of our sample are the largest and most sophisticated banks in the world, we find it unlikely that this deterioration in model quality would occur precisely in the quarter after they experienced a drop in capital. These banks commented frequently in the press and in their financial statements that they were updating their models often during these periods, sometimes on a weekly basis, to account for new information. To the extent that banks were surprised by the events of the crisis and this, in turn, caused trading losses and thus a reduction in equity, this would cause the exceptions and the drop in capital to happen simultaneously rather than the exceptions occurring in the quarter following drop in capital. Further, researchers re-estimated the relationship between capital and future exceptions while controlling for the number of exceptions in the past quarter to capture past model performance. The main results remain the same. In the paper, researchers exploited details of the regulatory penalty function to further support the strategic nature of this behavior. They next examined which types of banks and at what times the relationship between low equity and underreporting is the strongest.

What Types of Banks Underreport Risk?

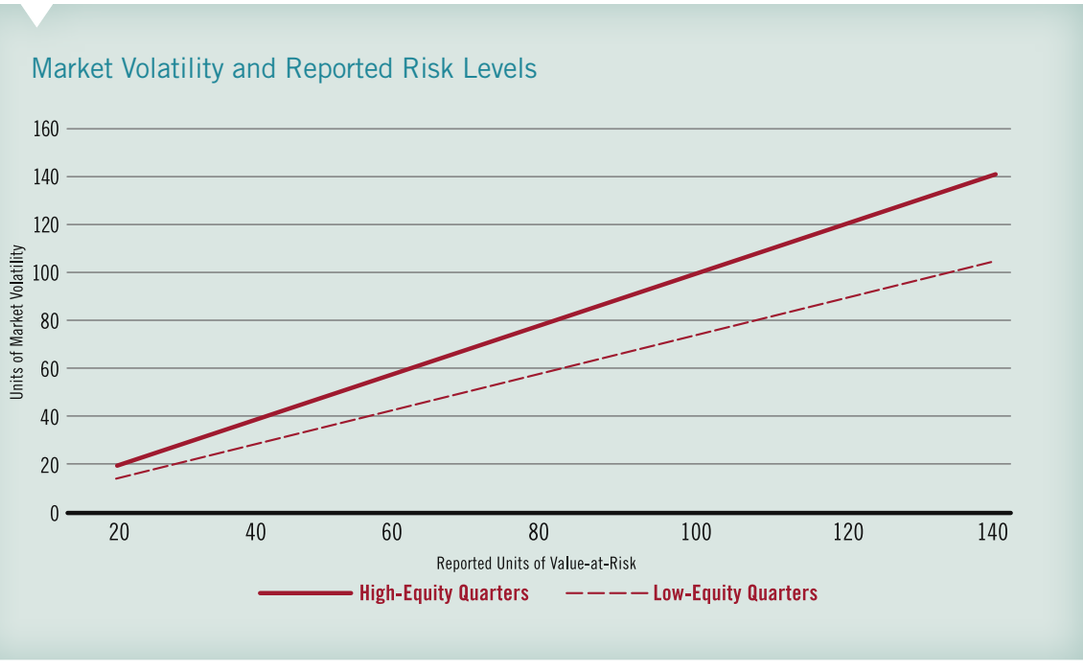
There is significant variation in the size of trading activities across banks. For example, Deutsche Bank and JP Morgan had very large trading desks while other large banks such as Bank of NY Mellon and PNC had relatively smaller trading operations. Banks with smaller trading operations have relatively less to gain from underreporting their trading risk, as their market-risk capital charge is a much smaller portion of their overall equity capital requirement. Banks with larger trading desks, however, stand to get a great deal of capital relief from underreporting. Indeed, the study found that results are driven primary by these banks with more trading activities. For these banks, the result is more than twice as large as the baseline case, with a one standard deviation drop in equity capital leading to three more exceptions than the baseline average of 0.54 in the following quarter. That means that for those quarters, rather than an exception one out of 100 trading days, they averaged one exception every 17 days.

When Do Banks Underreport Risk?

Thus far, the study focused on examining when a given bank will more likely under-report its risk. Understanding this relationship is important for informing micro-prudential (bank-level) regulation. Researchers next examined if there are macro-prudential (financial sector wide) implications for our results.

When a given bank falls into distress, there can be adverse consequences for those that do business with that bank. When there is system-wide financial sector distress, the consequences are much more dire. It is in the times when the financial system is under great strain that identifying the location and characteristics of risk in the financial sector is most critical.

When a given bank is undercapitalized, it faces a higher cost of equity financing. This notion motivated the main tests. When the financial system is under stress after a shock such as the collapse of Lehman Brothers, this simultaneously raises the cost of external equity financing for all banks in the system. Thus, all banks experience an increase, on the margin, in their incentives to under-report to save equity capital. As a result, the reported risk levels of banks across the sector are likely to simultaneously be less accurate. Indeed, the study found the relationship between equity capital and future exceptions to be strongest during 2008 to 2009 when funding conditions for banks were very unfavorable. In fact, it showed the effect of low capital on future exceptions to be three times larger in the fourth quarter of 2008, following the Lehman Brothers collapse. It also showed that the heightened underreporting across this system occurs using a variety of measures of financial system stress beyond



just the Lehman quarter. These results show the unfortunate result that the self-reported measures of risk were least informative in times when regulators may value accurate information the most.

Bank Discretion and Underreporting

While researchers could not directly observe the VaR models that the banks were using, they could investigate a possible mechanism through which the underreporting can take place. While modelers must make many choices in building their risk model, one of the most important inputs is the correlation structure of their assets, and one of the key factors that will correlate with the assets' value is the overall stock market, as proxied by the S&P 500. Researchers took this intuition as the base of their next tests.

Rather than focusing on VaR exceptions as in the rest of the study, they turned to the level of VaR itself. To the extent that the assets in the trading book move with the S&P 500, the level of S&P 500 volatility should have a direct relationship with the modeled VaR. All else equal, higher volatility mechanically leads to higher value at risk. Thus, they modeled the banks' reported VaR as a function of the past year's S&P 500 volatility and, as expected, higher volatility is associated with higher levels of VaR. However, for quarters following a reduction in equity capital (the quarters in which we found a greater number of exceptions), they found the relationship between market volatility and VaR to be weaker. This is illustrated conceptually in the figure above, with the dashed flatter line representing the relatively weaker relationship between the key market input of market volatility and the reported level of risk for the quarters when a bank has low equity capital. This is suggestive that during these times, banks were using potentially more discretion in their reported VaR and that could be a channel through which they were underreporting.

Closing Thoughts

Because of the complexity and opacity of the assets of large, global banks, their disclosure of their risk forms an important input into investor perceptions and regulatory capital requirements. Particularly for the latter, it is important that these reports paint an accurate picture of the riskiness of the banks so that regulators can complete their task of ensuring the soundness of the financial system. The study's results show individual banks' incentives to save on equity capital can distort the reported risk levels for individual banks after they have experienced declines in their level of equity, and this occurs more broadly across the financial sector after aggregate shocks put the system under stress. As a result, the levels of reported risk are least informative during the times when accurate risk assessment is needed the most.

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Paper: "Standing on the Shoulders of Giants: The Effect of Passive Investors on Activism"

Authors: Todd A. Gormley, Washington University in St. Louis; Ian R. Appel; and Donald B. Keim.

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Examining the Impact of Passive Investors on the Activism of Other Investors

TODD GORMLEY, Washington University in St. Louis

The willingness of investors to engage in activism has grown rapidly in recent years. Hundreds of activist campaigns targeting U.S. companies are launched per year, and as noted by *the Economist*, the current "scale of their insurrection in America is unprecedented … one in seven [companies in the S&P 500 index] has been on the receiving end of an activist attack over the past five years." The goals of activists have also become more ambitious, and the success rate of activist campaigns has improved. Activists increasingly wage proxy fights to obtain board representation, and more than 70 percent of these campaigns were successful in 2014.

At the same time, stock ownership by passive institutional investors has grown rapidly. Passively managed mutual funds, which seek to deliver the returns of a market index (e.g., S&P 500) or particular investment style (e.g., large-cap value), have quadrupled their ownership share of the U.S. stock market over the last 15 years and now account for more than a third of all mutual fund assets. And the institutions that offer these funds, like Vanguard, Blackrock, and State Street, are now often the largest shareholders of U.S. companies.

