

SHAREHOLDER TRADING PRACTICES AND CORPORATE INVESTMENT HORIZONS

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In recent years, the manner in which corporate equities are bought and sold has been transformed. Fueled by changes in the composition of share ownership, advances in communications technology, and a worldwide trend towards market deregulation, trading volumes have skyrocketed. For example, in 1960 the rate of turnover of the average share on the New York Stock Exchange was 12%. NYSE turnover increased more than sixfold by 1987, reaching a rate of 73%, before falling back to 52% in 1989. Other countries have followed the U.S. example with only a slight delay. During the 1980s alone, average turnover on the major exchanges in Japan, the U.K., and West Germany increased more than threefold.

In addition to reduced transactional costs and heightened activity in the underlying equities, there has been an explosion in the use of derivative instruments such as index futures and options. Since their introduction in the early 1980s, S&P 500 futures contracts alone have achieved a trading volume roughly equivalent to that of the entire U.S. stock market. The new instruments have facilitated the development of a variety of sophisticated trading and risk-management strategies such as indexing, portfolio insurance, and index arbitrage.

There is sharp disagreement about the economic effects of these changes in capital markets. Business leaders in particular have expressed concern that the changes have compromised the ability of companies to invest. In its most basic form, this concern stems from a belief that increased trading reflects the market's growing orientation toward short-term performance. Greater trading volume is, by definition, equivalent to a reduction in the holding period of the average stockholder; the increase in turnover from roughly 10% to 50% in the past 30 years means that the average holding period has fallen from ten to two years. And many hold the view that shorter horizons for stockholders lead inevitably to shorter horizons for managers when they evaluate investment opportunities.

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Although such a link between stockholders' trading horizons and managers' horizons for corporate investment may at first glance seem natural, it is actually quite hard to pinpoint the mechanisms behind it. In an idealized world known to academic economists as "perfect markets," shareholder trading horizons would have no effect on either stock prices or corporate investment. In such a world, there are assumed to be no discrepancies between the information available to managers and to shareholders about future company performance. Moreover, prices are forward-looking and accurately reflect all this information, however far into the future. As a result, the announcement of a valuable new investment project—even one that will not pay off for many years—can be expected to have an immediate and positive impact on a company's stock price as investors quickly adjust their forecasts of future cash flows. Thus, given perfect markets, there is no reason for traders with short horizons to shun the stocks of companies making long-term investments, and no reason for managers to fret over the presence of such traders.

To take a concrete example, suppose a manufacturing company announces its intent to spend \$100 million on plant modernization. Because the cost savings from the modernization will not begin to accrue for two years, the current impact on cash flow will be negative. But once the cost savings do come on line, they will have a cumulative present value of \$300 million. If market participants understand the nature of the investment, the company's stock market value should jump by \$200 million (the net value of the investment) as soon as the announcement is made. Traders do not have to hold the stock until the physical investment in modernization actually pays off to realize a gain; thus even those with the shortest of holding periods benefit from the company's long-term investment.

To understand the links between trading horizons and investment, one must therefore identify those aspects of both shareholder behavior and corporate structure that are not captured by the perfect markets ideal. That is the goal of this paper. We identify what we believe are the two most likely channels through which short trading horizons could be compromising investment. The first is excess volatility, which occurs when stock prices

react not only to news about economic fundamentals, but also to trades based on non-fundamental factors—so-called "noise" trades. Excess volatility could lead to a higher cost of capital, and thereby reduce long-term corporate investment.

The second channel derives from an information gap between management and outside shareholders. In the presence of such a gap, the aims of maximizing short-run and long-run stock prices can be inconsistent with one another. Management may be able to raise current stock prices by undertaking certain actions that will reduce long-run value. In such a case, management faces the dilemma of which shareholders to please: those who do not plan to hold the stock for the long run versus those who do. As shareholder horizons shorten, it can become more difficult to focus exclusively on maximizing long run value.

In the pages that follow, we begin by investigating the excess volatility question, examining the relevant evidence to determine whether changes in trading intensity could have raised volatility in a way that would compromise corporate investment. Then we explore the possibility and the implications of an "information gap" between management and investors for corporate investment.

