

**MARKET BUBBLES AND WASTEFUL AVOIDANCE:  
TAX AND REGULATORY CONSTRAINTS ON SHORT SALES**

**By**

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**MARKET BUBBLES AND WASTEFUL AVOIDANCE:  
TAX AND REGULATORY CONSTRAINTS ON SHORT SALES**

Michael R. Powers,<sup>\*</sup> David M. Schizer,<sup>\*\*</sup> Martin Shubik<sup>\*\*\*</sup>

**Abstract**

Although short sales make an important contribution to financial markets, this transaction faces legal constraints that do not govern long positions. In evaluating these constraints, other commentators, who are virtually all economists, have not focused rigorously enough on the precise contours of current law. Some short sale constraints are mischaracterized, while others are omitted entirely. Likewise, the existing literature neglects many strategies in which well advised investors circumvent these constraints; this avoidance may reduce the impact of short sale constraints on market prices, but may contribute to social waste in other ways. To fill these gaps in the literature, this paper offers a careful look at current law and draws three conclusions. First, short sales play a valuable role in the financial markets; while there may be plausible reasons to regulate short sales— most notably, concerns about market manipulation and panics – current law is very poorly tailored to these goals. Second, investor self-help can ease some of the harm from this poor tailoring, but at a cost. Third, relatively straightforward reforms can eliminate the need for self-help while accommodating legitimate regulatory goals. In making these points, we focus primarily on a burden that other commentators have neglected: profits from short sales generally are ineligible for the reduced tax rate on long-term capital gains, even if the short sale is in place for more than one year.

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## 1. Introduction

Recent months have witnessed the end of a speculative bubble in Internet stocks and the failure of several “blue chip” firms amidst high profile allegations of corporate misconduct.

Why did high-tech startups with no earnings attain such lofty valuations? Why didn’t sophisticated investors keep prices at saner levels? And why didn’t more sophisticated investors look past accounting gimmicks much earlier to uncover problems at Enron and other firms?

While there obviously is no single answer to these complex questions, this article focuses on part of the problem. U.S. tax and regulatory rules raise the cost of betting against the market, making it more costly for sophisticated investors to police the markets in this way. A short sale is the standard way to bet that publicly traded stock will decline in value. The seller sells stock that she does not own, hoping to purchase it later for a lower price. To implement this bet, the seller borrows stock (or, to be precise, the seller’s broker borrows it).<sup>1</sup> Although short sales serve an important function in financial markets, this transaction faces legal constraints that do not govern long positions.

While others have criticized these constraints, these commentators, who are virtually all economists, have not focused rigorously enough on the precise contours of current law. Some short sale constraints are mischaracterized<sup>2</sup> and others are omitted entirely, such as the extra tax burden on short sales.<sup>3</sup> Likewise, the existing literature neglects many strategies that enable well-advised investors to circumvent these constraints. This avoidance may reduce the impact of

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<sup>1</sup> For instance, assume the short sale occurs on January 1, when the stock price is \$100. If the stock declines to \$40 on June 1, the short seller can “cover” the short by buying shares for \$40 and returning to the stock lender, netting a \$60 per share profit. She buys the stock for \$40 and sells it for \$100, albeit in reverse order. This article focuses on legal rules governing the short sales of equities, but other assets can also be sold short, including bonds, currency, and commodities.

<sup>2</sup> For instance, several commentators focus on the fact that short sellers must pledge the short sale proceeds as collateral, and cannot earn a return on these funds. See Miller (1997); Figlewski (1981); Diamond & Verrecchia (1987). Yet many commentators fail to mention that hedge funds and institutional investors typically can negotiate for a return on these funds. See *infra* note 11.

short sale constraints on market prices, but may contribute to social waste in other ways.

To fill these gaps in the literature, this paper offers a careful look at existing law and draws three conclusions. First, short sales play a valuable role in the financial markets; while there may be plausible reasons to regulate them – most notably, concerns about market manipulation and panics – current law is poorly tailored to these goals. Second, investor self-help can mitigate some of the harm from this poor tailoring, but at a cost. Third, relatively straightforward reforms can eliminate the need for such self-help while accommodating legitimate regulatory goals. In making these points, we focus primarily on a burden that other commentators have neglected: profits from short sales generally are ineligible for the reduced tax rate on long-term capital gains, even if the short sale is in place for more than one year.

The paper proceeds as follows. Section 2 considers the effect of short sale constraints on market efficiency. In many cases these constraints will be harmful, but in others they could have no effect and could even prove helpful. Much depends on the precise scope of the short sale constraint at issue. Is it narrowly tailored to legitimate regulatory goals? To answer this question, Sections 3 and 4 turn to current law, considering three legal burdens that apply to short sales but not to long positions<sup>4</sup> (“short specific constraints”). In addition to the tax differential between longs and shorts, we offer a brief discussion of the “up-tick” rule and “locate requirement.”<sup>5</sup> We show that these three burdens are not narrowly tailored to the concerns identified in Section 2, and should be repealed. Section 5 provides our recommendations, including a proposal that additional disclosure should accompany certain large short sales.

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<sup>3</sup> Dechow et al. (2001) is the only exception; they mention the tax rule in passing.

<sup>4</sup> We use the term “long” to describe a bet that the market will rise, including the acquisition of an asset or of a derivative that simulates such ownership.

<sup>5</sup> While the “tick” test and locate requirement have been the subject of scholarly attention, the tax treatment of short sales have not. See, e.g., Diamond & Verrecchia (1987) (discussing tick test); Macey et al., 799 (1989) (focusing on tick test); Stout (1999) (mentioning tick test); D’Avolio (2002) (discussing locate requirement).

Section 6 is the conclusion.

## 2. Competing Efficiency Effects of Short Sale Constraints

This section surveys the positive contributions of short sales, as well as the policy concerns they raise. The purpose is to determine when legal constraints on short sales are efficient, and when they are not.

### 2.1. Reasons Why Short Sale Constraints May Prove Costly

This subsection develops the familiar point that short sale constraints can prove costly because short sales generally contribute to market efficiency, whether the market operates rationally or is dominated by noise traders.

#### 2.1.1. Unimportance in a Perfectly Functioning Market

We begin with the assumption that markets function rationally, although there is an irony in beginning here: if markets were perfectly complete, as the general equilibrium (“GE”) model posits, short sales would be unnecessary—and so would all trading of shares.<sup>6</sup> Without transactions costs, asymmetric information, taxes, or other imperfections, currency would be unnecessary and credit would be unconstrained. The only financial instruments would be bundles of contingent goods.<sup>7</sup> As market actors would have to satisfy only one budget constraint

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<sup>6</sup> We distinguish among: (1) new issues and the second-hand stock market; (2) multi-stage general equilibrium with complete markets or incomplete markets; (3) “rational” and other expectations; (4) the roles of expertise and perception; and (5) the roles of asymmetric taxes and transactions costs. We concentrate on the second-hand market for items (2), (3), (4), and (5), and omit discussion of new issues, except for a brief discussion infra in Section 3.3.1.

<sup>7</sup> The general equilibrium model typically assumes such perfect conditions. It posits: a set  $I$  of individuals,  $i = 1, 2, \dots, n_I$ ; a set  $J$  of firms,  $j = 1, 2, \dots, n_J$  (each of which issues shares so that individuals own firms); a set  $G$  of basic goods,  $g = 1, 2, \dots, n_G$ ; a set  $S$  of states of nature,  $s = 1, 2, \dots, n_S$ ; and a set  $T$  of time periods,  $t = 1, 2, \dots, n_T$ . To avoid accounting for time or uncertainty, the commodity set is enlarged to include as many as  $n_G n_S n_T$  commodities. These new or synthetic commodities combine a basic commodity with a state and an age. For example, the basic commodity, “wheat,” may be replaced by a set that includes, *inter alia*, two distinct commodities: “two-year-old wheat in a period when the weather is good” and “two-year-old wheat in a period when the weather is bad.” As Debreu and others showed, this somewhat tortuous abstraction of the economy, complete with all futures markets, is sufficient to demonstrate the existence of an efficient price equilibrium. See Debreu (1959).

at the end of time, they could simply borrow in the interim, instead of selling their bundles. At the end of the game, income from the bundles would precisely offset the borrowing.

This unrealistic scenario suggests two methodological limitations of the GE model that obscure the value of short sales. First, the model finesses cash-flow constraints by implicitly positing perfect trust. Second, the model assumes that parties' expectations are consistent (or "rational"). We relax these assumptions to highlight the importance of short sales in a well functioning market.

### 2.1.2. Life Cycles and Liquidity

Once credit constraints require individuals to minimize their borrowing, trading in financial assets becomes necessary as current consumers sell financial assets to future consumers.<sup>8</sup> Theoretically, short sales could serve as substitutes for borrowing if the seller immediately gained access to sale proceeds. Yet short sellers generally must leave these funds

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<sup>8</sup> The U.S. equity market obviously is large enough to provide a deep source of liquidity. For 1998, corporate profits were \$824.6 billion and disposable personal income was \$6,027.8 billion. Dividends actually paid were \$263.1 billion, or approximately 32 percent of profits. Corporate profits were around 13 percent of individual income, but corporate dividends were only 4.36 percent of actual income. In 1998, the federal funds rate was 5.35 percent (*SAUS* 1999, p. 530) and the bank prime rate was 8.35 percent. If we select 7 percent as the rate for the modified Debreu economy, the value of all stock, based upon discounted profits, is \$12,600 billion. The 1998 valuation of just the 3,114 companies listed on the NYSE, with 239,302 million shares at an average of \$45.40 per share, is approximately \$10,900 billion (*NYSE Fact Book*, 1999, p. 99), ignoring transaction costs and the skewed nature of share ownership. Life-cycle considerations can explain trade in shares of around 2 to 3 percent per annum based upon an approximate 40-year holding period (*NYSE Fact Book*, 1999, p. 58) from 35 to death. Yet turnover on the New York Stock Exchange in 1999 was 78 percent, and rose during the 1990s (along with margin debt), as shown in Table 1.

**Table 1**

Date	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Debt	28.3	36.7	44	60.3	61.2	76.7	97.4	126.1	141	228.5
Turnover	46	48	48	54	54	59	63	69	76	78

Turnover as percentage of shares.  
*NYSE Fact Book*, 1999, p. 91.  
 Margin Debt in billions.

on deposit with their stock lender.<sup>9</sup> While other commentators often criticize this short sale constraint because it supposedly keeps short sellers from earning a return on these funds,<sup>10</sup> the reality is not as unfavorable. Although retail investors earn no return, hedge funds and other institutional investors typically negotiate for a so-called “rebate.”<sup>11</sup> Even so, short sales are rarely used as a source of liquidity, if only because they are a risky source of funds; the amount to be repaid varies with the underlying stock price.<sup>12</sup>

### ***2.1.3. Speculation, Inconsistent Expectations, and Spanning the Market***

Aside from liquidity, the main rationale for trading financial assets in the secondary market—and, indeed, for selling short—is to place a bet.<sup>13</sup> Obviously, there is little point in

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<sup>9</sup> Under Regulation T, short sellers in U.S. capital markets must deposit cash proceeds from short sales as collateral with the stock lender (i.e., the party that lent stock to the short seller). See Section 220.16 of Regulation T. A further requirement, which does not apply to broker-dealers selling short for their own accounts, is to deposit additional margin: generally 50 percent of the stock’s initial fair market value. See Regulation T; 12 CFR 220.18. The NYSE also requires more margin as the stock appreciates. See NYSE Rule 431. Sophisticated investors sometimes can circumvent the margin rules. For instance, instead of a short sale, an investor who satisfies the minimum asset requirements for over-the-counter derivatives could enter into a prepaid forward. For a discussion, see Schizer (2001).

<sup>10</sup> See supra note 2.

<sup>11</sup> Dechow (2001); Kwan (1995).

<sup>12</sup> An exception is a form of so-called convertible arbitrage. Hedge funds in effect finance the purchase of convertible bonds by short-selling the underlying stock (thereby earning a rebate on short sale proceeds that nearly covers their borrowing cost). The short sale and convertible bond are economically offsetting (as long as the portfolio is dynamically rebalanced), and the hedge fund earns a positive spread because the coupon on the convertible bond exceeds the net borrowing cost. For a description of “coupon stripping,” see Gentry & Schizer (2002).

