

Evaluating Stock-Trading Practices and Their Regulation

Merritt B. Fox* & Kevin S. Haeberle**

High-frequency trading, dark pools, and the practices associated with them have come under tremendous scrutiny lately, giving rise to much hot rhetoric. Missing from the discussion, however, is a principled, comprehensive standard for evaluating such practices and the law that governs them. This Article fills that gap by providing a general framework for making serious normative judgments about stock-trading behavior and its regulation. In particular, we argue that such practices and laws should be evaluated with an eye to the secondary trading market's impact on four main aspects of our economy: the use of existing productive capacity, the allocation of capital, the allocation of resources over time, and the allocation of risk. Three additional considerations should also be taken into account: the amount of resources consumed by the operation of the market, the market's ability to innovate, and fairness.

I. INTRODUCTION	888
II. THE USE OF THE ECONOMY'S EXISTING PRODUCTIVE CAPACITY	890
A. <i>The Role of a Well-Functioning Stock Market in Promoting Accurate Share Prices</i>	891
B. <i>How More Accurate Share Prices Deter Non-Share-Value-Maximizing Production Decisions</i>	891
1. <i>Alerting Corrective Forces to Non-Maximizing Behavior</i>	893
2. <i>Reducing the Riskiness of the Investment Necessary to Take Corrective Action</i>	894
3. <i>Providing Guidance to Managers</i>	894
4. <i>Enhancing the Effectiveness of Share-Price-Based Compensation</i>	894
C. <i>Share Value Maximization and the Use of Existing Productive Capacity to Produce the Output of the Greatest Social Value</i>	895
III. THE ALLOCATION OF CAPITAL.....	897
A. <i>The Meaning of Efficient Capital Allocation</i>	897
B. <i>How More Accurate Share Prices Promote More Efficient Capital Allocation by Prompting Managers to Maximize Share Value</i>	898
1. <i>Project Choice in the Presence of Available Internal Funds</i>	898

* Michael E. Patterson Professor of Law, NASDAQ Professor for the Law and Economics of Capital Markets, Columbia Law School.

** Associate Professor of Law, William & Mary Law School.

2. Share-Value-Maximization Requires Avoiding the Implementation of Negative NPV Projects	898
3. Avoiding the Implementation of Negative NPV Projects Avoids Social-value-decreasing Uses of Society's Scarce Capital.....	899
4. The Natural Tendency of Managers to Use Internal Funds to Implement Negative NPV Projects and the Particular Importance of Accurate Prices to Combat This	899
5. The Danger of Inaccurately Low Share Prices Leading Managers to Avoid Implementing Positive NPV Projects	900
C. How More Accurate Share Prices Promote Efficient Capital Allocation by Their Effects on the Terms of External Finance.....	901
1. Classical Finance Theory	901
2. Institutional Finance Theory	902
a. A firm with a Positive NPV Project and an Inaccurately Low Share Price	902
b. A Firm with a Negative NPV Project and an Inaccurately High Share Price	902
c. The Effect of Inaccurate Share Prices on the Use of Debt	903
IV. THE ALLOCATION OF RESOURCES OVER TIME.....	904
A. The Meaning of an Efficient Allocation of Resources Over Time	904
B. How a More Liquid Market Can Promote the Efficient Allocation of Resources Over Time	905
V. THE ALLOCATION OF RISK.....	906
A. The Meaning of Efficient Risk Allocation.....	907
B. How a More Liquid Market Can Promote the Efficient Allocation of Risk.....	908
VI. ADDITIONAL CONSIDERATIONS	908
A. Resource Consumption by the Market Itself.....	909
B. Fairness.....	909
1. Actual Fairness	909
a. Situation 1: Ex Ante, the Person Whose Trade Was Affected by the Practice Was as Likely to Have Done Better in Terms of Trading Profits as to Have Done Worse	910
b. Situation 2: Ex Ante, the Person Whose Trade Was Affected by the Practice Was Not as Likely to Have Done Better in Terms of Trading Profits as to Have Done Worse, But the General Existence of the Practice Leads to Some Kind of Fully Compensating Change	911
2. Perceived Fairness	912
C. Innovation	912
VII. CONCLUSION	913

I. INTRODUCTION

Pundits, policymakers, and scholars alike have expressed a variety of views over recent years concerning the functioning of the market for the public trading of previously

issued equity securities and how this market should be regulated. These commentators, however, have largely failed to consider the overall social criteria by which the answers to these questions should be judged. This Article seeks to set forth a guiding framework that provides these diverse voices with a common language that can facilitate informed analysis.

How exactly should trading-market practices and their regulation be evaluated? Answering this question requires thinking about why we care about this market in the first place. In other words, we need to consider how a well-functioning secondary trading market for equities creates social value. In this Article, we identify four dimensions along which a well-functioning market can enhance economic efficiency:

The use of the economy's existing productive capacity. A well-functioning stock-trading market can prompt the more efficient use of the economy's existing productive capacity so as to maximize the value of the goods and services that it yields.

Capital allocation. A well-functioning market can also assist in the efficient allocation of society's scarce capital, helping to steer it to the most-promising proposed new investment projects in our economy.

Resource allocation over time. A well-functioning market can promote the efficient division of currently available resources between the production of goods and services for *current consumption*, and the creation of new productive capacity. This new productive capacity in turn will allow for the greater production of goods and services in subsequent periods than would otherwise have been the case, thereby allowing for greater *future consumption*. In other words, it facilitates the adoption of the most efficient level of savings and investment by individuals and businesses in the economy.

Risk allocation. A well-functioning market can aid in the reallocation of the risks generated by the inevitably volatile cash flows generated by each of the firms in the economy, so that investors, most of whom are risk averse, hold portfolios of these firms that lead to investors suffering as little pain as possible.

A critical task evaluating any given market practice or regulation is thus to compare a world with and without the practice or regulation to see whether its presence helps or hurts the market in creating social value in each of these four ways. This task is greatly simplified by the fact that the equities trading market has two key characteristics—price accuracy and liquidity—that are central to the creation of social value along these four dimensions. *Price accuracy* concerns the accuracy with which the market price of an issuer's shares predicts the future cash flows the issuer will generate. *Liquidity* relates to the costs of transacting. The latter is a multidimensional concept involving the size of a trade, the price at which it is accomplished, and the time it takes to be completed. Generally, the larger the size of the purchase or sale and the faster one wishes to accomplish it, the less desirable will be the price. The more liquid the market is, however, the less severe are these trade-offs. The more accurate the market's share prices are and the greater these shares' liquidity, the better the market is at generating social value in the four ways introduced above.

Beyond this analysis concerning the impact of a practice or regulation on the creation of social value in these four ways, a proper evaluation requires three additional considerations:

Consumption of real resources. Evaluating a practice or regulation requires an understanding of its effects on the amount of resources society devotes to the operation of the equities trading market. All the activities associated with this market, including those

involved in compliance with, and enforcement of, its regulations, consume considerable real resources. These include equipment, communications facilities, real estate, and talented personnel. These are resources that, if not used to operate the market, would be available to produce more in the way of other goods and services that people enjoy.

Innovation. It is important to know effects of a practice or regulation on the capacity of the system to further innovate in favorable ways in the future. Indeed, history has shown the overall system of equities trading to be very dynamic, with changes driven by innovations in both technology and market-participant strategies. Such innovations have often allowed the equity market to generate greater social value or reduce resources it consumes in satisfying a given amount of trading interest.

Fairness. The actual fairness of a practice is a worthy concern in and of itself. Indeed, promoting such fairness has traditionally been regarded as a core mission of securities regulation.¹ Moreover, mere perceptions of unfairness, whether accurate or not, are important as well. For one thing, perceptions of unfairness associated with a social institution as significant as the stock market create a sense of demoralization that diminishes social utility. For another, these perceptions can substantially affect how well the equities trading market performs in creating social value in all the ways mentioned above, a concept that is often loosely referred to as “confidence in the market.”

The remainder of this Article proceeds along the following lines. Parts II through V detail, in turn, each of the four dimensions along which a well-functioning stock market can enhance economic efficiency and hence create social value. Each dimension thus forms an essential prong of our framework for evaluating market practices and regulations. Part VI then provides an overview of each of the three additional considerations—resource consumption, innovation and fairness—that should be taken into account in the evaluation process.

II. THE USE OF THE ECONOMY’S EXISTING PRODUCTIVE CAPACITY

One of the critical functions in any economy is to decide how to deploy its existing productive capacity so that it produces the mix of goods and services most valued by society. In a capitalist economy where a significant portion of production is undertaken by publicly traded companies with dispersed shareholdings, a well-functioning secondary market for public-company stocks plays an important role in this process. Specifically, all else equal, the more accurate share prices are in that market, the closer the mix will be to the one most valued by society. The overall story, detailed in this Part, runs as follows.

Step one involves the accuracy with which a firm’s future cash flows to its shareholders is predicted by its share price. The more information relevant to making this prediction is incorporated into this price, the more accurate the price is. A well-functioning market helps in two ways. First, new information allowing a more accurate appraisal of the stock’s value than is currently reflected in its market price is constantly becoming publicly available. A liquid trading market fosters buying and selling activity that moves price to rapidly incorporate this information. Second, creating and trading upon new private fundamental value information can yield expected profits. The more liquid the market and

1. See, e.g., Securities Exchange Act of 1934, 15 U.S.C. § 78b (2010) (noting the need “to insure the maintenance of fair and honest [securities] markets”).

the more it is otherwise structured to enhance the profitability of such information creation, the greater are the incentives to do so and the more accurate share prices are.