AN "EXCESS VOLATILITY" LINK BETWEEN TRADING AND INVESTMENT?

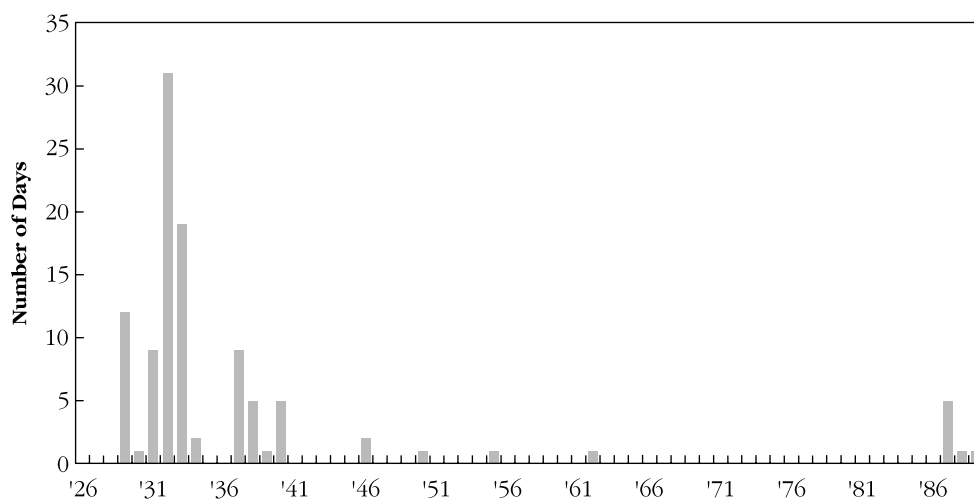
Ideally, fluctuations in stock prices should be driven solely by news about fundamental economic factors. It is unclear, however, whether real-world markets actually live up to this ideal. Many practitioners, as well as a large number of researchers, have argued that stock prices also reflect "irrational" investor sentiment—the kind that produces waves of excessive optimism or pessimism.¹ Because investor sentiment varies over time and often seems unrelated to fundamentals, this view implies that stock prices are more variable than they would be if only fundamentals mattered.

Such excess volatility could impose real economic costs, and one place where these costs are most likely to manifest themselves is in the area of corporate investment. All else being equal, an increase in volatility leads investors to demand higher returns from their shares as compensation for

1. For early discussions of how noise traders might affect stock prices, see Fischer Black, "Noise," *Journal of Finance*, 41 (July 1986), pp. 529-543. See also

Robert Shiller, "Stock Prices and Social Dynamics," *Brookings Papers on Economic Activity*, 1984:2, pp. 457-498.

FIGURE 1
DAILY CHANGES
IN THE S&P 500
IN EXCESS OF
5 PERCENT



Source: Standard and Poor's and authors' calculations.

the added risk.² From the perspective of the corporation, this translates into a higher cost of capital that must be used when evaluating prospective investments, thus reducing the aggregate level of investment.

But, even if a large component of volatility can be attributed to investor sentiment, it does not follow that lower trading costs and more trading volume make things worse. To understand this critical point, it is useful to think of stock prices as being determined by the interaction of two types of traders: “smart-money” traders who accurately assess the fundamental value of stocks and “noise” traders who are subject to irrational waves of optimism and pessimism. When noise traders are excessively bearish, their selling activity exerts a downward influence on prices. To some extent this is countered by the smart-money traders who buy when stocks are undervalued relative to fundamentals. But because stocks may take a long time to come back to fundamental values, this kind of arbitrage can be very risky; and thus the offset by the smart-money traders may be only partial. Thus noise traders have a real impact, and prices are excessively volatile.

Now let us ask what happens if trading costs are reduced. On the one hand, this might lead noise traders to respond more aggressively to non-fundamental factors, which would tend to increase volatility. On the other hand, it can also make it easier

for smart money traders to engage in buy-low, sell-high arbitrage, which exerts a stabilizing influence on prices. Thus, while the effect of reduced trading costs on trading volume is likely to be positive, the effect on volatility is, as a matter of theory, ambiguous.

Given this theoretical ambiguity, we devote the rest of this section to investigating a wide range of asset price data bearing on the actual relationship between trading behavior and volatility.