<sup>13</sup> In this context investors are functioning as traders, who are willing to be on either side of the market, depending on price. Of course, few consumers have either the time or desire to short coffee, butter, or their houses when they feel that prices are too high. Knowledge, experience, training, and habit introduce considerable asymmetries among economic agents. But in the financial markets, with their low transactions costs and high liquidity, economic agents are more likely to function as traders. Although it is difficult to determine how many shareholders in U.S. equity markets function as traders, data suggest that the percentage is significant. In 1995, 69.3 percent of individuals owned their shares through mutual funds, retirement savings accounts, or pension plans. Only 27.4 percent were held directly. More generally, the *NYSE Fact Book* of 1999 estimates that, in 1995, 69,300,000 individuals owned stock directly or indirectly. In the late 1990s, the total population of the United States was about 270,000,000, composed of approximately 103,000,000 household units (extrapolated from *SAUS* 1999, Tables 32, 33). In 1998, there were about 8,000 commercial banks, 1700 mutual savings institutions, 1600 life and 3300 property-liability insurance companies, 8100 pension funds, and 7300 mutual funds in the U.S., and the number of brokers and dealers was estimated at 25,000 in 1996 (*SAUS* T796), with 411,000 employees. In that year, the NYSE had 487 members with 12,695 offices and 120,000 full-time employees (*NYSE Fact Book*, 1999). Thus, at least 70 percent of share ownership is professionally managed by intermediaries presumably trained in some form of finance. Of all stock held by individuals, 60 percent is held by those with four or more years of higher education, and 66 percent with annual incomes over \$100,000.

betting—whether the bet is a long or a short—if everyone has the same information, preferences, and expectations. So, again, simplifying assumptions about market behavior, such as the idea that all information is evenly disseminated, obscure the importance of short selling and thus of short-sale constraints.<sup>14</sup>

Short sales enable market pessimists to optimize their portfolios.<sup>15</sup> Indeed, short sales can be an important element of a diversified portfolio because they tend to appreciate during market declines, thereby reducing a portfolio's market exposure.<sup>16</sup> Shorts are needed not only for bets against the market, but also for market-making, hedges, and bets about volatility – transactions that are not inherently pessimistic about market prices. For example, specialists engage in short sales in order to provide liquidity.<sup>17</sup> When securities dealers supply put options to clients—transactions that clients might use as hedges for existing positions or as bets that the market will decline—the dealers typically hedge these derivatives by engaging in short sales.<sup>18</sup>

In another example, convertible arbitrageurs often use the combination of convertible bonds and

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<sup>14</sup> Lintner (1969) (arguing that short sale constraints do not matter if all traders share the same assessment of price and risk). Indeed, the capital asset pricing model generally presumes that expectations are homogenous and that the market portfolio is mean-variance efficient, such that every trader holds a market portfolio containing the same proportion of each security. On these assumptions, short sales are unnecessary. But once trader preferences are not homogenous, short sale constraints matter. Ross (1977); Miller (1977). Cf. Wu et al (1996) (arguing that short sale restrictions can improve mean variance inefficiency of market portfolio by “reducing the opportunity cost of ignorance”; since traders cannot necessarily use information that they uncover, they face less of a disadvantage in passively holding the market portfolio instead).

<sup>15</sup> Miller (1977) is the seminal paper on this point.

<sup>16</sup> This negative beta is the rationale for “pairs” or “long-short” trading, a strategy that many hedge funds use. Kwan (1993). Cf. De Roon et al (2001) (while adding emerging market stocks to a portfolio generally is thought to improve mean variance efficiency of market portfolio, these benefits do not materialize when short sales are constrained in emerging markets).

<sup>17</sup> In an example of market making, if a flurry of buy orders come in, the specialist will fill them from a short position and then cover the shorts within a brief time, profiting from the commission spread more than the price change. Battachary & Gallinger (1991) (finding empirical support for idea that specialists short as market rises and cover as market falls, such that their short selling activity has no informational content).

<sup>18</sup> Specifically, dealers engage in so-called “dynamic” hedging. They compute the “delta” of the derivative—that is, the number of cents by which the derivative's value changes for each dollar change in the underlying property's value. For instance, assume that the dealer's short put position declines by 80 cents for each dollar of decline in the stock price. Given this delta of .80, the dealer's hedge will be based on eighty percent of the position. For instance, if the put is for 1000 shares, the dealer will short 800 shares. Since the delta of an option changes with the stock price, the size of the hedge will have to change constantly. For a discussion of dynamic hedging, see Schizer



short sales of the underlying stock as bets on the volatility of the underlying stock.<sup>19</sup> “Risk” arbitrageurs bet that a merger will go through by shorting the acquirer and buying the target.<sup>20</sup> In facilitating various bets,<sup>21</sup> short sales play a valuable role in completing financial markets.<sup>22</sup>

(2001).

<sup>19</sup> In buying a convertible bond, the arbitrageur in effect buys a call option and makes a loan. With a short sale, the arbitrageur in effect can finance the position (thus canceling out the loan), while hedging the option. To be precise, the short sale hedges the option against changes in the *price* of the underlying stock (assuming the size of the short sale is constantly adjusted, as noted in the prior footnote). Yet the short sale does not necessarily hedge against changes in the *volatility* of the underlying stock. Thus, this “hedged” position enables a convertible arbitrageur to place bets on volatility. For a discussion, see Gentry & Schizer (2003). For discussion of another convertible arbitrage strategy, coupon stripping, see *supra* note 12.

<sup>20</sup> Dechow et al (2001). In addition, investors who hold highly appreciated securities and feel undiversified may engage in tax motivated hedging that simulates a sale but does not trigger tax; as one of us has written elsewhere, though, these tax-motivated strategies often are a source of social waste. See generally Schizer (2001); see also Brent et al. (1990) (finding that significant proportion of short sales are associated with tax deferral efforts, hedging, and arbitrage that is not information-based). Tax-motivated traders can be information-based if the taxpayer expects the stock to decline in value, but in many cases the taxpayer has no view on the stock’s future and merely feels undiversified. In the wake of a 1997 tax reform, tax-motivated hedging generally relies on derivatives instead of short sales, but the provider of these derivatives, securities dealers, engage in short sales to hedge their own positions.

<sup>21</sup> To what extent does empirical evidence indicate that short sales are vehicles for placing bets? Although short selling constitutes a small part of total trade—ranging from 3 to 10.5 percent of total trading, as indicated by Table 2—mere quantity does not signify importance. Especially in rising markets, one would not expect heavy shorting, except to correct overly sanguine expectations.

**Table 2**

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
<b>Shares</b>	39.7	45.3	51.4	66.9	73.4	87.2	104.6	133.3	169.7	203.9
<b>Shorts</b>	3.5	4.1	3.9	5.0	5.8	7.1	9.2	12.8	17.8	20.6

Volume of share trading on the NYSE in billions of shares.

*NYSE Fact Book*, 1999.

Short trading in billions of shares.

Short selling is a common practice of two distinct groups, as suggested by Table 3, which contrasts short selling of stock by members of the NYSE and others. Members, who have accounted for 50 to 65 percent of the volume, often engage in short sales as part of market-making efforts (though sometimes they do so as part of trading or arbitrage strategies). In contrast, private shorts are likely to be more speculative in nature.

**Table 3**

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
<b>Members</b>	2.17	2.72	2.73	3.2	3.6	3.8	4.6	6.9	9.8	11.6
<b>Others</b>	1.36	1.34	1.22	1.8	2.3	3.3	4.6	5.9	8.0	9.0

Volume of short trading on the NYSE in billions of shares.

Not only do short sales help individual traders, but, perhaps even more importantly, they generate positive externalities by making prices more accurate. Thus, short sales discipline corporate managers and allocate resources more efficiently.<sup>23</sup> It is well understood that excluding the short seller may undermine this benefit by slowing the market's progress toward an equilibrium price. If pessimists cannot trade, optimists are likely to have a disproportionate influence on prices.<sup>24</sup>

#### ***2.1.4 The Contribution of Short Sales in a Market with Noise Traders***

Short sales can be especially important if noise traders have significant influence over the market. A “noise” trader pays insufficient attention to a financial asset's real value, instead trading on market momentum, unsound theories, inaccurate information, and the like. Thus, if noise traders dump a stock (or sell it short), the market could decline steeply unless sophisticated traders go “long.” Likewise, if noise traders bid up an asset price, a bubble is averted only if sophisticated investors sell short.<sup>25</sup>

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*NYSE Fact Book*, 1999.

<sup>22</sup> For a discussion of the economic significance of completing markets, see Shubik (1999).

<sup>23</sup> For instance, in a study of forty-seven countries, some of which allow short sales and some of which do not, Bris, Goetzmann and Zhu find more cross-sectional variation in equity returns in markets where short selling is feasible and practiced. As a result, they conclude that short sales enhance price discovery, while short sale constraints impede this process. Bris et al (2002). For other empirical studies showing the negative effects of short sale constraints on market efficiency, see *infra* notes 35, 36, and 40.

<sup>24</sup> Miller proposed this idea in an influential paper that applies the “winner's curse” to a market with short sale constraints. Miller (1977); see also Lintner (1969) (modeling idea that if traders have heterogeneous expectations, short sale constraints raise the market price of risk); Harrison & Kreps (1978) (modeling effect of short sale constraints on price in market with speculators). Carassus & Jouini (1998) (offering formal proof that short sale constraints render arbitrage impossible even in a frictionless economy in which all assets have negative present value); Allen et al (1992) (modeling speculative bubbles and arguing that short sale constraints are precondition); Ofek & Richardson (2001) (using model of heterogenous expectations and short sale constraints to explain Internet bubble). In response to Miller, Jarrow proposed a circumstance in which easing short sale constraints may cause some prices to rise, instead of falling (as Miller predicted). Jarrow's claim depends on the premise that short sales can be used as a source of financing; the idea is that some traders will be able to buy more of a stock (and thus will drive up its price) if they can finance the purchase by shorting other stocks. Jarrow (1980). As noted above, the premise that traders can use short sales as a source of funding generally does not hold. See *supra* text accompanying notes 11-12 .

<sup>25</sup> DeLong (1990). In addition to the noise trader literature, another literature grounded in behavioral law and economics explores the extent to which cognitive biases spawn market imperfections. For example, optimism bias may cause traders to have too much confidence in their own judgment. Yet this bias is not unique to short sellers.

While noise traders could be either long or short, optimistic noise traders pose a particular threat because, for two reasons, their overly rosy assessment is less likely to be corrected than an overly pessimistic view. First, many market gatekeepers who monitor managers and market prices have private incentives to deemphasize negative information and, in some cases, to fuel a speculative bubble. For instance, research analysts are often reluctant to issue “sell” recommendations because the downgraded firm might retaliate by withholding underwriting business from the analyst’s investment bank.<sup>26</sup> Likewise, auditors may cooperate with misleadingly optimistic accounting practices as a way to win consulting business for their accounting firms.

Second, while sophisticated short sellers might correct for these conflicts, the economic fragility of short sales could discourage short sellers from intervening – a deterrent that is wholly separate from *legal* burdens unique to short sales. Shorts present the risk of unlimited losses; unlike the buyer of a long position, who cannot lose more than the purchase price of the long, a short seller theoretically can lose an infinite amount as the price rises.<sup>27</sup> Likewise, shorts present only limited opportunity for gain; unlike a long, which can yield an infinite profit, a short can yield no more than the short sale proceeds (i.e., the value of the security when it is sold short). In addition, short sellers do not have access to these proceeds, so their costs rise as the short sale remains in place (assuming the short sale rebate does not provide an adequate return).<sup>28</sup> Finally,

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Indeed, we are not aware of any cognitive bias that uniquely impacts short sellers. Even without cognitive biases or noise traders, moreover, speculative bubbles are still possible. Rational traders can bid up the price while expecting to sell before the price falls. Short sale constraints also are a precondition for this type of bubble. See Allen et al (1992).

<sup>26</sup> See Coffee (2002); see also Hong & Kubik (showing that securities analysts are more likely to be promoted if they offer optimistic assessments, particularly of stocks underwritten by their employer).

<sup>27</sup> In response, some short sellers automatically cover after a stock rises by a stated amount, such as 25%. Braham (2000).

<sup>28</sup> Tickman & Vila (1992). The same, of course, is true of leveraged long positions.

whether they are short or long, arbitrageurs are prone to liquidity constraints and other costs.<sup>29</sup> Their investors typically expect quick results, and may view short run unprofitability as a mark of incompetence. As a result, arbitrageurs are likely to underinvest in long-term bets that could prove unprofitable in the short run.<sup>30</sup> Likewise, they know they may leave their current job, and thus may no longer be managing the portfolio when the long-term bet pays off.<sup>31</sup> Given these built-in obstacles to market-correcting short sales, legal constraints on short sales could prove all the more harmful.

The role of short sales in preventing bubbles can be presented formally. The intuition is that well informed expert traders use short sales to trade against unsophisticated momentum traders, who buy merely because the price has just risen; as long as enough experts trade, the price remains at the correct (fundamentals-based) level. Consider a simple market with  $n$  homogeneous “expert” (fundamental) traders and  $\tilde{n}$  homogeneous “momentum” (second-order price-tracking) traders. Let  $V_t = \mu$  denote a stock’s perceived value at time  $t$  by one of the expert traders, where it is assumed that each expert is given some private “information” about the value of the stock through the parameter  $\mu$ . Furthermore, let  $\tilde{V}_t = P_{t-1} + \gamma(P_{t-1} - P_{t-2})$  denote a stock’s perceived value at time  $t$  by one of the momentum traders, where the constant  $\gamma > 0$  governs the sensitivity of the momentum traders to recent price changes. Finally, let the market

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<sup>29</sup> For an estimation of various costs of arbitrage, including the risk that markets will not converge, the cost of borrowing stock to sell short, the cost of posting margin, and the like, see Mitchell et al (2001); see also Ofek & Richardson (explaining why mutual and hedge funds were reluctant to short Internet stocks, and why they faced high costs in doing so).