The next step is that more accurate share prices increase the effectiveness of a number of mechanisms that deter managers from making non-share-value-maximizing decisions concerning the use of the firm's existing productive capacity, decisions that their personal interests might otherwise incline them to make.

Finally, as we will show below, the production decisions by managers that maximize share value turn out to be the ones that utilize the economy's existing productive capacity in a way that yields the particular mix of goods and services that society would value most. Thus, the more liquid the market and more that it is structured to reward the creation of new fundamental value information, the closer the economy will come to this optimal use of the economy's existing productive capacity.

A. The Role of a Well-Functioning Stock Market in Promoting Accurate Share Prices

A well-functioning stock market has the potential of generating share prices reflecting a more accurate prediction of a firm's future cash flows than any prediction an individual or group is able to generate on a consistent basis on its own. It does so in two ways.

First, a liquid market provides a forum that allows the traders who first learn about a new piece of publicly available information to profit by buying when the information indicates that a firm's current share price is too low and by selling when it indicates the price is too high. This is the fundamental mechanism behind the efficient market hypothesis, which stands for the proposition that share prices in such a market quickly incorporate all publicly available information.²

Second, such a market incentivizes the production of private information that allows a more accurate appraisal of a stock's value than what its current price implies. Greater liquidity reduces the transaction costs associated with speculative trading based on acquiring a variety of bits of information and analyzing them to make more accurate predictions of an issuer's cash flows. In other words, greater liquidity reduces the transaction costs associated with trading upon new fundamental value information that the trader creates or pays to have created. Thus greater liquidity, by lowering the costs of trading on fundamental value information not yet reflected in price, makes such trading more profitable and hence stimulates the creation of such information. The more such information is created and traded upon, the more accurate are share prices.

B. How More Accurate Share Prices Deter Non-Share-Value-Maximizing Production Decisions

What do accurate share prices have to do with managers making share-value-maximizing decisions concerning the use of the existing productive capacity under their direction? The starting point is to note that most shareholders invest with the aim of having a portfolio that, adjusted for risk, will get them the most they can in return for their savings.

2. See, e.g., Merritt B. Fox et al., *Informed Trading and Its Regulation*, 43 J. CORP. L. (forthcoming 2018) [hereinafter Fox et al., *Informed Trading*] (discussing these and other types of information-based trading); LARRY HARRIS, *TRADING & EXCHANGES: MARKET MICROSTRUCTURE FOR PRACTITIONERS* 6 (2003) ("Information [t]raders . . . estimate fundamental values [and] cause prices to reflect their value estimates.").

This translates to wanting the managers of each firm in their portfolio to make decisions—including those with respect to the use of the firm's productive capacity—that maximize the value of its shares.³ The problem here is that ordinary shareholders do not run publicly traded firms. Instead, decisions like those concerning the deployment of companies' existing productive capacity are in the first instance made by firm managers. A substantial portion of publicly traded firms are "management controlled," in the sense that the holders of their shares are sufficiently dispersed that no one shareholder or organized group of shareholders has a control block.

When making production decisions, these managers are mere mortals. They are driven to use their power at least in part to obtain the same ends that drive most people: compensation, perquisites, respect, power, affection of those around them, and a sense of rectitude, among other things.⁴ Given this, there is no guarantee that managers will use their discretion in making production decisions to make the ones that maximize share value. Indeed, the fundamental problem of the corporate governance of management controlled corporations is how to design a structure of carrots and sticks that optimally channels these personal drives so that the decisions the managers make will in fact be value-maximizing, i.e., the ones that are in the best interests of their shareholders.⁵

Enter the market for seasoned stock. As we have seen, properly structured, this market has the potential of generating prices reflecting a more accurate prediction of the value of a firm's stock—the future expected cash flows for the rest of the life of the firm (discounted to present value) paid to a holder of a share⁶—than that any individual or group is able to generate on a consistent basis. More accurate share prices increase the effectiveness of four mechanisms that incentivize the managers to make decisions concerning the use of the firm's existing productive capacity that are closer to the ones that maximize a firm's share value. First, a more accurate share price is more likely to alert the market to instances of non-share-value-maximizing behavior on the part of a firm's managers. This increases the likelihood of corrective action, which could come from the members of the firm's board who are independent of management, an activist hedge fund, or a hostile acquirer. Second, more accurate prices makes less risky the investment needed to take action by a potential activist hedge fund or hostile acquirer and so it will be more willing to do so. Third, a more accurate share price provides better guidance to managers themselves as to how to

3. RICHARD A. BREALEY ET AL., PRINCIPLES OF CORPORATE FINANCE 7 (11th ed. 2013) (noting that shareholders "differ in age, tastes, wealth, time horizon, risk tolerance, and investment strategy" but that they can all agree on the financial objective of "[m]aximiz[ing] the current market value of [their] investment in the firm.>").

4. For the seminal articulation of this problem associated with the separation between ownership and control in the modern large corporation, see ADOLF BERLE, JR. & GARDINER C. MEANS, THE MODERN CORPORATION AND PRIVATE PROPERTY (1932); see also Michael C. Jensen & William H. Meckling, *Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure*, 3 J. FIN. ECON. 305, 308–10 (1976) (discussing agency costs and the firm).

5. See, e.g., WILLIAM T. ALLEN ET AL., COMMENTARIES AND CASES ON THE LAW OF BUSINESS ORGANIZATIONS 12–13 (3d ed. 2009).

6. Share value is determined by the future expected cash flows, discounted to present value, a firm is expected to generate and pay out to the holder of the share. See, e.g., Marcel Kahan, *Securities Laws and the Social Cost of "Inaccurate" Stock Prices*, 41 DUKE L.J. 977, 979 (1992) (defining a stock's fundamental value as "the best estimate at any time, and given all information available at such time, of the discounted value of all distributions . . . accruing to a stockholder who continues to hold the stock."). Indeed, stocks can even be thought of as ultimately having *actual* values based on the actual amounts that their holders end up receiving. See Merritt B. Fox, *Shelf Registration, Integrated Disclosure, and Underwriter Due Diligence: An Economic Analysis*, 70 VA. L. REV. 1005, 1013–14 (1984).

maximize share value. Fourth, a more accurate share price makes share-price-based managerial compensation more effective in incentivizing share-value-maximizing decisions. We touch on each of these points in turn throughout the remainder of this section.

1. Alerting Corrective Forces to Non-Maximizing Behavior

More accurate pricing increases the likelihood that persons outside a firm's full time management become aware when these managers deviate from value-maximizing behavior. Outsider awareness of the problem can lead to corrective action through a number of channels. One possible channel is the firm's own independent directors, who use their powers under corporate law to redirect or replace the errant managers. A second channel is an activist hedge-fund, which can combine the votes of its own toe-hold shareholdings with those of other institutional investors to change the board to accomplish the same ends.⁷ A third channel is a hostile takeover by a person or entity that seeks to profit by running the company in a more share-value-maximizing way.

The corrective role of activist hedge funds, and of institutional investors more generally, has grown in recent years. The practice of using the shareholder franchise to effect change depends on institutions or wealthy individuals, each holding somewhere between as little as perhaps a fraction of one percent and a few percent of the issuer's outstanding shares. These stakes are large enough that free-rider/collective-action problems do not lead to a signal of non-maximizing behavior just being ignored or, where it is noticed, to an unwillingness to engage in even the minimal effort needed to coordinate with other shareholders when someone—often an activist hedge fund—takes the lead.⁸ For most publicly traded corporations that lack a controlling shareholder or group, the growth of institutional investing means that shareholders of this kind hold in aggregate sufficiently large portions of the total shares outstanding to play a potentially critical role in voting.⁹

Importantly, we do not need to see frequent examples of corrective action through any of these channels for them to greatly reduce non-maximizing behavior. Their mere availability is often enough. Managers do not want to lose their jobs, and the threat of replacement alone can lead them to avoid such behavior. Indeed, in an ideal world, ex ante avoidance by managers would totally dominate actual ex post correction by the market.

7. William W. Bratton, *Hedge Funds and Governance Targets*, 95 GEO. L.J. 1375 (2007) (showing that hedge funds have a high record of success in using the proxy system to achieve corporate change); Alon Brav et al., *Hedge Fund Activism, Corporate Governance, and Firm Performance*, 63 J. FIN. 1729 (2008) (demonstrating that activists are at least partially successful at achieving corporate change two-thirds of the time and that there are statistically significant abnormal returns in the range of 5%–7% around the time of the announcement that a hedge fund has become active with respect to a particular issuer).

8. For a more detailed discussion of the severe collective-action problems associated with holders smaller than this, see Merritt B. Fox, *Required Disclosure and Corporate Governance*, 62 LAW & CONTEMP. PROB. 113, 116–18 (1999).

9. Jay C. Hartzell & Laura T. Starks, *Institutional Investors and Executive Compensation*, 58 J. FIN. 2351, 2356 (2003) (in a sample including all the firms in the S&P 500 Index, the S&P Midcap Index, and the S&P Smallcap Index, the average aggregate institutional holdings are 53.1% of shares outstanding and the average holdings of the top five institutional investors in a firm are 22% of the outstanding shares and 44% of the aggregate institutional holdings.); Accord M.M. Cornett et al., *The Impact of Institutional Ownership on Corporate Operating Performance*, J. BANKING & FIN. 1771, 1778 (2007) (in a sample of the firms in the S&P 100, 59.4% of shares outstanding were held by institutions, and the average holdings of the top five institutional investors in a firm is 20.1% of the outstanding shares).

2. Reducing the Riskiness of the Investment Necessary to Take Corrective Action

More accurate prices may enhance the effectiveness of the activist hedge fund and hostile tender offer threat in a second way as well. This is by reducing the firm-specific risk associated with the shares of a firm with non-maximizing managers. Greater price accuracy reduces the firm-specific risk that comes along with ownership of the shares of such a firm. This occurs because, with more information about the firm's condition and prospects already reflected in its stock price, there will be less in the way of volatility-inducing surprises.

