

Research Summary

VINCENT GLODE
Wharton School (Finance)
University of Pennsylvania
May 24, 2023

The resources allocated to the financial sector have dramatically increased in recent decades. For example, students from the top universities in the world are now entering the financial sector in great numbers — e.g., 36% of all graduating students at Princeton University, 30% at the University of Pennsylvania, and 17% at Harvard University, according to Roose (2014) and Miao and Son (2021). Compensation in the sector has also reached unprecedented levels — a compensation premium of at least 24% persists for finance jobs after controlling for workers’ expertise, risk aversion, and hours worked, according to Philippon and Reshef (2012) and Célérier and Vallée (2019). Altogether, the financial sector has contributed to almost 10% of U.S. GDP in recent years, according to the St. Louis Fed (2022). In light of these magnitudes, the financial sector’s contribution to the well-being of society is being debated inside and outside academia.

My research sheds light on this topic. I use economic theory to study how financial intermediaries create and allocate surplus in the economy. My research speaks to how efficiently resources such as labor and capital (the financial sector’s two main inputs) are allocated toward the various activities financial intermediaries perform and how the surplus created by these activities is divided among the many stakeholders. My work stresses the important, and often surprising, implications of market power, private information, and talent scarcity for the determination of these outcomes. I strive to answer important questions about the *raison d’être* of financial intermediaries by developing tractable models that provide original, yet intuitive insights. These insights often explain empirical findings commonly regarded as puzzling in light of the existing literature.

Thirteen years after joining the Wharton School, my research portfolio consists of 11 peer-reviewed articles accepted at top economics and finance journals (1 in the *American Economic Review*, 1 in the *Journal of Economic Theory*, 2 in the *Journal of Finance*, 3 in the *Journal of Financial Economics*, 1 in the *Journal of Financial Intermediation*, and 3 in the *Review of Financial Studies*, 3 invited publications, and 3 working papers that were all presented at recent conferences and are now being prepared for submission to academic journals. This statement summarizes my research contributions. To facilitate the exposition, it groups my papers based on the type of financial intermediation being studied: (i) trade intermediation in over-the-counter markets, and (ii) active portfolio management. Emphasis is given to 3 papers designated as representative work:

- “Asymmetric Information and Intermediation Chains” (with Christian Opp, *American Economic Review*, 2016)

- “Over-the-Counter vs. Limit-Order Markets: The Role of Traders’ Expertise” (with Christian Opp, *Review of Financial Studies*, 2020)
- “Technological Progress and Rent Seeking” (with Guillermo Ordoñez, working paper, 2023)

These papers develop new insights about how financial intermediaries impact social welfare and showcase my ability to make different types of theoretical contributions, be they more conceptual or more applied.

1 Trade intermediation in over-the-counter markets

Most financial assets are traded in over-the-counter (OTC) markets, often through intermediaries such as broker-dealers. The early literature on these markets has mainly focused on the impact of search frictions. My papers instead study the effects of imperfect competition and asymmetric information on OTC trading. Imperfect competition (i.e., the use of market power) is a prominent feature in my models since it helps capture the high concentration of asset holdings and trading observed in OTC markets. Asymmetric information is another important feature in my models as it helps capture the heterogeneity in traders’ expertise also observed in those markets. My research shows how these two frictions can rationalize many commonly observed behaviors in OTC markets, where some traders attempt to acquire better information and/or increase their market power while counterparties attempt to counteract these efforts.

One of the most puzzling observations about OTC markets, in light of the early literature and the public discourse, is their persistence. OTC markets are commonly described as opaque and illiquid compared to centralized exchanges, which led many commentators to blame them for exacerbating the 2007-08 financial crisis. In light of recent technological innovations in market design, centralizing the trading of a class of financial assets should be relatively easy — why aren’t market participants migrating the trading of all asset classes towards centralized electronic exchanges? In my representative article “Over-the-Counter vs. Limit-Order Markets: The Role of Traders’ Expertise” (with Christian Opp, *Review of Financial Studies*, 2020) we analyze how traders’ privately optimal, and sometimes socially efficient, acquisition of expertise is shaped by market structure. We show how the reduced competition associated with OTC markets yields increased rents from expertise acquisition for the subset of well-connected core traders receiving most of the order flow. In contrast, the stronger competition associated with limit-order markets reduces each individual trader’s rents from expertise acquisition, especially when the number of competing traders is large. When expertise yields information that helps prospective traders determine which transactions generate positive economic surplus (e.g., for assets primarily traded for hedging purposes), trading in OTC markets heightens the incentives for expertise acquisition and improves allocative efficiency. The opposite is true, however, when expertise merely provides informational advantages about assets’ common values, thereby impeding trade through adverse selection (e.g., for assets primarily traded for speculation purposes).