<sup>30</sup> Shleifer & Vishny (1997).

<sup>31</sup> See Goldman & Sleazak (2003).

price of one share at time  $t$  be described by the simple weighted average  $P_t = \beta V_t + (1 - \beta)\tilde{V}_t$ ,

where  $\beta = \frac{n}{\tilde{n} + n} \in [0, 1]$  denotes the “expert ratio.”<sup>32</sup>

Rewriting the market price as  $P_t = \beta\mu + (1 - \beta)[(1 + \gamma)P_{t-1} - \gamma P_{t-2}]$ , it is easy to show that this non-homogeneous second-order difference equation possesses a general solution of the form

$$P_t = C_1 m_1^t + C_2 m_2^t + \mu, \text{ where } m_1 = \frac{1}{2} \left[ (1 - \beta)(1 + \gamma) + \sqrt{(1 - \beta)^2(1 + \gamma)^2 - 4(1 - \beta)\gamma} \right],$$

$$m_2 = \frac{1}{2} \left[ (1 - \beta)(1 + \gamma) - \sqrt{(1 - \beta)^2(1 + \gamma)^2 - 4(1 - \beta)\gamma} \right], \text{ and the constants } C_1 \text{ and } C_2 \text{ are}$$

determined by the initial values  $P_0 = P_0$  and  $P_1 = \beta\mu + (1 - \beta)\tilde{V}_1$ . Checking various conditions on the (possibly complex) characteristic roots  $m_1$  and  $m_2$ , it is straightforward to show that  $\|m_1\| < 1$

and  $\|m_2\| < 1$  if  $\beta \in \left( \frac{2\gamma}{1 + 2\gamma}, 1 \right]$ . Thus, regardless of the initial prices  $P_0$  and  $P_1$ , the market price

will converge to  $P_\infty = \mu$  as long as the “expert ratio” is sufficiently large in comparison to the

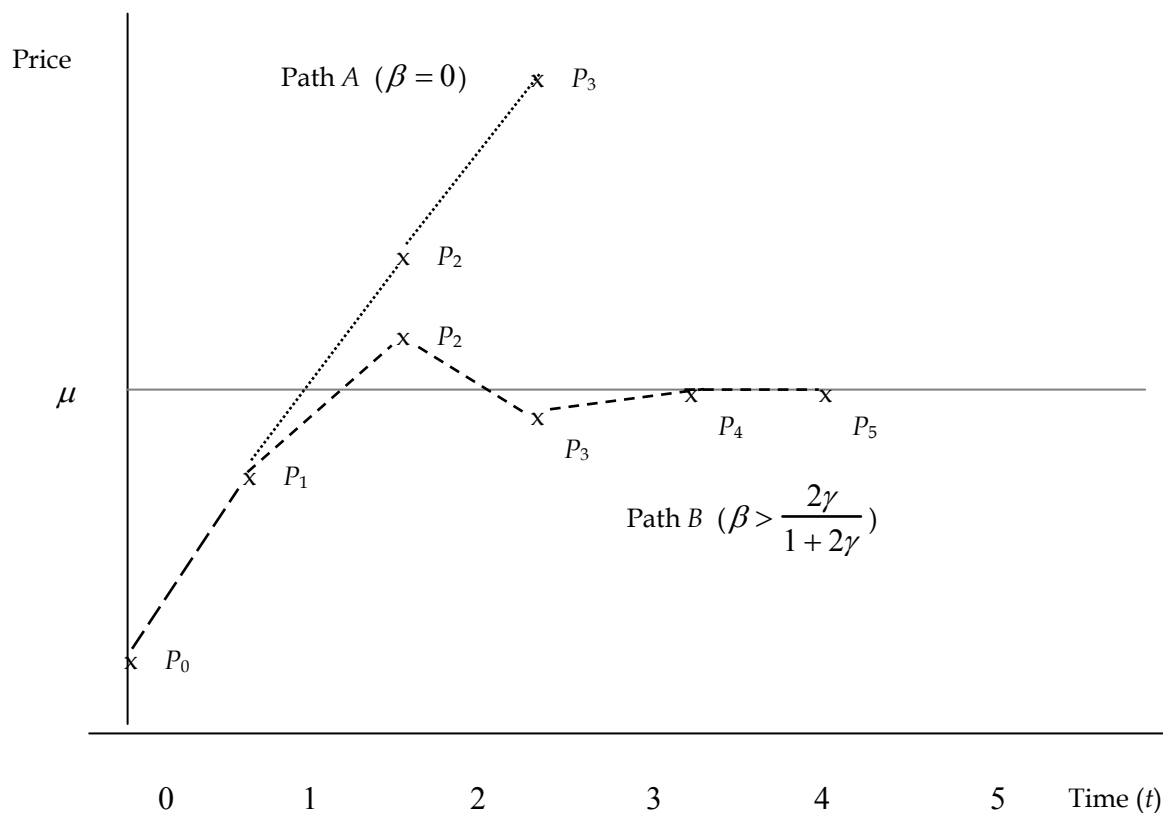
sensitivity parameter  $\gamma$ . Path *B* of Figure 1 illustrates how a sufficient number of expert traders

can prevent a price bubble (i.e., Path *A*) by selling short at time  $t = 2$ .

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<sup>32</sup> Although the market price is modeled as a weighted average of  $V(t)$  and  $\tilde{V}(t)$ , this does not imply that price is determined as an average of all of the bids made by the various traders. Each trader (expert or momentum) can move in or out of the market whenever he/she chooses, and price is determined by the actions of individual traders on the margin. In essence,  $V(t)$  is the marginally determined price in a market with only expert traders, and  $\tilde{V}(t)$  is the marginally determined price in a market with only momentum traders. We assume that, descriptively, the marginally determined price in our composite market may be expressed as a weighted average of these two marginally determined prices.

**Figure 1**



## 2.2. Reasons Why Short Sale Constraints May Be Unimportant

Thus far, we have shown that short sales play a vital role in optimizing individual portfolios and policing market prices, whether the market functions rationally or is dominated by noise traders. Yet for two reasons, it does follow that the short sale constraints under current law are necessarily inefficient. First, these constraints may have *no* effect on market prices because the market has adjusted to them, or because they are easy to avoid. Second, even if the constraints *do* have an effect on market prices or individual portfolios, the constraints may serve

a valuable function that offsets the distortions discussed above. These possibilities are developed in this subsection and the next.

### ***2.2.1.Sophisticated Investors Adjust Their Expectations***

While short sale constraints may prevent pessimists from optimizing their individual portfolios, they do not distort market prices if the owners of overvalued securities pick up the slack. For instance, assume that Sarah the short seller has negative information about a stock. Does it matter if a legal rule keeps Sarah from selling short? If we assume that Larry, the owner of a long position, has the same information and thus decides to sell, then excluding Sarah from the market is less likely to distort prices (though it still will keep Sarah from optimizing her portfolio).<sup>33</sup> Yet market prices are unaffected only if the longs learn what the shorts know and are equally capable of processing this information.<sup>34</sup> We should be careful about this assumption because, in many cases, expectations are inconsistent and information is unevenly disseminated; indeed, empirical studies show that short sellers often have superior information<sup>35</sup> and that mispriced securities are more likely to be overvalued than to be undervalued.<sup>36</sup>

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<sup>33</sup> Likewise, excluding Sarah from selling short seems less harmful if Sarah can sell a different security that she owns, and this security tends to correlate in value with the security she would like to short. Jarrow (1980). Yet this theory is less reassuring to the extent that firm specific risks do not correlate in this way.

<sup>34</sup> See Harris & Raviv (1993) (short sale constraints matter not only if traders have different information, but also if they draw different inferences from the same information).

<sup>35</sup> Jones & Lamont (2002) (using early 20<sup>th</sup> Century U.S. data to show that stocks which are expensive to short have high valuations and low subsequent returns); Dechow et al (2001) (finding that high short interest is a strong indicator of poor future performance); Asquith & Meulbroek (1995) (detecting strong negative relation, during the period 1976-93, between short interest and subsequent returns); Senchack & Starks (1993) (showing that unexpected increase in short interest leads to negative returns); Chen et al (2001) (using narrow share ownership as proxy for difficulty of selling short, and showing that narrow share ownership predicts abnormal negative returns during period from 1979 to 1998). But cf. Woolridge & Dickinson (1994) (finding that increase in short interest corresponds with small but statistically insignificant increase in price). While Woolridge & Dickinson's result is an outlier, Dechow et al. attribute the discrepancy to the fact that Woolridge & Dickinson chose stocks at random, whereas Dechow et al. choose stocks with a short interest that is above a specified threshold. As a result, Dechow et al avoid stocks in which short interest is a product of liquidity trading, instead of information-based trading.

<sup>36</sup> For instance, using price earnings ratios and the level of firm repurchases and issuances of new stock, Finn et al. identified a portfolio of undervalued stocks and a portfolio of overvalued stocks. The undervalued securities modestly outperformed the market while the overvalued securities dramatically underperformed. They conclude, therefore, that mispricing is "mostly on the short side." Finn et al (1999).

Even if longs do not learn what the shorts know (or would have uncovered), short sale constraints still would not distort prices if the longs adjust their valuations to account for the exclusion of shorts from the market.<sup>37</sup> Yet any estimates of this missing volume are imprecise.<sup>38</sup> In addition, changes in short-sale volume are a noisy signal because spikes in short-sale volume do not necessarily connote market pessimism (i.e., since short sales are used to bet on market volatility, the success of mergers, etc.)<sup>39</sup> Not surprisingly, empirical evidence shows that short sale constraints do, indeed, inflate market prices.<sup>40</sup> In any event, even if market actors are able to correct for distortions arising from the above rules, at least to an extent, short sellers cannot optimize their individual portfolios. In addition, the efforts of market actors to correct for missing short sales are themselves costly. It would be better to eliminate this costly self help by crafting short-sale constraints with greater precision.

### ***2.2.2. Constraints May Be Balanced By Offsetting Benefits***

Even if traders cannot adjust their valuations, short sale constraints can prove unimportant if other factors heighten the appeal of short sales. A constraint should not deter short sellers if they expect an offsetting legal benefit. Even if the law penalizes some short sales

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<sup>37</sup> Diamond & Verrecchia (1987).

<sup>38</sup> Figlewski (1981) (average discounting will be incorrect).

<sup>39</sup> See supra text accompanying note 19.

<sup>40</sup> Ofek et al (2002) (offering empirical evidence that short sale constraints prevent arbitrage and thus allow stock to be overpriced relative to the underlying options and showing that this mispricing increases with the strength of the short sale constraint, as measured by the size of the short sale rebate); Wang (1998) (offering empirical evidence that short sale constraints undermine mean variance efficiency of holding market portfolio); Jarrow & O'Hara (1989) (showing that when financial engineers divided common stock into "primes" and "scores," the combined value of the pieces exceeded the value of the stock, and attributing this failure of arbitrage to short sale constraints). Bris et al (2002) (showing that markets that restrict short sales offer less efficient price discovery); Lamont & Thaler (2001) (observing instances in which the value of stock to be spun off exceeds the value of the distributing company, such as the spinoff of Palm by 3Com, and explaining these blatant mispricings with short sale constraints); Kempf (1998) (using data from German equity spot and futures markets to show that short sale constraints lead to mispricing in the spot market); Gay & Jung (1999) (offering empirical evidence that Korean short sale constraints serve to inflate equity prices relative to futures prices, as only the former is subject to short sale constraints); Fung & Liang (1999) (offering time series data in Hong Kong to show that relaxing short sale constraints narrowed gap between spot and futures prices); Jiang et al (2001) (same). Cf. Karpoff (1988) (offering empirical evidence that short sale constraints reduce volume in bear market); Danielson & Sorescu (2001) (concluding that rational expectations prediction is wrong because introduction of options trading, which facilitates short sales, leads to decline in stock price,



ex post (i.e., because a penalty applies but a benefit does not), risk neutral short sellers should not be discouraged ex ante if the probability and magnitude of the penalty and benefit are comparable. Thus, these short sellers can still optimize their portfolios and influence market prices.

### ***2.2.3.Sophisticated Investors Avoid the Constraints***

Even if there are no offsetting benefits, short sale constraints would be unimportant if market pessimists can avoid them easily. For instance, if avoidance is cheap, all would-be-short sellers can still sell short, and so the constraints should not affect market prices or the ability of traders to optimize their portfolios. Yet the cost of avoidance is probably not so trivial, and it probably varies for different constraints and classes of traders. The existing literature provides very little guidance on this issue. A few commentators mention the public options market as a way around short sale constraints, and show that short interest is greater for optionable stock.<sup>41</sup> But this literature does not give a sense of how costly such avoidance is, except that two commentators suggest it is expensive.<sup>42</sup> The literature does not mention other methods of avoidance or distinguish among the various constraints.