Investors can entirely avoid suffering from firm-specific risk by holding a sufficiently diversified portfolio of stocks.¹⁰ In contrast, an activist hedge fund or a hostile tender offerer cannot avoid such risk. To accumulate a block of the target firm's shares large enough to successfully execute its strategy will inevitably leave it less than fully diversified. In short, the firm-specific risk associated with investment in the target firm matters. The greater this risk, the riskier it is to hold the block of shares. Thus, greater price accuracy, by reducing firm-specific risk, makes it less likely that the activist hedge fund or hostile acquirer will be deterred from acting by the riskiness of the needed investment when it sees signals of non-maximizing behavior. This makes the threat posed by such actors more real and hence more effective at improving managerial decision-making.

3. Providing Guidance to Managers

A firm's share price can provide useful guidance to managers as to what in fact are share-value-maximizing decisions. To be sure, for the most part, managers know more about what is going on within the firm than does anyone else. But even the most share-value-maximizing oriented managers are not so expert relative to others with respect to many features of the outside environment within which the firm operates. Prices in an efficient market very usefully incorporate publicly available information concerning these features of the outside environment. Again, also, there are expected trading profits for persons who create new private information of this sort. Accordingly, market prices can reflect predictions of the effects of these features of the outside environment on the firm's future cash flows that are better than the parallel predictions of the managers concerning the same matters. The bottom line is that managers can benefit from the informational signals found both in the price of their company's stock as well as the prices of certain other companies—such as their competitors.

4. Enhancing the Effectiveness of Share-Price-Based Compensation

Share-price-based compensation can help align the personal incentives of managers with the share value-maximizing desires of shareholders. Typically, this form of compensation takes the form of the award of a right to receive in the future an amount based on the increase in the stock price, if any, between the time of the award and the time when the right vests. The period between the award and the vesting is usually measured in years. The less accurate the company's stock price is expected to be at the time that the manager realizes his share-price-determined gain, the less effective this form of

10. The paradigm is an investor in an index fund that has proportionate holdings in all the different stocks in the market. *See infra* note 40 and accompanying text.

compensation is at prompting the manager to make share-value-maximizing decisions.

Consider the diminished incentive effects if the manager anticipates that the price at the time of vesting, while perhaps an unbiased estimate of the value of the shares at that point, will not very accurately reflect her decision's true consequences for firm value. In other words, the manager anticipates that there is a significant chance that the price will be substantially above or below the stock's true value down the road at the time of vesting. If this is what she anticipates, she will not be as motivated to override her parochial self-interests and make the production decisions that would be share-value-maximizing. She knows that should she make share-value-maximizing decisions, but the price at vesting time turns out to be inaccurately low, she will not get fully rewarded for sacrificing her self-interests. Likewise, should she instead make non-share-value-maximizing decisions in furtherance of her own parochial self-interests and the price turns out to be inaccurately high at vesting time, she will not be fully punished for neglecting to maximize share value. In contrast, if the price is more accurate, she will be more reliably rewarded for making value-maximizing decisions and more reliably punished for making non-maximizing ones.¹¹

C. Share Value Maximization and the Use of Existing Productive Capacity to Produce the Output of the Greatest Social Value

So far, we have established that a well-functioning stock market leads to more accurate share prices and that more accurate share prices increase the effectiveness of a number of mechanisms that deter managers from making the non-share-value-maximizing decisions concerning the use of the firm's existing productive capacity. The last step in this initial part of our story is to show that the production decisions that maximize share value are the ones that utilize the economy's existing productive capacity in a way that yields the particular mix of goods and services that society values most. This is an important conclusion because the public firms with shares that are regularly bought and sold on organized trading venues play a major role in the nation's economy.¹² The managers of these important players in the economy thus make decisions that affect how a substantial portion of the existing productive capacity of the country is used.

To see how we get to this conclusion, assume, as a rough approximation of reality, that publicly traded firms operate in competitive markets and are properly regulated to account for their externalities such as pollution. Under these circumstances, what a firm

11. More accurate prices may be able to help the effectiveness of share-price-based compensation in another way as well. The problem for managers with this mode of pay, compared to straight salary with the same expected value, is the undiversifiable, firm-specific risk it imposes on the manager. As noted earlier, greater price accuracy is likely to lead to less such risk because there will be less in the way of volatility-inducing surprises. As a result, a manager, when offered a total compensation package with a given expected value, will be willing to take a larger portion of it in share-price-based form. In the end, with more pay tied to the firms' fortunes, this mechanism for increasing the extent to which managers put shareholder and social interests ahead of their own has a better chance of accomplishing its goals. In fact, there is empirical evidence that a reduction in the riskiness of an issuer's stock will increase the proportion of stock-based compensation that a manager is willing to accept. Clifford G. Holderness et al., *Were the Good Old Days That Good? Changes in Managerial Stock Ownership Since the Great Depression*, 54 J. FIN. 435 (1999).

12. Public firms in the United States had an aggregate value of 147% of the nation's GDP in 2016. *Market Capitalization of Listed Domestic Companies (% of GDP)*, THE WORLD BANK, <http://data.worldbank.org/indicator/CM.MKT.LCAP.CD?page=5> (last visited July 27, 2017).

pays for its inputs (e.g., metals, labor) used to generate the current period's production (e.g., autos) equals, at the margin, the value of what it takes from society in that period. The price of each input represents the cost to society arising from the corporation's use of the input. After all, the input could have been employed elsewhere in the economy, toward its next-best use—meaning society suffers an opportunity cost when it is instead used by the firm in question. At the same time, the price for which the corporation sells its outputs in that period equals, at the margin, the value of what it gives back to society. This measure is appropriate, as the marginal purchaser who paid this price for the final product voluntarily decided that having the item was worth more to her than whatever else she could buy with the same amount of cash. In short, if a consumer pays \$30,000 for a new auto, she has indicated that she prefers the new auto to an extra \$30,000 in her pocket or to the other things this sum could have purchased.

It follows that the production decisions that maximize expected corporate profits over the life of the firm are also the ones that maximize the difference between the total social costs and benefits of the firm's production. It is those decisions that maximize the difference between what the firm takes from society and what it gives back to the same. Corporate decisions made in accordance with the profit-maximization principle thus are said to maximize the firm's contribution to social welfare.

In sum, production decisions that maximize firms' expected profits are also ones that maximize the cash flows the firm expects to generate over time (discounted to present value), and thus share value.¹³ Those are the decisions that squeeze the most juice out of the orange. The efficient use of existing productive capacity is therefore one that maximizes share value in this way, as maximizing share value requires a firm to use its productive resources in a way that maximizes its cash flows. Thus, share-value maximization (via profit maximization) is the key to social-welfare gains generated by the firms that decide how a sizeable portion of the economy's existing productive capacity will be used.

To be sure, this "what is good for the firm is good for society" reasoning sits on layers of assumptions that are open to reasonable attack. For one thing, in reality, existing regulations of externalities such as pollution leave much to be desired. For another, many consumers are not well-informed, rational maximizers of their own self-interest. Instead, they no doubt make purchase decisions that do not in fact leave them better off. Despite these and other considerable caveats along the same lines, the profit-focused view provides at least a rough measure of the effect of production decisions on social wellbeing, and has thus enjoyed the support of a loose consensus among most law and economics commentators in the United States.

* * *

We have seen in this Part that one important consideration in assessing any given stock-market practice or regulation is its impact on the efficiency with which the economy's existing productive capacity is utilized. If the practice or regulation increases the extent to which the market generates accurate pricing, either directly or derivatively through a favorable impact on liquidity, it enhances the economy's productive efficiency. If it decreases that contribution to price accuracy, it has the opposite effect.

13. *See supra* note 6 and accompanying text.

III. THE ALLOCATION OF CAPITAL

A second critical function in any economy is to decide how to allocate society's savings (the portion of goods and services produced, but not consumed in the current period) among proposed investment projects that create new capacity. This new capacity will enable the production of more goods and services for consumption in the future than would otherwise have been the case. A well-functioning stock market plays an important role in this allocative process in two ways. First, more accurate prices, in the same ways as discussed in Part II above with regard to production decisions, enhance the effectiveness of the various mechanisms pressuring firm managers to make share-value-maximizing decisions concerning which proposed investment projects to undertake. As with respect to production decisions, it turns out that the decisions that are share-value maximizing with respect to capital allocation are also the ones that are socially optimal. Second, share prices also affect these decisions more directly through their effect on the terms on which firms can obtain external financing. When prices are more accurate, management is more likely to make efficient decisions with respect to which proposed investment project to implement for this second reason as well.

A. The Meaning of Efficient Capital Allocation

Before exploring the various capital-allocation benefits of a well-functioning stock market, it is important to define exactly what is meant by efficient capital allocation. Engage in a brief thought experiment. Imagine a nirvana world with no information asymmetries: everyone's expectations concerning the future cash flows that would be generated by each proposed investment project¹⁴ in the economy would be based on an intelligent analysis of the aggregation of all bits of information that are known by people around the world. Thus each individual's prediction of each project's future cash flows would be as accurate as is possible given the existing state of knowledge and intelligence in society. Moreover, these predictions would be uniform across all actors.

Based on these predictions, the future cash flows of each of the proposed investment projects in the economy could be listed in rank order from most to least promising. Society's scarce savings would be optimally allocated if these savings were used to fund proposed projects one by one going down the list until the savings were exhausted. Any other allocation would substitute a project that, as best can be told, would generate lower returns in the future for one that would generate greater returns.

