SHADOW TRADING AND MACROECONOMIC RISK

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"Shadow trading" occurs when a corporate insider uses sensitive inside information pertaining to her own firm to buy or sell shares of other companies whose stock price movements can be predicted given the information. These transactions are highly profitable but not systematically regulated, and there is evidence that they are a widespread phenomenon among corporate insiders. Unlike classical insider trading, shadow trading by a corporation's insiders does not result in a direct harm to the corporation's own shareholders, and to some extent, shareholders may even benefit from such transactions. In this Article, we argue nevertheless that shadow trading poses three issues: (i) it can create a moral hazard problem for corporate insiders, which can lead them to engage in excessive corporate risk-taking and to even invest in negative-expected-value projects; (ii) it can increase the level of macroeconomic risk to which the economy is exposed; and (iii) it can exacerbate the severity of economic crises. Our analysis thus offers novel rationales for regulating shadow trades. This Article concludes by suggesting a menu of possible policy reforms that can address the problems created by shadow trading.

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INTRODUCTION

In November 2020, more than eight months into the COVID-19 pandemic lock-down, Pfizer, Inc. released promising news about its vaccine development. This was welcome news for most, but not all. Upon the release of Pfizer's news, the share prices of "stay-at-home-stocks" sharply declined: Zoom Video lost 17.4%, while Netflix shares dropped by 8.6%.[1] These movements were largely predictable for Pfizer insiders because it was reasonable to expect that an effective COVID-19 vaccine would eventually lead to less demand for stay-at-home products and services. Notably, Pfizer's Code of Conduct would not have prohibited these insiders from short-selling these shares.[2] Moreover, these transactions are not reportable events under our securities laws.[3] Thus, Pfizer insiders might have reaped handsome profits "in the shadow."

That an event at one company influences other companies' stocks is not an anomaly.[4] In an interconnected economy, shocks at one company routinely affect economically connected firms. Therefore, corporate insiders often have an opportunity to trade on the basis of material nonpublic information—pertaining to their own firm—that can affect the stock prices of *other* companies in a predictable manner.[5] These trades have recently been

[1] Fred Imbert, *Zoom and Other 'Stay-At-Home' Stocks Got Crushed on the Positive Vaccine News*, CNBC (Nov. 9, 2020, 4:31 PM), https://www.cnbc.com/2020/11/09/zoom-and-other-stay-at-home-stocks-are-getting-crushed-on-the-positive-vaccine-news.html.

[2] Pfizer, Inc.'s code of conduct specifically prohibits its employees from using material nonpublic information to buy or sell the securities of Pfizer or any other company "with which Pfizer has or may be considering a relationship (such as a customer, supplier, research partner or potential acquisition or collaboration candidate)." *See* PFIZER, BLUE BOOK: PFIZER'S CODE OF CONDUCT 25 (2020), https://cdn.pfizer.com/pfizercom/investors/corporate/Pfizer_2020Blue Book_English_08.2021.pdf. Zoom Video and Netflix, Inc. would not fall under these categories.

[3] *See infra* Section II.A.2.

[4] *See infra* Section III.A.

[5] *See infra* notes 98–102 and accompanying text.

labeled "shadow trades."[6] Shadow trades are highly profitable but not systematically regulated, and there is evidence that they are a widespread phenomenon among corporate insiders.[7]

Despite the prevalence of such trades, the Securities and Exchange Commission (SEC) has only recently started paying attention to them. As of this writing, the SEC is litigating *SEC v. Panuwat*,[8] a case in which a corporate insider traded in the shares of a competitor ahead of a merger.[9]

In this Article, we argue that current regulation of shadow trading—which leaves room for ambiguity—is a cause for concern. Specifically, we argue that the current rules and regulations can potentially lead corporate insiders to invest in negative-expected-value projects and increase the level of macroeconomic risk to which the economy is exposed. In addition, unregulated shadow trades can also worsen the consequences of economic crises, such as the one triggered by COVID-19. Thus, we offer novel rationales for regulating shadow trading.

Our argument proceeds as follows.[10] Imagine that the CEO of a major company is choosing between two corporate investment opportunities. One project is risky and can either increase the company's stock price by five percent or decrease it by ten percent, with equal probability. The other project is safe and would result in a relatively small increase in the stock price. Thus, the safe project is superior in expectation.[11] Nevertheless, the CEO may still decide to have the company invest in the risky option. Because the risky project can generate significant fluctuations in the stock price of her company and in those of connected companies, the CEO can potentially use her privileged position to gain early access to information on the direction of these swings and engage in profitable shadow trades for herself.

The twist is that the CEO can profit irrespective of the project outcome. If the project looks to be successful, the CEO can profit by buying stocks of other companies that would be positively affected by the news, while short-selling those of companies that would be negatively affected. On the other

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[6] For an early treatment of these trades, see Ian Ayres & Joe Bankman, *Substitutes for Insider Trading*, 54 STAN. L. REV. 235, 239 (2001). The term was first coined in Mihir N. Mehta, David M. Reeb & Wanli Zhao, *Shadow Trading*, 96 ACCT. REV. 367, 367 (2021).

[7] *See* Mehta et al., *supra* note 6, at 367 ("[W]e provide evidence that shadow trading is an undocumented and widespread mechanism that insiders use to avoid regulatory scrutiny.").

[8] Complaint, Sec. & Exch. Comm'n v. Panuwat, No. 4:21-cv-06322 (N.D. Cal. Aug. 17, 2021).

[9] *See infra* Section II.D; *see also SEC Charges Biopharmaceutical Company Employee with Insider Trading*, U.S. SEC. & EXCH. COMM'N (Aug. 17, 2021), https://www.sec.gov/litigation/litreleases/2021/lr25170.htm.

[10] A more rigorous analysis would compare the CEO's incentive-based compensation against her potential trading profit, while adjusting for her risk preference. In a companion piece, we provide a formal model analyzing shadow trading and corporate investment incentives. *See* Yoon-Ho Alex Lee, Lawrence Liu & Alessandro Romano, *Shadow Trading and Corporate Investments*, 7 J.L. FIN. & ACCT. 191 (2023).

[11] By assumption, the expected impact of the safe project on share price is only marginally positive, whereas the expected impact of the risky project is equal to -2.5%.

hand, if the project looks to be unsuccessful, she can profit by using the opposite trading strategy.

Consider our original example. Having learned about the vaccine's effectiveness, Pfizer's CEO could have profited by buying stocks of companies that would benefit from the vaccine (e.g., cruise companies and movie theaters), while short-selling stay-home stocks like Zoom. On the other hand, if the Pfizer vaccine had not been effective, he could have profited by short-selling stocks of cruise companies and movie theaters, while buying stay-home stocks. In short, as far as the CEO learns about the project outcome before the market, he can make profits by engaging in shadow trading provided that the project creates fluctuation in the stock prices of other companies. For this reason, a corporate manager may have incentives to take on excessive risk to create fluctuations in connected companies' share prices, from which she can profit.

The story does not end there. Recent empirical evidence tells us that a small subset of firms and sectors play a critical role in engendering macroeconomic risk: microeconomic shocks to these sectors or firms may not cancel out but create aggregate fluctuations that have a significant impact on the economy as a whole.[12] We refer to these industries and these firms as "central."[13] This finding points to a connection between shadow trading and macroeconomic risk. On the one hand, central firms can create macroeconomic risk and bring about aggregate fluctuations; on the other hand, the prospect of shadow trades provides incentives to take on more risk exactly for the insiders of central firms because shocks originating at these firms affect the stock price of multiple companies and create greater opportunities for profitable trades. In simple terms, the more central a firm is, the more it can affect the stock prices of other firms, and the more insiders can profit by taking risks and then engaging in shadow trading. Thus, insiders of central firms have incentives to engage in projects that can contribute to macroeconomic risk and eventually result in aggregate fluctuations. As the creation of macroeconomic risk is a pure externality that cannot be internalized contractually by the insider and her firm, there is a compelling case for regulating shadow trading.

One mechanism through which shadow trades can elevate macroeconomic risk is by exacerbating the moral hazard problem created by

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[12] *See* Daron Acemoglu et al., *The Network Origins of Aggregate Fluctuations*, 80 ECONOMETRICA 1977, 1977–78 (2012) (showing that local shocks can propagate through input-output relationships among firms and have aggregate consequences) [hereinafter Acemoglu et al., *Network Origins*]; Daron Acemoglu et al., *Microeconomic Origins of Macroeconomic Tail Risks*, 107 AM. ECON. REV. 54, 56 (2017) (showing that macroeconomic risks "can have their origins in idiosyncratic microeconomic shocks to disaggregated sectors") [hereinafter Acemoglu et al., *Microeconomic Origins*].

[13] There are various definitions of centrality, but they all revolve around the idea of how interconnected a given sector is to other sectors in the economy. For a discussion of the concept of centrality, see SANJEEV GOYAL, CONNECTIONS: AN INTRODUCTION TO THE ECONOMICS OF NETWORKS 16 (2012), providing formal definitions of various centrality measures.

bailouts. When a systemically important financial institution (SIFI) defaults, it imposes significant negative externalities on the economy.[14] As a result, the government is forced to bail out such a firm if it is in distress.[15] From an *ex ante* perspective, this creates a moral hazard problem: SIFI creditors and shareholders—knowing that the SIFI will likely be bailed out if the risky investments turn out badly—would have incentives to take on excessive risks and refrain from engaging in monitoring.[16] Arguably, one saving grace is that managers, who play an important role in risk-taking decisions, may be less subject to the same moral hazard problem; after all, managers of bailed-out SIFIs generally lose their jobs. But then our analysis illustrates how shadow trades can skew managers' preferences toward risk-taking. This creates a perfect storm: all the key actors of the very firms that can take down the economy have incentives to take on too much risk.

Our analysis further suggests that conditional on the onset of an economic crisis, shadow trading can also exacerbate its severity *ex post*. Economists have shown that during crises—like the one triggered by COVID-19—the consequences of negative shocks are particularly severe. This is because the worst affected sectors can become supply bottlenecks that drag the rest of the economy down with them.[17] An unfortunate implication is that insiders would have even greater incentives to gamble and engage in excessive risk-taking. If they win their bet, they and their company can profit; if they lose their bet, they can still make profits by short-selling the shares of the companies in the many sectors that they are dragging down by creating a bottleneck. Therefore, limitations on shadow trading are also important in preventing opportunistic behavior by insiders during crises.

Finally, our analysis identifies a trade-off between the informational efficiency of financial markets and the stability of the economy. Informed trading by insiders will increase the accuracy of stock prices because it al-

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[14] *See, e.g.*, THE FIN. CRISIS INQUIRY COMM'N, THE FINANCIAL CRISIS INQUIRY REPORT: FINAL REPORT OF THE NATIONAL COMMISSION ON THE CAUSES OF THE FINANCIAL AND ECONOMIC CRISIS IN THE UNITED STATES, at xviii–xix (2011) (noting that SIFIs' behavior was one of the main causes of the 2007 financial crisis).

[15] Despite various attempts by policymakers, there are no viable alternatives to bailouts. *See* Christopher M. Bruner, *Corporate Governance Reform in Post-Crisis Financial Firms: Two Fundamental Tensions*, 60 ARIZ. L. REV. 959, 961 (2018) ("[T]he predominant bank holding companies remain so large and so complex that the legislative claim to have statutorily foreclosed future bailouts lacks credibility."); Alessandro Romano et al., *Extended Shareholder Liability for Systematically Important Financial Institutions*, 69 AM. U. L. REV. 967, 969 (2020) (noting that "[n]o one has devised a functional plan to enable governments credibly to commit to refrain from carrying out such bailouts").

[16] *See* Saule T. Omarova, *The "Too Big To Fail" Problem*, 103 MINN. L. REV. 2495, 2500 (2019) ("The well-known notion of 'moral hazard' captures the economic inefficiencies associated with this implicit subsidy: large firms shielded from the negative consequences of their risk-taking have an incentive to take greater risks than they otherwise would.").