Our insights shed light on why bonds, exotic derivatives, currencies and their derivatives are mostly traded in OTC markets whereas stocks and standardized derivatives such as corporate call options are mostly traded on centralized exchanges. More broadly, we highlight the positive impact that search frictions might have had in curbing inefficient behavior among endogenously informed traders, contrasting with the predictions of search-based models with symmetrically informed traders. In fact, empirical findings by Hendershott, Livdan, and Schürhoff (2021) provide support for our main message that incentivizing the costly acquisition of expertise by dealers is currently a first-order concern in OTC markets, now that technological innovations have significantly facilitated the search for trade partners. Our analysis also emphasizes that empirical measures such as bid-ask spreads and trading volume provide little information about the relative efficiency of markets when expertise is endogenous and needed to determine the gains from a transaction.

Accounting for fundamental differences between OTC and centralized trading also allows to shed light on a common question in financial intermediation: how should an issuer design the securities used to secure funding from outside investors? In “To Pool or Not to Pool? Security Design in OTC Markets” (with Christian Opp and Ruslan Sverchkov, *Journal of Financial Economics*, 2022) we investigate the optimal design of securities intended to be sold in OTC markets by a privately informed issuer and contrast our predictions with well-known insights from models assuming centralized markets. In particular, we show that pooling several assets in order to sell them as an asset-backed security (ABS) has an important downside for the issuer once the demand side has market power and acts non-competitively: the payoff diversification that results from pooling invites strategic buyers (typically: intermediaries) with market power to choose aggressive pricing strategies aimed at screening the issuer and thereby destroy the surplus from trade with positive probability. More specifically, pooling affects the shape of the distributions characterizing information asymmetries between issuers and buyers, causing them to have thinner tails. As a result, the elasticity of trade volume — a key determinant of price-setting behavior in the presence of market power — decreases in the right tails of these distributions. Thus, due to a channel absent from competitive environments such as in De Marzo (2005), an issuer may prefer to sell assets separately rather than pooling them into fewer securities, especially when the potential surplus from trade is large. Our analysis provides novel empirical predictions and policy implications regarding security issuances in OTC markets. In particular, it shows how liquidity shortages among major institutions intermediating trade (perhaps due to common regulatory constraints) can contribute to declines in ABS issuances despite concurrent increases in the volume of assets sold separately, as witnessed following the 2007-08 financial crisis.¹

In my two papers described above (and the large literature they build on), a trader’s informational advantage over its counterparty may harm both parties by preventing transactions to take place.

¹In 2009, the issuance volume of ABS in the US was 73% lower than it was in 2006, while the issuance volume of CDO was 97% lower. In contrast, the total issuance volume in US fixed income markets was 13% higher in 2009 than in 2006. For more data, see the Securities Industry and Financial Markets Association: <http://www.sifma.org/research/statistics.aspx>.

But why would traders *let* their private information be an impediment to trade in the first place? In “Voluntary Disclosure in Bilateral Transactions” (with Christian Opp and Xingtang Zhang, *Journal of Economic Theory*, 2018) we model a fairly standard bilateral trading interaction and, using tools from the information design literature, characterize the information that a privately informed trader would choose to share with a counterparty endowed with market power. Without information disclosure, a standard outcome in this type of models is that the counterparty with market power uses aggressive pricing strategies that jeopardize the surplus from trade. By sharing information, the trader may reduce its own information rents (e.g., full disclosure leaves no rents) but it may also make it less likely that its counterparty would use inefficiently aggressive pricing strategies.