To begin filling this gap, we describe ways in which well advised traders can avoid various short sale constraints, as well as some limits on this avoidance. Not surprisingly, the constraints differ in various ways. A constraint could prove less harmful if it is easier for sophisticated traders to avoid than for noise traders. Yet a constraint will be a less effective filter if some noise traders can still avoid the constraint, and if some sophisticated traders are likely to

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especially in volatile and high beta stocks).

<sup>41</sup> Figlewski (1993); Senchack & Starks (1993). Cf. Raab & Schwager (1993) (showing that, in theory, short sale restrictions do not matter if traders can short an index future).

<sup>42</sup> Dechow (2001); Asquith & Meulbroek (“ Hedge fund managers and other practitioners involved in short selling maintain that they cannot effectively use the options market. In interviews, they repeatedly claimed that the options market provides less liquidity and is more expensive than the short sales market when trying to establish a large position on a hard to borrow stock.”).

be shut out. The latter scenario is especially troubling if the excluded short sellers would have been marginal (and thus price setting) traders; and, in theory, in a market with heterogeneous preferences, *every* trader is marginal as to the last share she holds or shorts.<sup>43</sup> Finally, even if all sophisticated traders can sell short, this avoidance may be expensive. We do not offer empirical data on these issues. Yet Sections 3 and 4 lay the groundwork for such research by offering careful legal analysis and anecdotal evidence to illuminate the type of avoidance that is possible, and some of the costs it presents.

### **2.3. Reasons Why Short Sale Constraints May Be Valuable**

We have shown that in some cases short sale constraints are harmful, and in some cases they may be unimportant. Yet in other cases, short sale constraints may enhance efficiency. This sub-section considers when short sales would lead to unappealing results, so that constraints are useful.

#### **2.3.1. *Moral Hazard and Panics***

By taking a large enough position, a short seller may be able to depress the market price, thereby manufacturing profits on the short as the stock price declines. Obviously, if this price starts out at too high a level (e.g., because noise traders have bid up the price), this use of a short sale is not objectionable. But in some circumstances a short seller can trigger a decline even if the market price already is at an appropriate level – for instance, by spreading false rumors. Not only might a sophisticated investor use short sales in manipulating the market, but, as noted above, noise traders might use short sales in a way that precipitates or intensifies a panic—that is, a steep market decline that market fundamentals do not justify.<sup>44</sup> While manipulation and

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<sup>43</sup> Lintner (1969).

<sup>44</sup> Indeed, there is empirical support for the intuitive idea that, in markets that allow short sales, panics are somewhat more frequent and intense. Bris et al (2002).

noise traders may offer valid rationales for regulation,<sup>45</sup> these justifications are not unique to short sales. Similar issues arise for long positions.<sup>46</sup> For instance, a sophisticated investor could buy a large block, and then profit as this trade induces unsophisticated investors to buy at higher prices. Likewise, there is no a priori reason to believe that panics are worse than bubbles. Thus, the proper regulatory response is to target *all* manipulative and “noise” trading, without singling out short sales.

### ***2.3.2. Cascading Defaults***

If the stock price rises dramatically after a short sale – so that the short seller has misjudged the market – it will be expensive for the short seller to return the stock she has borrowed. If she is unable to raise the funds, the stock lender will lose her stock, a loss that could, for instance, keep the stock lender from repaying margin debt. Preventing such a cascade of defaults by ensuring that shorts can cover their positions is a plausible rationale for regulation. Yet this concern is not unique to short sales. There is a similar need to ensure that a *purchaser* of securities can repay loans that funded the purchase price.<sup>47</sup> The margin rules and related requirements address these concerns for long positions; they also apply to short sales, and rightly so.<sup>48</sup> Because this regime is not unique to short sales, we do not focus on it below.

### ***2.3.3. Incomplete Markets and Second-Best Concerns***

There is no developed market for short sales outside the financial markets, for instance, in personal property, land, buildings, or human capital.<sup>49</sup> Since we do not have short sales of

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<sup>45</sup> For a disclosure-based regulatory response, see *infra* Section 5.

<sup>46</sup> A difference is that, theoretically, a short seller does not need capital to sell short, since she is selling borrowed stock; as a practical matter, though, the margin rules operate to require short sellers to put up capital. See *supra* note 9.

<sup>47</sup> The main difference is that losses on a long position are limited to the purchase price of the security, while losses on a short sale are theoretically unlimited.

<sup>48</sup> See *supra* text accompanying notes 9 to 12.

<sup>49</sup> The difference is that financial markets (1) impose lower transaction costs, (2) offer greater liquidity, and (3) serve as a perception and evaluation device to help resolve inconsistent expectations. On the last point, even the most

human capital or residential real property, should we have short sales in the financial markets? If the absence of short sales causes prices to rise, it may be better to have this distortion apply across the board.

This is a difficult question because, in theory, partial moves toward completing the market have ambiguous results; if the market will remain incomplete anyway, a partial step toward completion can either enhance or reduce welfare, depending upon the precise facts (which typically are not measurable).<sup>50</sup> In the absence of data, we favor a presumption in favor of incremental steps toward complete markets, if only because the market otherwise cannot become complete. Thus, in order to allow markets to become complete, legal impediments to short selling should be narrowly tailored.

#### ***2.3.4. Social Waste from Speculation***

Short sales arguably share a deficiency that is sometimes attributed to speculation in general: since one party's market prediction will be correct, and the other's will not, speculation is a zero-sum game in which transaction costs represent social waste.<sup>51</sup> We are skeptical about this argument because we believe accurate market prices yield significant positive externalities. In any event, if this concern is valid, it is not unique to short sales. A legal response (such as a securities transfer tax, designed to dampen the volume of secondary market trading) presumably should constrain speculative longs to the same extent as speculative shorts.

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resolute fundamental value analyst regards the economic system at best as “an equilibrium-tending device,” rather than a system that is truly in equilibrium.

<sup>50</sup> See Hart (1975); Huang (2000).

<sup>51</sup> Stout (1999). In fact, although speculation is a zero-sum game in terms of cash—in that one party's gain is the other party's loss—it is not necessarily a zero-sum game in terms of utility. The parties to these bets *both* improve their utilities, as measured before they know whether their market prediction was correct. For instance, assume that the owner of a large undiversified position in Microsoft decides to sell a portion of her position, investing the proceeds in risk-free bonds. If Microsoft continues to appreciate, this seller has “lost” and the new owner has “won” an offsetting amount of cash. But, measured at the time of the sale (i.e., when the future price was unknown), both parties have improved their utility. The seller has reduced her undiversified exposure, while the buyer has entered into a new bet that he deems desirable.

### **2.3.5. *Executive Incentives and Insider Trading***

Special concerns arise when executives short their employer's stock, since this transaction might undermine their incentives and serve as a means of misappropriating the firm's proprietary information through insider trading.<sup>52</sup> These issues are beyond this article's scope because we focus on investors as opposed to managers.

### **2.3.6. *“Sin,” “Unpatriotic” Short Sales, and a Brief Note on Political Economy***

In the popular mind, short sellers are sometimes viewed as unsavory, and even unpatriotic.<sup>53</sup> Long positions are admired as investments, while short positions are dismissed as speculation. This perspective is naïve. Setting aside the primary market (in which investors buy securities directly from the firm),<sup>54</sup> any secondary market activity—whether it is a long or a short—is a speculative bet. As such, it can contribute to liquidity and more accurate pricing, thereby enhancing the primary market's appeal, disciplining corporate managers, and having useful allocative effects for the rest of the economy.

Nevertheless, the “sin” rhetoric can prove helpful to interest groups that benefit from short sale constraints. While the political economy of short sale constraints is beyond this Article's scope, it should be noted that managers of publicly traded firms benefit when their employer's stock rises, and suffer financial injury from “bear raids.”<sup>55</sup> Inflated equity prices also

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<sup>52</sup> Thus, officers, directors, and certain large shareholders are not permitted to sell short unless they cover within 20 days. See Section 16(c). In contrast, short positions in derivatives are permitted for hedging (i.e., if the so-called “section 16 insider” owns as many shares as are the subject of the derivative short position). See SEC Rule 16c-4. These provisions are outside the scope of this article. For a discussion, see Schizer (2000).

<sup>53</sup> Evans (2002) (describing view among general public that “short sellers are evil people, they have robbed us of our money and they must be stopped”; also quoting Axa Chairman Claude Bebear's description of short sellers as “irrational, even immoral”); Asiamoney (2002) (“Short sellers are mean-spirited sorts bent on making money by getting a jump on ordinary investors.”) (quoting Japanese finance minister Maajuro Shiokawa).

<sup>54</sup> For discussion of the primary market, see *infra* Section 3.3.1.

<sup>55</sup> We thank Jack Coffee for this observation.

reduce a firm's cost of capital.<sup>56</sup> Likewise, investment banks and research analysts generally benefit when stock prices rise.<sup>57</sup>

## **2.4. Implications for Legal Constraints on Short Sales**

We have shown that short selling serves a socially useful function, whether the market operates rationally or is dominated by noise traders. Generally, then, regulators should permit short sales to the same extent as “longs.” Regulation may be needed to prevent market manipulation and panics, but any constraint on short sales should be narrowly tailored to these concerns and should also apply to long positions. Of course, poor tailoring will not distort market prices as much if market actors can avoid the constraint, but this self-help can be a separate source of social waste. The next two sections identify three legal constraints that single out short sales: ineligibility for the reduced tax rate for long-term capital gains; the uptick rule; and the locate requirement. We ask whether these rules are narrowly tailored and, if not, whether they are easy to avoid. In general, we find that these rules are likely to undermine market efficiency, and thus should be reconsidered.

## **3. Tax Penalty on Short Sale Profits**

This section critiques a short-specific constraint that other commentators have overlooked: Unlike gains from long positions, short-sale gains are not eligible for favorable long-term capital gain tax rates even if the short sale remains open for more than a year.<sup>58</sup> Of course, one might question whether the tax rate should be reduced for *any* long-term capital gain, and we do not address this issue. Our point is that, if a reduced rate is offered to long positions,

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<sup>56</sup> Miller (1977); see also Allen & Gale (1991) (short sale constraints protect financial innovators).

<sup>57</sup> See *supra* Section 2.1.4. Relatedly, anecdotal evidence suggests that fund managers and investment banks that profit from rising markets have tried to drive certain professional short sellers out of business. For a discussion, see Cole (2001).

<sup>58</sup>For individuals, long-term capital gain generally is taxed at a 20 percent rate. Short-term capital gain is taxed at the taxpayer's marginal rate for ordinary income, the maximum of which was 38.6 percent in 2002 for individuals.

it generally should be available to short sales on comparable terms. To develop this argument, we consider three issues outlined in Part II: why the higher tax on short sales might be harmful, why it might not matter, and why it might prove socially useful.

### **3.1. Why the Tax Penalty Could Prove Inefficient**

To benefit from a reduced rate for capital gains, a taxpayer must hold the relevant asset for the requisite holding period, which currently is one year. Short sellers are ineligible for this benefit because of a quirk in the computation of holding period. For a short sale, the holding period is not based on the length of time that the short sale is open, but on the time the taxpayer holds the stock that is delivered to the stock lender to “cover” the short.

As an example, assume that on January 1, 2003, a taxpayer enters into a short sale of stock for \$100 by borrowing the necessary shares from her broker (the “stock lender”). Two years later, on January 1, 2005, the taxpayer covers the short at a \$60 per share gain by purchasing shares for \$40 and immediately delivering them to the stock lender. Even though the short sale has lasted for more than a year, the taxpayer has held the stock for only a matter of minutes. As a result, the taxpayer’s gain is treated as short-term.

This rule relies on a formalistic definition of holding period. Although the taxpayer places a two-year bet, the short sale is a liability, not something that the taxpayer is “holding,” and so “holding” period is not earned. Rather, the only thing the taxpayer actually “holds” is the stock purchased to cover the short, and that stock is held only briefly.<sup>59</sup> In effect, the tax law

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<sup>59</sup> See Section 1233; Treas. Reg. 1-1233-1(a)(3) (“Generally, the period for which a taxpayer holds property delivered to close a short sale determined whether long-term or short-term capital gain or loss results.”). Assume, again, that the taxpayer shorts the stock on January 1, 2003, and purchases stock to cover the short on January 1, 2005. But assume that, instead of actually covering the short, the taxpayer holds this stock for a year, and covers the short on January 2, 2006. Although she held the stock for more than one year, the gain is still short-term. See Treas. Reg. 1.1233-1(c).

relies on an uneconomic definition of the relevant transaction that focuses on the asset purchased to cover the short sale, instead of on the short sale itself.

The bottom line is that, under the current rate structure,<sup>60</sup> individuals who bet on market increases generally face a lower long-term tax rate (20 percent) than individuals who bet on market declines (short-term capital gains rates that are approximately 39 percent in the maximum bracket).<sup>61</sup> As we argued in the preceding section, such favoritism for long positions can prevent individuals from optimizing their portfolios and can distort market prices.