[17] *See* David Baqaee & Emmanuel Farhi, *Nonlinear Production Networks with an Application to the COVID-19 Crisis* 3 (Nat'l Bureau of Econ. Rsch., Working Paper No. 27281, 2020), https://www.nber.org/papers/w27281 (discussing conditions under which shocks at a given sector are likely to create a bottleneck and drag down the economy).

lows private information to be incorporated into the stock price.[18] But our framework also reveals the risk of allowing such trades. When addressing this tradeoff, policymakers must account for the centrality of the firm considered. For central firms it is paramount to pay close attention to the stability of the economy, whereas price discovery might be given priority for the other firms. This suggests that it may make sense to regulate shadow trading differently—between transactions taking place at central firms and those occurring at peripheral firms.

The rest of the Article is organized as follows. Part I introduces a simple example that will be used throughout the Article to facilitate the exposition of the problem. Part II offers a summary of the long-standing debate surrounding corporate insiders' trades based on material nonpublic information and how the current rules and regulations apply to cover shadow trades. Part III provides a review of the economics literature on how idiosyncratic shocks at firms can have both local and macroeconomic consequences. Part IV considers three different types of problems caused by shadow trading. First, shadow trades can create a moral hazard problem for corporate insiders, which increases their risk appetite and might push them to invest in negative-expected-value projects. Second, shadow trades increase the level of macroeconomic risk to which the economy is exposed and may intensify the undesirable effects of potential bailouts on SIFIs' insiders. Third, shadow trades can exacerbate the severity of economic crises. Nevertheless, we also acknowledge that there can be some benefits associated with shadow trading. Part V addresses some possible counterarguments to our analysis. Part VI discusses a menu of policy reform options, and Part VII concludes.

I. A Simple Example

Imagine that Mary is the CEO of DriveSafely, a large car manufacturer that is currently competing with another car maker called DriveFast. Assume that DriveSafely purchases all its inputs from McEngines and sells most of its cars to the car dealer WeSellCars. Assume also that DriveSafely is by far the biggest customer of McEngines and the biggest supplier of WeSellCars. Figure 1 summarizes the relationship among the firms considered in the example. The dotted line indicates a competitive relationship. The solid lines indicate a relationship between a supplier and its customers, with the arrow going from the former to the latter.[19]

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[18] *See* Dennis W. Carlton & Daniel R. Fischel, *The Regulation of Insider Trading*, 35 Stan. L. Rev. 857, 868 (1983) (noting that "[i]f insiders trade, the share price will move closer to what it would have been had the information been disclosed").

[19] This example works with companies that are economically connected in a concrete manner: supplier, customer, or competitor. There are other ways in which one company's news can affect another company's stock price. For example, Ayres and Bankman also mention "complementors," which are companies that sell complementary products. Ayres & Bankman, *supra* note 6, at 241. As with our opening example, there are also scenarios in which one firm's

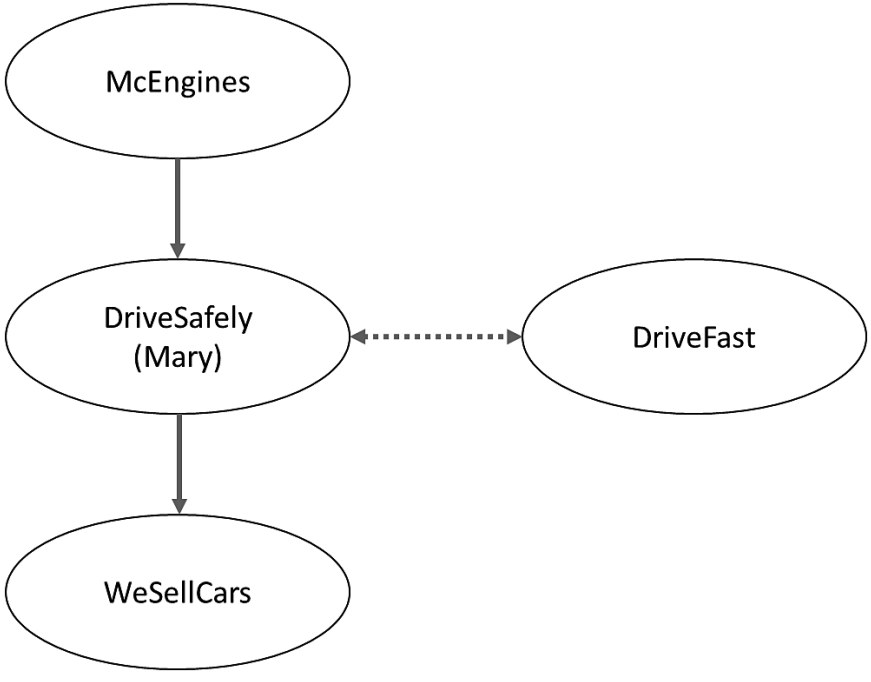

FIGURE 1: DRIVESAFELY AND CONNECTED FIRMS.

For simplicity, we assume that the shares of all these companies trade at $1. Now, assume that Mary decides to launch a very large and risky project called DriveCheaply that could allow DriveSafely to cut its operating costs in half. The success of this project would bring the price of the shares up to $1.50. At the same time, however, its failure would severely affect the competitiveness of DriveSafely and reduce the stock price to $0.50. A few months into the project, during a visit to the company lab, Mary learns that DriveCheaply will be ready in a month.

At this point, Mary can potentially execute several different transactions to profit from this material nonpublic information. First, Mary can tell a broker to buy 1,000 shares at $1/share in DriveSafely and resell them at $1.50/share later to obtain a profit of $500 (Scenario I).[20] Second, Mary can get DriveSafely, the corporation, to buy 1,000 of its own shares in open-market repurchases (OMRs) (Scenario II). DriveSafely will then make an additional profit of $500 that will be shared *pro rata* by all its shareholders. Mary's personal profit will then depend on how many DriveSafely shares she owns. Third, Mary can tell a broker to trade in the shares of economi-

project success or failure can predictably affect companies that are not specifically related to the firm in these manners. All these scenarios present profitable shadow trading opportunities.

[20] Mary will be able to buy the 1,000 shares at $1 and then resell them at $1.50 after the information on DriveCheaply is released.

cally connected companies (Scenario III). This is because a positive shock affecting DriveSafely is likely to affect several companies. To begin with, it can benefit DriveSafely's customer and supplier,[21] and thus, the shares of McEngines and WeSellCars can also be expected to gain value once the news about DriveSafely is released. Suppose we can predict that the shock halves its intensity at each step from the source. Then the share price of McEngines and WeSellCars would increase to $1.25. If Mary buys 1,000 of their shares for $1, she can sell them at $1.25/share to make profits equal to $500.[22] Moreover, DriveSafely's increased competitive strength can also harm its competitors. For example, it could lead to a decline in DriveFast's stock price to $0.90. Then, Mary could also instruct a broker to short-sell DriveFast's stock ahead of the announcement. In a similar vein, Mary could ensure that DriveSafely buys shares in its customer and supplier, or that it short-sells its competitor's shares (Scenario IV). In this case, the profits are shared *pro rata* among DriveSafely's shareholders.

All of these transactions are expected to be profitable trades for Mary. Which ones, if any, are allowed under our securities regulation? In Part II, we provide a quick survey of insider trading law and discuss how the current law would deal with these four scenarios.

II. Regulation of Insider Trading

Insider trading—and more generally, trading based on material nonpublic information—is a complex topic that has received many book-length discussions.[23] Naturally, we make no attempt to offer a comprehensive description of its regulations, or of the endless debate on whether and how trades by insiders should be regulated. Instead, we sketch some key arguments that help frame the legal challenges specifically posed by shadow trades.

A. Arguments in Support of/Against Regulating Trades by Insiders on Material Nonpublic Information

Whether the ability of corporate insiders to trade on material nonpublic information ought to be constrained is a controversial issue. Arguing in favor of deregulation, Henry Manne famously noted two benefits of insider trading: first, insider trading can increase the price accuracy of the traded

[21] Shocks propagate beyond the direct suppliers and customers. *See* discussion *infra* Section III.B. Therefore, private material information about one firm might also have predictive power, for instance, on the performances on the suppliers of the suppliers of that firm.

[22] The calculation is as follows: (2000 * $1.25) - (2000 * $1.00) = $500.

[23] *See, e.g.*, Donald C. Langevoort, Insider Trading: Regulation, Enforcement and Prevention (2002).

shares;[24] and second, insider trading can serve as an effective means of compensating managers that innovate and generate value for their companies.[25] To the extent that Manne's two arguments are valid, they would also apply in the context of shadow trading. Shadow trading can likewise increase the price accuracy of the shares in which the insiders trade. Moreover, it can incentivize corporate insiders to develop value (e.g., through a new technology) because they can then trade in the shares of connected companies that would be positively affected by the spillovers deriving from their efforts. Nevertheless, the general validity of Manne's arguments has been disputed over the years.

For example, contrary to Manne's first hypothesis, there is evidence that stock prices tend to be *more* accurate in countries that enforce insider trading prohibitions aggressively.[26] One speculation is that effective enforcement of insider trading induces more agents to invest resources to uncover information.[27] In addition, trades by insiders tend to be relatively small compared to the total volume of trades. Hence, some scholars argue that they can affect prices only indirectly and in limited circumstances.[28]

Manne's second hypothesis seems even less defensible. As a compensation mechanism, insider trading is a poor way to tie executives' compensation to their productivity. Optimal compensation mechanisms should reward managers for any action they take to the extent it contributes to maximizing shareholders' value.[29] But there is hardly any relationship between the amount of material nonpublic information produced by an insider and the value that she creates for the firm. Crucially, insider trading allows managers to profit from *negative* information as well.[30] As such, while one can argue that corporate insiders may be motivated to generate value to profit off

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[24] Henry G. Manne, *Insider Trading and the Law Professors*, 23 VAND. L. REV. 547, 572 (1970) (arguing that allowing insiders to trade "necessarily improve the efficiency with which the stock market assimilates new information into stock prices").

[25] HENRY G. MANNE, INSIDER TRADING AND THE STOCK MARKET 138–41 (1966) ("Insider trading meets all the conditions for appropriately compensating entrepreneurs. It readily allows corporate entrepreneurs to market their innovations.").

[26] *See* Laura Nyantung Beny, *Do Insider Trading Laws Matter? Some Preliminary Comparative Evidence*, 7 AM. L. & ECON. REV. 144, 144 (2005). *But see* Lisa K. Meulbroek, *An Empirical Analysis of Illegal Insider Trading*, 47 J. FIN. 1661, 1678 (1992) (finding that "stock price accuracy does increase on insider trading days").

[27] Nuno Fernandes & Miguel A. Ferreira, *Insider Trading Laws and Stock Price Informativeness*, 22 REV. FIN. STUD. 1845, 1847 (2008) (arguing that "insider trading can in fact crowd out information collection and constrain informed trading by outside investors").

[28] *See, e.g.*, STEPHEN M. BAINBRIDGE, RESEARCH HANDBOOK ON INSIDER TRADING 21 (2013) (describing the process of gradual price adjustment).

[29] Alex Edmans et al., *Executive Compensation: A Survey of Theory and Evidence*, *in* THE HANDBOOK OF THE ECONOMICS OF CORPORATE GOVERNANCE 383, 405 (Benjamin E. Hermalin & Michael S. Weisbach eds., 2017) ("In principle, pay should be based on any signal that is incrementally informative about whether the executive has taken actions that maximize shareholder value." (citation omitted)).

[30] *See, e.g.*, Jesse M. Fried, *Insider Trading via the Corporation*, 162 U. PA. L. REV. 801, 807 (2014) (arguing that allowing insider trading profits can "provide insiders with incentives to take steps that may destroy economic value").

shadow trading opportunities, they can likewise destroy value and thereafter engage in profitable shadow trades.