Our analysis establishes a powerful result: when considering ex post verifiable disclosures, a privately informed trader always finds it optimal to design a partial disclosure plan that implements socially efficient trade in equilibrium. What is not trivial is the fact that this trader is always willing and able to design signals such that the information rents forgone are dominated by the additional surplus from trade that can be extracted by preventing a counterparty from using inefficient pricing strategies. But unlike Milgrom’s (1981) famous unravelling result derived in an environment with competitive counterparties, the informed trader in our setting only partially shares its information because private information is the only reason why this trader gets to retain some rents when facing a counterparty with market power. Thus, once more, my research highlights how relaxing the standard assumption of perfect competition to capture a prevalent feature of OTC markets can overturn a well-known result from the existing literature. Given the standard set of assumptions we consider and the strong prediction we obtain — efficient trade always occurs in equilibrium — our paper contributes to the literature by identifying the conditions that must be *violated* for asymmetric information and market power to impede the efficiency of trade. Our insights also emphasize that regulation does not need to mandate what information issuers and traders should disclose but it needs to enforce the truthfulness of disclosure by disciplining agents who send signals that ex post (i.e., given the information revealed after the transaction occurs) prove to violate their own disclosure standards.

All of the papers described so far study how asymmetric information and imperfect competition can drive various OTC trader behaviors (e.g., expertise acquisition, market and security design, voluntary disclosure). In my representative article “Asymmetric Information and Intermediation Chains” (with Christian Opp, *American Economic Review*, 2016) we show how these two frictions can rationalize why OTC transactions often feature the sequential involvement of multiple intermediaries. In fact, “chains” of intermediaries represent a market solution to the inefficient trading that usually results from these frictions. We study a bilateral trading interaction similar to that studied in many of the papers described above: a prospective seller who has market power in pricing an asset meets a prospective buyer who is privately informed about how much it is willing to pay for the asset. As before, the seller may find it optimal to use its market power to screen the privately informed buyer, inefficiently destroying the surplus from trade with positive probability — this inefficiency is a probabilistic version of the classic monopoly pricing problem.

Given that the seller's market power leads to this inefficiency, one might expect that involving an intermediary endowed with its own market power once it acquires the asset from the seller would further reduce the surplus as we would now have two sequential rounds of screening instead of one (i.e., a phenomenon commonly referred to as "double marginalization"). We show, however, that involving a *moderately informed* intermediary, whose information quality ranks between the seller's and buyer's, can improve the efficiency of trade by steepening the tradeoff between the probability of a sale and the payoff the seller collects conditional on a sale. The more dispersed the seller's beliefs about its counterparty's valuation are, the less the seller reduces the probability of trade when increasing its price quote. A seller with more dispersed beliefs is thus more tempted to quote a high, inefficient price. If a moderately informed intermediary is involved, however, the seller finds deviating from a more efficient, lower price less attractive when facing the intermediary rather than the buyer. Similarly, when holding the asset the intermediary is less tempted to screen the buyer than the seller would have been. In sum, replacing one monopoly problem with a large information asymmetry by two sequential monopoly problems, each with less information asymmetry, may reduce all traders' incentives to screen their counterparties and improve the social efficiency of trade.

When private information is sufficiently dispersed and the incentives to screen counterparties are strong, the benefits of involving a moderately informed intermediary further extend to having several intermediaries trade an asset sequentially, as part of an intermediation chain in which each trader's information set is similar, although not identical, to those of its direct counterparties. Thus, in contrast to most intermediation theories, our model provides a rationale for why assets are often traded through long chains involving many intermediaries rather than through simpler trading networks centered around one dominant broker-dealer. Extending our insights to multiple intermediaries, however, posed a technical challenge: solving for equilibrium trading outcomes in a chain of M intermediaries necessitates the analysis of $(M+1)$ sequential bargaining problems among $(M+2)$ heterogeneously informed agents. Fortunately, we were able to derive tractable and intuitive equilibrium predictions thanks to careful modeling choices. Yet, as shown in earlier versions of the paper, these predictions survive in alternative settings where market power still leads to inefficient trading (e.g., if the roles are reversed and an uninformed buyer makes an ultimatum offer to a privately informed seller, or if they both possess their own private information).