Nor can this rule be justified as a response to manipulative short sales. The rule applies to *all* short sales by individuals,<sup>62</sup> without asking whether the trader has manipulative intent. Indeed, the rule penalizes *long-term* short positions,<sup>63</sup> which are less likely than short-term bets to be involved in manipulative schemes. After all, the market is likely to discover the inaccuracy of a manipulative rumor by the time a position has been in place for a year.<sup>64</sup>

Instead of penalizing short sales with a formalistic rule, it would seem advisable to attain conformity with the rule for long positions. To do so, we would measure the holding period for naked shorts by the length of time that the short sale is open, and not by the holding period of property used to cover the short. Yet before drawing this conclusion, we should consider reasons why this penalty on short sales could prove unimportant or even useful.

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<sup>60</sup> While there currently is a significant gap between the rate for long-term capital gain and the rate for short term capital gain and ordinary income, this gap has been both broader and narrower at various points in our history. For instance, in 1986, when the capital gains preference was temporarily repealed, the tax rate on longs and shorts was comparable. For a historical survey of the capital gains preference, see Schizer (1998b).

<sup>61</sup> For both long and short positions, the tax rates in text are overstated. Given the taxpayer's ability to defer recognition of gain, and the tax-reducing effect of deferral, the effective tax rate is lower for each type of position. Yet the benefits of deferral are available to both long and short positions. For a discussion of strategic trading, see *infra* text accompanying note 71.

<sup>62</sup> For discussion of those who are not covered by the rule, including corporate taxpayers, see *infra* Section 3.2.2.

<sup>63</sup> The tax rule's adverse effect falls on long-term traders. Short-term traders – whether long or short – will always be subject to the higher short-term tax rates. In contrast, long-term traders can benefit from the reduced tax rate if they *buy* stock, but not if they sell it short.

<sup>64</sup> Of course, a trader could take a position, wait a year, and then begin spreading rumors, but the trader would have to be exposed to a year's unhedged risk before commencing manipulative activity, and this extra risk is likely to



### 3.2. Why the Tax Penalty Could Prove Unimportant

There are two reasons why the extra tax burden on short sales might not distort market prices. First, the tax burden we describe (a high rate on short-sale gains) is offset, to an extent, by a tax benefit (a potentially more valuable deduction for short-sale losses). Second, the rate differential between longs and shorts does not affect some taxpayers. On balance, the first alleviating factor offers little comfort, while the second is more reassuring but is not a complete solution.

#### 3.2.1. *Offsetting Tax Benefits from Short-Sale Losses*

Thus far, we have emphasized the higher tax rate on short-sale *gains*, but we have not considered the tax treatment of short-sale *losses*. While a high tax rate means the government claims a large share of gains, it can also mean that the government bears a larger share of losses.<sup>65</sup> If so, the higher tax rate may not make short sales less attractive, on balance, than long positions.

As a simple illustration, assume that a long bet (“Long”) and a short bet (“Short”) each generate the same pretax cash flow: \$200 if the bet is successful, and \$0 if it is not. Assuming success and failure are equally likely, a risk-neutral investor would value either bet at \$100.<sup>66</sup> This obviously is true if the tax rate is 0 percent, but it remains true for any other tax rate<sup>67</sup> and—  
notably for our purposes—it remains true if Long and Short are subject to *different* tax rates. Thus, Long is still worth \$100 if subject to a 20 percent tax rate: compared with a 0 percent tax rate, the taxpayer is worse off if the bet succeeds (keeping \$180 instead of \$200), but better off if

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discourage most would-be manipulators.

<sup>65</sup> It is well understood that the tax rate on risk does not affect the price of risk if full loss offsets are available – that is, if the government shares in losses to the same extent that it shares in gains. See, e.g., Domar & Musgrave (1944); Stiglitz (1969); Kaplow (1994); Bradford (1995).

<sup>66</sup>  $.50(200) + .50(0) = 100$ . To avoid issues about timing and the time value of money, we assume there is no delay in the receipt of either the \$0 or \$200.

it fails (keeping \$20 instead of \$0),<sup>68</sup> leaving the same average value of \$100.<sup>69</sup> The same analysis holds if Short is subject to a 40 percent tax rate. The taxpayer is even worse off if the bet succeeds (with \$160 instead of \$180 under a 20 percent tax rate or \$200 under a 0 percent tax rate), but is even better off if the bet fails (with \$40 instead of \$20 or \$0).<sup>70</sup> Because of the higher tax rate, Short offers less after-tax profit if the bet succeeds, but also less after-tax *loss* if the bet fails. As a result, Short and Long have the same value in this example, notwithstanding the difference in tax rates.

So far, we have argued that a higher tax rate is not worse than a lower one but, ironically, a high tax rate can even be *better* in some cases. Risk-averse taxpayers may prefer a higher tax rate if they value protection in the loss scenario (from more valuable deductions) more than they object to forgone gains in the profit scenario (from higher taxes). Even risk-neutral taxpayers may benefit from a higher tax rate because they control the timing of their tax. As a result, they can claim deductions currently while deferring the tax on gains (thereby reducing its present value). In such “strategic” trading, the high tax rate raises the value of the deductions, while deferral reduces the rate for gains (even if the rate is high in nominal terms). As long as losses are fully deductible, then, strategic trading is more valuable when the tax rate is high.<sup>71</sup>

However, there are two reasons why strategic trading does not convert the tax penalty into a benefit and, more generally, why generous tax treatment of short-sale losses should not be adequate to offset the unfavorable tax treatment of short-sale gains. First, the reality is that the treatment of losses on short sales is *not* necessarily more generous than the treatment of losses

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<sup>67</sup> For any tax rate  $\tau$ ,  $.50[200 - \tau(200 - 100)] + .50(0 + \tau 100) = 100 - \tau 50 + \tau 50 = 100$ .

<sup>68</sup> The government bears \$20 of the loss if the taxpayer deducts the loss and thus avoids \$20 of tax on \$100 of other income.

<sup>69</sup>  $.50[200 - (.20)(200 - 100)] + .50[0 + (.20)100] = 100 - (.20)50 + (.20)50 = 100$ .

<sup>70</sup>  $.50[200 - (.40)(200 - 100)] + .50[0 + (.40)100] = 100 - (.40)50 + (.40)50 = 100$ .

from long positions. Second, even if short-sale losses are treated favorably, taxpayers will not take full account of this tax benefit for losses if they *expect a profit*, for instance, because they have uncovered new information; in other words, even if tax rates do not matter in equilibrium, they can matter in disequilibrium. We discuss these points in turn.

### 3.2.1.a. *The Limited Tax Advantage of Short-Sale Losses*

Is it safe to assume that losses from short sales are more valuable than losses from long positions? The assumption is crucial because a more valuable deduction for short-sale losses is needed to compensate, *ex ante*, for the higher tax on short-sale profits. In general, a deduction has value in sparing the taxpayer from tax on other income. Losses from short sales would be more valuable if (1) they offset high-tax income and (2) losses from long positions offset low tax income.

At first blush, these conditions appear to hold: losses from a “naked” short sale are always short-term capital losses, regardless of how long the short sale lasts, whereas losses from long-positions are long-term capital losses if the taxpayer holds the property for more than one year. The advantage of short-term capital losses is that they can automatically be used to offset short-term capital gains.<sup>72</sup>

On closer inspection, though, it turns out that losses from short sales are *not* always more valuable than losses from long positions. For one thing, losses from long positions *also* can qualify as short-term, provided that the taxpayer disposes of the depreciated position before she has held it for a year. Moreover, even if these losses from a long position are long-term (for instance, because the long does not decline in value until after a year has past), these losses can

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<sup>71</sup> Strnad (1990).

<sup>72</sup> For instance, assume a taxpayer has \$100 of long-term capital gain (taxable at 20 percent) and \$100 of short-term capital gain (taxable at approximately 39 percent). If the taxpayer has \$100 of short-term capital loss, she can use it to avoid tax on the short-term gain (so the losses are worth \$39); in contrast, if the taxpayer has \$100 of long-term

still *sometimes* shelter short-term capital gains. Gains and losses of a like character are first netted against each other (e.g., long-term loss against long-term gain), and then any excess is netted against other types (e.g., long-term loss against short-term gain). For example, if a taxpayer has only short-term gains and only long-term losses, she can use these losses to offset the short-term gain. In addition, sometimes short-term losses are used to offset long-term gains—for instance, if the taxpayer does not have any short-term gains. Finally, sometimes neither long- nor short-term losses can be used at all, for instance, if taxpayers have no capital gain<sup>73</sup> or if the wash sale rules apply.<sup>74</sup> The bottom line is that losses from short sales are *not* always more valuable than losses from long positions. As a result, the prospect of more generous treatment of losses cannot wholly offset the prospect of less generous treatment for short-sale gains.

### 3.2.1.b. *The Importance of Tax Rates in Disequilibrium*

Even assuming that losses from short sales are treated more favorably than losses from long positions—and the preceding discussion shows the limitations of this assumption—taxpayers still will discount this tax advantage if they expect to have a gain instead of a loss, for instance, because they have uncovered new information. In the above example, the \$100 market valuation of the Long and Short positions reflects a 50:50 probability of yielding either \$200 or \$0. As noted above, a taxpayer who agrees with this 50:50 probability will value either position at \$100 even if different tax rates apply (and, of course, will not trade in equilibrium). But if the taxpayer *disagrees* with the market valuation—for instance, because she believes the probability

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capital loss, she can use it only to avoid tax on the long-term capital gain (so the losses are worth \$20).

<sup>73</sup> Under the capital loss limitations, individual taxpayers can deduct up to \$3000 of capital loss from ordinary income, and must carry the rest forward to later tax years.

<sup>74</sup> The wash sale rules prevent taxpayers from claiming a deduction when they immediately reacquire the position (and thus, presumably, are selling merely to claim the deduction). These rules explicitly apply to short positions, see Section 1091(e), although their scope is somewhat narrower than when they apply to longs. For instance, the rule arguably does not apply when a short sale is replaced with a put option, but it clearly applies when a long is replaced

of a \$200 payout is .60, instead of .50—then her expected profit from trading (and thus her willingness to trade) obviously *will* vary with the tax rate. A low tax rate leaves the taxpayer with a larger share of gains and, in this state of disequilibrium, this factor matters more than reducing the taxpayer’s share of losses.

Unfortunately, the tax differential could prove more daunting to sophisticated traders than to unsophisticated ones. The extra tax on profits presumably is most costly to well informed traders, since they are most likely to expect a profit and thus have less interest *ex ante* in deducting losses.<sup>75</sup> Correspondingly, the extra tax on profits is least costly to uninformed traders. They are more likely to have a loss, and thus should assign a higher value *ex ante* to a generous deduction for losses. In other words, the tax constraint may have exactly the wrong sorting effect, discouraging informed traders more than it discourages uninformed ones.<sup>76</sup>

An example illustrates the effect on an informed trader in disequilibrium. Assume there are two stocks,  $S_1$  and  $S_2$ , and two risk-neutral traders, a long buyer and a short seller. Each stock is trading at \$100 because each will yield either \$200 or 0, and the market assigns a 50:50 probability to these scenarios. In equilibrium, neither trader will trade these stocks because \$100 is the correct price. In disequilibrium, however, the long buyer might consider stock  $S_1$  to be undervalued, while the short seller might consider stock  $S_2$  to be overvalued. Assume the long buyer believes there is a .60 probability that stock  $S_1$  will go to 200, and a .40 probability that it will go to zero. Meanwhile, the short seller believes there is a .60 probability that stock  $S_2$  will

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with a call option. For a discussion, see Schizer (2003).

<sup>75</sup> The extra tax on profits could also discourage uninformed traders who are overconfident, perhaps as a result of a cognitive bias such as optimism bias. Chilling the enthusiasm of these traders can be a useful contribution, although its value is undermined by the lack of a corresponding check on overconfident longs.

<sup>76</sup> This result is the opposite of the rosier scenario that Diamond and Verrecchia posit, in which short sale constraints promote market efficiency if “a cost has the least effect on those who have a strong desire to short for informational reasons.” Diamond & Verrecchia (1987). Of course, the deterrent effect on confident traders should not be overstated. As long as the tax rate on gains is less than 100%, the after-tax return from a successful short sale

go to zero and a .40 probability that it will go to \$200. In buying  $S_1$ , the long buyer expects pretax a profit of \$20,<sup>77</sup> and, in shorting  $S_2$ , the short seller expects the same pretax profit.<sup>78</sup> Yet their expected profits diverge if the tax rates are different (that is, 20 percent on longs and 40 percent on shorts): the long expects  $.80(20)$ , or \$16, while the short seller expects  $.60(20)$ , or \$12.<sup>79</sup>

We can show more formally that taxes have a significant impact in disequilibrium. The intuition is that, if profits from short sales are taxed at a higher rate than profits from long positions, optimists are more likely to trade than pessimists, and so prices rise. Assume that a share of stock can take on either of two values, \$200 or \$0. Assume also that there are two types of traders, and both types are risk neutral: optimists (long buyers) and pessimists (short sellers).<sup>80</sup> The optimists believe that  $Pr\{\text{share} = \$200\} = p_B$  and the pessimists believe that  $Pr\{\text{share} = \$200\} = p_S$ , where  $p_B > p_S$ . Assume that there are equal numbers of optimists and pessimists with access to the market ( $n_B = n_S$ ), but not all are willing to trade at any given time. Let  $N_B \leq n_B$  denote the number of optimists that are willing to trade, and let  $N_S \leq n_S$  denote the number of pessimists willing to trade. The proportion of optimists that trade is given by

$$\omega_B = \frac{N_B}{N_B + N_S}, \text{ whereas the proportion of pessimists is given by } 1 - \omega_B = \frac{N_S}{N_B + N_S}.$$

We will assume:

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obviously is still positive (albeit less than the return on a correspondingly successful long).