In his paper, Todd Gormley and his coauthors ask whether these two concurrent trends are related. In particular, they analyze whether the increasingly large and concentrated ownership stakes of passive institutional investors may be facilitating activists' ability to monitor managers and enact changes in companies they deem to be poorly managed.

Why Passive Investors Might Facilitate Activism

Gormley and his coauthors point out that there are numerous reasons to suspect that the growing presence of passive investors might facilitate activism by other investors. First, the large and concentrated ownership stakes of passive institutions might make it less costly for an activist to coordinate an activist campaign and rally support for its demands. For example,

See "Capitalism's Unlikely Heroes: Why Activist Investors Are Good for the Public Company," the Economist, February 7, 2015. T*he Wall Street Journal* also notes that activists have "cemented their position as a force in U.S. markets and boardrooms; see "Activists are on a roll, with more to come," the Wall Street Journal, January 1, 2015.

For example, in an article titled, "Activist Investors Ramp Up, and Boardroom Rifts Ensue," *the Wall Street Journal* reports that the number of companies targeted by an activist seeking board representation has more than doubled in the last five years. And in a separate article, "CEOs Test: Contending With Activist Investors," *the Wall Street Journal* reports that activists seeking a board seat obtained at least a partial victory in 72 percent of such campaigns in 2014, up from a success rate of 57 percent in 2008.

the costs of a proxy fight can be considerable for an activist, and one key component of this cost is hiring proxy solicitation services to identify all of a company's key shareholders and then meeting with these shareholders in attempt to persuade them to side with the activist. When a firm's ownership structure is dominated by a few large institutions, like Vanguard and Blackrock, however, it is easier for the activist to identify these shareholders and cobble together the support necessary to win a proxy fight. Whereas before it might take hundreds of meetings with small shareholders to garner the necessary support, the activist often now just needs to persuade a few of the big passive institutions to side with him.

A second way passive institutions might facilitate activism is by being more attentive and responsive to activists' campaigns. The growing ownership stakes of passive institutions has coincided with a significant drop in the percentage of shares held by smaller retail investors, and unlike retail investors, all institutional investors have a fiduciary duty to vote their proxies and to disclose their votes. For this reason, passive institutions might be more engaged owners. The inability of passive institutions to sell poorly performing stocks in their portfolios (due to their mandate to closely track underlying indexes) might also make them more willing partners in an activist campaign. As noted by F. William McNabb III, chairman and CEO of the Vanguard funds, "We're going to hold your stock when you hit your quarterly earnings target. And we'll hold it when you don't. We're going to hold your stock if we like you. And if we don't. We're going to hold your stock when everyone else is piling in. And when everyone else is running for the exits. That is precisely why we care so much about good governance."

There is also anecdotal evidence that gaining the support of a couple of large passive institution can increase the credibility of a campaign and make resistant managers back down and address an activist's concerns. For example, in a 2014 article, "New alliances in the battle for corporate control," *the New York Times* argued that the activist hedge fund ValueAct was successful in obtaining a seat on Microsoft's board with less than 1 percent of stock because Microsoft recognized that other large institutional investors backed the fund's demand. Why might managers be so responsive to the views of these large passive institutions? One answer proposed by Gormley and his coauthors is that managers understand that these large passive institutions are expected to continue to be an important part of the financial market, so failing to address their concerns (when they side with an activist) likely means troublesome shareholder relations for firms going forward.

And … Why Passive Investors Might Not Help

Gormley and his coauthors point out, however, that it is not obvious that the growing presence of passive institutional investors necessarily helps activists. Because passive investors are primarily focused on minimizing tracking errors and lowering costs, some view passive investors as lazy investors that take little interest in how the firms they own are actually run. Given their diversified holdings that typically include ownership stakes in thousands of firms, passive investors might also lack the resources necessary to research and monitor the corporate policies of each individual firm in their portfolio. In either case, the increasing market share of passive investors could make it more difficult for activists to rally support for their demands.

Some activists also argue that passive investors are making it harder for activists to win campaigns against resistant management and boards. In particular, these activists argue that a conflict of interest among index fund managers makes them less willing to support activists' campaigns. An example of this argument was made by hedge fund manager William A. Ackman, in his December 2015 letter to the investors of Pershing Square Capital. Ackman argues that a fear of losing corporate pension plans, one of the largest investors in index funds, deters many passive institutions from supporting activists. In other words, it isn't good for business for a passive institution to be seen siding with an activist.

Finally, as long-term investors, passive institutions might not share the same goals as activists. For example, Larry Fink, the CEO of Blackrock, has expressed his unwillingness to support activist demands he sees as short-sighted and detrimental to long-term value, including demands for increased debt, dividends, and repurchases. Similar statements have also been made by the governance divisions of State Street and Vanguard. If activists are primarily interested in achieving objectives viewed as shortsighted by the passive institutions, then the growing influence of such institutions makes it more difficult for activists.

Empirical Challenges

Ultimately, Gormley and his coauthors note that the question of whether and how passive investors affect activism is something that can only be answered empirically. To do so, they set out to analyze whether activists behave differently when a larger share of a company's equity is held by passively managed mutual funds and ETFs. In particular, they seek to analyze how the extent of passive ownership affects the likelihood of an activist campaign, the goals and tactics of activist campaigns, and the eventual outcomes of campaigns. In doing so, they hope to shed light on whether the recent rise in activism is being driven or hampered by the coinciding rise in the popularity of passive investment strategies.

Identifying the impact of passive institutional investors on activists' choices and success rates, however, poses numerous empirical challenges. The first challenge the authors need to overcome is how to measure the extent of a company's equity held by passively managed mutual funds or ETFs. The second challenge is to obtain comprehensive information on activism campaigns, their tactics, and outcomes. The third challenge is to identify the causal effect of passive ownership on activists' choices. Because passive institutional portfolios are related to the composition of the indexes they track, passive ownership of a stock might be correlated with factors that directly affect activists' tactics and success rates. Thus, naïve correlations between passive ownership and activism outcomes might not reflect a causal relation.

Measuring Passive Ownership

To overcome the first empirical challenge and measure the extent of a company's equity held by passive investors, Gormley and his coauthors turn to the S12 mutual fund holdings data compiled by Thomson Reuters to compute mutual fund and ETF holdings in a stock as a percentage of its market capitalization. Since May 2004, all (open-end) mutual funds and exchange-traded funds (ETFs) holding stocks traded on U.S. exchanges are required to report those holdings every quarter to the SEC using Forms N-CSR and N-Q. They calculate the total

If activists are primarily interested in achieving objectives viewed as shortsighted by the passive institutions, then the growing influence of such institutions makes it more difficult for activists.

market cap of each stock using the sum of shares outstanding multiplied by price for each class of common stock, as reported in the CRSP monthly file.

To classify a mutual fund or ETF as either passively managed or actively managed, they make use of a fund's name and the index fund indicator available in the CRSP Mutual Fund Database. Specifically, they obtain fund names by merging the Thomson Reuters data with the CRSP Mutual Fund data. They then flag a fund as passively managed if its fund name includes a string that identifies it as an index fund or if the CRSP Mutual Fund Database classifies the fund as an index fund (e.g., if the fund name were to include a word like "Index," "Russell," or "2000.") All other funds that can be matched to the CRSP mutual fund data but are not flagged as passive are classified as actively managed, and funds that cannot be matched are left unclassified. Gormley and his coauthors then compute the percentage of each stock's market capitalization that is owned by passive, active, and unclassified mutual funds.

Measuring Activist Outcomes

To obtain comprehensive information about activist campaigns, Gormley and his coauthors turn to the SharkWatch data provided by FactSet. Using information in company and activist filings, press releases, news publications, and company websites, SharkWatch provides detailed descriptions of any campaign it can obtain information about. Using this information, Gormley and his coauthors are able to classify the main goal of an activist campaign (e.g., obtain board representation, seek some policy change thought to enhance shareholder value, push for adoption of nonbinding shareholder proposal, etc.), the tactics adopted by the activist (e.g., proxy fight, lawsuit, letter to shareholders, hostile takeover attempt, etc.), and the ultimate outcome of the campaign (e.g., win board seat, achieve policy change, etc.).