The empirical literature on OTC trading networks has since provided support for our main predictions. Li and Schürhoff (2019) show that municipal bonds without credit ratings or with speculative ratings are typically traded through longer chains than municipal bonds with investment-grade ratings, which arguably are less likely to be associated with large information asymmetries. Hollifield, Neklyudov, and Spatt (2017) show that securitized products traded both by sophisticated and unsophisticated investors (i.e., "registered" instruments) are subject to more adverse selection and traded through longer chains than products only traded by sophisticated investors (i.e., "rule 144a" instruments). Specifically testing our predictions, Di Maggio, Kermani, and Song (2017) find that the average chain length in the corporate bond market greatly increased following Lehman Brothers' collapse, a time during which uncertainty and the

potential for information asymmetries spiked. More broadly, our paper sheds light on the observation by Adrian and Shin (2010) (and many others) that the whole U.S. financial system shifted in recent decades from its traditional, centralized model of financial intermediation to a more complex, market-based model characterized by “the long chain of financial intermediaries involved in channeling funds.”

In a companion paper “On the Efficiency of Long Intermediation Chains” (with Christian Opp and Xingtan Zhang, *Journal of Financial Intermediation*, 2019) we extend our analysis of intermediation chains and relate it to optimal mechanism design. We show that, generically, if efficient trade is possible using incentive-compatible bilateral mechanisms (which effectively eliminate inefficiencies linked to market power), then efficient trade can also be implemented through a sufficiently long intermediation chain.

The recent pandemic, and how firms and governments responded to it, highlighted a different type of intermediation chains that needed to be better understood: credit/debt chains. Rare are the credit suppliers (e.g., banks, landlords, inventory suppliers) that do not have liabilities of their own (e.g., interbank loans, mortgages, accounts payable). Practitioners and policy commentators have recognized the complexity of designing private and public interventions in this context. In “Private Renegotiations and Government Interventions in Credit Chains” (with Christian Opp, forthcoming at the *Review of Financial Studies*, 2023) we develop a tractable model of strategic renegotiation in a chain of N agents where agent j is agent $(j - 1)$'s borrower and agent $(j + 1)$'s lender. When renegotiating, each lender decides whether to reduce the payment owed by its borrower (sometimes referred to as “taking a haircut”) and thereby lower its default risk. We use the model to analyze the effectiveness of government interventions aimed at avoiding large-scale default waves. Our model accounts for two key frictions affecting renegotiation in practice. First, agents are heterogeneously exposed to economic shocks and have private information about their own financial conditions. Second, renegotiation between a borrower and its lender is bilateral, giving rise to the possibility that an agent’s bargaining power impedes the renegotiation efficiency of not only one credit relationship but the whole chain. By providing concessions to a struggling borrower, a lender makes the distribution of its payment collection outcomes more concentrated and reduces the probability that the borrower defaults. Due to limited liability, the benefits of these concessions are, however, not fully internalized by a lender who is at risk of defaulting on its own liabilities (whose level depends on how this lender’s lender chooses to renegotiate their credit relationship). Renegotiation and default outcomes are thus generically interrelated across the chain.

Our analysis sheds light on which chain member(s) should be targeted by various types of government interventions in order to minimize default losses throughout the whole network of renegotiable credit relationships. Specifically, we analyze and contrast the renegotiation consequences of two types of interventions aimed at reducing the shortfall between a borrower’s assets and liabilities: subsidies (e.g., the 2020 CARES act) and mandated debt reductions (e.g., the 2020 Eviction Moratorium). We also show how incentivizing early renegotiation by lenders (e.g., the 2009 Home Affordable Modification Program) may reduce the negative impact of private information on the social efficiency of private renegotiations.