This allocative ideal would be achieved if we in fact lived in this nirvana world with its accompanying absence of transaction costs, because, without such costs, it would be mutually advantageous for people to enter into deals to make this happen. But the real world is of course no nirvana. It involves very significant information asymmetries and trading frictions, as different people possess different bits of information with limited information sharing among them and transaction costs are present. The goal is thus to design a financial system that routes scarce capital to a set of projects in a way that comes as close as possible to this ideal.

14. A proposed new investment project might involve a new product or process never undertaken by the firm before. It could also just involve an expansion of something the firm was already doing, or a replacement of existing productive assets that have worn out.

B. How More Accurate Share Prices Promote More Efficient Capital Allocation by Prompting Managers to Maximize Share Value

We have already seen that more accurate prices enhance the effectiveness of the various mechanisms pressuring a firm's managers to make share-value-maximizing decisions.¹⁵ We saw that with respect to decisions concerning the deployment of existing productive capacity.¹⁶ For the same reasons detailed earlier, more accurate prices will pressure managers to make share-value-maximizing decisions with regard to the distinct issue of which proposed investment projects to undertake. And as it turns out, if such decisions are made in a share-value-maximizing way, they also will be ones that maximizes social value.

1. Project Choice in the Presence of Available Internal Funds

The starting point for seeing why this is so is to note that at any point in time a firm will often have in its coffers a certain amount of cash in excess of what it needs for day-to-day working capital. These excess funds could be retained earnings—funds that the firm has generated internally when the revenues from the goods or services it sells exceed the costs of the inputs needed to produce them. They could also be funds previously raised through some kind of external financing, such as those traceable to bank loans or publicly offered or privately placed equity or debt securities.

Persons within the firm organization will present to the firm's top managers various proposed investment projects. In deciding how to deploy the firm's available funds, the top managers can choose to invest in as many of these projects as these excess funds cover. Alternatively, they can pay out some or all of these funds to their shareholders, who can then reinvest them elsewhere. Thus, in making these decisions, a firm's managers are participating in the larger process of determining which proposed real investment projects in the economy ultimately receive funding.

2. Share-Value-Maximization Requires Avoiding the Implementation of Negative NPV Projects

A basic tenet of financial economics is that to maximize share value, a firm should implement every proposed investment project that has a positive net present value ("NPV"), i.e., a project whose expected future net revenues discounted to present value are greater than the project's cost, and avoid implementing any such proposed project with a negative NPV.¹⁷

The discount rate applied to come up with the present value of the net cash flows calculation is determined by reference to the market price of alternative expected cash flows available for purchase in the market that have an amount of undiversifiable risk comparable to the project at issue.¹⁸ If the proposed project has a negative NPV, the shareholders are better off receiving the cash rather than the firm using it to invest in the project. This because the shareholders, for less than the full amount of cash that they

15. *See supra* Part II.B.

16. *See id.*

17. BREALEY ET AL., *supra* note 3, at 22. Investing in zero net present value projects has no effect on share value one way or the other. *Id.*

18. *Id.* at 215–17.

receive, can buy an expected future income stream equivalent to what the proposed project would have produced. In other words, relative to the firm investing its funds in the negative NPV project, its shareholders can expect to do better if the firm distributes cash to them to reinvest in the market.¹⁹ As a result, the shares of the firm will be more valuable to hold if the firm avoids the project and instead provides the cash to the shareholders.²⁰

3. Avoiding the Implementation of Negative NPV Projects Avoids Social-value-decreasing Uses of Society's Scarce Capital

The share-value-maximizing decision to not use resources to fund any proposed project with a negative NPV is also a social-value-maximizing decision. The risk-adjusted expected return of the future income stream that the shareholder can purchase in the market is determined by the expected return on the most marginal proposed project being implemented elsewhere in the economy.²¹ In other words, the risk-adjusted return represents the opportunity cost associated with the firm investing in its own project: if the firm implements its negative NPV project, the resources that it uses will not be available for some other proposed project. If the rest of the system is working correctly, this project will be the marginal one. This means that capital will be allocated inefficiently: a more promising proposed project will be sacrificed due to the implementation of a less promising one.

4. The Natural Tendency of Managers to Use Internal Funds to Implement Negative NPV Projects and the Particular Importance of Accurate Prices to Combat This

The importance of having strong forces that push managers toward value-maximizing project implementation decisions is worth stressing. As we have just seen, when managers have surplus internally generated funds, yet only *negative* NPV proposed projects in front of them, they should pay the funds out to shareholders rather than implement their projects. Yet, both theory and empirical studies suggest that managers, left to their own devices in this situation, will often prefer to use these funds to implement negative NPV projects rather than paying the funds out to shareholders. This shouldn't come as a big surprise. Managers tend to benefit personally both from the process of firm growth and from running a firm of larger absolute size. Accordingly, if they still have internal funds available after they have exhausted their firm's positive and zero NPV investment opportunities, they are likely to find it in their personal interests to implement some negative NPV ones in addition.²² The chance that their share-value-diminishing behavior goes undetected is

19. See Daniel Fischel, *The Law and Economics of Dividend Policy*, 67 VA. L. REV. 699, 701–02 (1981).

20. The same conclusion applies where the firm does not have funds in its coffers and is deciding whether to implement a proposed negative NPV investment project funded by a new stock issue. The dilution caused by the new issue would reduce each currently outstanding share's pro rata claim on the firm's total future expected cash flow. The proposed project's addition to this total cash flow would not add as much to the value of each currently outstanding share as this reduction in pro rata claim would subtract from it.

21. BREALEY ET AL., *supra* note 3, at 218–20.

22. One of us has argued elsewhere that to the extent that the managers of a management-controlled firm can do so without risk of losing their jobs through a takeover or the actions of an activist hedge fund or their firm's own independent directors, it is in management's best interests to maximize the firm's aggregate available cash flow ("AACF"), i.e., its aggregate future earnings, before deductions for depreciation and management compensation and expenses, discounted to present value at a rate reflecting management's time preference and risk aversion. MERRITT B. FOX, *FINANCE AND INDUSTRIAL PERFORMANCE IN A DYNAMIC ECONOMY: THEORY,*

increased by the very fact that by implementing a project with surplus internally generated funds, a firm can avoid engaging in outside finance. As a result, these managers are not subjected to the external market's extra discipline and scrutiny.²³ In fact, there is substantial empirical evidence, gathered in an era when the forces pushing for share-value maximization were weaker,²⁴ that the investment projects chosen by firms that relied predominantly on internal finance were considerably inferior to projects chosen by other firms.²⁵

5. The Danger of Inaccurately Low Share Prices Leading Managers to Avoid Implementing Positive NPV Projects

Lastly, it is worth noting the other side of this coin relating to the use of internally generated funds. The managerial concern with public perceptions alone here can result in inaccurately *low* share prices leading managers to avoid implementing positive NPV projects even when they have internally available funds to do so.²⁶ As we saw in Part II, a low share price can attract investor attention.²⁷ The problem, however, is that a low share price is a noisy signal, and the less accurate it is, the noisier it is. Because of the major concern from the initial side of the coin (that firms will engage in the value-destroying behavior with respect to the use of internal funds), an inaccurately low share price may put management on the defensive and cause them to forgo implementation of a positive NPV

PRACTICE, AND POLICY 121–27 (1987) [hereinafter FOX, FINANCE AND INDUSTRIAL PERFORMANCE]. The greater AACF, the greater the capacity of the firm over time to satisfy the interests of each of the top managers: compensation, luxury perquisites, respect, power, affection of those around him, and a sense of rectitude. Striving to make AACF as large as possible also implies, after deduction for management compensation and expenses, the largest possible growth in firm assets (subject, of course, to the constraint that each project invested in is not expected to actually lose money). The idea that managers gain utility simply from the size of the firm they run has a long history. See, e.g., FRANK KNIGHT, RISK, UNCERTAINTY, AND PROFIT 97 (1921); JOSEPH A. SCHUMPETER, THE THEORY OF ECONOMIC DEVELOPMENT 17 (1937); R. GORDON, BUSINESS LEADERSHIP IN THE LARGE CORPORATION (1945). Moreover, the greater the rate of growth of the assets, the more opportunities for promotion, thereby improving the relations between top managers and those directly below them. OLIVER WILLIAMSON, MARKETS AND HIERARCHIES 120 (1975). The idea that managers of public corporations will under many circumstances have an interest in investing in negative NPV projects is also behind Jensen's so-called "free cash flow" hypothesis. Michael C. Jensen, *Agency Costs of Free Cash Flow, Corporate Finance and Takeovers*, 76 AM. ECON. REV. 323 (May 1986).

23. See Frank H. Easterbrook, *Two Agency-Cost Explanations of Dividends*, 74 AM. ECON. REV. 650, 654 (1984); FOX, FINANCE AND INDUSTRIAL PERFORMANCE, *supra* note 22, at 132–40.

24. There are good reasons to believe that the forces that push managers toward value-maximizing behavior have become stronger over the last several decades for a number of reasons. See Jeffrey N. Gordon, *The Rise of Independent Directors in the United States, 1950-2005: Of Shareholder Value and Stock Market Prices*, 59 STAN. L. REV. 1465, 1466 (2007). Bengt Holmstrom & Steven N. Kaplan, *Corporate Governance and Merger Activity in the United States: Making Sense of the 1980s and 1990s*, 15 J. ECON. PERSP. 121 (2001) (documenting a move toward a more market-oriented style of corporate governance in the United States); Accord Merritt B. Fox, *Promoting Innovation: The Law of Publicly Traded Corporations*, 5 CAPITALISM AND SOC'Y 1, 39–41 (2010).