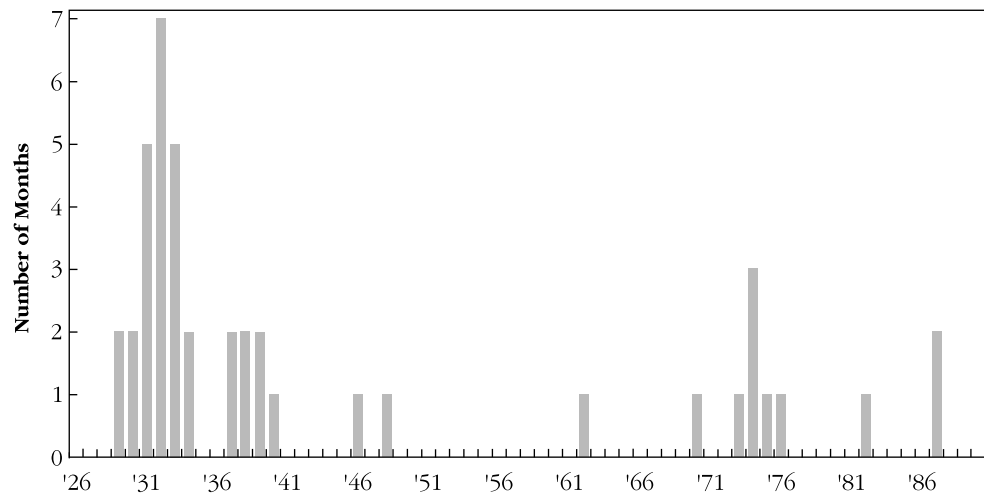
Empirical Evidence

Some observers claim it is quite obvious that recent increases in trading intensity have raised volatility in a way that is damaging to investment. Proponents of such a view typically start by pointing to the rash of “big days” seen in the past few years, including the October 1987 crash, the October 1989 “mini-crash,” and a handful of other days when prices moved very substantially. As Figure 1 documents, there have indeed been more big days (where “big” is defined as a percentage price movement of 5% or more) in the last few years than in any other period since the end of World War II. Note, however, that the Great Depression is associated with by far the most dramatic fluctuations in stock prices yet seen—and the same is true of every other measure of risk we consider below.

2. This presumes that investor sentiment induces “systematic” volatility (i.e. volatility shared by many different securities), or that investors demand higher returns even for bearing unsystematic risk.

What should matter to investors is the *total* risk they expect to bear over their entire holding period. From the perspective of an investor with a one-month holding period, the potential for the most extreme outcomes is not noticeably different now than at many other times in the past.

FIGURE 2
MONTHLY CHANGES
IN THE S&P 500
IN EXCESS OF
10 PERCENT



Data for 1990 include January through June only.
Source: Standard and Poor's and authors' calculations.

While the recent increase in the frequency of big days is certainly striking, it needs to be interpreted very carefully, particularly with respect to its implications for corporate investment and public policy. A few big days in and of themselves need not raise the risks to equity holders in such a way as to make them demand higher returns. What should matter to investors is the *total* risk they expect to bear over their entire holding period. Since big days are very rare and since even quite short-horizon investors hold stocks for several months or more (recall that the average holding period of a share on the NYSE is about two years), the chances are that the big days may simply “wash out” in terms of the risks they create for most investors.