<sup>77</sup>  $.60(100) - .40(100) = 20$ .

<sup>78</sup>  $.60(100) - .40(100) = 20$ .

<sup>79</sup> In order to match the pretax profit earned by the Long, the Short might respond by scaling up the size of his position. Yet this does not remedy the disparity between Longs and Shorts because the Long *can also* scale up his position, and thus can earn still a higher profit. At some point, the Long and Short will not be able to increase the size of their bets (e.g., due to credit constraints and other transaction costs), and, for any given size, the Long's bet will be more profitable, *ex ante*.

<sup>80</sup> The result is similar for risk-averse traders. For a formal development, see the appendix.

(1) the prevailing price in the market is set as the weighted average of the certainty equivalents (under linear utility),<sup>81</sup>

$$P = \omega_B(200p_B) + (1 - \omega_B)(200p_S); \quad (\text{A})$$

and

(2) the ratio of proportions,  $\frac{\omega_B}{1 - \omega_B} = \frac{N_B}{N_S}$ , is given by the ratio of the buyers' net after-tax

expected gain to the sellers' net after-tax expected gain; i.e.,

$$\frac{\omega_B}{1 - \omega_B} = \frac{[p_B(200 - P) - (1 - p_B)P](1 - \tau_B)}{[p_S(P - 200) + (1 - p_S)P](1 - \tau_S)}. \quad (\text{B})$$

Solving equations (A) and (B) simultaneously yields

$$\frac{(P - 200p_S)^2}{(200p_B - P)^2} = \frac{1 - \tau_B}{1 - \tau_S},$$

from which it in turn follows that

$$\frac{dP}{d\tau_B} = -\frac{\frac{1}{1 - \tau_S}(200p_B - P)^3}{400(P - 200p_S)(p_B - p_S)} < 0 \text{ and}$$

$$\frac{dP}{d\tau_S} = \frac{\frac{1}{1 - \tau_B}(P - 200p_S)^3}{400(200p_B - P)(p_L - p_S)} > 0.$$

Therefore, (1) the market price decreases as the tax rate on long positions increases, and (2) the market price increases as the tax rate on short positions increases. Both of these results are anticipated by intuition.

### 3.2.2. *Avoidance by Sophisticated Taxpayers*

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<sup>81</sup> For a discussion of the role of the weighted average in setting price in our model, see supra note 32.

Aside from the treatment of short-sale losses, there is a more important reason why it might not matter that gains from a short sale are taxed at a higher rate than gains from a long position: Sometimes traders can avoid this constraint.

Most straightforwardly, the tax differential between longs and shorts does not apply to three classes of investors and, to an extent, these investors can counter the “pro-long” bias that U.S. tax law otherwise has. Most importantly, foreigners generally do not pay US capital gains tax. As a result, foreign trading firms can engage in information-based trading that brings prices closer to fundamental value, without incurring extra U.S. tax.<sup>82</sup> Yet foreigners may still undersupply short arbitrage because of economic costs described above, such as liquidity constraints and the prospect of unlimited losses,<sup>83</sup> as well as regulatory constraints in their home jurisdictions. Tax-exempt entities such as pension funds and endowments may pick up some of the slack because they also do not pay U.S. tax on their trading activity. Yet their contribution to tax arbitrage may be limited because they typically do not invest on their own. Instead, they usually invest with a mutual or hedge fund, and tax considerations *can* affect these trading firms. Finally, U.S. corporations are taxed at the same capital gains rate for longs and shorts (generally 35%) because they are not eligible for a reduced rate on long-term gain. Even so, a firm that engages solely in trading (such as a hedge fund) would not organize as a U.S. corporation because profits would be taxed at both the entity and investor level. Investment banks such as Morgan Stanley and Goldman Sachs organize as US corporations in order to list on the US capital markets. While these firms pay the same tax on shorts and longs,<sup>84</sup> and have trading

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<sup>82</sup> Section 864 provides a safe harbor for non-U.S. traders who trade in the United States. Passive investors are similarly protected. Foreign dealers must pay U.S. tax on their US activities but, as noted below, dealers generally are unaffected by the tax differential for a different reason. See *infra* note 84.

<sup>83</sup> See *supra* text accompanying notes 27 to 30.

<sup>84</sup> While the trading desks of investment banks earn capital gain on shorts and longs, their securities dealer subsidiaries earn ordinary income on their dealing activity. Section 475.



desks that engage in arbitrage, they have other reasons not to place too many short bets, including concerns about alienating CEOs, and thus losing lucrative underwriting business. In sum, there are important market players who are immune to the rate differential between shorts and longs, and thus will supply some (but probably not all) of the necessary arbitrage.

To be precise, the tax differential between longs and shorts affects only individuals who pay US tax, including retail investors, wealthy individual investors, professional short sellers, and funds that invest for these individuals, such as hedge funds. At first blush, the exclusion of nonprofessionals who trade on their own may seem unimportant because, in general, they are unlikely to uncover information that would escape others or to form especially shrewd judgments. Yet although these traders generally are unsophisticated, they are a large group in the aggregate and the rate differential encourages them to favor long positions. This bias should push market prices upwards if more knowledgeable investors do not intervene with short sales.

The rate differential could also be important in influencing professional traders such as hedge fund managers to prefer longs to shorts. This is unfortunate because these knowledgeable and highly motivated traders are well positioned to hunt for shaky financial statements or other evidence of overpricing. They also are more independent, and thus are more free of conflicts, than traders at investment banks.

To an extent, we can take comfort in the fact that these traders sometimes ignore tax considerations (and thus might not be deterred by the high tax burden on shorts), although it is hard to assess the pervasiveness of this tax indifference. In some circumstances, fund managers will favor business considerations over tax planning. For instance, arbitrageurs may face liquidity constraints that discourage them from placing long-term bets.<sup>85</sup> This market failure may thin the ranks of those who would be willing to engage in long-term short sales even if the

tax rate was favorable. At the margin, though, arbitrageurs should be more willing to take long-term positions if the tax treatment is favorable – and, again, it is favorable only for longs, not for shorts.

Fund managers may be more likely to consider tax implications – and, in particular, the unfavorable treatment of short sales – if their own compensation is implicated, as is the case with hedge fund managers. The manager pays the same tax as investors pay (because the tax law views the manager as collecting a share of these investments, in effect taxing her as an investor rather than as a wage earner).<sup>86</sup> As a result, a hedge fund manager can cut her tax in half by earning long-term capital gains for investors.<sup>87</sup>

While it is likely that a large class of traders are at least somewhat tax sensitive, there is a final reason why the rate differential between longs and shorts may not matter: With careful structuring, well advised traders who otherwise would earn short term capital gain can sometimes earn long-term capital gain. Yet we should not take too much comfort in this avoidance, which is costly and can be a separate source of social waste. For instance, buying a put option can yield long-term capital gain,<sup>88</sup> although taxpayers must pay a premium for these options; while they can sell a call to fund the premium, any profit from this short call is ineligible for long-term capital gain. Alternatively, over-the-counter (“OTC”) equity swaps and forward

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<sup>85</sup> See text accompanying notes 30.

<sup>86</sup> Note that investor tax burdens do not affect the pretax amount of a hedge funds manager’s compensation, which typically is a share of the fund’s pretax profit.

<sup>87</sup> Mutual fund managers, in contrast, cannot cut their taxes in this way. Their fee typically is taxed as a wage (i.e., at ordinary income rates). Yet the pretax amount of this fee generally is a percentage of assets under management, an amount that reflects the manager’s reputation and past performance. While performance evaluations traditionally have focused on pretax returns, recent changes in the securities laws require funds to disclose *aftertax* performance. This change should focus more attention on tax considerations. Yet even if the tax law has not been preventing mutual funds from selling short, they generally have been reluctant to do so, at least as a historical matter. This may be a vestige of legal restrictions that no longer are in effect. See Chen et al (2001) (noting that 70% of mutual funds explicitly state in filings with the SEC that short sales are not part of their investment strategy, a step that legally prevents them from selling short).

<sup>88</sup> See IRC Section 1234. The options dealer who sells this put option will typically hedge by engaging in a short sale. Yet unlike individual taxpayers, dealers do not face different tax treatment for longs and shorts. See *supra*

contracts can yield long-term capital gain on short positions if structured properly.<sup>89</sup> Yet fees on these transactions are large (e.g., one percent of the notional amount per year), expensive legal advice may be necessary, and these deals are not available to everyone; the commodities laws set minimum wealth requirements for them.<sup>90</sup> While exchange-traded securities futures promise to be less expensive and more widely available, these short futures are taxed like short sales, so that long-term capital gain rates never apply.<sup>91</sup> Indeed, it is unfortunate that Congress chose to extend the tax differential to this new market.<sup>92</sup>

### ***3.3. Why the Tax Penalty Could Prove Useful***

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note 84.

<sup>89</sup> A swap transaction “obligates the two parties to the contract to exchange a series of cash flows at specified intervals known as payment or settlement dates.” Group of Thirty Global Derivatives Study Group, *Derivatives: Practices and Principles* (1993). Over-the-counter derivatives are available through dealers such as Goldman Sachs, instead of an organized exchange. See Section 1234A. Long-term capital gain is most clearly available when the derivative is terminated prior to its scheduled maturity date. For a discussion, see New York State Bar Association Tax Section, Notional Principal Contract Character and Timing Issues, reprinted in 79 Tax Notes 1303 (1998).

<sup>90</sup> For small investors, these contracts could potentially be unenforceable under either the federal commodities laws or state gambling laws. Yet these results are expressly avoided for a designated class of large investors, so-called “Eligible Contract Participants,” under the Commodity Futures Modernization Act of 2000 (“CFMA”). For instance, individuals must have at least \$10 million of assets or, alternatively, \$5 million if the derivative contract will serve as a hedge. See generally Section 101 of the CFMA, which adds a definition of eligible contract participant to Section 1a(12) of the Commodity Exchange Act.

<sup>91</sup> See Section 1234B(b) (if gain or loss from a short securities future contract to sell property is treated as capital gain, the gain is short-term). Alternatively, there is some authority that cash-settled short sales are taxed at long-term capital gains rates, although the authority is old and of uncertain reliability. Our sense is that this strategy is not commonly used. For a discussion, see New York State Bar Association Tax Section, Comments on H.R. 3170, reprinted in 98 TNT 136-38; see also I.T. 3721, 1945 C.B. 164 (gain on the assignment of a contract to sell stock on a “when-issued” basis is long-term if the contract has been held for the long-term holding period); cf. Gen. Couns. Mem. 37332 (Nov. 25, 1977) (styled as the “Republication of I.T. 3721”) (cites legislative history of Section 1233 indicating that a forward sale of when-issued stock constitutes a short sale and the assignment of such contract constitutes the closing of such short sale; the GCM nonetheless implies that the short-term loss rule applies only if the taxpayer acquires the stock or substantially identical property prior to assigning the contract to sell); *American Home Prods. Corp. v. United States*, 601 F.2d 540 (Ct. Cl. 1979) (taxpayer entered into a contract to sell British pounds at a time when it did not own British pounds; assuming arguendo that the contract was a commodity futures contract, the court held that assignment of the contract to a third party in exchange for cash produced long-term capital gain not subject to Section 1233(b) because the taxpayer had not held or acquired “substantially identical property,” which the court viewed as “an essential part of the statutory scheme”); *The Carborundum Co. v. Comm’r*, 74 T.C. 730 (1980) (holding for taxpayer on facts similar to those of *American Home Prods.*), acq., 1984-2 C.B. 1.

<sup>92</sup> Congress authorized this market in December 2000 and it began trading in 2002.

We have considered reasons why the rate differential between longs and shorts may impede market efficiency, as well as reasons why it may be unimportant. But are there ways in which the rate differential could enhance efficiency? In particular, we turn now to traditional tax policy explanations for the capital gains preference and ask whether they apply to short sales.

### *3.3.1. An Incentive for Savings and Investment*

One reason for the capital gains preference – to encourage investors to provide investment capital to businesses – obviously does not apply to short sales. Yet this rationale also does not apply to *most* longs. Specifically, this justification extends only to the primary market – that is, investors who buy securities directly from the issuer.<sup>93</sup> Those who buy stock in the secondary market do not directly supply capital to firms. They play a different role – providing liquidity and policing the accuracy of prices – and short sellers contribute equally to these functions.