This is not to say that all trading based on material nonpublic information should be banned. The arguments in support of regulating such trades do not fare much better. For example, a common argument is that insider trading should be prohibited because it is "unfair."[31] As this Article is mostly concerned with efficiency, we will not discuss the notion of fairness in detail. Nevertheless, one point is worth making: if fairness is defined in terms of loyalty—that is, an agent (insider) should not cheat her principal (firm)—then insider trading regulations are superfluous. Any principal that considers such trading to be "cheating" on her agent's part can specify the prohibition in a contract.[32]

In fact, this argument also serves as an effective criticism of the efficiency-based defenses of insider trading prohibitions that focus on the alleged harm *to the firm* caused by trades made by its insiders.[33] For instance, some have argued that insider trading regulation can address the agency problem between the firm and its insiders because it constrains the ability of the latter to trade on material nonpublic information pertaining to the former.[34] Nevertheless, if one is concerned with mitigating such agency costs or preventing insiders from intentionally reducing the value of the corporation, prohibitions against insider trading should at best be default rules. A company concerned with these problems can stipulate contracts with its insiders that restrict their ability to trade in its stock, and those contracts are likely to be more efficient than a one-size-fits-all mandatory ban of insider trading.[35] As firms internalize these effects of insiders trading in their shares, the firms and their insiders can contract around the allocation of rights on information.[36] At any rate, for our purposes, we note only that this particular argu-

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[31] For an extensive discussion, see ADOLPH A. BERLE & GARDINER C. MEANS, THE MODERN CORPORATION AND PRIVATE PROPERTY 226 (1932), suggesting that insiders keep their trading secret because they know it is unethical. *But see* Henry G. Manne, *Insider Trading: Hayek, Virtual Markets, and the Dog that Did Not Bark*, 31 J. CORP. L. 167, 182 n.60 (2005) (describing fairness concerns as "puerile").

[32] *See* MANNE, *supra* note 25; *see also* Ian Ayres & Stephen Choi, *Internalizing Outsider Trading*, 101 MICH. L. REV. 313, 321 (2002) (noting that if the costs associated with insider trading are borne by the firm, then the firm will have incentives to design an insider trading policy that maximize the value for its shareholders).

[33] *See* Jonathan R. Macey, *From Fairness to Contract: The New Direction of the Rules Against Insider Trading*, 13 HOFSTRA L. REV. 9, 32 (1984) ("[I]nsider trading rules curtail the extent to which owners of inside information can make use of such information. These limitations inhibit the creation of valuable information.").

[34] *See* Jonathan R. Macey, Martoma *and* Newman*: Valid Corporate Purpose and the Personal Benefit Test*, 71 SMU L. REV. 869, 874 (2018) (suggesting that insider trading law plays an important role in mitigating the agency costs within public companies that manifest themselves in the form of illicit trading on the basis of material nonpublic information).

[35] Macey, *supra* note 33, at 32 ("[I]nsider trading rules curtail the extent to which owners of inside information can make use of such information. These limitations inhibit the creation of valuable information.").

[36] *See* Ayres & Choi, *supra* note 32, at 321.

ment is less applicable to shadow trades, which concern trades in the stock of other companies.

Possibly the best footing on which to defend insider trading prohibitions may be that they help prevent some form of *negative externality*. The most enduring argument along this line is that insider trading reduces faith in the markets because outsiders perceive they might be playing a rigged game against insiders that have access to better information. Concerned about trading against better informed insiders, the argument goes, investors will either demand higher (lower) prices to sell (buy) their shares or drop out of the markets altogether,[37] leading to markets that are less liquid and characterized by higher bid-ask spreads.

This argument—which remains relevant for shadow trades—has received some empirical support. For instance, Del Guercio et al. document some evidence that bid-ask spreads declined when the SEC enforced insider trading prohibitions more aggressively.[38] Likewise, Utpal Bhattacharya and Hazem Daouk find that enforcement of insider trading prohibitions reduces the cost of equity.[39]

As revealed by this quick overview, the debate over regulating these trades is not entirely settled. In an article published by the *Annual Review of Financial Economics*, Bhattacharya considers the merits of various arguments and concludes that a jury called to decide on whether insider trading should be considered illegal on efficiency grounds would be split, and that banning trades by insiders would win by a "razor-thin" margin.[40]

Against this backdrop, this Article can be seen as advancing a different rationale for regulating shadow trading (one not contemplated by Bhattacharya's jury): shadow trades can increase *macroeconomic risk*. Because macroeconomic risk is a pure externality, we cannot rely on the market to contract around this problem. From this perspective, regulating insiders' ability to trade is no longer—or at least not only—aimed at protecting companies and their investors, but rather, at preserving the stability of the broader economic system. We now turn to briefly discuss the current regulation of insider trading and how shadow trading fits into the regulatory framework.

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[37] Roy A. Schotland, *Unsafe at Any Price: A Reply to Manne, Insider Trading and the Stock Market*, 53 VA. L. REV. 1425, 1440 (1967) ("The prime objection to . . . [insider trading] is the impact it would have on the public's confidence in the stock markets.").

[38] Diane Del Guercio et al., *The Deterrent Effect of the Securities and Exchange Commission's Enforcement Intensity on Illegal Insider Trading: Evidence from Run-up Before News Events*, 60 J.L. & ECON. 269, 273 (2017) (finding "that the SEC's effort is associated with improved liquidity, as proxied by the quoted bid-ask spread, which suggests that greater enforcement has liquidity benefits, supportive of the crowding-out view").

[39] Utpal Bhattacharya & Hazem Daouk, *The World Price of Insider Trading*, 57 J. FIN. 75, 78 (2002) (reporting that insider trading enforcement reduces the cost of equity by a value between 0.3% and 7%).

[40] Utpal Bhattacharya, *Insider Trading Controversies: A Literature Review*, 6 ANN. REV. FIN. ECON. 385, 399 (2014).

B. Trades by Insiders

Insider trading prohibitions originated from the fiduciary duties that state law imposed on corporate officers and remained mostly confined to state law until the late 1960s when a series of decisions by federal courts and the Supreme Court molded insider trading rules into their current shape.[41] The main statutory anchor comes from Section 10(b) of the Securities Exchange Act of 1934, based on which the SEC adopted Rule 10b-5. Rule 10b-5 in the relevant part reads (17 C.F.R. § 240.10b-5):

> It shall be unlawful for any person . . . (a) To employ any device, scheme, or artifice to defraud, (b) To make any untrue statement of a material fact or to omit to state a material fact necessary in order to make the statements made, in the light of the circumstances under which they were made, not misleading, or (c) To engage in any act, practice, or course of business which operates or would operate as a fraud or deceit upon any person, in connection with the purchase or sale of any security.[42]

Note that Rule 10b-5 makes no mention of insider trading, much less prohibit it. For this reason, its prohibition has evolved through a series of court decisions that defined the contours of the present-day doctrine.

1. Classical Theory and Misappropriation Theory

In *Chiarella v. United States*,[43] the Supreme Court spelled out what is now known as the classical theory of insider trading. Thanks to his job at a financial printer, Vincent Chiarella managed to infer material nonpublic information on future mergers and traded on this information for personal profit without disclosing this relevant information to the transacting parties.[44] The Court nevertheless decided that the duty of disclosure did not apply to Chiarella because such a duty presupposes the existence of a fiduciary relationship between the trading parties.[45] Because Chiarella was not an insider of the company in whose stocks he traded, the Court noted, he had no duty to "speak" and could freely trade.[46]

An important, yet limited, expansion of the standard imposed by *Chiarella* comes from *Dirks v. SEC*.[47] The *Dirks* Court clarified that an *outsider* can also be held liable under Rule 10b-5 for trading on material non-

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[41] Bainbridge, *supra* note 28, at 1–3 (discussing the evolution of insider trading regulation).

[42] Rule 10b-5, 17 C.F.R. § 240.10b-5 (2022).

[43] 445 U.S. 222 (1980).

[44] *Id.* at 224.

[45] *Id.* at 231–32.

[46] *Id.* at 235 ("When an allegation of fraud is based upon nondisclosure, there can be no fraud absent a duty to speak.").

[47] 463 U.S. 646 (1983).

public information that comes from inside a corporation as long as the outsider was tipped by an insider in breach of *her* fiduciary duty and the outsider should have known of the breach.[48] The Court further explained that an insider's fiduciary duty is breached when the insider tips information in exchange for a personal gain.[49]

Finally, in a footnote, the *Dirks* Court also adopted the "temporary insider" doctrine: outsiders who are given material nonpublic information by a corporation under conditions of confidentiality become "temporary insiders" of that corporation, and hence cannot make trades based on such information in that company's stock.[50] The typical case is that of a lawyer or an accountant who learns material nonpublic information by working in close contact with a firm.[51]

Even with the *Dirks* doctrine, the classical theory left many questions unanswered and many potentially problematic behaviors out of SEC reach. For this reason, the SEC began advocating the idea that nobody should be allowed to trade on the basis of information that was obtained in a fiduciary relation or in breach of fiduciary duty.[52] This approach, known as the misappropriation theory,[53] was ultimately espoused by the Supreme Court in *United States v. O'Hagan*.[54] Under the misappropriation theory, however, liability is extinguished if the outside trader discloses to the source of information his intention to trade.[55] Importantly, this is the case even if the source

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[48] *Id.* at 659–60 ("[A] tippee assumes a fiduciary duty to the shareholders of a corporation not to trade on material nonpublic information only when the insider has breached his fiduciary duty . . . by disclosing the information to the tippee and the tippee knows or should know that there has been a breach.").

[49] *Id.* at 662 ("Thus, the test is whether the insider personally will benefit, directly or indirectly, from his disclosure. Absent some personal gain, there has been no breach of duty to stockholders.").

[50] *See id.* at 655 n.14 ("Under certain circumstances, such as where corporate information is revealed legitimately to an underwriter, accountant, lawyer, or consultant working for the corporation, these outsiders may become fiduciaries of the shareholders."); *see also* Sec. & Exch. Comm'n v. Lerner, No. 9049, 1980 WL 1388, at *1 (D.D.C. Apr. 2, 1980) (stating that an attorney cannot trade on the stocks of a client on the basis of private material information that he possesses).

[51] Ayres & Bankman, *supra* note 6, at 253–54.

[52] STEPHEN J. CHOI & ADAM C. PRITCHARD, SECURITIES REGULATION: CASES AND ANALYSIS 362–71 (4th ed. 2015). The other approach the SEC took was to adopt Rule 14e-3 (pursuant to Section 14 of the Exchange Act, rather than Section 10) to prohibit all trades based on material nonpublic information in target shares in the context of an upcoming tender offer. The SEC's authority to adopt this rule was challenged, but the Supreme Court also affirmed it in *United States v. O'Hagan*, 521 U.S. 642 (1997).

[53] The first formulation of the misappropriation theory is owed to Chief Justice Burger's dissent in *Chiarella v. United States*, 445 U.S. 222, 240 (1980) (Burger, C.J., dissenting) ("[A] person who has misappropriated nonpublic information has an absolute duty to disclose that information or to refrain from trading.").

[54] 521 U.S. 642 (1997).

[55] *Id.* at 655 ("[I]f the fiduciary discloses to the source that he plans to trade on the nonpublic information, there is no 'deceptive device' and thus no § 10(b) violation."). *But see* Sec. & Exch. Comm'n v. Rocklage, 471 F.3d 1, 11–13 (1st Cir. 2006) (holding that a wife's mere disclosure to her husband, the source of information, of her intent to trade did not fully extinguish her liability).

does not grant any permission. Because Rule 10b-5 and Section 10(b) are premised on *deception*, full disclosure extinguishes liability even if there may be a breach of fiduciary duty.[56] In addition, outsiders that obtain information without any breach of a fiduciary duty can trade on the information without running afoul of Rule 10b-5.[57] Finally, the corporation, the original source of information, can itself trade on the information that it produces without breaching any duty.[58]

2. Disclosure Obligations

Rule 10b-5 imposes specific disclosure requirements for trades based on material nonpublic information. Under the classical theory, if an insider of a firm in possession of material nonpublic information about the firm were to buy or sell shares of her own company, she would have to disclose the relevant information to the transacting party (*Chiarella*). Under the misappropriation theory, if a fiduciary wants to trade shares based on material nonpublic information she received in a fiduciary relationship, she must disclose her intention to trade to the principal—the source of information (*O'Hagan*). Rule 10b-5, however, does not mandate disclosure of detailed information about these trades, such as the specific date or the number of shares. In addition, these disclosures need only be directed at specific parties (i.e., to the transacting party or the source of information), and hence the general investing public will not be informed about such trades taking place.