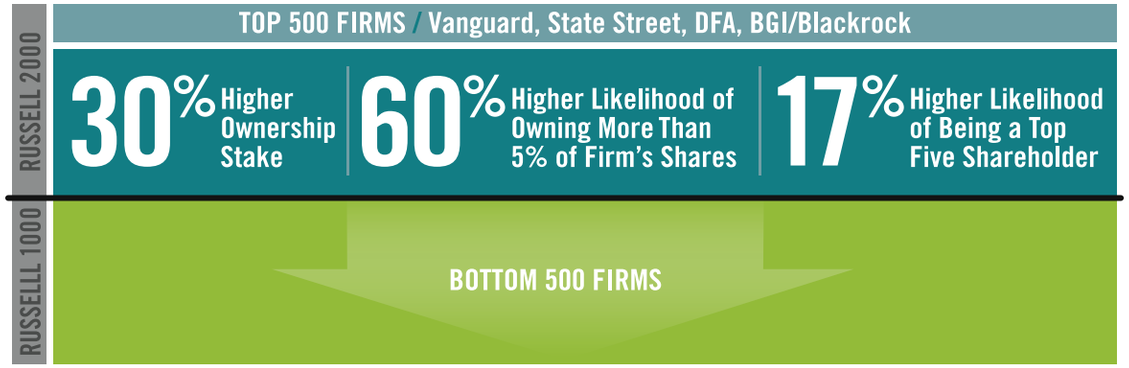
Identifying the Effect of Passive Ownership on Activism

To identify the effect of passive investors on the strategic choices of activists, Gormley and his coauthors exploit variation in stock ownership by passive and index mutual funds that occurs around the cutoff point used to construct two widely-used market benchmarks, the Russell 1000 and Russell 2000 indexes. The Russell 1000 largely consists of the 1,000 largest U.S. stocks, in terms of market capitalization, and the Russell 2000 comprises the next largest 2,000 stocks.

To account for changes in stocks' ranking by market cap, the Russell indexes are reconstituted each year at the end of June. Russell Investments determines index assignment for the following 12 months primarily using a stock's market capitalization as of the last trading day in May of that year, with the Russell 1000 including the 1,000 largest stocks at the end of the last trading day in May, and the Russell 2000 including the next 2,000 largest stocks. In practice, the process is a bit more complicated in that Russell also uses a "banding" policy that modifies the above rule to prevent stocks from changing indexes from one year to the next unless their market cap ranking has changed significantly enough. Gormley and his coauthors discuss the subtleties of this in more detail in their paper.

Benchmarking by passive funds leads to a sharp difference in ownership by passive investors for stocks at the top of the Russell 2000 relative to stocks at the bottom of the Russell 1000 even though they are otherwise similar in terms of their overall market capitalization. This occurs because there is a relatively larger share of money passively indexed to the Russell 2000. The disproportionate amount of money passively tracking the Russell 2000 occurs because the Russell 2000 is the most widely used market index for small cap stocks. The Russell 1000, which spans both large and midcap stocks, is less widely used as a benchmark because it faces more competition from other large cap and midcap market indexes, including the S&P 500.

Consistent with the relative popularity of the Russell 2000 index, Gormley and coauthors find there is a sharp increase in ownership by passively managed mutual funds and ETFs for stocks at the top of the Russell 2000 relative to stocks at the bottom of the Russell 1000. During their sample period, 2007 to 2014, they find that the combined ownership stake of passive mutual funds and ETFs is 40 percent higher for stocks at the top of the Russell 2000 relative to stocks at the bottom of the Russell 1000 even though these stocks are otherwise similar in terms of their overall market capitalization. This increase corresponds to about a 4 to 5 percentage point jump in passive ownership. Importantly, there is no corresponding difference in ownership by actively managed or unclassified mutual funds and ETFs.



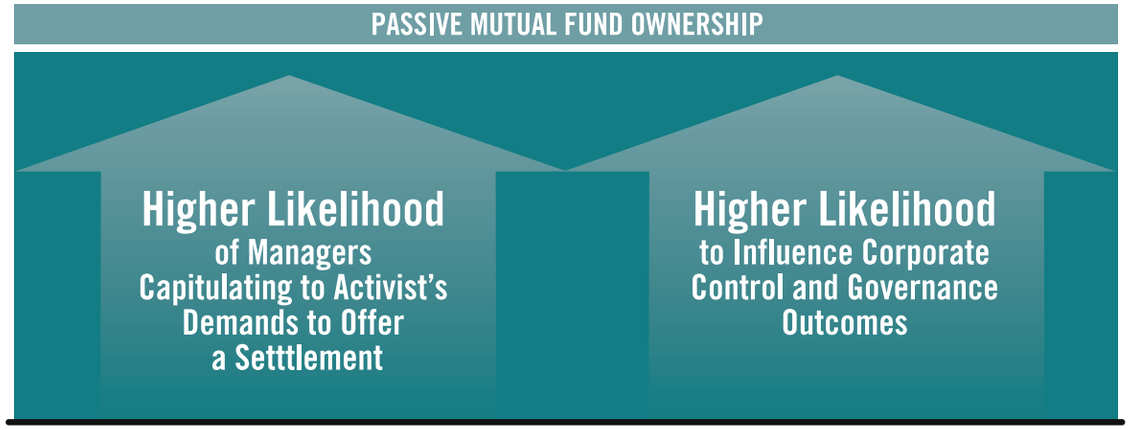
Gormley and his coauthors show that the effect of index assignment on a firm's ownership structure can also be seen by examining the total ownership stakes of the largest passive institutions—Vanguard, State Street, DFA, and BGI/Blackrock. Using the Thomson Reuters Institutional Holdings (13F) Database, which reports the total holdings of each institution, they show that the ownership stake of each of these four institutions is 30 percent higher for the 500 firms at the top of the Russell 2000 relative to the bottom 500 firms of the Russell 1000, while the likelihood of each institution owning more than 5 percent of a firm's shares is 60 percent higher and the likelihood of each institution being a top five shareholder is 17 percent higher.

Using this variation in what is called an instrumental variable estimation, Gormley and his coauthors are able to identify the causal effect of passive ownership on activists' choices. Essentially, for each year, they restrict their sample to those stocks near the bottom of the Russell 1000 and near the top of the Russell 2000. After controlling for the differences in market cap sizes across the two indexes, they then compare the activism outcomes for stocks in the Russell 2000 versus activism outcomes for stocks in the Russell 1000. The underlying assumption of this comparison is that there is no reason to expect the activism outcomes of stocks in the Russell 2000 to be any different than outcomes for stocks in the Russell 1000, except through the possible difference in passive ownership that occurs because of being assigned to either the Russell 1000 or Russell 2000 index.

For their main analysis, Gormley and his coauthors restrict their sample to activist events occurring in the 500 bandwidth around the cutoff between the Russell 1000 and 2000 indexes between 2007 and 2014. There are 466 such events for 310 unique firms. They note that their findings are robust to using smaller bandwidths.

Passive Investors Appear to Facilitate Activism

The first thing Gormley and his coauthors analyze is whether having more of your stock held by passive investors affects the likelihood of being targeted by an activist. Theoretically, the effect is unclear. Even if the presence of passive investors makes it easier for other investors to engage in activism (which would likely contribute to a rise in the likelihood of being targeted), it might be that managers preemptively take actions to mitigate this possibility). Consistent with this ambiguity, they find no overall effect of passive ownership on the likelihood a firm is targeted.



The next thing Gormley and his coauthors analyze is whether passive investors affect the type of campaigns launched by activists. The presence of passive investors might affect the composition of activist campaigns, even absent a change in the frequency, by differentially affecting the expected costs or benefits of different types of campaigns. For example, if governance- or board-related issues, such as board independence, are more important to passive investors, then activists might be more likely to seek board representation as part of their campaign. Likewise, if the concentrated ownership stakes of passive investors lower the costs of launching a proxy fight, which is a common tactic used to achieve board representation, then the activists might also be more likely to seek board representation.