A more persuasive rationale to favor longs is to encourage savings. In purchasing securities, taxpayers typically part with their money and thus defer consumption, something a short seller (theoretically) does not have to do. This difference could plausibly justify the rate differential between longs and shorts. However, even if a savings incentive is advisable – a question we do not address here – the existing rate distinction between longs and shorts is a poorly tailored response. Longs are taxed favorably even if a full prepayment is not needed, as in a long forward contract or securities future<sup>94</sup> or in a debt-financed purchase. Short sales,

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<sup>93</sup> In fact, Congress has provided a separate tax preference for those who invest directly in certain new ventures. See Section 1202.

<sup>94</sup> A securities future is a publicly traded forward contract. In a forward contract, the “long” puts no money down (other than collateral) and commits to buy the property in the future for a fixed price. If the underlying property appreciates, the investor can terminate the contract at a profit without *ever paying* for the underlying property. For instance, the investor might commit to pay \$109 in two years for a share of XYZ, which is currently trading at \$100. If XYZ appreciates to \$119, the investor can terminate the contract, receiving \$10. Even though the investor puts no money down, he earns \$10 of long-term capital gain if he held the contract for a year before terminating it. See Section 1234A (governing over the counter forward contracts); Section 1234B (governing securities futures).

meanwhile, are taxed unfavorably even though short sellers *do* go out of pocket in pledging collateral (i.e., 150% of the short sale proceeds).<sup>95</sup>

### 3.3.2. *A Response to Tax Planning*

A second reason to tax short sales less favorably is to discourage taxpayers from using them in wasteful tax planning. Two strategies come to mind, but the rate differential is not an effective response.

First, taxpayers might try to “age” appreciated longs that have not been held for a full year. For instance, assume a taxpayer buys stock that immediately appreciates. If she sells it a month later, the gain is short-term. What if, instead, she shorts the stock—a position that perfectly hedges the stock she owns—but does not actually sell the appreciated stock until a year later? The government will not want to allow the preference here because the stock has been hedged for all but one month.<sup>96</sup> Yet the current rule denying the preference is far broader than necessary: in general, taxpayers *never* earn long-term capital gain on short sales.<sup>97</sup> The policy objective here—not allowing holding period to accrue on hedged positions—obviously could be achieved while still allowing long-term treatment to short sales that are not part of a hedge.

A second planning strategy is to simulate a “tax free” sale of appreciated assets. In a “short sale against the box,” the short sale hedges an appreciated asset, yielding sale proceeds

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<sup>95</sup> Usually this collateral is a debt instrument, on which interest payments are not eligible for a reduced tax rate.

<sup>96</sup> The assumption here is that the government wishes to reward only long-term economic exposure, as opposed to mere formal ownership. While there is room to question this objective, and it is not our purpose here to defend it, one reason for such a policy preference would be to encourage long-term shareholder monitoring of management, which in turn might lead to better corporate governance, more accurate market pricing, and other positive externalities.

<sup>97</sup> There is an exception for taxpayers who cover the short with property they held for more than one year before initiating the short sale. See Treat. Reg. 1.1233-1(c). Notably, holding period is “lost,” and not merely “suspended.” For instance, assume taxpayer buys the stock on January 1, 2002, shorts the stock on December 1, 2002, and closes the short sale the next day, December 2, with newly acquired stock. Even though the stock was held for eleven months before the short sale, the taxpayer loses all of the holding period, and must hold the stock unhedged for twelve additional months in order to qualify for the reduced tax rate.

and insulating the taxpayer from changes in the asset's value.<sup>98</sup> Since the taxpayer's goal is to simulate a sale while deferring tax, the logical response is to tax short sales against the box as sales, as a 1997 reform requires.<sup>99</sup> There is no need to apply a higher tax rate to every short sale, including one that is not part of a hedge.<sup>100</sup>

### 3.3.3. *A Second-Best Response to Other Tax Distortions*

The tax rate for longs may be lower than the rate for shorts for still another reason. Perhaps our purpose in cutting the rate for longs does not apply to shorts. Two traditional tax policy rationales for the capital gains preference should be considered. First, the preference might correct for the double taxation of corporate profits. This rationale is not persuasive for short sellers – and so a rate differential might be justified – since shorts typically appreciate when the firm is *not* profitable. Yet this justification for a rate differential is unpersuasive for three reasons. First, a capital gains preference obviously is a much less effective remedy for double taxation than comprehensive integration of corporate and personal taxation – a step that, for instance, also would provide relief for dividends. Second, the preference applies to assets that are not subject to double taxation, such as debt securities, real estate investment trusts, partnership interests, and foreign corporations. Third, even if the preference does alleviate double taxation, we may still want to extend it to short sales in order to prevent other distortions, such as upward price pressure deriving from short specific constraints.<sup>101</sup>

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<sup>98</sup> For example, if the short is established at 100 and the stock drops to 60, the seller can cover by delivering the stock and has, in essence, sold shares at 100. The margin rules are more generous to short sales against the box than to naked short sales, allowing withdrawal of 95% of the proceeds. See Schizer (2001).

<sup>99</sup> For a discussion, see Schizer (2001) and Schizer (1998a).

<sup>100</sup> The higher tax rate is also not an effective response to tax-free hedging. The higher tax rate does not apply if the appreciated asset has been held for at least a year before the short sale is initiated. Treas. Reg. 1.1233-1(c).

<sup>101</sup> Indeed, an argument might be made that these distortions justify a *lower* tax on shorts than on longs, not just parity between the two. Yet we are reluctant to propose this more extreme response because of the difficult empirical judgments required in alleviating one regulatory distortion by creating another.

A second rationale for the capital gains preference that could apply only to longs is inflation. By not increasing tax basis to account for inflation, our system overstates (and thus overtaxes) profits on longs; reducing the tax rate on longs may alleviate this concern. Of course, the best solution for this problem is to index the system for inflation, not to provide a reduced rate on a subset of profits. But assuming this superior solution is unavailable, and a reduced rate is applied to longs, does the inflation rationale also apply to short sales? If not, it may be appropriate to tax shorts and longs at different rates. The question, then, is whether inflation causes short sales to be undertaxed. Admittedly, short sellers *could* be undertaxed if they received short sale proceeds upon executing the short sale; they would receive more valuable dollars at an earlier time, while spending less valuable dollars at a later time to cover the short. However, because short sellers cannot access proceeds,<sup>102</sup> inflation typically hurts them. Short sellers who do not earn a return on these proceeds get no compensation for inflation (and, while they may not be overtaxed, this is not terribly comforting). Those who *do* get a return *are* compensated for inflation, but this rebate is taxable in full without any adjustment for inflation.<sup>103</sup>

### ***3.4. Assessment***

In sum, all secondary market trading, whether long or short, should be subject to the same tax rates and holding period rules. If a reduced capital gains rate applies to longs (and we take no position about whether it should), the preference also should apply to shorts. Even without this formal parity, there is some comfort in the fact that many traders are indifferent to U.S. tax

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<sup>102</sup> See *supra* text accompanying notes 9 to 11.

<sup>103</sup> Another traditional rationale for the capital gains preference is “lock-in.” The concern here is that, in order to defer their tax liability, taxpayers keep appreciated positions that they no longer want (i.e., because, under the realization rule, tax is not due until they sell the position). The lower the tax rate, the less daunting is the toll charge for disposing of the position. While this concern is a plausible rationale for a capital gains preference, it applies equally to long and short positions. For either one, taxpayers can defer the tax by retaining the position.

rules, while others can use self help. Yet this avoidance is not available to all taxpayers and avoidance costs can be a separate source of waste. Instead of relying on self help, we should reform the rule.

#### **4. Other Legal Constraints on Short Sales**

While our primary focus is on the tax rule, which other commentators have neglected, we also offer a brief discussion of two other short-specific constraints: the up-tick rule and the “locate” requirement.<sup>104</sup> We explore the same two themes that we developed above. First, is the constraint narrowly tailored to preventing panics and market manipulation? Second, is it easy to avoid? We find that the tailoring of these proposals, while inadequate, is somewhat better than that of the tax constraint – and not surprisingly since, unlike the tax rule, these actually were intended as financial market regulation. We also suggest that avoidance here is relatively easy, though it still imposes wasteful costs.

##### **4.1. Up-Tick Rule**

The up-tick test limits short sales in a falling market. Short sales are permitted only (1) at a price higher than the previous price (an “up-tick”), or (2) at the previous price if the last different price was lower (a “zero-plus tick”). Obviously, there is no corresponding ban on bids in a rising market. While the SEC rule applies only to exchange-listed stocks (whether traded on exchanges or over-the-counter), NASDAQ secured SEC approval in 1994 for a similar rule for over-the-counter securities.<sup>105</sup>

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<sup>104</sup>Two other context-specific constraints are not considered here. First, it is illegal to cover certain short sales with stock received in a public offering. See Rule 105 of Regulation M under the Securities Act (rule applies to short sales after a registration statement was filed and during the five business days before pricing). Second, Rule 14e-4 bans the tender of borrowed shares in a tender offer.

<sup>105</sup>Section 10(a) of the Exchange Act gives the SEC authority to regulate short sales. After the market break of 1937, the SEC adopted the tick test in Rule 10a-1. See Securities Exchange Act Release No. 1548 (Jan. 24, 1938), 3 F.R. 213. The purposes of the rule are described in Exchange Act Release No. 13091 (Dec. 21, 1976), 41 FR 56530. See also Exchange Act Release No. 34277 (July 6, 1994), 59 FR 34885 (approving NASD Rule 3350); Securities Exchange Act Release No. 44030 (March 2, 2001), 66 FR 14235 (March 9, 2001) (modifying NASDAQ tick test to



#### 4.1.1 Tailoring

To an extent, the up-tick rule is meant to address the concerns, discussed above, about using short sales to manipulate the market and to intensify a panic. Yet the rule is both over- and under-inclusive. It applies even if the stock is up for the day, as long as the current price is lower than the previous one. The rule applies not only to large positions that can move the market, but also to small positions. Similarly, it applies to liquid as well as illiquid stocks.

In some cases, moreover, the rule may fail to stop short sales that *should* be stopped. For instance, someone bent on manipulating the market might be happy to trade 100 shares on an up-tick (or to invite a friend to do so), as a prelude to shorting 1 million shares in an effort to precipitate a panic. As a practical matter, the government is unlikely to detect such behavior. Even without such manipulation, moreover, the tick test has less bite now that share prices are quoted in pennies, instead of in eighths.<sup>106</sup> In short, the rule is not well tailored.

#### 4.1.2 Avoidance

This poor tailoring is less harmful because the tick test is easy to avoid, although, again, self-help can be a separate source of social waste. Well-advised investors sometimes can take advantage of the test's exceptions—for instance, for market professionals engaged in certain arbitrage transactions, block trades or, in the case of the NASDAQ rule, market-making.<sup>107</sup> In addition, the tick test does not apply to a sale if the seller is “net long”—that is, if the seller has

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take account of decimalization). These rules are policed and supplemented via disclosure. Short sellers are required to designate their orders as “short” (i.e., so that each sale “ticket” is supposed to be labeled short or long), see Rule 10a-1(c), and also make periodic disclosure of the size of their uncovered short positions. See NYSE Rule 421 and NASD Rule 3360 (requiring monthly reports of short interest).

<sup>106</sup> The SEC has raised this issue in a 2001 concept release about the effects of “decimalization.” See Exchange Act Release No. 44568 (July 18, 2001) (“transactions based on very small price changes could undermine the operation of short sale regulation”)

<sup>107</sup> See generally Rule 10a-1(e) (listing exemptions). See also, e.g., Exchange Act Release No. 29237 (May 24, 1991) (exemption for off hours trading); SEC No-Action Letter to Merrill Lynch, Pierce, Fener & Smith, Inc. (Dec. 17, 1986) (relief from tick test for index arbitrage); NASD Rule 3350 (exempting market makers). See generally Lofschie (2000) (describing various exceptions).

more long positions than shorts (e.g., by owning shares or holding derivative positions that count as ownership). Yet the regulation’s malleable definition of “net long”—and, in particular, the treatment of derivatives—sometimes allows for avoidance. For example, a trader might enter into a forward contract to purchase the stock—a step that counts as a “long”—even if no purchase price is specified, and so this “long” does not expose the trader to changes in the stock price.<sup>108</sup>

Nor does the tick test apply in the options markets. The test generally also does not govern equity swaps and other over-the-counter derivatives. Finally, investors often avoid the rule by booking short sales offshore (e.g., when the U.S. markets are closed), although the legal basis for this strategy might be questioned.<sup>109</sup> Given these limitations, as well as empirical studies casting doubt on the rule’s effectiveness,<sup>110</sup> the SEC has at times proposed to repeal or revise the tick test, including most recently in October 1999.<sup>111</sup> We recommend repealing this rule.

#### **4.2. Locate Requirement**

Finally, a third short-specific constraint is the need for short sellers to borrow the stock – and, relatedly, the “recall” risk of having to return the stock before they want to close their shorts. Short-sellers generally cannot engage in “naked shorts,” in which they bet against a stock

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<sup>108</sup> Id. Although the SEC proposed a rule to foreclose this strategy, see SEC Release No. 34-30772 (June 3, 1992), this amendment has not been adopted. See Lofschie (2000).