There is a more extensive public disclosure requirement when certain insiders of a firm trade in the stock of their own company.[59] Section 16(a) of the Securities and Exchange Act requires *statutory insiders*—which include, top executives, directors, and shareholders that have more than ten percent of the shares of a publicly traded firm—to disclose the details of their otherwise legal trades by the end of the second business day following the transaction.[60] The purpose of Section 16(a) is twofold: (i) facilitate detection of insider trading and (ii) inform the market that an insider is trading in the stock of her company.[61] This alerts other traders and thus reduces the possi-

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[56] *See* Santa Fe Indus., Inc. v. Green, 430 U.S. 462 (1977). There may, however, be a breach of duty claim against the trading insider. *See* Brophy v. Cities Service Co., 70 A.2d 5 (Del. Ch. 1949).

[57] This follows because *O'Hagan* specified that a person is "guilty of violating Section 10(b) and Rule 10b-5" when he "trades in securities . . . using confidential information misappropriated *in breach of a fiduciary duty* to the source of the information." 524 U.S. at 647 (emphasis added). *See also* Ayres & Choi, *supra* note 32, at 348 ("Any outsider trader that obtains the information without breaching a fiduciary duty may trade on the information.").

[58] *See, e.g.*, Ayres & Bankman, *supra* note 6, at 259 (explaining how "corporations have virtually no limit on [shadow] trading").

[59] Fried, *supra* note 30, at 803 ("Since the 1930s, insiders of a U.S. firm have been required to report the specific details of each trade in the firm's shares." (footnote omitted)).

[60] Sarbanes-Oxley Act of 2002, Pub. L. No. 107-204, § 403(a), 116 Stat. 745, 788 (2002) (current version at 15 U.S.C. § 78p(a)(2)(C) (2012)).

[61] Fried, *supra* note 30, at 810 (discussing the two functions of Section 16(a)).

ble gains that the insiders can derive from trading on material nonpublic information. Section 16(a) provides no further reporting requirement for these statutory insiders.[62]

C. Trades by the Firm

A corporation is a legal person that is separate from its shareholders, employees, or board of directors. As such, it can legally own and trade shares. For example, corporations often trade on their own stocks, mostly via open market repurchases and at-the-market issuances.[63] Therefore, insiders can decide to exploit their material nonpublic information also by engaging in *indirect* insider trading via the corporation.[64] One difference between traditional insider trading and indirect insider trading via the corporation is that the latter benefits *pro rata* all the shareholders.[65]

Within the classical theory, the company is considered an "insider," and the SEC considers it a violation of Rule 10b-5 if the company were to trade in (more specifically, repurchase) its own stock on material nonpublic information.[66] While this limitation is similar to that faced by insiders trading in their corporation's stock, it is accompanied by lax disclosure requirements that make enforcement much less effective. More specifically, starting in 2003,[67] firms have been required to state in their Form 10-Q the number of shares purchased in each month of that quarter and the average price paid.[68] Therefore, disclosure requirements of trades via the corporation differ from those imposed on the insiders on two fundamental dimensions.[69] First, instead of having to report the trades within two business days, corporations can disclose their trades at the end of each quarter. Second, unlike insiders, corporations do not have to report the details of each transaction but only monthly aggregates. The combined result is that corporations are able to trade in their stocks for months before the market is informed.[70]

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[62] A related disclosure requirement, which we discuss in section VII.B, is Item 407(i) of Regulation S-K. This rule directs corporations to disclose "any practices or policies that the registrant has adopted regarding the ability of employees . . . or directors . . . to . . . engage in transactions, that . . . are designed to hedge or offset, any decrease in the market value of registrant equity securities." 17 CFR § 229.407(i).

[63] Fried, *supra* note 30, *passim*.

[64] *Id.*

[65] *Id.* at 828 (noting that insider trading via the corporation boosts the value for long-term shareholders).

[66] *See id.* at 813–14. Note, however, that Fried considers the SEC's position "somewhat shaky." *Id.*

[67] *See* Jesse M. Fried, *Informed Trading and False Signaling with Open Market Repurchases*, 93 CALIF. L. REV. 1323, 1328, 1340–41 (2005) (discussing pre-2003 reporting requirements for share repurchases).

[68] *See* Purchases of Certain Equity Securities by the Issuer and Others, 68 Fed. Reg. 64952, 64961 (Nov. 17, 2003) (amending 17 C.F.R. pts. 228, 229, 240, 249, 270 & 274) (codified at 17 C.F.R. § 240.10b-18 (2013)).

[69] Fried, *supra* note 30, at 814–15 (discussing disclosure rules of OMR).

[70] *Id.* at 815 ("The firm has thus months to trade secretly on inside information.").

Furthermore, the limited disclosure obligations that a corporation faces when trading its own stock do not apply when it is purchasing shares of other companies.

D. Shadow Trades

By "shadow trades," we refer to trades by an insider of a company—in her individual capacity or via the corporation—in the stocks of other companies based on material nonpublic information from his own company. According to one study published in 2021, shadow trading is "an undocumented and widespread mechanism that insiders use to avoid regulatory scrutiny."[71] The study estimates that "the profitability from a single shadow trading event ranges from $139,400 to $678,000."[72]

To what extent are these trades legal? For one thing, shadow trades are not covered by the classical theory of insider trading because they involve stocks of other companies. The extent to which they are covered by the misappropriation theory remains unclear. As a general matter, "[t]he legality of shadow trading appears to be relatively untested due to the lack of a clear breach of fiduciary responsibility by insiders who use private information to facilitate trading in other firms."[73] As a historical matter, "prosecutions for shadow trading [had been] virtually nonexistent."[74]

This may change soon, however. Shadow trading recently came under the spotlight. In *SEC v. Panuwat*,[75] defendant Panuwat was a business development head of Medivation, Inc., a biopharmaceutical company. Soon after learning that Pfizer, Inc. was about to purchase Medivation, Inc., Panuwat purchased shares of Incyte Corp., another biopharmaceutical company whose stock price would be affected by the merger news. Eventually, Incyte Corp.'s stock price increased sharply and Panuwat made over $100,000. Importantly, Medivation Inc. had an insider trading policy prohibiting employees from using confidential information concerning Medivation Inc. to trade in its own securities or the securities of any other company. Thus, the strongest argument against Panuwat is that he violated his employer's policy and thus breached his duty. The argument against Panuwat may be on less secure footing had Medivation Inc.'s insider trading policy not addressed shadow trades.

On this point, Ayres and Bankman explain the potential applicability of the misappropriation theory to shadow trades as follows:

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[71] Mehta et al., *supra* note 6, at 367.
[72] *Id.* at 368.
[73] *Id.*
[74] *Id.*
[75] Complaint, Sec. & Exch. Comm'n v. Panuwat, No. 4:21-cv-06322 (N.D. Cal. Aug. 17, 2021).

> An employee is a fiduciary of her employer. If a company explicitly prohibits its employees from using non-public information to trade in another company's stock, an employee who violates that prohibition will violate Section 10(b). If, on the other hand, a company explicitly permits its employees to trade in another company's stock, an employee who trades will not violate the confidence of her employer and will not run afoul of Section 10(b). The application of the doctrine in the (typical) case in which the employment contract is silent as to the permissibility of trading in stock substitutes is somewhat unclear; security lawyers would advise employees in this situation not to trade.[76]

In cases in which the employer has an explicit prohibition to trade (as was the case in *Panuwat*), it seems reasonable to infer that shadow trades breach a fiduciary duty owed to the source of the information and should be considered covered by the misappropriation theory. Still, trades by insiders are illegal only when they are based on nonpublic information that is also *material*. In the coming months, *Panuwat* will reveal to what extent courts are willing to consider material information pertaining to the insider's firm in connection to securities of other firms.[77] Less certain is the legality of shadow trades when the employer does not have an explicit prohibition because a breach of fiduciary duty cannot be automatically assumed in that case. The *Panuwat* court might not resolve this issue since Medivation Inc. did have such a prohibition.

Writing in 2002, Ayres and Bankman found that all shadow trading cases brought by the SEC—in which there was no specific contractual prohibition of such trades—could be characterized as scenarios in which the employees' trades would cause a harm to their own firms (e.g., trading shares in the face of pending acquisitions).[78] If liability for shadow trading is predicated only upon a demonstrable harm to the employer firm, then shadow trades—so the argument goes—might be thought to be permissible as long as they do not cause any such harms.[79] Our follow-up Westlaw search of all insider trading cases since 2001 provided no further clarity on this issue.

In terms of prohibiting shadow trades by their employees, firms vary widely in their approaches. Having surveyed codes of conduct from 267 companies, Mehta et al. report that "[a]pproximately 53% of the sample

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[76] Ayres & Bankman, *supra* note 6, at 239.

[77] *See*, *e.g.*, John F. Savarese & Wayne Carlin, *A New Variation in SEC Insider Trading Enforcement*, HARV. L. SCH. F. ON CORP. GOVERNANCE (Aug. 20, 2021), https://corpgov.law.harvard.edu/2021/08/20/a-new-variation-in-sec-insider-trading-enforcement ("[T]he issue of materiality is likely to be hard-fought.").

[78] Ayres & Bankman, *supra* note 6, at 239.

[79] By contrast, writing in 2017, Cody Donald argued in favor of applying the fiduciary-sourced default rule and thus, "trading in substitute securities [should be] presumptively illegal under the misappropriation theory." Cody Donald, *Trading in Substitute Securities: Liability Under Rule 10b-5*, 7 HARV. BUS. L. REV. 68, 68 (2017) (arguing that "trading in substitute securities is presumptively illegal under the misappropriation theory").

prohibits employees from using private information to trade in their firms or stakeholders,"[80] while "[t]he remaining 47% only expressly prevent employees from using private information to trade in their firms."[81]

Corporations also update and change their policies from time to time. For example, Cisco, Inc. used to openly permit shadow trades by its employees in the early 2000s,[82] but now they are prohibited.[83] Up until 2020, Facebook, Inc. prohibited its employees only from trading in its own stock based on material nonpublic information.[84] Its latest code of conduct, however, explicitly prohibits its employees from trading in any stock based on material nonpublic information from Facebook, Inc.[85]

In a more recent study, Min examines insider trading policies from fifty-one S&P 500 companies and reports that 76% (39) of the corporations prohibit trading of any other companies' stock (based on material nonpublic information), 22% (11) prohibit their employees from trading securities of their business partners (e.g., customers or suppliers) and competitors, and only one prohibited only trading in the employer's stock.[86] The differences in the statistics may be due to the differences in their samples; alternatively, this may reflect a growing trend among corporations to restrict shadow trading by their employees.

Whereas the legality of shadow trading by employees can depend on the corporation's policy, the legality of shadow trading via the corporation is well established.[87] This is because the corporation is the source of information, and as such, the misappropriation doctrine does not apply.[88] Table 1 below summarizes the legality of shadow trades and insider trades.

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[80] Mehta et al., *supra* note 6, at 393.

[81] *Id.* The authors report that "[o]ther sample firms for which we cannot obtain data refer readers to a corporate intranet site or employee handbook for details." *Id.* at 373, n.28.

[82] Glenn R. Simpson & Scott Thurm, *Web of Interests: At Cisco, Executives Accumulate Stakes in Clients, Suppliers*, WALL ST. J., (Oct. 3, 2000), https://www.wsj.com/articles/SB970535968595732228.

[83] CISCO, FY22 CODE OF BUSINESS CONDUCT 26, https://www.cisco.com/c/dam/en_us/about/cobc/2021/fy22-code-of-business-conduct-english.pdf (prohibiting shadow trades in the securities of "Cisco customers, suppliers, vendors, subcontractors, acquisition targets, and other business partners, and at times, competitors").

[84] FACEBOOK, CODE OF CONDUCT 8 (Sept. 10, 2020) (on file with author).