Gormley and his coauthors find strong evidence that there is a considerable difference in the type and aggressiveness of campaigns launched by activists when more of a company's stock is held by passive investors. In particular, they find that activists are more likely to pursue ambitious changes to corporate control or influence (e.g., via board representation). The observed magnitudes are sizable. Being assigned to the Russell 2000 (which increases passive ownership by about 4 to 5 percentage points) results in a near doubling in the likelihood the activist seeks board representation. The increase in campaigns seeking board representation appears to be offset by a decrease in campaigns seeking incremental changes to firm policies through the use of shareholder nonbinding resolutions, exempt solicitations, and other means. Beyond being more likely to seek board representation, activists also seek more board seats overall when a higher fraction of a firm's stock is held by passive investors.

Not only do they find activists seem to set more ambitious goals, they also seem more willing to adopt expensive and confrontational tactics when passive investors are present. Specifically, among firms targeted by an activist, they find that a one standard deviation increase in passive ownership is associated with doubling the likelihood of activists launching a proxy fight against incumbent directors. Activists are also more likely to launch a hostile bid to acquire the targeted firm. Combined, their findings suggest that the presence of passive institutions and their concentrated ownership stakes alter the strategic choices of activists and increase their willingness to engage in costlier forms of activism. In contrast, they do not find evidence of effects related to policies passive investors sometimes associate with shorter-term goals, such as increased dividends and changes to the capital structure.

Passive mutual fund ownership is also associated with an increase in the successes of activists. While Gormley and his coauthors do not find evidence that passive ownership is associated with differences in the rate at which activists win proxy fights that come to a vote, they do document a sizeable increase in the likelihood of managers capitulating to activists' demands and offering a settlement during the proxy fight. They also find evidence that when passive ownership is higher, activists are more likely to successfully influence outcomes related to corporate control and governance, which are topics that receive considerable attention in the proxy voting guidelines of passive institutions.

For example, activists are more successful in removing takeover defenses, facilitating the sale of the targeted firm to a third party, and engaging in a hostile offer when passive ownership is higher.

Interestingly, Gormley and his coauthors find no evidence that passive ownership is associated with the characteristics of firms being targeted by activists, which could be another mechanism by which passive ownership affects the strategic choices of activists. In particular, passive mutual fund and ETF ownership does not have a statistically significant association with target firms' cash holdings, dividend yield, leverage ratio, level of capital expenditures, return on assets, or stock return in the year prior to being targeted. Overall, activists seem to target the same number and type of firms as before, but they are much more ambitious and willing to adopt expensive tactics when passive investors are present.

Key Takeaways of the Study

Overall, their findings suggest that the rise in activism and the growth of passive investors, two recent and fundamental shifts in ownership, are interconnected. In particular, their findings suggest that the growth of passive investors facilitates activism by lowering the costs associated with certain activism tactics and by increasing the activists' likelihood of success

These findings are important for at least two reasons. First, their findings shed light on the determinants of activists' strategic choices. While most of the previous academic literature has focused on whether activists affect corporate policies and long-term performance, there is little understanding of how activists choose their tactics and what factors contribute to their success. Intuitively, Gormley and his coauthors show that the ownership structure of a company will be a key determinant in the tactics employed by the activist and their likelihood of success.

Second, they provide evidence that passive investors can have a positive influence on firms' governance structure. The potential impact of such passive investors on governance and firm value is heavily debated. In earlier work, Gormley and the same coauthors showed that passive investors appear to use their direct voting power to exert influence over firms' governance choices (e.g., more independent directors, fewer takeover defenses, and more equal voting rights) and ultimately improve firm-level performance. In this newer work, they show that the increased presence of passive investors also affects the choices of activists, an entirely separate class of institutional investors that are widely thought to play an important role in governance. In all, their evidence indicates that, while not engaging in traditional forms of activism themselves, passive investors have a meaningful impact on the activism of other investors, providing another distinct mechanism by which the recent growth of passive investors may be affecting the monitoring of managers and corporate performance.

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Paper: "Deciphering Tax Avoidance: Evidence from Credit Rating Disagreements"

Author: Kevin Koharki, Washington University in St. Louis.

Originally published in spring 2017.

The More Transparent Tax Avoidance Information Is, the More Uniform Credit Ratings Will Be

KEVIN KOHARKI, Washington University in St. Louis

When credit rating agencies disagree about a firm's overall creditworthiness, the company involved can bear significant cost burdens. This study, conducted by Olin's Professor Kevin Koharki, shows that firms can take specific actions to reduce credit rating disagreements resulting from relatively uncertain or complex positions and opaque tax avoidance practices.

Credit rating agencies are an indispensable part of the financial market, and numerous debt issues—including mortgage-backed securities, corporate, and municipal debt issues—have credit ratings to indicate their risk of default. While rating agencies use considerable "hard" information in their analysis, they also rely on subjective judgment and "soft" information. This often leads to disagreement among rating agencies in the ratings they assign to a given debt issue. This disagreement is important because it can affect the firm's cost of financing. But we have little understanding of what causes this disagreement and when it is more likely to arise. In this research, Koharki explores the question of why such disagreement arises among experts in rating debt issues. The key hypothesis is that in part this is caused by the complexity of tax strategies followed by firms that are being rated. The complexity of these strategies can generate opaqueness and cause rating agencies to interpret their default-risk implications differently.

Credit rating agencies represent a unique subset of market participants because of their level of sophistication and access to material nonpublic information. Credit rating agencies obtain nonpublic information (from potential bond issuers). This information typically includes key transactions, multiyear financial statement forecasts including both sales and capital budgets, and proprietary information about new product lines or markets. Because of credit rating agencies' sophistication and information access, regulations and contracts rely significantly on their credit ratings. In addition, as opinion providers, credit rating agencies add value beyond that of other intermediaries with access to nonpublic information because rating agencies must account for a firm's overall creditworthiness in their analyses.

During the credit rating process, rating agency analysts are strongly encouraged to question and obtain additional information related to complex or opaque transactions. This is due to the fact that these transactions can cause uncertainty about a firm's overall credit risk. Such uncertainty is typically reflected in one rating agency assigning a credit rating that differs from another rating agency. This difference during the rating process from multiple rating agencies is commonly referred to as rating agency "disagreement."

Rating agency disagreement is not a minor concern, as prior research suggests that firms that experience disagreement are typically charged higher-cost financing than firms that do not experience disagreement during the rating process. In addition, credit rating agencies are more likely to downgrade bond issuances where two or more rating agencies initially disagreed. Firms will also suffer from rating

disagreement by issuing debt instruments that are less liquid, coupled with the fact that they will have difficulty in reducing or eliminating disagreement. Given these costs, rating agency disagreement can significantly impact a firm's ability to finance its operations.

Tax-related transactions are notable examples of when rating agencies are likely to disagree about credit risk. For rating agency analysts to assess the costs and benefits associated with tax avoidance, they must first identify and quantify the impact of such costs and benefits on a firm's creditworthiness. This entails not only a thorough understanding of the costs and benefits of tax avoidance but also a reasonable estimation of the likelihood that such costs and benefits are realized. Complicating the credit rating agencies' analytical processes is the fact that tax avoidance often relies on complex and opaque positions, which are often structured by outside tax experts. These experts are unlikely to assist credit rating agencies in understanding issuers' tax avoidance techniques during the rating process. Without full and complete information, rating agency analysts are required to use their best judgment in the face of information uncertainty with regard to both the ultimate magnitude of potential outcomes and their likelihood of occurrence. This can be difficult because rating agency analysts are typically not tax experts. Given this, Koharki first examines whether credit rating agencies are more likely to disagree during the rating process for firms that engage in greater amounts of tax avoidance relative to firms that engage in lower amounts of tax avoidance.

Complicating the credit rating agencies' analytical processes is the fact that tax avoidance often relies on complex and opaque positions, which are often structured by outside tax experts.

To examine the first hypothesis, Koharki identifies a sample of publicly traded industrial firms that issued public debt via the Mergent Fixed Income Securities Database during the period between 1994 and 2013. He found that firms that engage in greater amounts of tax avoidance are more likely to experience rating agency disagreement by Moody's Investors Service and Standard & Poor's relative to firms that engage in lower amounts of tax avoidance. More importantly, the findings suggest that greater tax avoidance results in greater disagreement among credit rating agencies, thus the magnitude of disagreement increases (decreases) as firms engage in greater (lower) amounts of tax avoidance.