<sup>109</sup> The SEC has noted that “a portion of foreign trading in U.S. equities by U.S. broker-dealers or institutions is done to avoid off-board trading restrictions, transparency standards in the U.S. markets . . . and other rules, such as the short sale rule.” Exchange Act Release No. 30920 (July 14, 1992); see also House Rep. No. 102-414 (Jan. 22, 1992) (“evasion of the [tick test] is possible, especially through overseas trading”). Yet the SEC has noted that the rule does not contain any express exemption for overseas transactions. See Exchange Act Release No. 21958 (Apr. 18, 1985).

<sup>110</sup> See, e.g., Pollack (1986) (study commissioned by NASDAQ that recommends against implementing tick test).

<sup>111</sup> See Exchange Act Release No. 42037 (Oct. 20, 1999) (seeking comments about continued viability of tick test). In 1976, the SEC proposed to eliminate the tick test, but was persuaded not to do so by opposition from CEOs. See Lofschie (2000) (“[T]he continuance of the Up-tick rules has been strongly supported by securities issuers who assert that so-called “bear raids”—the spreading of false negative rumors about an issuer combined with short selling of an issuer’s stock—are a significant problem.”).

without actually delivering shares. To borrow stock, the short-seller will have to pay a fee, a cost that can surge unexpectedly when demand outstrips the supply of readily borrowed stock in a “short squeeze.”<sup>112</sup> The difficulty of borrowing stock during a bubble is well documented, for instance, with Amazon.com,<sup>113</sup> although there also is empirical evidence that stock borrowing fees often are manageable.<sup>114</sup> In any event, recent tax proposals could increase the cost of borrowing stock.<sup>115</sup> The need to borrow shares can prevent an investor from even *offering* to make a short sale, since such offers can be made only after a source of borrowed shares has been identified (the “locate” requirement).<sup>116</sup> In contrast, no corresponding constraint binds would-be buyers who wish to place a bid.

#### 4.2.1. Tailoring

The locate requirement serves, in a modest way, to limit manipulation and panics. Since the investor’s broker must locate the stock before the investor can offer to sell short, flooding the market with such sell orders is not a costless step. But obviously, this rule can constrain short

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<sup>112</sup> Under SEC Rule 15c3-3, stock is most readily borrowed from brokers who hold customer stock in margin accounts. See House Rep. No. 102-414 (Jan. 22, 1992). Thus, short squeezes are most likely for stock that is commonly held by investors in physical form or in cash accounts. The phenomenon is also especially likely for small stock offerings. Cf. Pollack (1986) (“[W]hen extensive short selling occurs, stock is not readily available and sometimes cannot be borrowed at all.”). While the cost of borrowing stock is usually less than one percent per year, this cost can surge during a squeeze. D’Avolio (2002) (using eighteen months of data from a large financial institution, i.e., from April 2000 through September 2001, to show that the value weighted cost to borrow the sample loan portfolio is 25 basis points per annum and 91 % of stocks in the sample could be borrowed for less than 1 % per year, but the fees in the other nine percent average 5.4% per year; showing also that fees rise, and squeezes are most likely, for stocks that are the subject of the most divergent opinion and thus are most appealing candidates for short sales).

<sup>113</sup> See, e.g., Dechow (2001); see also Mitchell et al (2001) (offering data about stocks with negative short rebates during the period from October 1999 to October 2000, including Stratos Lightwave); Ofek & Richardson (2001) (showing that rebate rate was far higher during for Internet stocks in February 2000, short positions were already large relative to the float, the borrowing stock for additional short sales was very expensive); D’Avolio (finding that while borrowing fees “might be small on average, they are *systematically* high when differences of opinion are high”).

<sup>114</sup> See Geczy et al (2002) (using data from stock lender to show that the cost of borrowing stock is not sufficient to render various arbitrage strategies unprofitable, including long-short trading, shorting IPOs, and shorting Internet stocks, though this borrowing cost may be adequate to render merger arbitrage unprofitable).

<sup>115</sup> President Bush has proposed to exempt certain dividends from tax. This exclusion will apply only to the dividend, and not to a substitute payment from someone who has borrowed stock. Thus, taxable investors will not want to lend their shares when a dividend is about to be paid. Norris (2003).

sales that are not manipulative and can fuel speculative bubbles<sup>117</sup>—facts that obviously counsel in favor of abandoning the test.

#### *4.2.3. Avoidance*

As with the other short-specific constraints, well-advised investors sometimes can avoid the locate requirement<sup>118</sup>—although, again, this self-help itself can be a separate source of social waste. For instance, to avoid the rule, investors can enter into “short” swaps or other over-the-counter derivative contracts (although they incur extra fees to do so). Since these short positions are settled in cash, there is no practical need or legal requirement to locate the stock. While the counterparty on such contracts, the derivatives dealer, may engage in short sales (i.e., to hedge their “long” position on the derivative), market makers generally are exempt from the “locate” requirement.<sup>119</sup> In addition, other players may at times fail to comply.<sup>120</sup> Given these problems with the current rule, we would repeal it. To mitigate any concerns that short sellers would misuse a “naked” short, we would require them to post cash collateral equal to 150 percent of their liability, a step that already is required for most market actors.<sup>121</sup>

### **5. Recommendations and a Disclosure Alternative**

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<sup>116</sup> For a description of the process of locating stock, see Duffie et al (2002).

<sup>117</sup> See Duffie et al (2002) (offering model in which need to borrow stock increases return earned by stock lenders, and this extra return increases the stock lender’s valuation of stock, which in turn can increase market price of stock, thereby intensifying a bubble).

<sup>118</sup> Indeed, theoretically, at least, the same share can be lent and sold many times, such that one share can be shorted repeatedly.

<sup>119</sup> See NYSE Rule 440C; NASD Rule 3370(b)(2).

<sup>120</sup> Commentators have emphasized the lack of an effective sanction on broker-dealers who fail to deliver securities in making a short sale. The National Securities Clearing Corporation, which administers such settlements, will keep a record of what the dealer owes but will not require delivery. Nor will a customer who has purchased the securities through a broker necessarily know that securities have never been delivered. See generally Pollack (1986). According to David Worley, moreover, the legal authority requiring delivery is an NYSE interpretation, rather than an NYSE rule and is not necessarily authoritative. See Worley (1990). In response, the NYSE sent an information memo to its members emphasizing the need to comply with the locate requirement. See NYSE Information Memo No. 91-41 (Oct. 18, 1991). The NASD has also toughened its rule. See NASD to Revise Rule on Receipt, Delivery of Securities, Wall Street Letter 8 (Jan. 29, 1996) (describing evolution of NASD rule, including efforts to require NASD firms to indicate source of borrow on order ticket and retreat from this approach).

<sup>121</sup> See supra note 9.

In general, the law should treat all secondary market trading—whether long or short—as contributing equally to the ability of individuals to optimize their portfolios, as well as to the liquidity and the accuracy of market pricing. As a result, the same tax rules should apply to long and short positions, and the uptick rule and locate requirement should be repealed.

We have acknowledged that market manipulation and noise traders offer a rationale for regulating both shorts and longs. While this problem is not the focus of this Article, we offer a few tentative suggestions. First, existing limitations on fraudulent misstatements are still needed to keep investors from shorting (or buying) and then spreading false rumors to influence the price. At the same time, other safeguards may address the separate manipulation concern discussed above: the ability of a large short sale, by itself, to depress the price and prompt momentum traders to sell. For one thing, this concern does not arise for smaller trades, and so a legal constraint is needed only for short sales that are large enough to move the market.

For these large positions, one response is to require disclosure. For example, anyone shorting more than a minimum percentage of shares could be forced to disclose, in a statement issued within a brief time period after the short sale, information including (1) the fact of the trade, (2) their identity, and (3) their reason for shorting the stock.<sup>122</sup> Other market participations could then assess whether the short sale derives from a desire to manipulate prices, or from solid information,<sup>123</sup> in which case others would follow the short seller's lead but a decline in the market price would be socially desirable.<sup>124</sup>

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<sup>122</sup> Disclosure after the short sale is preferable to disclosure *before* the short sale because, in the latter case, the short seller will have to give away valuable information and analysis before placing himself in a position to capitalize on this disclosure, a step that obviously could undermine incentives to engage in such analysis.

<sup>123</sup> While there is a risk that disclosure statements could themselves be used to manipulate the market, such manipulations should not be effective once a trader develops a reputation for manipulative disclosure.

<sup>124</sup> Obviously, in applying the minimum size requirement, a series of roughly contemporaneous short sales would need to be aggregated, as would the short sales of certain related parties. Likewise, if the short seller is a corporation, it may be necessary, in some cases, to require disclosure of the corporation's owners. These and other details of implementation are beyond the scope of this article.

There remains the other concern described above: if unsophisticated noise or momentum traders are allowed to engage in short sales without limitation, they may be more likely (without any manipulative intent) to precipitate or intensify a panic. Of course, it is not clear that the existing constraints on short sales really mitigate this risk, since these constraints can be avoided in many cases, as noted above. Nor is it clear that panics are more damaging to the economy than bubbles—in fact, bubbles may well cause more lasting effects.<sup>125</sup> In any event, the best antidote to speculative panics may not be a more finely tailored short-sale constraint, but a market with full disclosure.<sup>126</sup> In such an environment, sophisticated investors should be more comfortable betting against the noise traders, thereby containing the panic.

## **6. Conclusions**

Information is the lifeblood of financial markets. Likewise, arbitrage is essential in policing market prices and in countering the effect of noise traders. Unfortunately, arbitrage is an economically fragile phenomenon because arbitrageurs face liquidity constraints, as well as the potential for unlimited risk when they sell short. We should not compound these economic burdens with unnecessary legal burdens on arbitrage and short sales. On the contrary, legal rules should nurture the dynamic processes that develop and incorporate information into market prices. Short-sale regulations under current law fail this test. In some cases, creative advisors have found ways to plan around these rules. We should eliminate the need for this imperfect and wasteful self-help. Our law should recognize the legitimate—indeed, necessary—role of short sales.

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<sup>125</sup> We thank Zohar Goshen for this observation.

<sup>126</sup> Our premise is that the law should safeguard the integrity of the market, but should not necessarily protect each investor from placing foolish bets.

## Appendix

We showed in Section 3.2.1.b that, in disequilibrium, the tax differential favors longs over shorts if the traders are risk-neutral. If instead the longs and shorts are risk averse, the result is basically the same. Let  $\kappa_B > 0$  and  $\kappa_S > 0$  denote the risk aversion coefficients of the buyers and sellers, respectively. By analogy with the development for risk neutral traders in Section 3.2.1.b, we assume:

(1) the prevailing price in the market is set as the weighted average of the certainty equivalents (under exponential utility),

$$P = \omega_B \left( -\frac{\ln(p_B e^{-200\kappa_B(1-\tau_B)} + 1 - p_B)}{\kappa_B(1-\tau_B)} \right) + (1 - \omega_B) \left( -\frac{\ln(p_S e^{-200\kappa_S(1-\tau_S)} + 1 - p_S)}{\kappa_S(1-\tau_S)} \right); \quad (C)$$

and

(2) the ratio of proportions,  $\frac{\omega_B}{1 - \omega_B} = \frac{N_B}{N_S}$ , is given by the ratio of the buyers' net after-tax expected utility to the sellers' net after-tax expected utility; i.e.,

$$\frac{\omega_B}{1 - \omega_B} = \frac{p_B \left[ 1 - e^{-\kappa_B(200-P)(1-\tau_B)} \right] + (1 - p_B) \left[ 1 - e^{\kappa_B P(1-\tau_B)} \right]}{p_S \left[ 1 - e^{-\kappa_S(P-200)(1-\tau_S)} \right] + (1 - p_S) \left[ 1 - e^{-\kappa_S P(1-\tau_S)} \right]}. \quad (D)$$

Solving equations (C) and (D) simultaneously yields

$$\frac{P + \frac{\ln(p_S e^{-200\kappa_S(1-\tau_S)} + 1 - p_S)}{\kappa_S(1-\tau_S)}}{-\frac{\ln(p_B e^{-200\kappa_B(1-\tau_B)} + 1 - p_B)}{\kappa_B(1-\tau_B)} - P} = \frac{p_B \left[ 1 - e^{-\kappa_B(200-P)(1-\tau_B)} \right] + (1 - p_B) \left[ 1 - e^{\kappa_B P(1-\tau_B)} \right]}{p_S \left[ 1 - e^{-\kappa_S(P-200)(1-\tau_S)} \right] + (1 - p_S) \left[ 1 - e^{-\kappa_S P(1-\tau_S)} \right]}$$

from which numerical sensitivity analysis shows that  $\frac{dP}{d\tau_B}$  is generally negative, and  $\frac{dP}{d\tau_S}$  is generally positive (consistent with the case of risk neutral traders). However, when the buyers' risk aversion coefficient is substantially larger than the sellers' risk aversion coefficient (e.g.,  $\kappa_B = 0.01$  and  $\kappa_S = 0.001$ ), then both  $\frac{dP}{d\tau_B}$  and  $\frac{dP}{d\tau_S}$  are positive.



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