[85] FACEBOOK, KEEP BUILDING BETTER: THE FACEBOOK CODE OF CONDUCT 44 (June 2021), https://s21.q4cdn.com/399680738/files/doc_downloads/governance_documents/2021/06/FB-Code-of-Conduct.pdf ("Never trade stock in Facebook or another public company while in possession of material non-public information concerning such stock.").

[86] Geeyoung Min, Strategic Compliance 32–33 (2023) (unpublished manuscript) (on file with author).

[87] Ayres & Bankman, *supra* note 6, at 259 (arguing that "[t]he freedom of corporations to engage in [shadow] trading is even more clearly established").

[88] *Id.* at 239 (arguing that the misappropriation theory "will not limit a company's use of its own nonpublic information to trade in another company's stock" because "[s]uch trading does not violate the confidence of any fiduciary").

TABLE 1: LEGALITY OF TRADING SCENARIOS

Scenario	Legality	Disclosure
I Traditional insider trading	Violates Rule 10b-5 (classical theory) unless disclosed	To the transacting party
II Insider trading (via the Corporation)	Likely violates Rule 10b-5 (classical theory) unless disclosed	Number of shares purchased each month of that quarter and average price paid
III Shadow Trading	If explicitly prohibited by the employer, likely violates Rule 10b-5 (misappropriation theory) unless disclosed; if not, unsettled but potentially permitted.	To the source of information (the corporation)
IV Shadow Trading (via the Corporation)	Legal	No disclosure necessary

Let us return to the four scenarios introduced in Part I to see how they are regulated (Table 1). While Scenarios I and II are covered by the classical theory, Scenarios III and IV are not because Mary and DriveSafely are not fiduciaries of McEngines, WeSellCars, or DriveFast.[89] For Scenario III, if DriveSafely has a code of conduct that prohibits shadow trading, then courts are likely to apply the misappropriation theory. Absent such an explicit prohibition, Mary's trades may be potentially permitted for reasons discussed above.[90] Finally, the misappropriation theory would not cover Scenario IV because the corporation is using its own information, and therefore there is no breach of duty of any kind.

The upshot of our analysis is that as a general matter, there is no *categorical* ban of shadow trades, and any liability based on Rule 10b-5 is extinguished in the case that the insider discloses her intent to trade to the company's board. Finally, there is no ambiguity when it comes to shadow trades via the corporation: no law prohibits such trades because no duty is breached. In the next Part, we consider more specifically how shock propa-

[89] To be sure, under specific circumstances these theories could be stretched to the point of covering shadow trades. For instance, if McEngines, had to work in close contact with DriveSafely to facilitate the development of DriveCheaply, then its CEO might be considered a "temporary insider" of DriveSafely. *See* Ayres & Choi, *supra* note 32, at 337 n.72 (citing SEC v. Dirks, 463 U.S. 646, 655 n.14 (1983)) (explaining the concept of "temporary insiders").

[90] *See supra* text accompanying notes 78–79.

gation in an interconnect economy might present opportunities for shadow trading.

III. Propagation of Shocks in an Interconnected Economy

Recall that in our example, the reason why Mary had these profitable trading opportunities was because her decision to invest in a particular technology could bring about a shock to her own firm, DriveSafely, as well as to the firms that are economically connected to DriveSafely. Indeed, such opportunities routinely arise in an interconnected economy because firms rely heavily on one another. One implication is that firm-level shocks (or sectoral shocks) can have both local and macroeconomic consequences. In this Part, we discuss each in turn.

A. Local Consequences of Shocks

Consider the following:

- When Amazon acquired online pharmacy PillPack in June of 2018, "[s]hares of CVS, Walgreens Boots Alliance Inc.[,] and Rite Aid Corp. . . . lost more than $11 billion in market value."[91]

- In April of 2019, when Disney made an announcement to launch Disney+—a streaming service that would rival Netflix's service and would be priced cheaper—Netflix's shares fell nearly 5% and the corporation "lost as much as $8 billion in market capitalization in a few minutes of trading on" this information.[92] Six months later, when Verizon announced a deal with Disney to offer a free one-year subscription to Disney+ to all its customers, Netflix's shares fell again by 4%.[93]

- In January of 2020, when imitation-meat maker Impossible Foods disclosed that it "[was] no longer trying to win a coveted deal to supply [McDonald's] with plant-based burgers" due to its production capacity, the shares of its rival, Beyond Meat, soared by 12.5%.[94]

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[91] Sharon Terlep & Laura Stevens, *Amazon Buys Online Pharmacy PillPack for $1 Billion*, Wall St. J. (June 28, 2018), https://www.wsj.com/articles/amazon-to-buy-online-pharmacy-pillpack-1530191443.

[92] John J. Edwards III, *Netflix's Market Value Dropped $8 Billion After the Disney Plus Announcement*, Time (Apr. 19, 2019), https://time.com/5569495/netflix-market-value-drop-disney-plus.

[93] Todd Spangler, *Netflix Stock Falls After Verizon Announces Disney Plus One-Year Giveaway*, Variety (Oct. 22, 2019), https://variety.com/2019/digital/news/netflix-stock-drop-verizon-disney-plus-free-1203378782.

[94] Richa Naidu & Hilary Russ, *Impossible Foods Has Stopped McDonald's Burger Talks, Shares of Beyond Meat Jump*, Reuters (Jan. 7, 2020), https://www.reuters.com/article/us-im-

In each of these instances, as a result of a shock propagation, insiders in one corporation had crucial information on which they could profitably trade by engaging in shadow trades.

Shock propagations can also have more extreme consequences. During his congressional testimony, Ford's Chief Executive Officer asked the government to bail out its *competitors*. What incentive would Ford have to make sure its competitors stay solvent? The CEO explained as follows:

> If any one of the domestic companies should fail, we believe there is a strong chance that the entire industry would face severe disruption. Ours is in some significant ways an industry that is uniquely interdependent—particularly with respect to our supply base, with more than 90 percent commonality among our suppliers. Should one of the other domestic companies declare bankruptcy, the effect on Ford's production operations would be felt within days—if not hours. Suppliers could not get financing and would stop shipments to customers. Without parts for the just-in-time inventory system, Ford plants would not be able to produce vehicles.[95]

This testimony reveals that insiders are keenly aware of the importance and intensity of intersectoral and interfirm spillovers. The government appears to have accepted this account,[96] given that in 2009 it pumped over $80.7 billion into this sector to prevent its collapse.[97]

More generally, there is now extensive evidence of how one company's public announcement can affect stock prices of other companies in a predictable manner, creating ample opportunities for shadow trades. The most obvious reason is that many firms are connected to others through input-output linkages or competitive ties. For instance, Menzly and Ozbas document a

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possible-foods-mcdonald-s-corp-excl/exclusive-impossible-foods-has-stopped-mcdonalds-burger-talks-shares-of-beyond-meat-jump-idUSKBN1Z62GJ. Ayres and Bankman also discuss an example involving Kodak and Polaroid. Kodak's announcement to enter the instant camera market in 1974 led to a sharp decline in Polaroid's stock price. *See* Ayres & Bankman, *supra* note 6, at 242.

[95] *Examining the State of the Domestic Automobile Industry—Part I: Hearing Before the S. Comm. on Banking, Hous., & Urb. Affs.*, 110th Cong. 86 (2008) (statement of Alan Mulally, President & Chief Executive Officer, Ford Motor Company). Other countries have also acknowledged the systemic importance of the car industry and have decided to bail out its key players. *See, e.g.*, Ben Hall, *France Unveils _6bn Auto Sector Bail-Out*, FIN. TIMES (Feb. 9, 2009), https://www.ft.com/content/68f24efa-f694-11dd-8a1f-0000779fd2ac.

[96] Press Release, White House Off. of the Press Sec'y, Fact Sheet: Financing Assistance to Facilitate the Restructuring of Auto Manufacturers to Attain Financial Viability (Dec. 19, 2008), https://georgewbush-whitehouse.archives.gov/news/releases/2008/12/20081219-6.html ("The direct costs of American automakers failing and laying off their workers in the near term would result in a more than one-percent reduction in real GDP growth and about 1.1 million workers losing their jobs, including workers from automotive suppliers and dealers.").

[97] Kimberley Amadeo, *What Was the Bank Bailout Bill?*, BALANCE (Dec. 31, 2021), https://www.thebalance.com/what-was-the-bank-bailout-bill-3305675.

strong cross-predictability of returns between suppliers and customers.[98] In particular, they find that trading strategies that exploit cross-predictability of returns can generate annual premiums of up to 8.7%.[99] They further observe that institutional investors' trading behavior suggests that their strategies account for cross-market spillovers.[100] Similarly, Cohen and Frazzini find that if every month, one purchases the stock of firms whose customers performed very well in the previous month, it yields annualized abnormal returns of 18.6%.[101]

These effects also vary across different types of firms. Aobdia et al. show that the spillovers from central firms are significantly larger than those from non-central firms.[102] The authors observe that "the association between central industries' ROA [that is, Returns on Assets] changes and ROA changes of the industries they trade with is over two times greater than that of noncentral industries."[103] In other words, all else equal, insiders at central firms would have opportunities for even larger returns based on shadow trading.

B. Macroeconomic Consequences of Shocks at Central Firms and Industries

Let us now consider macroeconomic consequences of these shocks—specifically, whether shocks at certain firms—can translate to economy-wide fluctuations. According to the traditional macroeconomic account, idiosyncratic or firm-specific shocks are highly unlikely to affect the entire economy. The standard argument—dating back to Nobel laureate Robert E. Lucas, Jr.—is that idiosyncratic shocks hitting a firm or a sector cannot determine significant aggregate fluctuations because the economy consists of many different firms and sectors.[104] As such, the random positive and negative idiosyncratic sectoral shocks will cancel out and cause only negligible consequences at the macroeconomic level.[105]

Nevertheless, the 2007–2009 crisis has shown that modern economies are more fragile than many had assumed. Ample empirical evidence has

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[98] Lior Menzly & Oguzhan Ozbas, *Market Segmentation and Cross-Predictability of Returns*, 65 J. FIN. 1555, 1556 (2010).

[99] *Id.* at 1577.

[100] *Id.*

[101] *See, e.g.*, Lauren Cohen & Andrea Frazzini, *Economic Links and Predictable Returns*, 63 J. FIN. 1977, 1980 (2008); *see also* Jean-Noël Barrot, & Julien Sauvagnat, *Input Specificity and the Propagation of Idiosyncratic Shocks in Production Networks*, 131 Q.J. ECON. 1543, 1544 (2016) (finding large negative spillovers from suppliers that are hit by a natural disaster to their customers).

[102] Daniel Aobdia, Judson Caskey & N. Bugra Ozel, *Inter-Industry Network Structure and the Cross-Predictability of Earnings and Stock Returns*, 19 REV. ACCT. STUD. 1191 (2014).

[103] *Id.* at 1193.

[104] *See generally* Vasco M. Carvalho, *From Micro to Macro via Production Networks*, 28 J. ECON. PERSP. 23, 25 (2014) (discussing Lucas' theory).

[105] *Id.*

since been accumulated to show that the traditional account needs to be revised.[106] The reality is that both sectoral and firm-level shocks can have a large impact on aggregate fluctuations. The reason is that an economy is more than just a large number of independently operating firms or sectors.

To understand the dynamics, we consider again the case of a simple economy based on the example described in Part I, in which there is also a firm (Oil Inc.) that supplies McEngines and DriveSafely with energy for their production process. Figure 2 represents the basic structure of this simple economy. As in Part I, solid lines indicate input-output connections directed from the supplier to the customer. The dashed line indicates a competitive relationship. One modification is that DriveSafely and Oil Inc. in this figure are central firms in the economy (underlined in Figure 2).