While the primary findings show that tax avoidance is positively associated with both the likelihood and magnitude of credit rating agency disagreement, it is important to note that all tax avoidance activities are not created equal. For instance, while firms can avoid paying taxes in simple terms by employing differing depreciation methods relative to their peers, more complex methods of tax avoidance also exist. For instance, firms can attempt to "shift" income to jurisdictions with lower effective tax rates or engage in significant research and development activities with unpredictable outcomes. Given this, credit rating agencies are more likely to disagree over a firm's creditworthiness when a firm engages in more complex or opaque tax transactions.

Hypothesis One

Rating agencies are more likely to disagree when firms engage in more tax avoidance

	Split			*SplitMag*		
	(1)	(2)	(3)	(4)	(5)	(6)
	ETR5 × −1	*CETR5* × −1	*Delta5* × −1	*ETR5* × −1	*CETR5* × −1	*Delta5* × −1
Tax Avoidance	0.193***	0.208***	4.715***	0.259***	0.294***	3.362***
	(5.69)	(5.94)	(2.87)	(5.55)	(6.08)	(2.82)
Size	-0.027	-0.028	0.015	0.009	0.007	0.044
	(-0.86)	(-0.90)	(0.48)	(0.29)	(0.22)	(1.42)
MB	0.098***	0.098***	0.076***	0.064***	0.063***	0.028**
	(3.93)	(3.91)	(2.94)	(5.12)	(5.05)	(2.25)
Intangible	0.295***	0.288***	0.500***	0.155***	0.142***	0.397***
	(4.50)	(4.38)	(7.80)	(4.13)	(3.79)	(11.12)
Mat	-0.064	-0.063	-0.067	-0.059	-0.058	-0.061
	(-1.55)	(-1.54)	(-1.62)	(-1.46)	(-1.45)	(-1.52)
BA Spread	4.654	4.804	5.948	0.231	0.450	2.127
	(0.67)	(0.69)	(0.91)	(0.04)	(0.07)	(0.35)
Follow	-2.068**	-2.108***	-4.518***	-2.207***	-2.257***	-4.696***
	(-2.54)	(-2.59)	(-5.52)	(-2.94)	(-3.01)	(-6.24)
Disp	0.901***	0.937***	1.995***	0.689***	0.745***	3.041***
	(6.26)	(6.53)	(5.55)	(9.75)	(3.01)	(7.83)
Rating	-0.115***	-0.115***	-0.127***	-0.117***	-0.116***	-0.126***
	(-8.14)	(-8.13)	(-9.21)	(-8.74)	(-8.72)	(-9.58)
AQ	-0.058	-0.059	-0.092	-0.005	-0.007	-0.034
	(-0.72)	(-0.74)	(-1.20)	(-0.06)	(-0.09)	(-0.44)
R&D	-0.354	-0.378	1.700	-0.213	-0.246	2.419
	(-0.22)	(-0.23)	(1.05)	(-0.13)	(-0.15)	(1.57)
Foreign Inc	-0.037	-0.033	-0.008	0.025	0.031	0.035
	(-0.41)	(-0.37)	(-0.10)	(0.26)	(0.31)	(0.41)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,780	4,780	4,914	4,780	4,780	4,914
Firms	974	974	987	974	974	987
Pseudo R^2	0.110	0.110	0.119	0.110	0.111	0.116
AUC	0.816	0.816	0.818			
LR χ^2	481.597***	481.686***	535.291***	491.095***	491.505***	544.218***
Hosmer-Lemeshow χ^2	9.515	8.559	12.430			

Hypothesis Two

Credit rating agencies will disagree more when firms engage in more complex tax transactions

	SplitMag		
	(1)	(2)	(3)
	ETR5 × −1	*CETR5* × −1	*Delta5* × −1
HighComplexity	0.387**	0.448***	0.459***
	(2.21)	(2.64)	(2.90)
HighTaxAvoidance	0.193	0.007	0.051
	(1.31)	(0.04)	(0.38)
HighComplexity × *HighTaxAvoidance*	2.400***	1.364***	0.877***
	(6.41)	(3.48)	(2.78)
Size	0.088	0.098	0.062
	(1.48)	(1.60)	(1.17)
MB	0.240***	0.224***	0.217***
	(6.24)	(5.79)	(6.03)
Intangible	0.110**	0.190***	0.311***
	(2.06)	(3.57)	(6.56)
Mat	-0.041	-0.047	-0.042
	(-0.43)	(-0.49)	(-0.47)
BASpread	15.934	27.545	47.392**
	(0.43)	(0.74)	(2.36)
Follow	-2.101***	-2.346***	-5.081***
	(-9.44)	(-6.40)	(-3.03)
Disp	0.795***	0.982***	1.098**
	(8.37)	(5.16)	(2.36)
Rating	-0.155***	-0.166***	-0.160***
	(-5.71)	(-6.06)	(-6.56)
AQ	-0.052	-0.052	-0.085
	(-0.35)	(-0.35)	(-0.69)
R&D	-0.196	0.256	2.223
	(-0.08)	(0.10)	(0.93)
ForeignInc	-0.345**	-0.359**	-0.231*
	(-2.29)	(-2.37)	(-1.81)
F-Test: *HighComplexity* × *HighTaxAvoidance* + *HighTaxAvoidance* = 0	53.46***	13.60***	10.49***
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	1,411	1,411	1,635
Firms	554	554	624
Pseudo R^2	0.096	0.095	0.085
LR χ^2	272.099***	267.870***	293.122***

To examine this hypothesis, the study employs several common measures that individually proxy for the complexity and/or opacity of firms' tax avoidance activities. The results suggest that firms experience less credit rating agency disagreement when they engage in less opaque tax avoidance activities. These results suggest that credit rating agencies attempt to disentangle the complexities of various tax transactions and structures, but have difficulty doing so for more complex and/or opaque tax avoidance activities.

While the larger credit rating agencies obtain material nonpublic information during the rating process, they routinely begin their analyses by examining a firm's public disclosures with the Securities and Exchange Commission (where applicable). In addition, it is unlikely that firms share key information regarding their tax transactions and structures with rating agency analysts during the rating process. This is due to the fact that outside consulting services are traditionally used to construct more complex or opaque activities, and these firms may be unwilling to share their materials with non-client members. Given this, the possibility exists that credit rating agencies will be forced to rely on a firm's public disclosures to deduce the complexity and risk relevance of firms' tax avoidance activities.

Firms can potentially reduce or exacerbate credit rating agency disagreement by altering the transparency of their financial disclosures. While firms will not publicly disseminate every facet of their tax transactions, firms in like industries tend to employ similar tax structures and engage in similar tax transactions. In addition, credit rating agency analysts are typically industry specialists, and are more likely to understand the more common tax transactions and structures that firms in their respective industries employ. This suggests that firms that increase the transparency of the tax disclosures can reduce the overall level of uncertainty (and thus disagreement) that may surface during the rating process with respect to tax avoidance.

During the credit rating process, rating agency analysts are strongly encouraged to question and obtain additional information related to complex or opaque transactions.

Hypothesis Three

Firms that make more transparent tax disclosures experience less disagreement in ratings

	$Converge_{t+1}$		
	(1) $\Delta(ETR5 \times -1)$	(2) $\Delta(CETR5 \times -1)$	(3) $\Delta(Delta5 \times -1)$
$\Delta TaxAvoidance$	-0.265***	-0.408***	-33.669***
	(-5.83)	(-4.06)	(-2.75)
$\Delta Log(TaxFN\_Sent)$	0.552***	0.553***	0.560***
	(3.34)	(3.34)	(3.66)
$\Delta Log(TaxFN\_Nums)$	0.018	0.018	0.044
	(0.07)	(0.07)	(0.20)
$\Delta InvTaxFN\_Fog$	0.100***	0.101***	0.115***
	(3.16)	(3.19)	(3.67)
Constant	-1.365***	-1.366***	-1.334***
	(-14.04)	(-14.06)	(-13.41)
Observations	721	721	676
Firms	357	357	335
Pseudo R^2	0.048	0.047	0.071
AUC	0.744	0.745	0.741
LR χ^2	17.160***	16.885***	24.395***
Hosmer-Lemeshow χ^2	9.531	11.556	10.440

To examine this hypothesis (three, above), Koharki employs three common measures that individually proxy for the quality of firms' tax disclosures. The results show that firms experience less credit rating agency disagreement when they increase the quality of their tax disclosures. These results suggest that firms care about the impact that poor tax disclosures can have on market participants' credit risk assessments, and thus these firms alter their financial reporting quality to improve their outcomes from the credit rating process.