25. See, e.g., GORDON DONALDSON, CORPORATE DEBT CAPACITY (1961); William J. Baumol et al., *Earnings Retention, New Capital and the Growth of the Firm*, 52 REV. ECON. & STAT. 345 (1970). For a critical review of these and several other studies, along with an estimate of the magnitude of the effects on the economy, see FOX, FINANCE AND INDUSTRIAL PERFORMANCE, *supra* note 22, at 233–37; see also Jensen, *supra* note 22; Reinier Kraakman, *Taking Discounts Seriously: The Implications of "Discounted" Share Prices as an Acquisition Motive*, 88 COLUM. L. REV. 891, 898 (1988).

26. See FOX, FINANCE AND INDUSTRIAL PERFORMANCE, *supra* note 22, at 282–87 (1987).

27. See *supra* Part II.B.

project. In this way, a mere perception of improper behavior dominates reality—thereby generating a misallocation of capital.

C. How More Accurate Share Prices Promote Efficient Capital Allocation by Their Effects on the Terms of External Finance

More accurate secondary market share prices also more directly improve the selection of proposed new investment projects in the economy, though the importance of this more direct route is a matter of debate. As developed below, strict, classical corporate finance theory suggests that share-price accuracy's effect on project choice occurs only as a result of its impact on the quality of corporate governance, i.e., through its enhancement of the various mechanisms discussed above that prompt managers to maximize share value. The classical theory concludes that when an established issuer with sufficient internal funds considers a proposed investment project, the terms at which outside funds can be obtained should not influence the decision of management as to whether to implement the project. A more nuanced, institutionally oriented view, however, recognizes that the forces pushing for share-value-maximizing decisions will not be fully effective for all firms and that at least some firms will not generate sufficient funds internally to implement all their positive NPV projects. This suggests that share price *can* more directly affect an issuer's decision whether or not to undertake a proposed investment project. This conclusion under this second view—which we embrace—holds whatever the source of external funds that is tapped to implement the project, whether it be bank loans of publicly or privately offered equity or debt securities.

1. Classical Finance Theory

Classical finance theory's conclusion that an issuer's share price should not directly affect its project-choice decisions reflects the basic Modigliani and Miller tenet that investment and financing decisions should be separate.²⁸ As we have seen, the share-value-maximizing rule for real investment decisions is that the issuer should not undertake a proposed investment project unless the project has a positive or zero NPV. The rate used to discount expected future cash flows is determined by the market price of alternative expected cash flows available for purchase in the market that have comparable amounts of undiversifiable risk.²⁹ Thus the two factors needed to make the NPV determination—this discount rate and the expected net revenues from the project—are each unaffected by the issuer's current share price.

The share-value-maximizing rule for *finance* is that the issuer should raise external funds if and only if the funds received are greater than the discounted present value of the expected future cash flows that must be paid out in return. In case of external equity finance, for example, the funds received are the share price times the number of shares sold (less the transaction costs of the offering), and the future cash flows that must be paid out are expected dividends and other shareholder distributions on the newly issued shares for the rest of the issuer's life. Thus, for a manager seeking to maximize the value of her firm's currently outstanding shares, share price is important to the finance decision concerning

28. See Merton H. Miller & Frances Modigliani, *Dividend Policy, Growth and the Valuation of Shares*, 34 J. FIN. 411 (1961) (discussing classical finance theory's conclusion).

29. BREALEY ET AL., *supra* note 3, at 215–17.

whether to raise funds by issuing new shares, but is not important to the real investment decision as to whether to implement any particular project.³⁰ Consequently, under this view, only the investment decision affects the allocation of scarce capital among proposed real investment projects being considered by existing public firms.

2. Institutional Finance Theory

Notwithstanding the classical theory, there is nevertheless a significant chance that a firm's secondary-market share price will directly affect a firm's real-investment decision as to whether or not to undertake a proposed investment project.

a. A firm with a Positive NPV Project and an Inaccurately Low Share Price

Consider first the most obvious case: a firm lacking sufficient internal funds to finance a *positive* NPV project at a time when the secondary-market price for its shares is inaccurately low. That price in the secondary market will largely determine the price at which the firm can sell a new issue of shares to the public. This is because new and existing shares will be fungible after the issuance, and so no one is going to pay more to buy new shares given that existing ones can be purchased in the market at their current, inaccurately low price.

Suppose that a public offering of equity would, at an accurate price, represent the least-cost method of external finance. With the stock price inaccurately low, however, raising the needed funds in a public offering of equity and implementing the project may end up depressing the value of the existing shares even though the investment project has a positive NPV. This is because with a lower share price, more shares will need to be issued to raise the necessary amount of funding—thereby involving more dilution and a more negative dilutive effect on value of the existing shares. Thus this additional share dilution might depress share value more than the adoption of a positive NPV project would increase share value. And if, for example because of the agency costs of debt, other forms of finance are sufficiently more expensive than a public equity offering would have been if the share price had been accurate, then these alternative forms of external finance would also not be used. Hence, because the share price is inaccurately low, the project would not be undertaken at all even though its implementation would be socially desirable.

b. A Firm with a Negative NPV Project and an Inaccurately High Share Price

Now consider the opposite situation: a firm with an inaccurately high share price, but which only has a *negative* NPV investment project proposal. It is perfectly possible that the forces pushing the firm's managers to engage in share-value-maximizing behavior are not fully effective. In such a situation, the firm may both engage in a sale of new equity, as classical finance theory says it should, and also, contrary to the classical theory, implement the project. Doing so would satisfy the managerial preference for firm growth and larger

30. The importance of these rationales for separating the finance and investment decisions can be seen in the case of a firm that has inaccurately over-priced shares, but only a negative NPV investment project under consideration. Separating the finance decision from the investment decision suggests that the firm should sell additional shares, but should not invest the proceeds in the project. The proceeds should instead be paid out to the shareholders as additional dividends. See Fischel, *supra* note 19, at 701–02 (1981).

firm size.³¹ In essence, managers, acting on their personal interests, may be influenced by the easy-money terms at which financing is available to implement the inferior project.

c. The Effect of Inaccurate Share Prices on the Use of Debt

An inaccurate share price can affect the use of debt, whether in the form of publicly or privately offered debt securities or bank loans. On the finance supply side, share price can directly affect the cost of financing a project by affecting the terms required by the various sources of debt.³² On the demand side, an inaccurate share price can directly affect management's willingness to use not only equity to implement a new project, but debt as well.

Share price can directly affect the cost of financing a project by debt through its effect on the terms demanded by external sources of funding.³³ For example, lenders may charge a higher rate or demand additional security when a firm's value (reflected in its share price) is low relative to that of other similar companies. Thus, an inaccurately low share price may make a proposed project with a positive NPV not only too expensive to implement by using an equity offering, but also make its implementation by debt too expensive as well.

On the demand side, an inaccurately low share price can discourage implementation using debt because of the prospect that the firm will subsequently want to counterbalance any new debt financing with new equity financing in order to maintain a perceived optimal debt/equity ratio. Thus, if the company's share price is inaccurately low, managers may be unwilling to take on additional debt to finance a positive NPV project. This is because the prospect that the counterbalancing equity financing will, because of dilution, be too costly to current shareholders.³⁴

* * *

In sum, the more accurate share prices that the secondary market for public stocks can generate assists in the efficient allocation of capital in a number of ways. To start, it enhances the effectiveness of the various mechanisms that pressure the managers of each firm in the economy to make share-value-maximizing decisions with respect to which proposed real investment projects to implement. Such decisions, under our assumptions, benefit society through helping to allocate capital so that it is the most promising proposed projects that get implemented. More accurate share prices also affect these managers and firms more directly in terms of the cost and desirability of external finance, whether equity or debt, in ways that also assist in the efficient allocation of capital.

31. *See supra* Part III.B.4. In addition, the course of action dictated by the classical theory—raising funds through a new equity sale followed immediately by a distribution of the proceeds to the shareholders—would involve a certain awkwardness. It would tend to suggest that the gains to existing shareholders just come from the new shareholders paying too much.

32. *See* HOMER KRIPKE, *THE SEC AND CORPORATE DISCLOSURE: REGULATION IN SEARCH OF A PURPOSE* 123 (1979) (discussing effect share price can have on cost of financing a project).

33. *See id.* ("The market price of the shares is important to a company and its management. The market appraisal of the equity is considered by most analysts a far better indication of that equity than the accountants' computation. The size of that equity can significantly affect the company's borrowing power, the interest rate it pays on its borrowings . . .").

34. BREALEY ET AL., *supra* note 3, at 465–67.

IV. THE ALLOCATION OF RESOURCES OVER TIME

A well-functioning market can promote economic efficiency along a third dimension as well: the division of currently available resources between the production of goods and services for *current consumption*, on the one hand, and the creation of new productive capacity that will allow for the greater production of goods and services in subsequent periods, thereby allowing for greater *future consumption*, on the other. In different words, the market gets individuals and businesses to make decisions resulting in a level of savings and investment closer to what would be the tradeoff between current and future consumption that would lead to the most satisfaction over time. Here, however, the story diverges to some extent from the one told thus far. It now becomes a tale that relates directly to liquidity rather than price accuracy.

A. The Meaning of an Efficient Allocation of Resources Over Time

During the current period, there are firms each seeking to implement a proposed real investment project that, through the resulting production of goods and services in future periods for less than the cost of the needed inputs, is expected to produce an addition to its future cash flow. And there are individuals willing to forego consumption of goods and services now so that they can consume more in future periods. One of the most important functions of an economy is to bring these producing firms and saving individuals together.