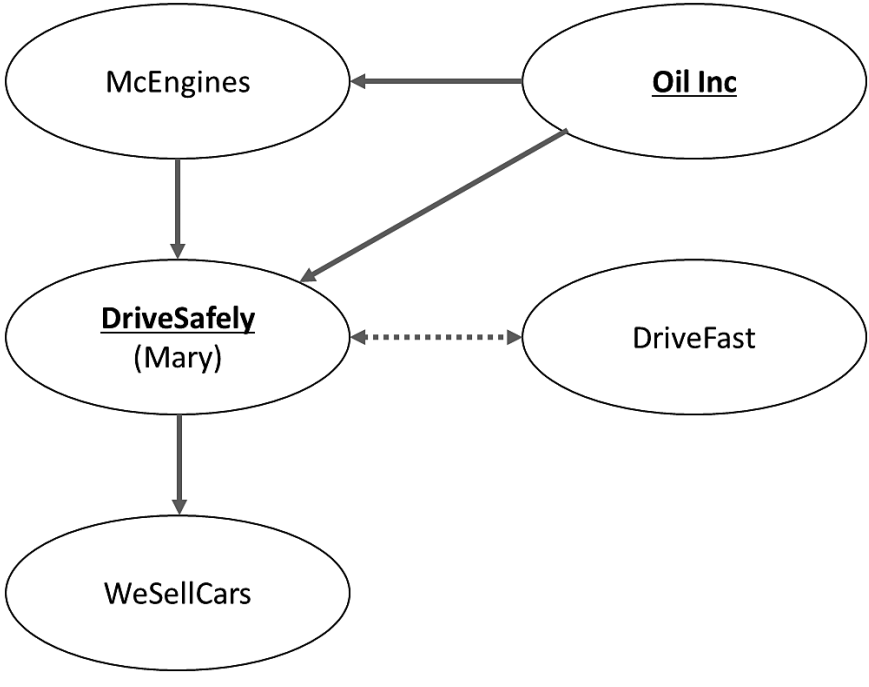

FIGURE 2: DriveSafely and Connected Firms (Modified).

In the example presented, the choice of investing in DriveCheaply has imposed a positive shock on DriveSafely. For example, suppose that DriveSafely can now increase the number of cars it produces due to the massive cost savings associated with DriveCheaply. As a result, it requires a higher level of input from McEngines and sells a higher level of output to WeSellCars. In addition, Oil Inc. is positively affected by the shock, since

[106] *See infra* text accompanying notes 107–16.

the two firms to which it was supplying energy increase their levels of input and output. Therefore, Oil Inc. will also have to increase its output. But to produce a higher level of output, Oil Inc. will also need a higher level of input. Given the structure of the economy and the fact that Oil Inc. is not the customer of any firm, we can assume that its main input is labor. Therefore, to increase its level of output, Oil Inc. will increase its consumption of labor, either by hiring new workers or by increasing their working hours. In turn, this will increase the purchasing power of Oil Inc. workers, who will be able to afford more cars. Ultimately, the higher purchasing power of Oil Inc.'s employees will further strengthen WeSellCars and its suppliers.

Of course, in real economies the interdependencies among sectors are significantly more complicated. Nevertheless, this stylized scenario illustrates that once we start viewing the economy not as a collection of atomistic firms but instead as networks of companies connected by input-output linkages, we can understand how sectoral shocks can bring about macroeconomic consequences.

Consistent with this explanation, Acemoglu et al. find that shocks hitting central well-connected sectors can propagate across the economy and generate "sizable aggregate effects" and thus, "in the presence of intersectoral input-output linkages, *microeconomic* idiosyncratic shocks may lead to *aggregate* fluctuations."[107] The authors conclude that "[s]uch higher-order interconnections capture the possibility of 'cascade effects' whereby productivity shocks to a sector propagate not only to its immediate downstream customers, but also to the rest of the economy."[108]

In a similar vein, Gabaix shows that the size distribution of U.S. firms is fat-tailed (i.e., there are a few very large firms and many smaller ones), and hence that idiosyncratic shocks cannot be diversified away.[109] He finds that idiosyncratic shocks hitting the top 100 firms account for one-third of GDP aggregate fluctuations.[110] This insight is further confirmed by di Giovanni et al. who find that firm-specific factors play a key role in explaining aggregate fluctuations.[111]

In a more recent paper, Acemoglu et al. observe that a normal distribution cannot describe the fluctuations of U.S. postwar quarterly GDP.[112] This, too, is a critical observation. Given that "most macro variables, such as GDP, are obtained from combining more disaggregated ones, it is reasonable

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[107] Acemoglu et al., *Network Origins*, *supra* note 12, at 1977.

[108] *Id.*

[109] Xavier Gabaix, *The Granular Origins of Aggregate Fluctuations*, 79 ECONOMETRICA 733, 735 (2011) ("[I]t is critical to show that . . . diversification does not occur in an economy with a fat-tailed distribution of firms.").

[110] *Id.* at 736.

[111] Julian di Giovanni, Andrei A. Levchenko & Isabelle Mejean, *Firms, Destinations, and Aggregate Fluctuations*, 82 ECONOMETRICA 1303, 1304 (2014) (reporting that "firm-specific components contribute substantially to aggregate fluctuations").

[112] Acemoglu et al., *Microeconomic Origins*, *supra* note 12, at 54–56.

to expect that a central limit theorem-type result should imply normality."[113] Nevertheless, they find that a normal distribution would significantly underestimate the frequency of large economic downturns. In addition, they find that when sectors have heterogeneous sizes—as measured by Domar weights[114]—and levels of interconnectedness, a microeconomic shock hitting a key sector can produce significant drops in GDP and generate large contractions across many sectors.[115]

To summarize, both firm-level and sector-level shocks originating in central industries can generate significant spillovers and produce systemic consequences as well as opportunities for profitable shadow trading.

IV. The Consequences of Shadow Trading

The previous Part analyzed various scenarios under which opportunities for shadow trading might arise. What, then, are some consequences of shadow trading? In this Part, we discuss the problems posed by shadow trading as well as its potential benefits. Our analysis highlights three different types of problems associated with shadow trades: (i) moral hazard, (ii) macroeconomic risk, and (iii) exacerbation of economic crises. At the same time, however, we explain how shadow trading can also produce some positive consequences.

A. Shadow Trades and Moral Hazard

Let us return to our example from Part I, but we will move the clock a few months back to the time when DriveCheaply was conceived. As of this time, Mary already knows about the R&D project—call it Project A—and is in a position to decide whether to move forward with it. She also knows that DriveCheaply is a risky and expensive bet. Suppose that Mary could instead have invested in a safer and much cheaper project—call it Project B—that would have left the competitiveness of DriveSafely unaffected. Finally, to ease the exposition we will assume that DriveFast—DriveSafely's main competitor—had already decided to pursue the safer investment option. For the sake of simplicity, we assume that DriveSafely's payoffs based on these projects are as indicated in Table 2.

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[113] *Id.* at 54.
[114] The Domar weight of a sector is equal to sectoral sales divided by total GDP. *Id.* at 56.
[115] *Id.* at 57.

TABLE 2: DRIVESAFELY'S PAYOFFS.

Project	Probability of Success	Cost	Harm if unsuccessful	Benefit if successful	Expected Value
A (DriveCheaply)	50%	$10,000	$100,000	$100,000	-$10,000
B	100%	$10,000	N/A	$10,500	$500

Given these payoffs (and not accounting for shadow trades), Project B offers a higher expected value for DriveSafely. In fact, Project A is a negative-expected-value (NEV) investment: from a risk-neutral perspective, it is worse than doing nothing.

Now suppose that Mary has a compensation scheme that ties her personal payoffs to the value of the firm:[116] she captures 1% of the changes in her company's value. Without shadow trades, Mary's payoffs from her compensation scheme are indicated in Table 3. Project B provides $5 in expectation, whereas Mary can personally expect to lose money from Project A. Thus, Mary, too, should prefer Project B (from a risk-neutral perspective).[117]

TABLE 3: MARY'S PAYOFFS.

Project	Probability of Success	Mary's Share of Cost (1%)	Payoff if unsuccessful (1%)	Payoff if successful (1%)	Expected Value
A (DriveCheaply)	50%	$100	-$1,000	$1,000	-$100
B	100%	$100	$0	$105	$5

But notice what happens once we consider Mary's ability to trade shares of McEngines and WeSellCars. With Project B, there would be almost no nonpublic information on which Mary can trade because its outcome will not affect the stock price or the productivity of any company. By contrast, having early inside information regarding Project A's outcome would allow Mary to predict the direction of the stock price movement not only for DriveSafely but also for McEngines and WeSellCars. If Project A is expected to succeed, Mary can purchase 1,000 shares of McEngines and

[116] Note that if the assumption of an optimal compensation scheme is dropped, the likelihood that an insider can profit from shadow trades by engaging in inefficient investments increases. Since optimal compensation schemes are virtually impossible to draft, this example underestimates the impact of shadow trades on insiders' incentives.

[117] The findings of this Section can be generalized to risk-averse perspectives. *See* Lee et al., *supra* note 10, at Part III (formalizing shadow trading and corporate investment incentives in a model with a risk-averse manager).

WeSellCars and make $500 in profit; otherwise, Mary can short-sell 1,000 shares of each and make the same profit. Thus, *irrespective of Project A's outcome*, Mary can engage in profitable shadow trades. Building on this example, Mary's payoffs from Project A are those indicated in Table 4.

TABLE 4: MARY'S PAYOFFS FROM DRIVECHEAPLY (ACCOUNTING FOR SHADOW TRADES).

Outcome	Pr.	Payoffs without shadow trades	Profits from shadow trades	Value of DriveCheaply for Mary
Successful	50%	$1,000 - $100	$500	$1,400
Unsuccessful	50%	-$1,000 - $100	$500	-$600
Expected Value	100%	-$100	$500	$400

Note also that in this above example, if Mary short-sells more than 2,200 shares of McEngines and of WeSellCars, she can actually ensure that her payoff is positive even if Project A fails.[118] In short, once we account for the possibility of shadow trades, Mary will prefer Project A, even though (i) it has a *negative* net present value *and* (ii) she has an optimal compensation package that ties her remuneration to the value of her company.

We can generalize from this example:[119] risky strategies *create* opportunities for shadow trading with material nonpublic information. By definition, risky projects produce larger swings in the stock prices (and in the firm's output) than safer projects; therefore, for insiders, it is more valuable to have access to early information on projects that are risky. Thus, insiders will have incentives to create risk in order to create opportunities for shadow trades.[120]

To be sure, the mere fact that corporate investment projects may be riskier than they would otherwise have been in the absence of shadow trades does not reveal whether such investment projects will be socially harmful or

[118] If Mary short-sells 2,200 shares, then the profit from shadow trades will be $1,100, which can make up for the payoff of negatve $1,100 in the event Project A fails.

[119] Although in our examples we assumed that Mary would herself be trading the stocks, note that a similar calculus will arise if Mary directs her corporation to trade the stocks based on the same set of information. *See generally* Lee et al., *supra* note 10, for a formal analysis of shadow trading by the manager and by the corporation.

[120] The general idea that a manager may be incentivized to choose riskier investment projects has been discussed in the literature in the context of *classical insider* trades (which are prohibited). *See, e g.*, Lucian Arye Bebchuk & Chaim Fershtman, *Insider Trading and the Managerial Choice Among Risky Projects*, 29 J. FIN. QUANTITATIVE ANALYSIS 1, 2 (1994) (noting that "[u]nder contracts that allow insider trading, managers look more favorably on risky projects"). Our discussion highlights that shadow trades—which are permissible in various forms—can induce managers to take similar investment strategies.

beneficial.[121] But our example illustrates that shadow trades can even incentivize managers to choose NEV projects that are exceedingly risky. NEV projects are not desirable from the social welfare perspective, and typically not desirable from the shareholder perspective either.

B. Shadow Trades and Macroeconomic Risk

What exactly is the link between shadow trading and macroeconomic risk? As already noted, all else equal, insiders at central firms would have opportunities for even larger returns based on shadow trading. This is because the larger the fluctuations created by the insiders are, the more the insiders can profit. But this implies that shadow trading gives incentives to take risks precisely to insiders of companies who can trigger macroeconomic fluctuations. Thus, corporate investment incentives fueled by shadow trades can *contribute* to macroeconomic risk.