Credit rating agencies have an asymmetric loss function, which helps shape their analytical standards and procedures. However, while analysts are expected to adhere to their agency's standards during the rating process, they are given leniency in how ratings are assigned to issuers: rating agency professionals view credit analysis as both an art and a science. Credit rating agencies' have varying sensitivities to appearing either too optimistic or pessimistic during the rating process. As a result, rating agencies are likely not uniformly account for the credit risk associated with complex or opaque transactions.

When rating agency convergence occurs, it suggests that initial rating agency disagreement occurred because one rating agency underestimated or overestimated the costs or benefits associated with tax avoidance to a greater extent than the other. Identifying which rating agency initially underestimated or overestimated the costs or benefits of tax avoidance for the issuer is difficult because these

Hypothesis Four

Agencies that assign more conservative ratings are more likely to upgrade their ratings to conform to more favorable ratings when firms reduce their tax avoidance

	$Conserv_{Upgrade}$ (1) $\Delta(ETR5 \times -1)$	$Conserv_{Upgrade}$ (2) $\Delta(CETR5 \times -1)$	$Conserv_{Upgrade}$ (3) $\Delta(Delta5 \times -1)$
$\Delta Tax\ Avoidance$	-1.439***	-1.504***	-56.654***
	(-5.37)	(-4.31)	(-3.54)
$\Delta Log(TaxFN\_Sent)$	0.927***	1.022***	0.893***
	(3.39)	(3.68)	(3.29)
$\Delta Log(TaxFN\_Nums)$	2.729***	2.875***	2.454***
	(3.83)	(3.96)	(3.48)
$\Delta InvTaxFN\_Fog$	0.215***	0.217***	0.194***
	(4.51)	(4.54)	(4.06)
Constant	-0.128	-0.130	-0.118
	(-0.69)	(-0.70)	(-0.62)
Observations	133	133	130
Firms	95	95	90
Pseudo R^2	0.185	0.189	0.156
AUC	0.774	0.796	0.835
LR χ^2	33.849***	34.683***	28.007***
Hosmer-Lemeshow χ^2	10.136	8.948	6.684

initial assessments require assumptions about both the future magnitudes of tax avoidance and about the persistence of tax avoidance. However, we expect the conservative rating agency to be more likely to upgrade its ratings to match those of the favorable rating agency when firms reduce tax avoidance or when firms increase the transparency of their tax disclosures.

Koharki examines this hypothesis (four, above) for a sample of observations that achieved ratings convergence over the one-year period subsequent to an individual bond offering date. Ultimately, the results suggest that the conservative credit rating agency is more likely to upgrade firms' assigned credit ratings to match those of the favorable credit rating agency when firms reduce their tax avoidance activities. In addition, the results show that the conservative credit rating agency is more likely to upgrade firms' assigned credit ratings to match those of the favorable credit rating agency when firms increase the transparency of their tax disclosures.

Conclusion

In addition to contributing to prior academic research, this study has potential implications for firms and market participants. Specifically, the results suggest that rating agencies have greater difficulty understanding tax avoidance when it contains relatively uncertain or complex positions or is more opaquely disclosed. However, the study also shows that firms can take specific actions to reduce credit rating disagreement resulting from tax avoidance. These findings are nontrivial as firms and market participants bear significant costs when credit rating agencies fail to agree about firms' overall creditworthiness.

Paper: "Intermediary Capital Risk Everywhere"

Authors: Asaf Manela, Washington University in St. Louis; Zhiguo He; and Bryan Kelly.

Forthcoming in the *Journal of Financial Economics.*

Intermediary Capital Risk Everywhere

ASAF MANELA, Washington University in St. Louis

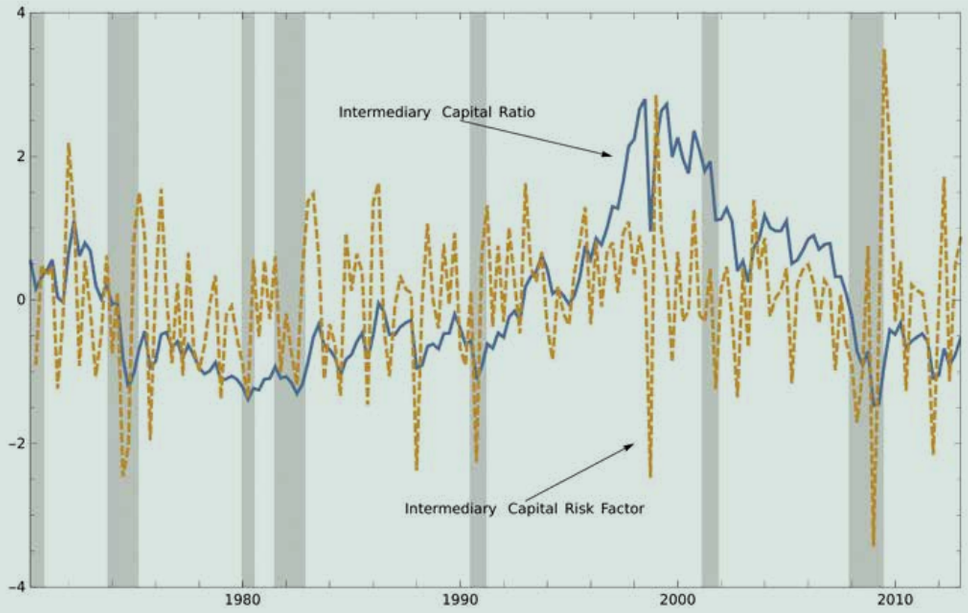
Why do some financial assets earn consistently larger average returns than others? In rational markets, such return differences are explained by differences in risk exposures (betas) to systematic risk factors. But identifying a parsimonious set of risk factors that can rationalize the observed cross-sectional variation in average returns both empirically and theoretically is challenging. In a forthcoming paper in the *Journal of Financial Economics*, Zhiguo He, Bryan Kelly, and Asaf Manela find that a simple two-factor extension to the CAPM, which in addition to market risk accounts for exposure to intermediary capital risk, is remarkably successful in explaining return differences across a wide array of asset classes. Intermediary capital risk appears to be priced everywhere.

This empirical investigation is motivated by recent intermediary asset pricing theories, which offer a new perspective for understanding risk premia. These theories are predicated on the fact that financial intermediaries are price-setting investors in financial markets who are in the advantageous position of trading almost all asset classes, anytime and everywhere. This view contrasts with standard models, which focus on the consumption growth of households. Households' comparative lack of expertise in trading assets, especially sophisticated ones like derivatives or commodities, casts doubt on their usefulness as a unified model for jointly pricing the wide array of traded assets in the economy.

The study's main finding, inspired by intermediary asset pricing theory, is that the classic risk-return asset pricing trade-off holds remarkably well in the data, once you shift the focus from unsophisticated households to sophisticated intermediaries. Specifically, the study shows that shocks to the equity capital ratio of financial intermediaries—Primary Dealers—possess significant explanatory power for cross-sectional variation in expected returns. This is true not only for commonly studied equity and government bond market portfolios, but also for other more sophisticated asset classes such as corporate and sovereign bonds, derivatives, commodities, and currencies. The price of risk for intermediary capital shocks is consistently positive and of similar magnitude when estimated separately for individual asset classes, suggesting that financial intermediaries are marginal investors in many markets and hence key to understanding asset prices.