At any given point in time, the economy's existing productive capacity and supply of inputs can only create so much in goods and services. The question is how much of what is produced should be dedicated to creating new productive capacity for the future, rather than to provide for consumption now. It is clear that deriving the most utility over time out of today's productive capacity involves spreading out over time the consumption potential of the goods and services that can be produced today. At the extreme, if all these goods and services were, period after period, dedicated entirely to the current period's consumption, it would not take too many years before we would find ourselves very hungry, thirsty, and cold.

The optimal tradeoff between consumption today and consumption tomorrow is derived from the following considerations. Individuals, in their life cycles, typically need to consume less than all their earnings—i.e., save—in some parts of their lives so that they can consume more than all their earnings at subsequent points in their lives. The less consumption they have to give up now for a dollar's worth of consumption in the future, however, the more they will save. In other words, the lower the cost today of an expected future dollar of consumption tomorrow, the more an individual will save. When individuals save and thus consume less than all their earnings, they free up goods and services that can be used for real investment. One way that firms can obtain the dollars to buy these freed-up goods and services is to sell shares in the primary market. These shares offer, in the form of dividends and other shareholder distributions, future expected dollars in return for current dollars. The price of an expected future dollar is determined by the expected return on the most marginal proposed real investment project implemented in the economy. The more money that is saved and invested in new real investment projects, the farther down the list of proposed projects the economy goes and hence the lower the return on the marginal project. Thus, there is an optimal level of savings and investment. If there is too little, there are unimplemented projects that could produce a return in future dollars that some saver would rather have a right to than the current dollars needed to implement them.

In other words, welfare-increasing transactions between savers and producers are lost—leaving projects unimplemented even when people value the future dollars that they would be expected to generate more than the current consumption they would need to give up for the projects to go forward.

B. How a More Liquid Market Can Promote the Efficient Allocation of Resources Over Time

In a capitalist society, firms take current resources in large scale from savers and use them to implement real investment projects. As we have seen, these savers' forgone current consumption frees up goods and services needed for implementation of these projects. These projects, through their resulting production of goods and services in future periods, lead to greater consumption in the future than would otherwise be the case. The sale by the firm of these goods and services will produce an expected future cash flow. A firm can sell off rights to this expected future cash flow by offering shares in the primary market. That about 3,500 U.S. companies have sold shares that are currently publicly traded (with many thousands more abroad) shows the scope of this mechanism for allocating resources over time.

Thus, during any current period, there are firms seeking to implement proposed real investment projects that, through the resulting production of goods and services in future periods, are expected to produce a future cash flow. And there are individuals willing to forego consumption of goods and services now so that they can consume more in future periods.

The more liquid the *secondary* trading market for equities is, the better the *primary* market for equities works in promoting this end. This primary market simultaneously satisfies the needs of firms seeking funds for real investments (which offer shares—a form of promise of future dollars—to implement real investment projects in return for obtaining from savers their current dollars) and the needs of savers seeking to forego current consumption in order to enjoy future consumption (individuals who provide these current dollars in return for these promises of future dollars).

Understanding the reason for this connection between the liquidity of the secondary-trading market and the workings of the primary market starts with the following observations. The more liquid an issuing firm's shares are expected to be, the more valuable they are to hold. For a prospective purchaser of these shares in the primary market (those who are contemplating providing firms with current dollars in return for the promise of receiving future dollars), the expectation of greater liquidity means that she will expect less cost in the future when she wishes to sell her shares in order to consume.³⁵ She will also expect that her buyer will pay more for her shares because her buyer too will, for the same reasons, put a higher value on more liquid shares. Thus, when an issuer offers shares in the primary market, the more liquid investors anticipate the shares will be in the future, the higher the price, all else equal, at

35. Few savers purchase shares in the primary market with the intention of holding them for the whole life of the firm, thereby collecting all the dividends and other distributions ever paid on the shares. Rather they hold shares for the span of time between when they want to save and when they later want to consume. Thus, part of their return comes from the resale of the share to someone else who will then receive the dividends and other special distributions for a span of time and resell and so on.

which the issuer can sell its shares. This higher primary-market price translates into a lower cost of capital for the issuing firm. This is because the prospect of greater liquidity results in the issuer's expected future cash flows being discounted to present value at a lower discount rate.³⁶

These observations concerning the benefits to investors and issuers from shares being more liquid lays the groundwork for seeing why a less liquid market leads to a less efficient choice as to the use of today's scarce resources in terms of the tradeoff between consumption today and consumption in future periods. The less liquid shares are expected to be, the less rewarding individuals find saving to be and, because their cost of capital is higher, the less firms will invest in proposed real investment projects. In welfare economics terms, just like a tax, illiquidity results in a wedge between the value of what the savers (the purchasers of future dollars) expect to receive in the future and what the entrepreneurs or issuers (the suppliers of future dollars in the form of future dividend streams) expect to give up in the future.³⁷ This wedge prevents certain transactions from occurring that would have occurred if the shares were expected to be more liquid. The fact that, absent this wedge, issuers and savers would have willingly entered into these transactions means the transactions prevented by illiquidity are ones that would, with greater liquidity, have made both parties better off on an expected basis. These lost transactions are projects with expected returns that are lower than the marginal project that gets funded in a world with a lower degree of illiquidity, but that nevertheless are high enough to make some individual investors feel that, absent liquidity concerns, sacrificing their current dollars for the projects' promises of future ones would be worthwhile.³⁸

* * *

This Part has focused on a third contribution a well-functioning stock market can make to society: the more efficient allocation of resources over time. In particular, it explained why the more liquid the shares trading in the market are, the closer the economy will come to achieving the optimal tradeoff between using the economy's existing productive capacity and store of inputs to produce goods and services for current consumption, on the one hand, and using them to create new productive capacity allowing for more future consumption, on the other.

V. THE ALLOCATION OF RISK

A well-functioning stock market can increase economic efficiency in a fourth and final way as well: aiding in the reallocation of the risks generated by the inevitably volatile cash flows generated by each of the firms in the economy. The goal is that investors, most of whom are risk averse, hold portfolios of public firms so that investors suffer as little risk-based pain as possible. As in the last Part, again here it is the liquidity trading markets foster, and not the price accuracy they help generate, that is at the center of this story.

36. See Yakov Amihud & Haim Mendelson, *Asset Pricing and the Bid-Ask Spread*, 17 J. FIN. ECON. 223, 230 (1986) ; Yakov Amihud & Haim Mendelson, *Liquidity and Asset Prices: Financial Management Implications*, 17 FIN. MGMT. 5, 6 (1988).

37. See THIERRY FOUCAULT ET AL., MARKET LIQUIDITY: THEORY, EVIDENCE, AND POLICY 307 (2013) (discussing how illiquidity acts as a wedge between transaction prices and the fundamental value of assets).

38. HARRIS, *supra* note 2, at 214-15.

A. The Meaning of Efficient Risk Allocation

For most individuals, the prospect of a wide divergence in possible future outcomes is a bad thing. In other words, they are risk-averse. However, much risk can be reallocated through voluntary market transactions in ways that limit its negative impact. Insurance arrangements are perhaps the most recognizable example of this principle. The diversification of investment risk is another example. In short, risk of catastrophe is greatly reduced when one has insurance, and risk of investment returns coming far under their expected return is likewise dampened when under- and over-performance of individual firms cancel each other out. When risk inevitably associated with each firm's future cash flows are handled in this way, society's individuals suffer less risk-based pain.

More specifically, the future cash flows that will be produced by any given real investment project cannot be predicted with certainty. Rather, based on the best information available, one can construct a probability distribution of possible future returns, with an expected return (the probabilistically weighted average of the different possible outcomes), a variance (a measure of the potential for the realized future return to deviate on one side or the other of the expected return), and co-variances with the returns on the other real investment projects in the economy (the tendency for, and extent to which, the project's realized future returns will be in the same or opposite direction as the realized return on each of the other real investment projects in the economy).

This lack of certainty concerning the future returns of the economy's real investment projects poses difficulties for investors, who are assumed typically to be risk averse. In other words, between two portfolios with the same expected return, the typical investor would choose the one with an actual realized return that is likely to be closer, on one side or the other, to the expected return. The standard explanation of this preference for less risk is that most individuals gain declining marginal utility from money. Thus an investor will gain less in utility in the future if the actual realized return is above the expected return by any given amount, than she will lose in utility if it is below the expected return by the same amount.

A very important function of the market for equities is to aid in the allocation of the risks generated by this lack of certainty as to what each investment project's actual realized returns will turn out to be. The goal is for these risks to be allocated in a way that risk-averse investors have holdings of claims on these future cash flows (i.e., in the portfolio of shares that they hold) such that in aggregate they suffer as little disutility as possible.³⁹ An individual investor seeking to maximize her economic welfare needs to achieve two ends in composing a collection of what shares to hold (taking also into account of her portfolio's non-equity investments such her human capital and the equity in her home). One end is to try to do as well as can be done in the tradeoff between the overall portfolio's expected return and its overall riskiness. This can be done by taking advantage of the fact that the returns from different stocks are not perfectly correlated and so putting together a collection of different stocks—diversification—can lead to a certain amount of cancelling out of risk. After all, some investments will turn out to realize returns greater than what is expected and others will turn out to realize return less than what is expected.