This idea becomes even more pronounced when we consider the possibility of bailouts. Indeed, one mechanism through which shadow trading can contribute to macroeconomic risk is by exacerbating the moral hazard problem associated with SIFI bailouts. The financial crisis of 2007–2009 has made clear that the default of some firms can have catastrophic consequences on the economy, and thus should be prevented to the extent feasible. In this vein, despite the claims of policymakers, SIFIs are aware that whenever they are on the verge of bankruptcy the government will necessarily bail them out.[122] The received wisdom is that this dynamic gives SIFIs incentives to take too much risk, which in turn contributes to causing systemic crises.

What, then, is the relationship between the moral hazard SIFIs face due to the prospect of a bailout and the moral hazard central firms face due to the prospect of profitable shadow trades? We argue that there is a perverse complementarity between the two: the moral hazard created by shadow trades can magnify—and can be magnified by—the problems created by SIFI bailouts.

Consider the following. In a typical bailout, the benefits largely accrue to the shareholders and creditors of the firm, while the bailout has, at best, an

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[121] After all, it is possible that the manager's alternative project choice may have been too risk-averse. Indeed, one argument advanced in favor of permitting (classical) insider trades is that managers' private risk aversion might otherwise pull them toward a more conservative investment policy than shareholders would like. *See* Bebchuk & Fershtman, *supra* note 120, at 2 ("Unlike the shareholders, who can diversify, managers' attitude toward a risky project's results is likely to be characterized by a significant degree of risk aversion."). Therefore, to a certain extent, shadow trades can be seen as offering benefits to shareholders. Lee et al., *supra* note 10, illustrate that shadow trades can incentivize managers to prefer NEV projects (i.e., projects that are excessively risky) and in addition, unlike classical insider trades, shadow trades can even incentivize *shareholders* to prefer NEV projects under certain parameter conditions. Lee et al., *supra* note 10, at 204–07.

[122] *See* Peter Conti-Brown, *Elective Shareholder Liability*, 64 STAN. L. REV. 409, 423–25 (2012) (discussing the impossibility of "Never Again" for bailouts).

indirect effect on the conduct of the officers and the directors of a SIFI. In fact, a bailout is generally accompanied by unpleasant conditions imposed by the government on the top executives of the bailed company. For instance, the CEO of AIG, Inc. was required to step down as part of the deal to bailout the company.[123] Anticipating such conditions, top executives have *less* incentive to support courses of actions that might endanger their firm and, consequently, result in a loss of their job and reputation. By contrast, the benefits from (individual) shadow trades accrue directly to the executives. Therefore, shadow trades can have a direct impact on the executives' choices in terms of how to manage the company's day-to-day operation.

While shadow trades can increase risk-taking by insiders of all firms, they create a particularly acute moral hazard problem for key insiders of firms that can impose gigantic externalities, such as SIFIs. Simultaneously, the *shareholders* of these firms have incentives to push management to take more risk, and creditors have fewer incentives to monitor.

Thus, the two mechanisms operate simultaneously and can reinforce each other. The shareholders and creditors are less risk-averse because of the moral hazard created by the prospect of a bailout *and* executives are also more inclined to take risks because they can profit from shadow trades. And these dynamics co-exist precisely among firms, which (by definition) can impose the largest externalities on the economy.

C. Shadow Trade Opportunities During Economic Crises

The eventful last fifteen years serve as a reminder that systemic crises are a fact of life. They can be triggered by any number of unforeseen events. For this reason, it is important to understand not only what can contribute to causing a crisis, but also what can exacerbate its intensity. Shadow trades can play a key role from this perspective as well. On the one hand, insiders can make even larger profits by engaging in shadow trades during a crisis. On the other hand, risky projects that result in negative outcomes can have outsized negative consequences on other firms.

To begin with, there is evidence that firms' idiosyncratic risk increases during economic downturns[124] and that stock prices are much more volatile during recessions.[125] Recall that as share prices fluctuate more, shadow trad-

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[123] William K. Sjostrom, Jr., *The AIG Bailout*, 66 WASH. & LEE L. REV. 943, 967 (2009) (noting that "[a]s a condition to the bailout, Treasury Secretary Henry Paulson required AIG's CEO, Robert Willumstad, to resign").

[124] *See, e.g.*, John Y. Campbell et al., *Have Individual Stocks Become More Volatile? An Empirical Exploration of Idiosyncratic Risk*, 56 J. FIN. 1, 3 (2001) (finding that market, industry, and firm-level volatility measures "increase substantially in economic downturns").

[125] G. William Schwert, *Stock Market Volatility*, 46 FIN. ANALYSTS J. 23, 30 (1990) ("There is strong evidence that stock volatility increases during economic recessions."); Nicholas Bloom, *Fluctuations in Uncertainty*, 28 J. ECON. PERSPS. 153, 155 (2014) ("The volatility of stock markets, bond markets, exchange rates, and GDP growth all rise steeply in recessions.").

ing profits also increase in size. Consequently, these crises-induced volatility spikes increase insiders' ability to profit from shadow trades. Indeed, it is noteworthy that during the recent COVID-19 crisis the Co-Directors of the SEC's Division of Enforcement issued a public statement noting that given the dynamic circumstances created by COVID-19, "corporate insiders are regularly learning new material nonpublic information that may hold an even greater value than under normal circumstances."[126]

Second, recent empirical evidence suggests that during crises the worst affected industries drag down other industries as they become supply bottlenecks.[127] Therefore, insiders of firms that could become bottlenecks might have incentives to gamble and engage in excessive risk-taking. If they win their bet, their company can profit. If they lose, they can still make profits by short-selling the shares of the companies in the sectors that they are dragging down. Because insiders may not even need to break the law to profit from crisis-induced volatility spikes, they have less incentive to take actions to mitigate such volatility and might even have incentives to engage in excessive risk-taking to fuel it.

These considerations suggest that during crises, insiders have greater opportunities to engage in shadow trades and that the consequences of a higher risk propensity of the insiders can be more severe.

D. Possible Advantages of Shadow Trading

Despite these concerns raised by shadow trades, there are also certain benefits of permitting shadow trades, and they ought to be considered. For example, just as in the case of classical insider trading,[128] an alleged advantage of shadow trading is that it can increase the speed at which relevant information is impounded into stock prices.[129] But as noted above,[130] empirical evidence tells a different tale, as prices seem to be more efficient in countries that enforce insider trading prohibitions aggressively.

There is, however, another possible advantage of shadow trading: it might allow firms to internalize part of the positive externalities they generate.[131] For instance, an influential study by Bloom et al. has shown that firms only capture part of the benefits of their investments in research and devel-

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[126] Stephanie Avakian & Steven Peikin, Div. of Enf't, *Statement Regarding Market Integrity*, U.S. SEC. & EXCH. COMM'N (Mar. 23, 2020), https://www.sec.gov/news/public-statement/statement-enforcement-co-directors-market-integrity.

[127] Baqaee & Farhi, *supra* note 17, at 3.

[128] *See* Sugato Chakravarty & John J. McConnell, *Does Insider Trading Really Move Stock Prices?*, 34 J. FIN. QUANTITATIVE ANALYSIS 191, 191 (1999) (noting that "[t]he argument in favor of allowing insider trading is that such trading leads to more informative security prices").

[129] Lee et al., *supra* note 10, at 217.

[130] *See supra* notes 26–28 and accompanying text.

[131] Lee et al., *supra* note 10, at 218.

opment (R&D), which results in a suboptimal level of investment in R&D.[132] But if insiders and corporations are allowed to engage in shadow trading, they might be able to appropriate part of the positive externalities generated by their R&D investment. In such cases, for instance, a corporation might even wish to permit its employees to engage in shadow trades as a form of compensation. From this perspective, the case for permitting shadow trades might be on its best footing if the project is net costly for the corporation but net beneficial for the economy. In that case, shadow trading can be a potential source of funding for projects that do not result in sufficient private benefits but generate positive externalities.[133]

V. Potential Counterarguments

Our analysis has highlighted a link between the availability of shadow trading opportunities and macroeconomic risk. In this Part, we address potential counterarguments.

To begin with, one might question whether insiders of central firms would really be incentivized to make risky investment decisions just to profit from shadow trades. On this point, we note only that *ceteris paribus* rational actors will take on more risk if they can profit by creating risk. To argue otherwise would be assuming that insiders of central firms are either not sophisticated enough to understand the interdependencies in the economy or not pursuing personal profits.

One might also argue that increasing managers' risk propensity may in fact be desirable because, due to their concentrated stakes in one firm, managers tend to be more risk-averse than diversified shareholders.[134] Specifically, the possibility of engaging in shadow trades could ensure that managers' risk-propensity is more in line with the risk-preferences of shareholders.[135] On this point, we generally agree. Nevertheless, the fact that shareholders may prefer their managers to be less risk-averse does not mean that the managers' chosen level of risk in the presence of shadow trades will in fact line up with shareholders' risk-preference. Furthermore, as has been shown, the fact that shareholders prefer more risk does not imply that more risk is better from the social welfare perspective.[136] This is especially true for SIFIs or central firms that are likely to be bailed out. Recall that these firms

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[132] Nicholas Bloom, Mark Schankerman & John Van Reenen, *Identifying Technology Spillovers and Product Market Rivalry*, 81 Econometrica 1347, 1349 (2013) (finding that the social rate of return of the R&D exceeds the private rate of return by a significant margin).

[133] Another way to frame this benefit is that permitting shadow trades can allow a firm to "externalize on shareholders of connected companies part of the cost of its insiders' compensation." *See* Lee et al., *supra* note 10, at 191.

[134] *See, e.g.*, Frank H. Easterbrook, *Two Agency-Cost Explanations of Dividends*, 74 Am. Econ. Rev. 650, 653 (1984) (explaining the difference between managers' and investors' risk-preferences).

[135] *See, e.g.*, Bebchuk & Fershtman, *supra* note 120, at 1–2.

[136] *See generally* Lee et al., *supra* note 10 (modeling the social harm from shadow trades).

can impose gigantic externalities on the economy. But their shareholders internalize only a small fraction of the potential losses that is equal to their investment in the firm *minus* the expected value of the bailout. For this reason, we note that the case for regulating shadow trades is much more compelling for central firms and SIFIs than for other firms.

In addition, one might question whether executives would ever engage in risky NEV projects given that such projects might increase the cost of capital. For instance, in the context of our example, if the investors knew that Mary would finance a risky project with a negative expected value, they should be willing to pay less for the shares of her company. Moreover, the board of directors would constrain the ability of managers to engage in NEV projects. This argument, however, is incomplete. For one thing, recall that firms—as corporations—can freely trade on material nonpublic information in the stocks of connected companies, and these trades would benefit *pro rata* all the shareholders. Given the payoffs in Table 1, DriveCheaply is an NEV project for DriveSafely. However, if DriveSafely buys more than 2,000 shares in its supplier and customer if the project is successful—or if it short-sells more than 2,000 of their shares if it is unsuccessful—then the project would have a positive net present value. Importantly, DriveCheaply would still not be a project that creates value, but the possibility of engaging in shadow trades allows DriveSafely to extract value from the firms to which it is connected. Under these circumstances, the shareholders would have no incentives to prevent Mary from investing in DriveSafely because they, too, would benefit from shadow trades via the corporation.[137] Thus, the prospect of shadow trades via the corporation can *reduce* the cost of equity for central firms whenever managers engage in risky projects, even when they are NEV projects. All that Mary has to do is to engage in shadow trades via the corporation to increase the payoffs of her shareholders. Note further that the shareholders of a firm face asymmetric payoffs: they can capture the full upside of successful projects, whereas their losses cannot exceed the capital invested.[138] Hence, the shareholders might favor risk creation provided that the potential upsides are sufficiently large. Separately, there are also projects that are NEV from the social perspective, but are positive-expected-value (PEV) from the firm's perspective. In particular, the creation of macroeconomic risk is in itself an externality, and as such, the shareholders internalize only a fraction of the expected losses.[139]

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[137] Since the fiduciary obligation of the directors is toward their shareholders, it is unlikely that they would oppose to DriveSafely on the basis that it could harm connected firms or that it could create systemic risk.

[138] Roberta Romano, Foundations of Corporate Law 91 (2010) ("Corporations are . . . likely to take on too much risk from a social-welfare perspective, as the equity owners capture all the benefits from the potential upside return of a risky project, while the downside risk is shared with creditors.").