Figure 1

Intermediary Capital Ratio and Risk Factor



Intermediary capital risk factor (dashed line) is AR(1) innovations to the market-based capital ratio of primary dealers (solid line), scaled by the lagged capital ratio. Both time series are standardized to zero mean and unit variance for illustration. The quarterly sample is 1970Q1-2012Q4. The intermediary capital ratio is the ratio of total market equity to total market assets (book debt plus market equity) of primary dealer holding companies. Shaded regions indicate NBER recessions.

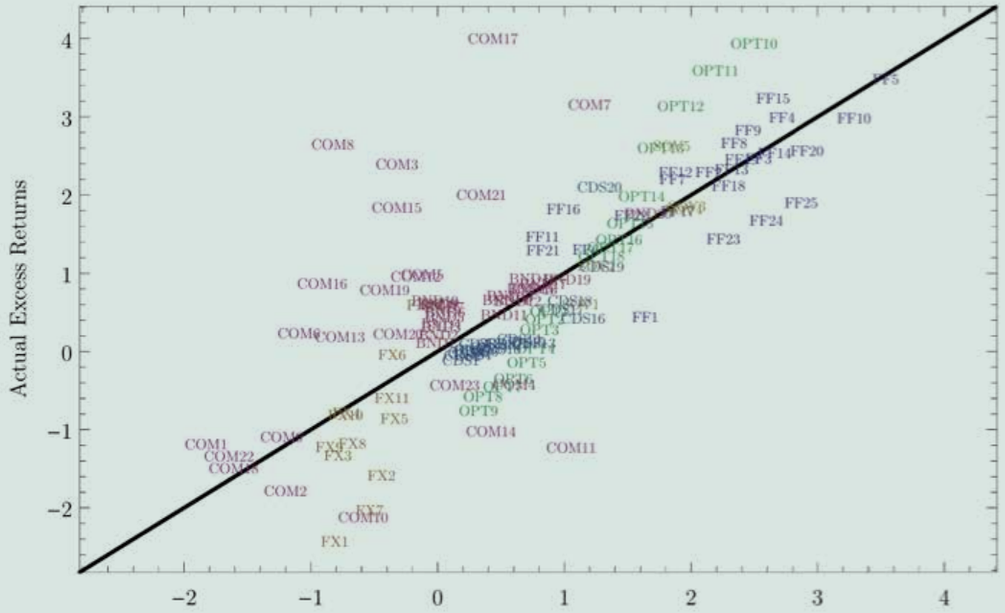
The Empirical Challenge

The central challenges facing this hypothesis are (1) how to identify a set of financial intermediaries that are marginal investors in many markets, and (2) how to measure their marginal value of wealth. For the first choice, the authors focus on primary dealers who serve as counterparties of the Federal Reserve Bank of New York in its implementation of monetary policy. Primary dealers are large and sophisticated financial institutions that operate in virtually the entire universe of capital markets, and include the likes of Goldman Sachs, JP Morgan, and Deutsche Bank.

The second choice is guided by the recent intermediary asset pricing models. In these models the intermediary sector's net worth (or, equivalently, its equity capital ratio) is the key determinant of its marginal value of wealth. When the intermediary experiences a negative shock to its equity capital, say due to an unexpected drop in the securitized mortgage market, its risk bearing capacity is impaired and its utility from an extra dollar of equity capital rises. Prompted by these theories, the authors propose an asset pricing model with two factors: the excess return on the market and the shock to intermediaries' (equity) capital ratio. The market excess return captures the usual persistent technology shock that drives general economic growth. Innovations to the intermediary capital ratio capture financial shocks that affect the soundness of the financial intermediary sector, arising for example from shocks to agency/contracting frictions, changes in regulation, or large abnormal gains/losses in parts of an intermediary's portfolio.

Figure 2

Pricing Errors/All Portfolios



Actual average percent excess returns on all tested portfolios versus predicted expected returns using their risk exposures (betas) with respect to shocks to the intermediary capital ratio and the excess return on the market. Test portfolios are abbreviated based on their asset class: equities (FF), U.S. bonds (BND), foreign sovereign bonds (SOV), options (OPT), CDS, commodities (COM), and foreign exchange (FX). Distance from the 45-degree line represents pricing errors (alphas).

The authors construct the aggregate capital ratio for the intermediary sector by matching the New York Fed's primary dealer list with stock market and financial reports of their publicly traded holding companies. They define the intermediary capital ratio, denoted η_t, as the aggregate value of market equity divided by aggregate market equity plus aggregate book debt of primary dealers active in *quarter t:*

$$\eta_t = \frac{\sum_i \text{Market Equity}_{i,t}}{\sum_i \left(\text{Market Equity}_{i,t} + \text{Book Debt}_{i,t}\right)}$$

The intermediary capital ratio, which runs from 1970 to 2012, is plotted in Figure 1. Intermediary capital falls during recessions and reaches its nadir in the 2008 financial crisis. The capital ratio also exhibits a sudden drop and rebound around the 1998 LTCM collapse, representing shocks that only affect certain asset markets (e.g., options) but not the entire stock market.

Main Empirical Results: The Role of the Intermediary Capital Ratio

The main empirical result, illustrated in Figure 2, is that assets' exposure to intermediary capital ratio shocks (innovations in η_t) possess a strong and consistent ability to explain cross-sectional differences in average returns for assets in seven different markets, including equities, U.S. government and corporate bonds, foreign sovereign bonds, options, credit default swaps (CDS), commodities, and foreign exchange (FX). The way to read the figure is that if the asset pricing model worked perfectly, all assets would line up on 45-degree diagonal, because all of the variation in average excess returns would be explained by the pricing factors (market and intermediary capital risk). The figure shows that even vastly different asset markets line up pretty well along this dimension as predicted by the theory.

Another way to judge the success of the simple two-factor model proposed is to perform cross-sectional asset pricing tests, both independently within each asset class, as well as jointly using all asset classes. Figure 3 compares the risk price on intermediary capital shocks estimated from different sets of test assets to evaluate the model assumptions that (1) intermediaries are marginal price setters in all markets and (2) their equity capital ratio is a sensible proxy for their marginal value of wealth. In particular, if the data shows insignificant intermediary capital risk prices for some asset classes, or there exist large disparities in risk prices across markets, then it suggests that (1) and/or (2) are violated.

To the contrary, the authors estimate significantly positive prices of risk on the intermediary capital factor in all asset classes, and find that all estimates have similar magnitudes, consistent with the view that primary dealers are marginal investors in all of these markets. Furthermore, the study shows that in placebo tests equity capital ratios of other sectors do not exhibit this property. When primary dealers are replaced with non-primary dealers (who tend to be smaller, stand-alone broker-dealers with little activity in derivatives markets) or nonfinancial firms, the study shows large discrepancies in risk prices estimated from different asset classes that are largely insignificant and often have conflicting signs.

The estimates for the price of risk on intermediary capital shocks carry two important economic implications. First, positivity of the estimated risk price means assets that pay more in states of the world with a low intermediary capital ratio (that is, assets with low shocks) also have lower expected returns in equilibrium. This implies that low capital-risk-beta assets are viewed as valuable hedges by marginal investors or, in other words, that primary dealers have high marginal value of wealth when their capital ratio is low. This conclusion accords with ample empirical evidence that institutional investors become distressed and place higher marginal value on a dollar when their capital is impaired. The risk price estimates also suggest that intermediary (primary dealer) equity capital ratios are pro-cyclical, or equivalently, that intermediary leverage is counter-cyclical.

The second economic implication arises from the similarity in magnitudes of capital ratio risk prices estimated from different asset classes. In the standard empirical asset pricing framework where one single pricing kernel applies to all assets, the estimated price of capital ratio risk should be the same in all asset classes. Figure 3 shows that we are not that far from this theoretical prediction. The risk price estimated jointly from all asset classes is 9 percent per quarter. For risk prices that are estimated independently from each asset class, we find that five of the seven estimates are between 7 percent and 11 percent; the estimated risk prices are 22 percent and 19 percent for options and FX portfolios, respectively. While we reject the null of 0 percent in all seven markets, we cannot reject the null of 9 percent in any individual market. One might expect that trading in different asset classes involves substantially different knowledge, expertise, and terminology; yet all of these markets produce estimated prices of intermediary capital risk with similar magnitude.