The second end is to have a portfolio that is as close as possible to the point in this tradeoff that best satisfies the investor's particular level of risk aversion, which depends on

39. See *id.* at 206–14 (discussing social functions of the market for equities).

her sensibilities with regard to risk and to her life circumstances. Once all diversifiable risk has been eliminated through portfolio diversification, some risk remains that cannot be diversified away. Assets with more of this undiversifiable risk per expected future dollar need to be priced lower to compensate for this undesirable feature. Otherwise, investors would not be willing to include them in their portfolios. In different words, stocks with more undiversified risk will be priced to yield a higher expected rate of return. This point is the central tenet of the Capital Asset Pricing Model (CAPM), one of the pillars of modern finance theory. Thus there is a tradeoff between the level of a portfolio's undiversifiable risk and its expected return. More risk-averse individuals are better off choosing a portfolio with a lower return in exchange for less undiversifiable risk. Less risk-averse people are better off taking on somewhat more risk in return for a higher expected return.⁴⁰

B. How a More Liquid Market Can Promote the Efficient Allocation of Risk

The very existence of a reasonably liquid secondary trading market is essential for the successful working of this whole system of risk reduction through diversified shareholdings by many investors. If there was no public market for securities and ownership of each issuer was divided up among only a small number of investors, the size of the typical stake would be larger than the total invested wealth of most potential equity investors. And for those investors with enough wealth to be able to hold such stakes, their fortunes would often not be large enough to hold stakes in enough different companies to gain anything like the full advantages of diversification. But, when markets are liquid, stakes can be better divided up.

A market with more than this minimum level of liquidity offers yet further advantages. Constant change in the world means that what constitutes an individual's optimal portfolio is always shifting. By making both the purchase and sale of securities less expensive, greater secondary-market liquidity allows the individual investor to cost-effectively adjust her portfolio over time to keep it closer at each moment to what is optimal for her.

* * *

By bringing buyers and sellers of seasoned securities together to trade in a way that lowers transaction costs, stock-trading markets help distribute risk in society in a way that limits its negative impact. Specifically, this liquidity supplied by secondary markets can help with the allocation of the risks generated by the lack of certainty as to what each investment project's actual returns will turn out to be. The goal is for these risks to be spread out in a way so that risk-averse investors have portfolios of stock holdings while suffering as little risk-based disutility in the aggregate as possible. Moreover, because changing circumstances make what constitutes an investor's optimal portfolio vary over time, the more liquid the market, the closer the investor can stay to this moving optimum, buying and selling to the extent that their gain in utility is cost-effective.

VI. ADDITIONAL CONSIDERATIONS

When operating well, equity-trading markets improve wellbeing in the four main ways explored in Parts II through V. But when evaluating stock-trading practices and their regulation, an eye should also be kept on more than just those main social functions of the

40. Modern portfolio theory instructs investors how to create a portfolio that best achieves these two ends. See, e.g., Harry Markowitz, *Portfolio Selection*, 7 J. FIN. 77 (1952).

markets. In this final Part, we briefly touch upon three additional considerations that should be taken into account: the extent to which the practice or regulation at issue affects the resources consumed by the operation of the markets, the market's fairness, and the markets' ability to innovate.

A. Resource Consumption by the Market Itself

Equity trading markets consume substantial amounts of resources. If not consumed by the markets, those resources would be available to produce additional goods and services that people can enjoy today or that can be used for real investment permitting greater future consumption. Indeed, the public market in the United States alone is no nickel-and-dime operation—a point evidenced by its prominent role in American culture alone. Further, a proper calculation of all the resources consumed by stock market must include not only those attributable to keeping the market lights on, but also those associated with enforcement. This includes the operations of the SEC, FINRA, as well as those of federal and state criminal enforcement. It follows that any change to trading practices or rules that alters the status quo with respect to resource consumption here in material ways should be of interest to those evaluating the desirability of the practices or rules.

B. Fairness

So far, this Article has addressed only the effects of equity-trading markets on the efficiency with which the economy operates. But much of the discussion concerning market practices and rules outside of economics and law-and-economics circles is articulated in terms of fairness. Indeed, the core mission of securities regulation has traditionally been articulated in these terms—even if references to economic efficiency are also prominent. Unfortunately, fairness discussions in this area are often rather superficial. Not infrequently, such analysis takes a representative single transaction involving a particular practice, shows that the transaction benefits one party at the expense of another, and then simply labels the resulting transfer as “larcenous,” “extractive,” “predatory,” “greedy,” or simply “unfair.”

Serious analysis requires digging deeper. There needs to be a consideration of the effects of the practice as something that occurs on a repeated basis, in most cases within a competitive market. And it is necessary to take into account the reaction of the various other participants in the market with knowledge of the practice.

That said, we do not mean to belittle fairness considerations. The impact of any given practice or regulation on fairness is obviously a worthy concern in and of itself. And perceptions of a practice's fairness, whether accurate or not, can substantially affect how well the equities trading market performs its social functions. Thus it is necessary in the evaluation of any practice or regulation to consider both the actual and perceived effects they have on market fairness.

1. Actual Fairness

The very meaning of fairness, of course, has been the subject of an ages-long philosophical debate. The best we can do here is to suggest what we think is a plausible approach to the question in the context of evaluating practices and regulation in the context of stock trading. The existence of any given practice, and the frequency with which participants engage in it, are likely to result in an increase in wealth position of some people

and a decrease in the wealth position of others. The same goes with respect to any regulation in the sense of the effect on the wealth positions of different market participants that result from the changes in behavior that the regulation brings. To us, the question of the fairness of the practice or regulation is whether these wealth effects are justifiable.

Although an ex post analysis of the impact on the wealth positions of the affected parties with regard to a single representative transaction is a necessary first step, as already indicated, we do not believe it is sufficient for a proper evaluation of the fairness of a given practice or rule. An ex ante analysis of the expected wealth positions of the persons who are made better or worse off because of the overall existence of the practice (or of the behavior brought on by the regulation) is necessary as well.

Suppose X buys or sells some shares and the price would have been more favorable but for an action by another market participant, Y, and that the action is an instance of a larger market practice, the fairness of which we wish to examine. Alternatively, suppose that X is induced into a share purchase or sale as a result of such action by Y and that, with the passage of time, the transaction turns out to be an unfortunate one for X for reasons related to Y's action. From an ex post point of view, X has in each case suffered a loss because of Y's action. We suggest, however, that to determine if the loss was unfair, we need to ask whether, ex ante, X would have been any better off in a world where the practice is not occurring at all. We consider two possible situations with regard to this question.

a. Situation 1: Ex Ante, the Person Whose Trade Was Affected by the Practice Was as Likely to Have Done Better in Terms of Trading Profits as to Have Done Worse

Suppose that over time, as various persons engage in the practice in which Y engaged, the price goes down as often as it goes up. Unfortunately for X, Y's instance of undertaking the action made the price go up, not down, and X just happened to be buying at that time. So, at the time X decided to transact, she was as likely to be a gainer because of someone engaged in the practice as a loser. X just turned out to be a loser in this instance.

Suppose, alternatively, that over time, as various persons engage in the practice, the action always moves price up, and unfortunately for X, she just happened to be making a purchase at a time when someone, Y, was engaging in the practice. An example is where X purchases shares whose market price has been inflated by Y when Y made a falsely positive statement that is believed by the market. Trading profits require both a purchase and a sale, however, and so X was as likely to have been a gainer at the time of sale from someone engaging in this practice as being a loser at the time of purchase.

Finally, suppose that Y's action induced X into making a purchase that turned out to be unfortunate, but it was just as likely that an instance of the practice would have induced X into a transaction that would turn out to be favorable.

In each of these three hypotheticals, it is hard to say that X's loss is the result of the practice involved being unfair. Whether any transaction entered into by X improves or diminishes X's wealth depends on a large number of factors as to which there is uncertainty at the time of X's decision to enter into the transaction. The possibility that the terms of any purchase or sale by X, or the decision itself to buy or sell, has been affected by a market participant engaging in this practice is just one more such risk. As long as, probabilistically, the upside of the risk associated with someone engaging in the practice is as big as the downside risk, the existence of the practice does not alter X's expected return. X had been just as likely to have enjoyed a windfall gain when she decided to transact, but in fact suffered a windfall loss instead.

Moreover, if X has a diversified portfolio and/or engages in a relatively large number of share transactions over X's life, the gains and losses resulting from the practice are likely to cancel each other out, leaving X in the same position as if she had lived in a world where the practice is not occurring at all. In essence, the situation is like playing a game of chance on a repeated basis where the dice are not loaded.

b. Situation 2: Ex Ante, the Person Whose Trade Was Affected by the Practice Was Not as Likely to Have Done Better in Terms of Trading Profits as to Have Done Worse, But the General Existence of the Practice Leads to Some Kind of Fully Compensating Change

Suppose instead that in each of the hypotheticals above, X, as the result of someone engaging in the practice under evaluation, has less chance (if any) of being a trading-profits winner than being a trading-profits loser. Suppose, as well, however, that the existence of the practice leads to some kind difference in X's circumstances that is fully compensating on an expected basis. If so, it is again hard to characterize the particular instance where X was a loser as unfair.

Consider just one example. Suppose that Y is an insider of the XYZ Corporation who sells some XYZ shares on the basis of negative confidential information obtained from within XYZ. X is a professional liquidity supplier and, in an anonymous market transaction, is Y's counterparty, i.e., the buyer purchasing Y's shares. X is likely to be a trading-profits loser when she engages in purchases from someone who is trading on the basis of negative confidential information.

However, the expectation that such informed trading based on negative information will occur from time to time will lead to liquidity suppliers such as X to protect themselves by quoting lower bids than they would if there were no such expectation. This allows them to pass on to the other sellers to whom they provide liquidity—the ones without inside information—the costs of their unfavorable purchases from persons such as X. Because insiders can also trade on the basis of positive confidential information, liquidity suppliers quote higher offers than if that practice did not occur. This greater bid/ask spread means that the stock will be less liquid. As we have seen in the preceding discussion, the purchase price of a less liquid stock is discounted to reflect this fact—something that can cause problems in terms of economic efficiency.