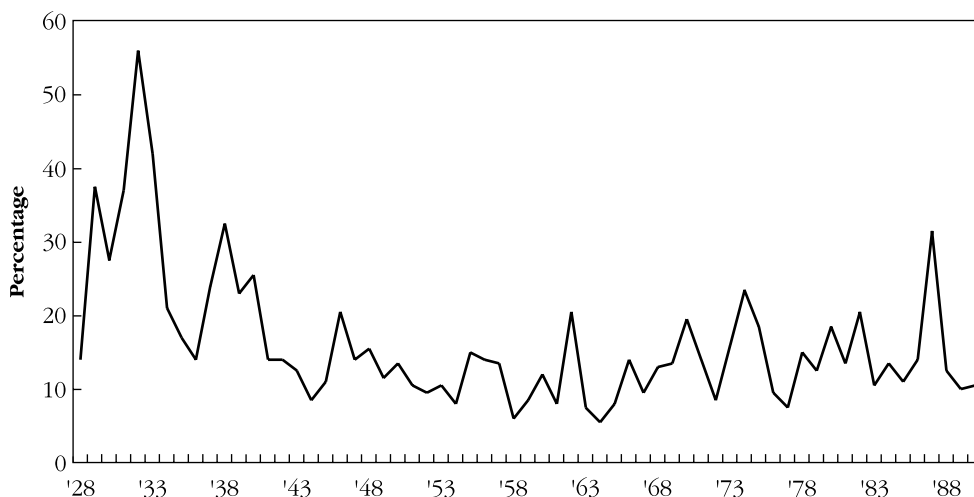
As shown in Figure 2, when one focuses on “big months” instead of big days, a quite different conclusion emerges. From the perspective of an investor with a one-month holding period, the potential for the most extreme outcomes is not noticeably different now than at many other times in the past. For example, there were seven months featuring moves of over 10% in the 1970s, but only three such months in the 1980s. Think of an investor who adjusts his portfolio on the first day of every month. On October 2, 1989 (the first trading day of that month), the Dow Jones average stood at 2714. On November 1, it was at 2646, a rather unremarkable one-month change of 2.5%. The fact that the market experienced a single very turbulent day during the month turns out to be not very relevant for our hypothetical investor.

None of this is meant to claim that the potential for rare but abrupt market movements should be of no policy concern. As the events of October 1987 have taught us, enough trading volume compressed into a short period of time can severely compromise the market's liquidity, price discovery, clearing and settlement functions. It is clearly desirable to take measures that protect the market's infrastructure against such shocks. Our point is not that big days are unimportant, but simply that a few big days are unlikely, in the absence of other developments, to have a significant effect on the cost of capital and on corporate investment.

Of course, looking at just the few most extreme days or months in a decade gives a very limited picture of the risks borne by investors. A more broadly-based, widely used measure of risk is the standard deviation of stock price changes. As shown in Figure 3, other than the data point for 1987 (which is strongly dominated by the events of a few days in October of that year), it is hard to see any significant long-run trend in the standard deviation of monthly returns. In spite of much lower average trading intensity, and a complete lack of instruments such as index futures and options, many years in the 1960s and 1970s were characterized by more volatility than 1988 and 1989.

What about volatility over shorter holding periods? The evidence on big days mentioned earlier suggests there has been some increased tendency for extreme stock price movements to be compressed

FIGURE 3
 AVERAGE MONTHLY
 VOLATILITY
 OF THE S&P 500
 1928-1990



Data for 1990 include January through June only.
 Source: Standard and Poor's and authors' calculations.

FIGURE 4
 RATIO OF ANNUALIZED
 15-MINUTE TO WEEKLY
 VOLATILITY
 OF THE S&P 500
 1983-1989



Source: Standard and Poor's, NYSE, and authors' calculations.

into short periods of time. We might also expect there has been some compression of price movements even on more typical days when price changes are more modest. In that case, short horizon volatility should rise relative to longer horizon volatility.