The papers described above highlight how commonly observed actions taken by financial intermediaries appear to be optimal responses to classic economic problems triggered by some traders having superior information. In practice, many financial institutions invest enormous amounts to acquire their superior information, by hiring smart workers, acquiring novel data, and building superior trading platforms. In “Financial Expertise as an Arms Race” (with Richard C. Green and Richard Lowery, *Journal of Finance*, 2012) we show how a race to acquire the expertise needed to value and trade assets in OTC markets can impede efficient trade. By investing in expertise, financial institutions can develop informational advantages in their future transactions. However, since all firms face similar incentives, the advantage each firm’s investments confer is neutralized in equilibrium by other firms’ investments. Our paper shows that the large investments in expertise previously made by financial institutions can be destabilizing, in that they jeopardize the surplus from trade in times of high volatility. As asset values become more volatile, financial institutions’ private information becomes more valuable and adverse selection concerns increase, leading to inefficiently low levels of liquidity in these states of the world. One may not be surprised that decisions that are good for some states (i.e., times of low volatility) are bad for others (i.e., times of high volatility). What is novel here is that the disruption of trade due to adverse selection is a conscious choice made by financial institutions. The benefit of becoming informed is that, when called upon to supply liquidity, the supplier’s share of the surplus is increasing in its expertise. The cost of becoming (too) informed is the increasing risk that, as the asymmetric information problem worsens, counterparties will choose to quote inefficient prices, thereby leaving the liquidity supplier with very little surplus. Facing this tradeoff, financial institutions overinvest in expertise, even though it puts their business at risk in times of high volatility.

Our model contributes to a better understanding of financial crises. For an “arms race” in financial expertise to lead to breakdowns in liquidity, we must have two forces at work. First, valuation must be sufficiently complex and uncertain to warrant investments in expertise to begin with and to raise the level of investment up to the point where liquidity is at risk. Second, volatility or uncertainty must jump in response to an exogenous shock. Recent financial crises appear to share these two characteristics.

In my representative article “Technological Progress and Rent Seeking” (with Guillermo Ordoñez, working paper, 2023) we analyze how significant technological advancements, such as the improved collection and processing of big data, affect financial as well as non-financial firms’ incentives to overinvest in surplus-appropriating activities (e.g., informed speculative trading). Using a simple model in which firms choose how much resources to allocate in surplus creation and in surplus appropriation, we show that a technological innovation that improves productivity for an entire industry or economy should generically induce a disproportionate and socially inefficient reallocation of resources towards surplus-appropriating activities. While this prediction would be trivial if restricted to innovations that mainly facilitated surplus appropriation, it holds in our model even when the productivity gains induced are far larger for surplus-creating activities than for surplus-appropriating activities. Whereas industry-wide improvements in the technology used to appropriate others’ surpluses amplify the payoff of surplus-appropriating activities

and reduce the payoff of surplus-creating activities, improvements in the technology used to create more surplus amplify the payoffs of both activities in lockstep. Put simply, efforts to appropriate others' surpluses are more profitable when others have larger surpluses to appropriate.

Although our model is kept general and does not solely target one sector of the economy, it rationalizes why Greenwood and Scharfstein (2013) observe an increasing economic importance of the financial sector over time (especially for surplus-appropriating activities like speculative trading). We also apply our theoretical insights to other rent-seeking activities such as civil litigation, product imitation, government lobbying, and the exercise of market power, thereby shedding light on their documented increasing prevalence.

In "Compensating Financial Experts" (with Richard Lowery, *Journal of Finance*, 2016) we show how financial institutions' incentives to acquire inefficient levels of expertise, as described above, can also explain the large amounts paid to financial workers, which often take up 40% of large banks' revenues, according to Franklin and Moise (2022). We propose a labor market model in which financial firms compete for a scarce supply of skilled workers who can be employed as either bankers or traders. A banker helps his/her employer identify profitable real investments, while a trader helps his/her employer value securities backed by the investments of other financial institutions, in case these firms need to trade the securities for liquidity reasons. Thus, deploying workers as bankers raises the surplus that can be split between a firm and its trading counterparties, whereas deploying workers as traders allows the firm to appropriate a larger share of that surplus.² A key insight from our model is that a financial institution that hires a trader not only improves its own ability to value securities but also ensures that this worker will not be employed by trading counterparties. Since traders impose negative externalities on their employers' trading counterparties, financial institutions bid defensively for workers suited to become traders and offer them what we call a "defense premium." If an institution hires a banker instead, the value this worker creates can be partially extracted by its counterparties when the institution is hit by a liquidity shock, resulting in lower compensation for bankers than for traders.

While compensation solely acts as a transfer from firms to workers, the equilibrium allocation of workers across jobs is socially inefficient in our model. As described earlier, the inefficiency comes from the incentives to invest resources in surplus appropriation rather than surplus creation. What is surprising, however, is the prediction that this inefficiency arises in conjunction with traders being "overpaid" from the perspective of their employers — each financial institution would prefer not to hire traders at the prevailing compensation levels, but does so to prevent other firms from hiring them. Moreover, we show how these inefficient hiring practices propagate across financial institutions; while an institution's banking expertise drives up the value of trading expertise for its counterparties, its trading expertise depresses the value of banking expertise for its counterparties.