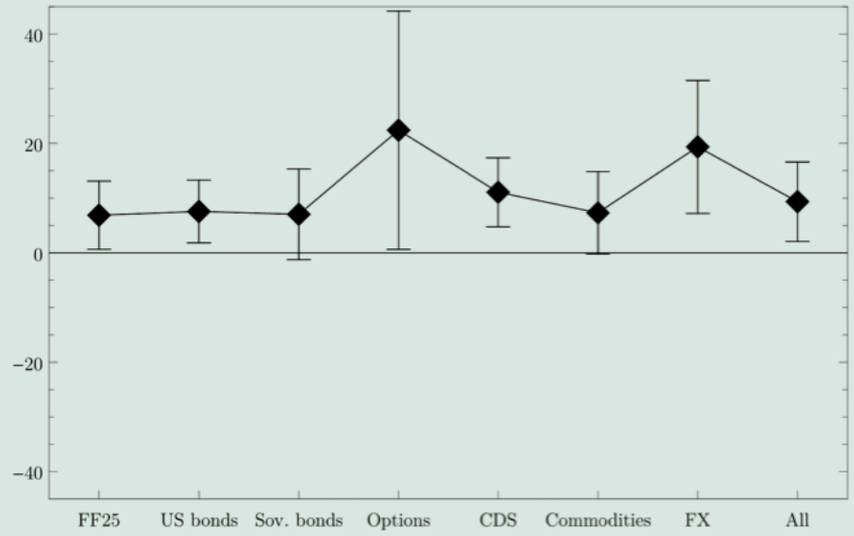
In the paper, the authors provide additional results and a battery of robustness tests. In single factor models without the market factor, the intermediary capital ratio continues to demonstrate large explanatory power for differences in average returns within sophisticated asset classes. The authors show that results are qualitatively similar in the precrisis sample period 1970Q1-2006Q4, in the more recent 1990Q1-2012Q4 sample period, and when tests are conducted at the monthly rather than quarterly frequency. Lastly, the authors report time series evidence that the intermediary capital ratio predicts future returns in five of the seven asset classes studied.

Conclusion

The authors find that assets' exposure to changes in the capital ratio of primary dealers explain variation in expected excess returns on equities, U.S. bonds, foreign sovereign bonds, options, CDS, commodities, and currencies. The findings lend new empirical support to the view that financial intermediaries are price-setting investors in many asset classes, and therefore that the financial soundness of these intermediaries is important for understanding wide-ranging asset price behavior.

Figure 3

Intermediary Capital Risk Price Estimates by Asset Class



Risk price estimates for shocks to the intermediary capital ratio, from a two-factor model that includes the excess return on the market. Risk prices are the mean slopes of period-by-period cross-sectional regressions of portfolio excess returns on risk exposures (betas), reported in percentage terms. Betas are estimated in a first-stage time-series regression. The quarterly sample is 1970Q1-2012Q4. Error bars are the 95 percent confidence interval around the point estimates.

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Finance Faculty

Deniz Aydin
Assistant Professor of Finance
PhD, Stanford
Research interests: finance, empirical macroeconomics and applied microeconomics

Taylor Begley
Assistant Professor of Finance
PhD, University of Michigan, Ross School of Business
Research interests: empirical investigation of financial contracting models

Jian Cai
Visiting Assistant Professor of Finance
PhD, Washington University in St. Louis
Research interests: financial reporting

Charles J. Cuny
Senior Lecturer in Finance
PhD, Stanford University
Research interests: capital structure, financial innovation, employee stock options

Jennifer Dlugosz
Assistant Professor of Finance
PhD, Harvard University
Research interests: credit ratings, securitization, syndicated lending

Jason R. Donaldson
Assistant Professor of Finance
PhD, London School of Economics
Research interests: contract theory, corporate finance theory

Philip H. Dybvig
Boatmen's Bancshares Professor of Banking and Finance
PhD, Yale University
Research interests: asset pricing, banking, financial markets, fixed-income securities

Armando R. Gomes
Associate Professor of Finance
PhD, Harvard University
Research interests: corporate finance, mergers and acquisitions, corporate governance, economic theory

Radhakrishnan Gopalan
Associate Professor of Finance
PhD, University of Michigan
Research interests: corporate finance, corporate governance, emerging-market financial systems

Todd Gormley
Associate Professor of Finance
PhD, Massachusetts Institute of Technology
Research interests: corporate governance, empirical methods, risk, banking, development

Stuart I. Greenbaum
Former Dean and Bank of America Professor Emeritus of Managerial Leadership
PhD, Johns Hopkins University
Research interests: banking, financial intermediation

Ohad Kadan
Professor of Finance
PhD, The Hebrew University of Jerusalem
Research interests: corporate finance, market microstructure, economics of information, game theory

Mark Leary
Assistant Professor of Finance
PhD, Duke University
Research interests: corporate finance, financial intermediaries

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

Hong Liu
Professor of Finance
PhD, University of Pennsylvania
Research interests: asset pricing, market microstructure

Asaf Manela
Assistant Professor of Finance
PhD, University of Chicago
Research interests: asset pricing, information acquisition and diffusion in financial markets, finance in the media, learning and portfolio choice

Thomas Maurer
Assistant Professor of Finance
PhD, London School of Economics
Research interests: asset pricing; optimal portfolio choice; long-run risk; demographic change/uncertainty; innovation, growth, and endogenous capital accumulation; learning in financial markets

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

Giorgia Piacentino
Assistant Professor of Finance
PhD, London School of Economics
Research interests: institutional investors, corporate finance, corporate governance, credit rating agencies

Rich Ryffel
Senior Lecturer in Finance
MBA in Finance, Boston University
Research interests: municipal bonds, urban education policy

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

Mark P. Taylor
Dean and 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
Director of WFA-CFAR, Director of Doctoral Programs, John E. Simon Professor of Finance
PhD, Northwestern University
Research interests: corporate finance, financial intermediation, economics of asymmetric information

Ngoc-Khanh Tran
Assistant Professor of Finance
PhD, Massachusetts Institute of Technology
PhD, University of Virginia
Research interests: asset pricing, international finance, investments

Guofu Zhou
Frederick Bierman and James E. Spears Professor of Finance
PhD, Duke University
Research interests: asset pricing tests, asset allocation, portfolio optimization

Accounting Faculty

Nicholas Dopuch
Hubert C. and Dorothy R. Moog Professor Emeritus of Accounting
PhD, University of Illinois
Research interests: financial reporting, auditing, regulation of accounting

Kimball Chapman
Assistant Professor of Accounting
PhD, Penn State University
Research interests: financial reporting

Amy Choy
Adjunct Lecturer
PhD, Olin Business School, Washington University in St. Louis
Research interests: The effect of financial and auditing guidance on bargaining outcomes

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

Richard Frankel
Beverly and James Hance Professor of Accounting, Accounting Coordinator
PhD, Stanford University
Research interests: accounting-based valuation, voluntary disclosure

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

Chad Ham
Assistant Professor of Accounting
PhD, University of Maryland
Research interests: financial accounting, corporate governance, litigation, manager traits

Jared Jennings
Assistant Professor of Accounting
PhD, University of Washington
Research interests: litigation, regulation, financial reporting

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

Al Kent
Adjunct Lecturer
Areas of expertise: accounting, auditing, financial reporting, managerial accounting

Ronald R. King
Director of the Center for Experiential Learning, Senior Associate Dean–Special Projects, Myron Northrop Professor of Accounting
PhD, The University of Arizona
Research interests: business law and economics, auditing, experimental economics

Kevin Koharki
Assistant Professor of Accounting
PhD, The Pennsylvania State University
Research interests: off-balance sheet financing, credit rating agencies, financial institutions

Zawadi Lemayian
Assistant Professor of Accounting
PhD, Massachusetts Institute of Technology
Research interests: financial accounting (debt, banking, disclosure), taxation

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

David Pearson
Adjunct Lecturer
DBA, Indiana University
Practice interests: improving the quality of audits performed by the large international accounting firms

Mark E. Soczek
Director of Taylor Community Consulting Project, Senior Lecturer in Accounting
PhD, Northwestern University
Research interests: corporate disclosure policy, financial reporting

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