Focusing now on fairness considerations, it is clear that this widened spread protects X on an expected basis. But it is also clear that the resulting discounting of share prices in the secondary market will have a number of radiating effects on the wealth positions of individuals other than X. So, one may fairly ask as well about the fairness of these more indirect wealth effects resulting from freely occurring insider trading. As we have seen, the expectations of wider spreads leads to lower IPO share prices, which will depress the founding of new firms. Wider spreads also increase the cost of transacting in shares, which means fewer such transactions will occur.

In a competitive economy, suppliers of the ordinary inputs connected with the creation of startups and the provision of liquidity will be paid a market return comparable to what they would earn if the resources they supplied were deployed instead another way. So, the wealth positions of these persons will be unaffected by whether or not, in our example, insider trading is freely occurring. They will simply do different work for the same pay. In contrast, the persons with uniquely useful abilities and skills for founding or financing startup companies, or for the liquidity-supply business, will each be paid extra in the way

of rents if they pursue these respective activities rather than engaging in a different line of work. The amount extra, though, depends on the level of demand for the activity. So, the lower number of IPOs and level of securities trading associated with freely occurring insider trading means that the rents going to these specialized providers of inputs will be lower with freely occurring insider trading than without, and hence their wealth positions reduced.

It is hard to characterize these diminished wealth positions as unfair. In a market economy, rents prompt the suppliers of specialized inputs to come forward. Under the right conditions, this is the mechanism by which these specialized resources get directed to the activity for which they are most particularly suited. As a general matter, an equity trading market practice's positive or negative effects on the rents being paid to the suppliers of specialized inputs to any activity associated with this market would not appear to raise any greater fairness issues than do the rents paid persons with special abilities and skills across the whole market-based part of our economy. The foregoing discussion suggests that the prime normative question raised by practices best described by Situation 2 is whether it increases or decreases economic efficiency, not the fairness of its effects on the wealth positions of the various participants in the market.

All of this suggests that the truly unfair practice in a trading market is one that moves wealth from one group to another without that movement being justified as part of a mechanism that enhances efficiency.

2. Perceived Fairness

It is important as well to note another important dimension of fairness analysis in this context—that relating to *perceptions of fairness*. Here, whether or not there is actual fairness of the kind detailed above, mere perceptions can be relevant. For one thing, perceptions of unfairness may impose a harm in and of themselves. If a major social institution is perceived to be unfair, members of society may suffer from disillusionment and worse. Those resulting feelings represent disutility that is traceable to perceptions of unfairness. For another, perception can have effects on other things that matter. In particular, they can substantially affect how well the trading market for equities performs its main social functions. And this can be the case even when the perceptions are not aligned with reality. For example, if a practice or regulation is perceived as unfair, certain market participants may withdraw from the market. For reasons beyond the reach of this paper, such a result harms liquidity. The harm to liquidity, in addition to its direct negative effects on social functions of the stock market, can also undermine price accuracy.⁴¹ All four main social functions of the equity-trading markets would therefore be impeded.

While the best public policy with regard to misperceptions is often education, there may be misperceptions that are so ineradicable, on the one hand, and so pernicious to the efficient operation of the market, on the other, that they should be prohibited even though they create no real unfairness.

C. Innovation

Lastly, it is also important to recognize effects of a market practice or regulation on innovation. The overall system for facilitating the buying and selling of previously issued

41. *See supra* Part II.A (discussing how harm to liquidity undermines price accuracy).

public stocks is dynamic: there is always the possibility of future innovation that would allow this stock-trading market (and related ones more generally) to better perform their social functions, reduce the real resources they consume in doing so, and/or increase fairness along the way. So when evaluating any given trading practice or regulation, we need to know its effect on the capacity of the system to innovate over time in socially favorable ways.

VII. CONCLUSION

Over the past few years, critiquing stock-trading practices and their regulation has been in vogue. However, these critiques and the larger conversations surrounding them have largely been untethered from any kind of consistent, principled evaluative framework. This Article contributes such a framework by thinking carefully about the main social functions of the market for trading previously issued public-company stocks as well as the main additional considerations that should be weighed when analyzing the pros and cons of any given market practice or regulation.

In sum, this equity-trading market can increase efficiency in the economy in four main ways. The first relates to the use of the enormous productive capacity at hand in corporate America, the second has to do with the allocation of large amounts of society's scarce capital by and among firms, the third involves the allocation of resources over time, and the fourth the allocation of risk. These four main social functions thus serve as the first set of prongs of the framework we articulated. But the extent to which effects are positive or negative along those dimensions must also be weighed with their impact on the second set of prongs—those relating to the system's consumption of real resources, fairness, and capacity for innovation.

As we have seen, at least when it comes to the social functions of the market, the analysis generally boils down to a look at how the practice or regulation affects the market's ability to generate accurate pricing and liquid trading. But it must also be recognized that not all effects on price accuracy and liquidity are the same. Some will present larger concerns along one or more of the dimensions of our evaluative framework, others smaller ones. For that reason, the more nuanced look at how price accuracy and liquidity affect each social function, as laid out in this Article, will be appropriate.

Our goal in this work has been to concisely articulate our evaluative framework. Undertaking this exercise required us to be fairly abstract throughout. But it helps to close with something more concrete: two brief examples of how we envision the framework being deployed, one narrower and one broad. We pick high-speed announcement trading as the narrow example, and the basic structure of the market as the broad one. Each falls into the group of practices that has been criticized without informed analysis tethered to the relevant social goals.

The main type of announcement information is that contained in public disclosures with implications as to the issuer's future cash flows that are obvious (e.g., a dividend announcement). The information only retains its trading-value status for a brief period of time—that between the time of the announcement and the time the information is fully reflected in price. This period appears to last for well under a second.⁴² Announcement

42. See Grace Xing Hu et al., *Early Peek Advantage? Efficient Price Discovery with Tiered Information Disclosure*, J. FIN. ECON. (forthcoming).

traders today thus profit by appreciating the import of an announcement with lightning speed (often based on machine reading of the announcement) combined with technology enabling their buy or sell orders to reach trading venues within this brief period.

What would our framework say about this practice? A full discussion is well beyond the scope of this Article, but even a brief application of the framework helps start an informed conversation. The resources devoted to this practice appear to be considerable—including investment in state-of-the-art high-speed-trading technology that must be updated over time. All the while, the benefits in terms of the use of productive capacity by firms, the efficient allocation of capital, the efficient allocation of resources over time, and the allocation of risk are almost non-existent. After all, the information would have likely found its way into prices within seconds with zero resources used toward high-speed announcement trading. A review of the ways that more accurate share prices enhance the real economy's efficiency shows that this vanishingly brief acceleration in the share price getting more accurate is of absolutely no value. All the while, the liquidity effects are likely negative because, given the existence of the practice, liquidity suppliers need to widen their spreads to protect themselves to losing to such announcement traders when announcements are unexpected.⁴³ When concerns relating to at least the mere perception of fairness are added in, it becomes safe to think that announcement trading of this sort is almost certainly socially undesirable. Even so, continuing with our framework, a regulation directly prohibiting such trading may still not be warranted because of costs associated with enforcement and the chilling effect that it might have on more socially worthwhile transactions.

The broader application of the framework to the most high-level debate about the structure of the stock market today proceeds along similar lines, and provides a further thought-provoking way to close out this Article and our analysis here. This lively debate centers on whether it would be better to have all equity trading occur on a single central limit order book rather than the current system where a single stock trades on many different venues.⁴⁴ The multiple-venue system undoubtedly uses more resources because of all the interconnections that are necessary to bring together the various fragments into a single overall market. By being competitive, however, that current system is much more open to innovation—and, better yet, is likely to spur the same. Its impact on price accuracy may be negative relative to a more consolidated market.⁴⁵ Its effect on liquidity may be more mixed, with gains for those able to access off-exchange platforms and losses for those

43. See generally Kevin S. Haeberle & M. Todd Henderson, *Information-Dissemination Law: The Regulation of How Market-Moving Information Is Revealed*, 101 CORNELL L. REV. 1373 (2016) (discussing the effect of information releases on liquidity in the market). In fact, even without considering the resource costs, the negative social consequences from the effect of this practice on liquidity almost certainly dominates the benefits from the fleeting improvement in price accuracy. One of us has suggested elsewhere that this is a reason not to alter market structure rules to prevent “electronic front running,” which can be used by liquidity suppliers to protect themselves against announcement traders and in the process narrow spreads and improve liquidity. See Fox et al., *Informed Trading*, *supra* note 2.

44. See Concept Release on Equity Market Structure, Securities Exchange Act Release No. 34-61358, 17 C.F.R. § 242, 12 n.19 at 37499 (2010) (discussing whether equity trading should occur on a single or multiple venues); Regulation NMS, 70 Fed. Reg. 37,499 (June 29, 2005) (to be codified at 17 C.F.R. pts. 200, 201, 230, 240, 242, 249, 270).

45. See Kevin S. Haeberle, *Stock-Market Law and the Accuracy of Public Companies' Stock Prices*, 2015 COLUM. BUS. L. REV. 121 (2015) (theorizing that the set of rules allowing off-exchange platforms to discriminate among traders while requiring exchanges to accept all comers reduces stock-price accuracy).

disproportionately restricted to exchanges.⁴⁶ In the end, a sound conclusion as to which structure is best thus would require considerable research to ferret out the magnitude of these and related pros and cons of the system. But even just this brief application here shows why a sound evaluative framework is needed in that process. We are currently using this framework in our own work to analyze in more detail a variety of market practices, and believe that more attention by other commentators to the issues that it raises would more generally improve the level of future discourse concerning stock-trading practices and their regulation.

46. *See id.*