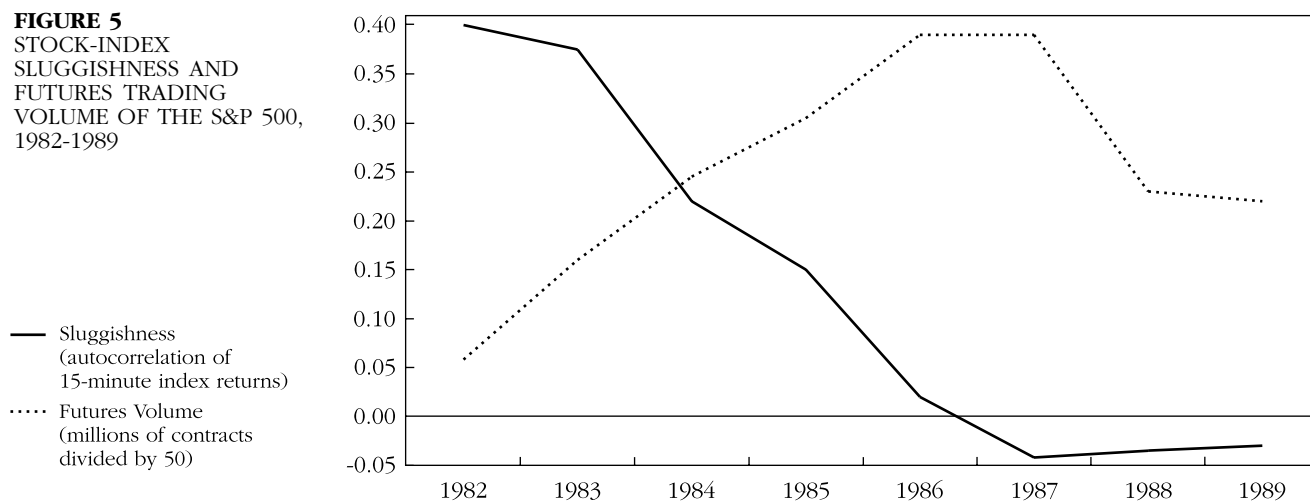
Indeed, this is exactly the conclusion that emerges when we calculate volatility at an extremely short horizon, and compare it to the sort of longer-horizon volatility used in Figure 3. This is done in Figure 4, which looks at the ratio of the volatility of 15-minute price changes to the volatility of one-week price changes over the period 1983-1989 (15-

minute data is not available going back farther into the past). There is a clear upward trend in the ratio, demonstrating that 15-minute volatility has been increasing significantly relative to longer-horizon volatility. Over the time period studied, the ratio went from approximately .7 to 1. This means that, even if long-horizon volatility has remained stable over time (as suggested by Figure 3) there may have been a trend increase in very short-horizon volatility on the order of 40%.

It is perhaps this very potential for large price adjustments in a matter of minutes that market

The volatility of S&P price movements over very short periods tends to go up, even when longer-horizon volatility is unchanged. There is nothing inherently troubling about this relative increase in very short-horizon volatility; it actually reflects for the most part a desirable improvement in the market's ability to process information rapidly.

FIGURE 5
STOCK-INDEX
SLUGGISHNESS AND
FUTURES TRADING
VOLUME OF THE S&P 500,
1982-1989



Source: Standard and Poor's, NYSE, CME, and authors' calculations.

participants and observers are thinking of when they express concerns about the developments of the past several years. Such concerns, however, may be largely misplaced. As we have already argued, a change in the nature of minute-to-minute volatility without a corresponding change in month-to-month volatility should not affect the returns investors require for holding stocks, and hence should not affect corporations' cost of capital or investment incentives.

Furthermore, it appears that the relative increase in very short-horizon volatility actually reflects for the most part a desirable improvement in the market's ability to process information rapidly. In the past, there had been a tendency for the market as a whole to incorporate information "sluggishly." That is, market-wide news would be reflected quickly in the prices of large-capitalization stocks, but would only work its way into the prices of small-capitalization stocks with a lag. For this reason, aggregate market indices such as the S&P 500 did not adjust instantaneously to new developments.

With the development of futures contracts on these indices, this sluggishness seems to have disappeared. Now all stocks tend to react with equal speed to economy-wide news. This is not really surprising, given that traders in any individual stock can now

look to futures prices as a concrete barometer of such news. The net result is that when news arrives, the S&P's entire reaction is concentrated in a very short period of time rather than spread out over several hours or even days. Consequently, the volatility of S&P price movements over very short periods tends to go up, even when longer-horizon volatility is unchanged. There is nothing inherently troubling about this compression phenomenon; as suggested, it simply represents a technological enhancement of the market's ability to digest information rapidly.³

One can measure the short-run sluggishness of the S&P 500 index by computing the correlation between stock price movements over adjacent 15-minute intervals. A positive correlation is a symptom of sluggishness. It indicates that news ripples through the market only slowly, causing the index to move in the same direction for several 15-minute intervals in a row. Figure 5 plots index sluggishness (as measured by the serial correlation of 15-minute returns), along with futures market volume, over the period since the inception of trading in S&P 500 futures, 1982-1989. The figure shows a dramatic decline in sluggishness, which coincides closely with the growth in index futures volume; indeed, by 1986, such sluggishness appears to have been virtually eliminated.⁴

3. For a detailed treatment of these issues, see Kenneth Froot and Andre Perold, "New Trading Practices and Short-Run Market Efficiency," NBER Working Paper no. 3498, November 1990.