²Obviously, in reality, distinctions between surplus-appropriating activities and surplus-creating activities are not as clean as in our model and most occupations involve different mixtures of these activities. The full separation of these two types of activities, however, allows our model to make intuitive predictions about the pecuniary incentives associated with the externalities workers impose on other firms.

Our model predicts that high trader compensation should arise in markets where trading is mostly concentrated among a few firms. For example, Begenau, Piazzesi, and Schneider (2015) show that three banks overwhelmingly dominate the market for interest rate derivatives, whose total notional value surpasses \$160 trillion. From a comparative perspective, the trading concentration of U.S. interest rate options is about two-thirds greater than that of foreign exchange options, when measured using the Herfindahl index as in Cetorelli et al. (2007). Consistent with our model, traders in the former market earn, on average, roughly twice as much as those in the latter market (see Options Group 2011). Optimal job assignment also implies that in our model average compensation paid to financial workers can increase with the supply of workers, which may help explain why average salaries in finance have continued to increase in recent decades (see Philippon and Reshef 2012; C  lerier and Vall  e 2019), despite the flood of workers entering the sector (see Goldin and Katz 2008; Roose 2014; Miao and Son 2021). Finally, our model sheds light on the reversal in the types of occupations that have been considered the most lucrative over time: from investment bankers in the 1980’s to highly specialized traders nowadays.

Many of the papers above emphasize financial institutions’ incentives to acquire high levels of expertise. But why do so many unsophisticated investors choose to rout their trades to expert dealers despite the obvious adverse selection concerns associated with their superior expertise? Why don’t some dealers try to develop a reputation for lacking the expertise used to take advantage of their counterparties, thereby minimizing adverse selection concerns? In “Trading with Expert Dealers” (with Maria Chaderina, working paper, 2023) we jointly model dealers’ expertise acquisition and investors’ order-flow allocation in OTC markets. An important and novel feature of our analysis consists of how we model dealers’ expertise: a dealer’s expertise level determines the number of transactions for which this dealer will have the resources needed to gain an informational advantage over its counterparties. We show that, under intuitive conditions, the equilibrium allocation of order flow is concentrated towards one dealer that invests significant resources to boost its expertise and gain informational advantages when trading with investors. Despite the adverse selection concerns associated with these investments, investors prefer to funnel their transactions to this expert dealer rather than trading with less popular dealers that potentially have unused expertise capacity that could be used against more investors. Our analysis rationalizes why the most sought-after dealers often are those with the best data, technology, and skills, despite the significant adverse selection concerns triggered by their expertise. It also sheds further light on the causes of the concentration of OTC intermediation as well as on the welfare implications of increasing access to OTC markets.

Whereas some of my papers described above study the competition for an exogenous supply of resources that can be used to appropriate others’ surpluses, many of the resources that provide a trading advantage are produced and sold by firms trying to maximize their profits. While large financial institutions spend astronomical sums on data and collocation services hoping to take advantage of their counterparties, 41% of individuals who do not participate in financial markets blame the fact that these markets are “rigged against them”, according to a 2021 Bankrate survey. In “Arms Sales in Financial Markets” (with

Xingtian Zhang, working paper, 2023) we model how the sales of trading advantages (e.g., data or collocation services) by a monopolist (e.g., data provider or securities exchange) affect traders' endogenous participation in a market and vice-versa. In our model, agents differ in their probability of being able to supply liquidity to counterparties. The likelier a market participant is to be asked to supply liquidity, the more valuable gaining a trading advantage is. Each agent chooses whether to participate in the market and whether to acquire a trading advantage at a price chosen by the monopolist. While the monopolist accounts for how its pricing strategy impacts market participation, we show that its optimal pricing strategy can result in socially excessive sales of goods and services that benefit a subset of market participants, but drive less sophisticated investors to exit financial markets which they consider as too rigged against them. We show how different types of market participants are impacted by this behavior and how changing the market structure may reduce or amplify the excessive sales of trading advantages.