[139] Lucian A. Bebchuk & Holger Spamann, *Regulating Bankers' Pay*, 98 Geo. L.J. 247, 256 (2009) ("[I]n the event the risky strategy would produce a loss . . . the shareholders will not bear this loss fully. Rather, they will lose only . . . their capital invested in the bank, with

Finally, while acknowledging that shocks at a single firm can cause significant fluctuations, one might still be skeptical about the idea that one insider of a central firm can make decisions with the potential to produce shocks of a sufficient magnitude to trigger macroeconomic consequences. On this point, it is worth clarifying our main argument. Our assertion is not that a *single* decision of a *single* insider of a *single* central firm will produce macroeconomic consequences. Rather, we argue that the availability of shadow trading opportunities will tend to skew the preferences of *many* insiders across multiple central firms toward more risk-taking. The actions taken by insiders in the aggregate will then result in successful projects as well as failures, and the combination of the effects of those decisions will propagate through the economy via linkages of various kinds. At times, the reverberations of these excessively risky choices will compound and trigger macroeconomic fluctuations.

Consider again the parallel with bailouts. It is an established fact that the distorted incentives created by the prospect of a bailout can threaten the stability of financial markets.[140] Nevertheless, this is not because a single action of a single insider of a single systemically important firm can trigger catastrophic consequences. Indeed, nobody would affirm that the decision of a single insider of JPMorgan Chase could trigger a systemic crisis. Instead, bailouts give diffuse incentives to engage in excessively risky behaviors to many agents that play a key role in systemically important firms. It is the many decisions by the many insiders of all the systemically important firms that become slightly skewed toward excessive risk-taking due to the prospect of bailouts. Taken together, these decisions can cause—and have caused—catastrophic consequences. The same argument applies to shadow trades. But as mentioned above, one fundamental difference between shadow trades and bailouts is that, while there may be compelling reasons to bail out systemically important firms, there are no equally strong arguments to protect the ability of insiders of central firms to engage in shadow trades.

VI. Policy Implications

In a companion paper focusing on the local consequences of shadow trading,[141] we have shown that efficiency dictates that shadow trading should be considered illegal when the firm has a policy explicitly prohibiting it. However, when a firm does not have such an explicit prohibition, the case

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the remainder . . . borne by depositors and/or the government as guarantor of depositors."); Steven L. Schwarcz, *Collapsing Corporate Structures: Resolving the Tension Between Form and Substance*, 60 Bus. Law. 109, 144 (2004) (arguing that risks taken by the corporation produce externalities).

[140] *See, e.g.*, Lawrence H. Summers, *International Financial Crises: Causes, Prevention, and Cures*, 90 Am. Econ. Rev. 1, 13 (2000) (stating that "it is certain that a healthy financial system cannot be built on the expectation of bailouts").

[141] *See generally* Lee et al., *supra* note 10.

for regulating shadow trading was not clear. For this reason, we remained agnostic on whether prohibiting shadow trading in such circumstances is warranted.

In this Article, we turned our attention to the macroeconomic consequences of shadow trading. This allowed us to highlight that shadow trading can also create important trade-offs at the systemic level. On the one hand, allowing insiders to trade on the basis of material nonpublic information increases the speed at which relevant information is impounded into stock prices,[142] and hence stock markets will be informationally more efficient. Moreover, shadow trading also allows firms to internalize part of the positive externalities they create—for instance, when they invest in R&D.[143] On the other hand, shadow trading can contribute to the creation of macroeconomic risk and worsen the consequences of economic crises.

As these are externalities that cannot be internalized contractually, our analysis reveals that policymakers cannot unconditionally defer to private ordering and must consider the possibility of imposing substantive limitations on shadow trading, especially for central firms whose investment practices can trigger aggregate fluctuations.[144]

In this Part, we discuss potential methods of regulating shadow trades and the issues to consider.

A. Disclosure Requirements

Given that shadow trades can impose significant negative externalities but also produce some benefits, increasing transparency is an important starting point. At a minimum, transparency regarding the extent of shadow trades can help policymakers gather sufficient information to identify the optimal policy mix to respond to the threat posed by shadow trading to the stability of the economy. This goal can be achieved by introducing new disclosure requirements in terms of company policies and of shadow trading

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[142] Chakravarty & McConnell, *supra* note 128, at 191–93.

[143] *See supra* Section V. .

[144] In practice, an insider might learn about material nonpublic information not only by creating it but also due to her position within the company. For instance, an insider may learn that the supply chain will be facing a negative shock due to a negative event that is affecting a small supplier of an important input. At first glance, allowing the insider to trade in the stocks of the companies in the supply chain based on this information would not appear to create moral hazard problems because the insider did not directly contribute to creating the negative event faced by the small supplier. A question thus arises as to whether such scenarios ought to be treated differently for enforcement purposes. Our tentative conclusion is that they should not be. Part of the reason is that—aside from the difficulty of ascertaining the source of information—in many such situations, corporate insiders likely have the ability to mitigate or prevent risk by taking both *ex ante* and *ex post* measures. For example, *ex ante* they could have chosen to diversify the supply chain instead of relying on a single small supplier. Or they could have made investments to help the small supplier prevent that negative events would have a catastrophic impact. *Ex post* they may be able to search for substitutes and reduce the negative impact. Thus, even in these cases shadow trading might give insiders incentives to increase the overall level of risk by discouraging investments in risk prevention and mitigation.

practices. On this point, our suggested solutions are similar to those of Ayres & Bankman.[145]

1. Company Policies

To begin with, firms should be required to disclose in a simple manner their companies' shadow trading policies. Specifically, each firm should disclose the following in their Form 10-K or 20-F:

(a) whether the firm explicitly prohibits its employees from engaging in all shadow trades;

(b) if not, a list or a general description of stocks its employees can permissibly trade based on material nonpublic information from the firm as well as the firm's internal clearance and reporting policy, if any, before its employees can engage in shadow trades; and

(c) the firm's own corporate shadow trading policy.

As we mentioned, many firms already include insider trading policies in their codes of conduct. But the language can vary from one firm to another, and it can be taxing for investors to locate each firm's code of conduct and study its insider trading policy. Having a simple disclosure regime on this point would increase transparency at a very low cost.

This disclosure requirement could be modeled after the one implemented by the SEC in 2019 under Item 407(i) of Regulation S-K. Under this rule, corporations must disclose in their proxy statements "any practices or policies that the registrant has adopted regarding the ability of employees . . . or directors . . . to . . . engage in transactions, that . . . are designed to hedge or offset, any decrease in the market value of registrant equity securities."[146] This rule does not prohibit shadow trades, but merely requires corporations to disclose whether they have adopted any internal policies governing their employees' hedging activities. We suggest that companies should likewise be required to disclose whether they have adopted any internal policies governing their employees' shadow trading. The SEC's 2022 amendment to Rule 10b5-1 requiring "comprehensive disclosure about issuers' policies and procedures related to insider trading" also serves as a good model.[147]

The primary effect of such disclosure regulation would be to bring greater transparency with respect to the issuers' various shadow trading policies and the possibilities that these issuers or their employees may engage in shadow trades. The secondary effect, however, may be to encourage more firms to adopt explicit policies prohibiting shadow trades by their employees.

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[145] *See* Ayres & Bankman, *supra* note 6, at 288–90.

[146] 17 C.F.R. § 229.407(i).

[147] *SEC Adopts Amendments to Modernize Rule 10b5-1 Insider Trading Plans and Related Disclosures*, U.S. Sec. & Exch. Comm'n (Dec. 14, 2022), https://www.sec.gov/news/press-release/2022-222; *see also* Insider Trading Arrangements and Related Disclosures, 87 Fed. Reg. 80362 (Dec. 29, 2022) (codified at 17 C.F.R. pts. 229, 232, 240, 249).

2. Disclosure Obligation of Shadow Trades

Shadow trades are so named because they take place in the shadow—in other words, these transactions need not be disclosed by the insiders. For this reason, we still know relatively little about them. Given the potential impact that they can have on the economy, we believe this ought to change. Accordingly, we suggest that—to the extent shadow trades are not otherwise prohibited by firms—the same disclosure requirements that apply to traditional insider trading under Section 16(a) should be extended to also cover shadow trades carried out by statutory insiders of central firms (especially SIFIs) and shadow trades carried out by central firms and SIFIs.

As discussed in section IV.A, the top executives have an incentive to engage in risky strategies to create material nonpublic information on which they can profit. This strategy is not necessarily in the best interest of shareholders because it might negatively affect the cost of equity; however, managers can compensate their shareholders for the risk by engaging in trades via the corporation, thus keeping the cost of equity down.

Against this background, mandating disclosure of such trades might reduce the profitability of shadow trades by signaling to the market that a firm is trading in connected companies. In turn, such a mandate would reduce managers' ability to compensate shareholders for risk-taking. Shareholders will then have greater incentive to engage in monitoring and the cost of equity for central firms that engage in risky projects will rise.

B. Substantive Limitations

Given the limited information available on shadow trading, a full comparison of the costs and benefits of implementing substantive limitations on shadow trading is not possible. We do know, however, that the costs of shadow trading are significantly higher when it is carried out at central firms because such firms can have an outsized impact on macroeconomic risk. Thus, one-size-fits-all solutions are unlikely to be warranted. Policymakers can instead focus their attention on the relatively few central firms.

There are at least two ways in which policymakers can consider limiting shadow trading at central firms. First, one can imagine a complete ban on shadow trading by statutory insiders at central firms. This would be a drastic measure, and it is worth noting that Rule 10b-5 does not provide grounds for prohibiting shadow trading when a corporation is otherwise willing to allow its employees to engage in such trades. Second, one can imagine a "short swing" rule for shadow trades. Currently, Section 16(b) of the Exchange Act requires statutory insiders to return to the company any profit deriving from the purchase or sale of their corporation's equity securities within a period of less than six months.[148] Extending the swing rules to

[148] *See* Securities Exchange Act of 1934 § 16(b), 15 U.S.C. § 78p(b) (2000).

cover trades by statutory insiders of central firms in economically linked companies—when they have material nonpublic information from their own firm[149]—would greatly reduce the profitability of shadow trading, and hence the reward for engaging in excessive risk-taking.

Our analysis suggests that policymakers should seriously consider the possibility of implementing limitations along these lines. In the meantime, the disclosure requirements we have suggested would provide important information both on the extent to which substantive limitations on shadow trading are warranted and on how such limitations should be implemented.

C. Trades by Insiders in Their Own Stocks

Enforcement of insider trading prohibitions is necessarily imperfect. Therefore, insiders still engage in trades in the shares of their firm based on material nonpublic information. According to standard economic theory, the likelihood that an insider engages in this kind of trades depends on the possible gains, on the magnitude of the sanction, and on the probability of detection.

It is also known that a manager who has an opportunity to trade profitably on her company's material nonpublic information may have an incentive to engage—all else equal—in a riskier investment strategy. Our framework shows that from the social welfare perspective, an excessively risky project by an insider of a central firms might have more negative consequences. Therefore, we suggest the following: (i) the SEC should concentrate a larger share of its resources on monitoring the trading behavior among firms in central sectors; and (ii) sanctions for insider trading should likewise be larger for insiders at those firms. An easy way to scale the sanction by the level of macroeconomic risk created by the firm would be to multiply the basic sanction for the normalized centrality score of the industry.

Conclusion

This Article is the first to identify a connection between insider trading regulation and macroeconomic risk. The main idea is that unregulated shadow trades can: (i) create a moral hazard problem that can lead insiders of central firms and SIFIs to engage in excessively risky projects; (ii) increase the level of risk to which the economy is exposed and exacerbate the moral hazard problem created by the prospect of bailout for SIFIs; and (iii) worsen the effect of economic crises. For these reasons, our Article has sug-

[149] Section 16(b) does not have any knowledge requirement because short-swing profits made by insiders are assumed to be due to nonpublic information that affect the performance of the corporation. If shadow trades were to be regulated, however, the knowledge requirement would have to be included: that short-swing profits from shadow trades are based on material nonpublic information from the employer.

gested a number of policy reforms that would mitigate the negative consequences caused by shadow trading.