4. Since 15-minute data are not available prior to 1983, it is interesting to note that sluggishness, as measured by the autocorrelation of *daily* returns, declines

steadily from the early 1970s until 1986, when it also reaches approximately zero. This decline coincides closely with the surge in growth of stock market turnover that occurred over this period.

Thus, it appears that the primary consequence of innovations in trading technology and increased trading volume has been a reduction in short-run sluggishness, but not an increase in long-horizon volatility. The notion that trading volume can increase dramatically over time without much of a change in volatility may seem to fly in the face of studies that document a positive association between measures of volume and volatility. But these studies typically do not focus on absolute volume *per se*, but rather on volume relative to its recent average—that is, volume relative to the market's current capacity for accommodating trade. It makes sense to think that Monday will be more volatile than Tuesday if trading volume is bigger on Monday. It makes much less sense to believe that 1990 will necessarily be more volatile than 1970 if average trading volume is higher in 1990. After all, the market's capacity is much greater in 1990. What would have been a high-volume day, with significant consequences for volatility, in 1970 is a humdrum day in 1990.

Understanding the role of changing market capacity is important when thinking about policy measures designed to reduce volatility. At first glance, the statistical evidence on the relationship between trading volume and volatility might lead one to believe that volatility could be lowered by making trading more costly (for example, through the use of transactions taxes or higher margin requirements.) But this belief would be mistaken because it implicitly disregards adjustments in trading capacity. The evidence presented in Figure 5 suggests that if trading costs were raised even to levels seen in the 1960s, average volatility would probably not change. The most likely outcome would be a reduction over time in the market's capacity. That is, while higher trading costs would likely discourage noise trades, they would also discourage the provision of "liquidity" by smart-money traders. The net effect on volatility would likely be minimal.

Similar conclusions about the relationship between the intensity of trading activity and volatility follow from an examination of asset markets in other

countries. As shown in Figure 6, there appears to be no noticeable correlation between rates of turnover and volatility in different countries' stock markets.⁵ For example, both Germany and Switzerland have very high turnover—over 100% per year—but below-average volatility. In fact, neither country's volatility is higher than that of Sweden, where there is a substantial transactions tax and relatively low turnover.⁶ It is interesting to note that volatility in the U.S. is low in comparison not only to the sample average, but also to the volatility of its major competitors, Japan, the U.K., and West Germany.⁷

In sum, the evidence we have examined thus far does not provide much support for the view that innovations in trading technology and practices have adversely affected corporate investment incentives by increasing volatility and thus cost of capital. It remains possible, however, that there are other operative linkages between equity trading and investment, and that one needs to go beyond statistics on trading volume and volatility to understand them.

AN "INFORMATION GAP" LINK BETWEEN TRADING AND INVESTMENT?

Although we have argued that changes in trading practices do not appear to have had a significant impact on stock price volatility, volatility is not the only measure of stock market performance that may be relevant for corporate investment. Managers may feel that the market does not "understand" certain investment decisions because it does not possess the right information about corporate strategy and prospects. If the market's lack of information is the principal cause of underinvestment, then volatility statistics need not be a useful indicator of the problem. After all, such statistics may not tell us anything about the amount and diversity of information that is reflected in market prices.

Differences in the quality of information available to shareholders can have important implications for corporate investment. Suppose that the managers of Companies A and B are both considering raising their R&D budgets by \$100 million. Both managers figure that this investment will eventually yield \$300