The papers above highlight financial institutions' incentives to perform activities that sometimes do and sometimes do not contribute to the good of society. Distinguishing these types of activities is however challenging, which is why the financial sector is much more regulated than most industries (at least in terms of total spending and number of regulators). Many commentators have expressed doubts about the efficacy of financial regulation. Although optimal financial regulation has justifiably received a lot of academic attention, very little has been done to understand the allocation of the dominant resource needed for regulation: labor. In "The Labor Market for Bankers and Regulators" (with Philip Bond, *Review of Financial Studies*, 2014) we propose a labor market model in which agents with heterogenous skill levels choose to work as either bankers or financial regulators. We show that if workers derive a utility benefit from working in regulation — due, for example, to public-sector motivation or to human capital benefits — then in equilibrium financial-sector regulators are less skilled, are paid less, and receive less performance pay than bankers. Moreover, our model predicts that the skill discrepancy between regulators and bankers should widen when the financial sector booms, consistent with casual observations.

Our paper has important implications for our understanding of financial regulation. First, the common complaint that regulators are typically less skilled than the bankers they oversee is misfounded — not because it is untrue (although there exist many individual exceptions!), but rather because it is the natural consequence of regulatory agencies making optimal hiring decisions with limited budgets. Redirecting resources toward hiring the most skilled workers would only reduce the overall efficacy of regulation. Second, and related, the skill differential with bankers is not a consequence of regulatory budgets being too small: in our model, a larger budget would lead to more regulators being hired, but would not reverse the skill differential. Third, the popular proposal of forbidding regulators from switching to banking during their career (i.e., closing the "revolving door") would reduce the human capital benefits of starting a career in regulation, thereby increasing the cost of hiring young regulators and making the regulatory sector potentially less productive in equilibrium.

2 Active portfolio management

Another way financial intermediaries may create, or at the very least redistribute, social surplus is through active portfolio management. To give an idea of the resources allocated to this activity, delegated portfolio managers are holding \$112 trillion in global investor wealth, according to a 2020 PwC report. Yet, the ability of portfolio managers to create value for investors, let alone for society, is still being debated, mainly based on the fact that mutual funds' risk-adjusted returns, net of fees, are on average negative.³

In "Why Mutual Funds 'Underperform' " (*Journal of Financial Economics*, 2011) I show that investing in actively managed mutual funds expected to perform poorly unconditionally can be rational for investors as long as these funds tend to perform abnormally well when the economy is doing poorly. The novelty of my model is that the fund manager can generate an active return, at a disutility or cost, that depends on the state of the economy. He/she finds it optimal to allocate resources and efforts towards realizing good performance in times when investors' marginal utility of consumption is high (i.e., in bad states of the economy), thereby generating active returns that covary positively with their pricing kernel. By doing so, the fund manager provides investors with (partial) insurance against bad states of the economy. This first insight is consistent not only with the growing literature documenting countercyclical mutual fund performance (e.g., Kosowski 2011; Kacperczyk, Van Nieuwerburgh, and Veldkamp 2016), but also with a survey of institutional investors questioned about their decision to hire delegated portfolio managers (Foster and Warren 2016). Merging one of Berk and Green's (2004) main insights with relatively simple asset pricing theory, I then show that investors in my model are willing to pay a constant fee equal to the certainty equivalent for the state-dependent active return in exchange for this insurance. In equilibrium, the fund manager fully uses his/her bargaining power and leaves investors with none of the created surplus. When an econometrician tries to measure the fund's risk-adjusted performance, however, a "misspecified" performance measure (i.e., based on an unbiased but imperfect proxy for investors' pricing kernel) *always underestimates* the value created for investors. Consequently, the fund manager wrongly appears to destroy value for investors, even though the returns generated are priced fairly by investors in equilibrium and the pricing kernel proxy being used to measure the fund's performance is unbiased from the econometrician's point of view. What is both unique and nontrivial about this new asset pricing insight is the demonstration that a fairly general type of misspecification should lead to the measurement of *negative* unconditional performance in equilibrium when a fund manager implements an investment strategy that insures investors against bad economic conditions. Negative expected performance is observed in equilibrium because active returns covary positively with a component of the pricing kernel that the econometrician omits when measuring performance.

³My interest in this topic started when I was working on my Master's thesis at Université Laval. My thesis focused on measuring the risk-adjusted performance of bond mutual funds, using daily data, and it was later invited to appear in a French-Canadian academic finance journal: "Conditional Daily Performance Measures Applied to Bond Mutual Funds (in French)" (*Fineco*, 2003).

I calibrate my model to the U.S. economy and generate levels of underperformance consistent with the data. Moreover, I provide new empirical evidence consistent with the model's cross-sectional predictions. Relative to other funds, funds with poor unconditional performance and high fees tend to generate highly countercyclical risk-adjusted returns. This finding is not only consistent with my model, but it may also explain why some funds with negative unconditional performance survive over time — these funds appear to partially insure investors against bad states of the economy.

The paper just described above speaks to the puzzling division of surplus between fund managers and investors that results in investors obtaining negative risk-adjusted returns on average. Another big puzzle in the literature on active portfolio managers relates to how this surplus division evolves throughout the life of a fund. In Berk and Green's (2004) model of mutual funds, every period investors adjust their capital allocations using funds' past performance until all funds promise the same risk-adjusted performance (net of fees and adjusted for fund-specific diseconomies of scale). Thus, mutual fund performance does not persist in their model, consistent with empirical evidence. What is puzzling then is the empirical finding that, unlike mutual funds, private investment partnerships such as hedge funds exhibit persistence in the performance they offer to investors (see Jagannathan, Malakhov, and Novikov 2010). In "Information Spillovers and Performance Persistence in Hedge Funds" (with Richard C. Green, *Journal of Financial Economics*, 2011) we show how fundamental differences between mutual funds and hedge funds can explain why, unlike their mutual fund counterparts, the best-performing hedge fund managers tend to share their surpluses with investors. Specifically, we show how performance persistence can be explained through a fund's needs for secrecy. Consistent with hedge funds' obvious attempts to protect their private information, the superior returns that a fund manager can produce in our model are attributable to strategies or techniques that could be expropriated and exploited if competitors were to become informed about them, as opposed to being entirely intrinsic to the manager as in Berk and Green (2004). Our model also introduces diseconomies of scale in asset management at the sector level. Together, these two ingredients yield performance persistence in equilibrium as incumbent investors benefit, along with managers, from increases in the estimated profitability of a given type of investment. After collecting high returns on their strategies, incumbent fund managers must share information rents with their investors to ensure they do not leave the partnership and form partnerships with non-incumbent managers, resulting in information spillovers and competition that dissipate profits.

We calibrate our model to unconditional moments of the cross section of hedge funds. We then ask if the model can simultaneously reproduce the persistence in returns observed in the data and the division of profits implied by the 2/20 contracts that are pervasive in the hedge fund industry.⁴ Although our focus on the consequences of information spillovers forces us to abstract from many features of the contracting environment for hedge funds, the equilibrium profit-sharing rule in our model still generates economically

⁴Hedge fund managers typically charge their investors an annual management fee of 2% of assets under management and a carried interest of 20% of abnormal profits, if positive.

significant levels of performance persistence (i.e., roughly half of empirically estimated magnitudes).

We also study the division of surplus between fund managers and their capital providers in an empirical paper started when I was a Ph.D. student. In “Is Investor Rationality Time Varying? Evidence from the Mutual Fund Industry” (with Burton Hollifield, Marcin Kacperczyk, and Shimon Kogan, published as a book chapter in *Behavioral Finance: Where do Investors Biases Come From?*, 2016) we study how capital allocation decisions relate to investment returns in the mutual fund industry. In particular, we compare the predictability of U.S. equity mutual fund returns after periods of high and low market returns, to see whether mutual fund investors leave more money on the table in some periods than others. We find that mutual funds’ risk-adjusted returns are predictable after periods of high market returns but not after periods of low market returns. After observing high market returns, marginal investors could boost their abnormal performance by moving capital from funds with poor past performance and relatively low flows to funds with good past performance and relatively high flows. Moreover, the performance predictability is more pronounced for funds catering to retail investors than for funds catering to institutional investors, suggesting that unsophisticated investors are the ones making capital allocation mistakes, especially in good economic times when their marginal utility of consumption is low.

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