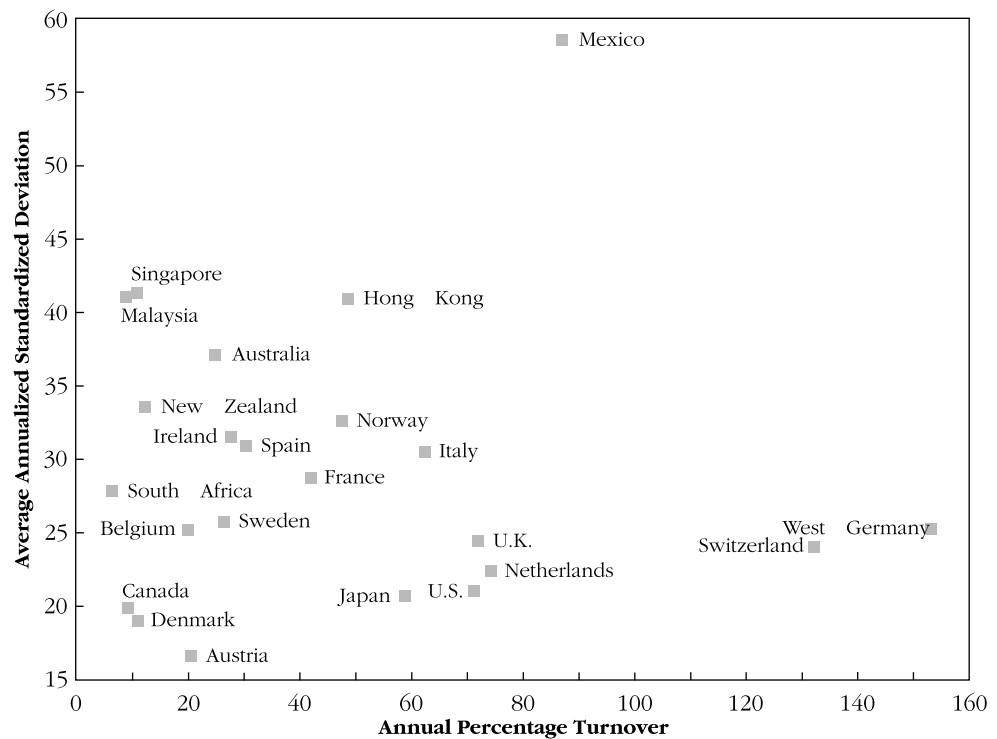
5. Although this sample period includes the world-wide stock market crash of October 1987, the results are representative of those obtained for other sample periods.

6. In 1988, Sweden raised its roundtrip transactions tax to 2%, the highest of any major world bourse. This tax was cut in half in April 1990, largely in response to a loss of domestic trading volume to competing foreign exchanges.

7. Figure 6 should be interpreted with some care, given that the volatilities we report are not adjusted for cross-country differences in corporate leverage and business conditions. However, it is unlikely that such adjustments would change the overall conclusions we draw above.

If trading costs were raised to levels seen in the 1960s, average volatility would probably not change. The most likely outcome would be a reduction over time in the market's capacity. That is, while higher trading costs would likely discourage noise trades, they would also discourage the provision of "liquidity" by smart-money traders.

FIGURE 6
RELATIONSHIP BETWEEN
STOCK MARKET
VOLATILITY AND
TURNOVER BY COUNTRY
1986-1988



Source: Goldman Sachs International, Ltd., and authors' calculations.

million in added profits, for a net benefit of \$200 million. Company A's shareholders understand the nature of the investment as well as management does. Consequently, the investment will be greeted with an immediate increase of \$200 million in the company's stock price. (This is the same scenario we used earlier in describing "perfect markets.")

Things are more complicated with Company B. Here, shareholders are not as well-informed as management. They see that current earnings have been reduced by \$100 million, but do not know for sure that this earnings drop represents a valuable economic investment. Instead, shareholders suspect it could instead reflect a sharp erosion in the profitability of ongoing business. Given their lack of information, Company B shareholders could rationally draw a negative inference from the decline in earnings, and push down the price of the stock.

Thus, Company B's management faces something of a dilemma in deciding whether or not to

make the investment. On the one hand, from their better-informed perspective, the investment increases long-run value. On the other hand, because shareholders are not as well-informed, the investment may lead to a short-run decline in the stock price. The investment decision will therefore turn on how intensely management is concerned with current stock prices as opposed to long-run value.⁸

Though obviously oversimplified, the example illustrates the "information gap" hypothesis and is helpful in identifying the forces that can lead to underinvestment. At the heart of this hypothesis are three preconditions that must hold if there is to be a stock-price-driven underinvestment problem:

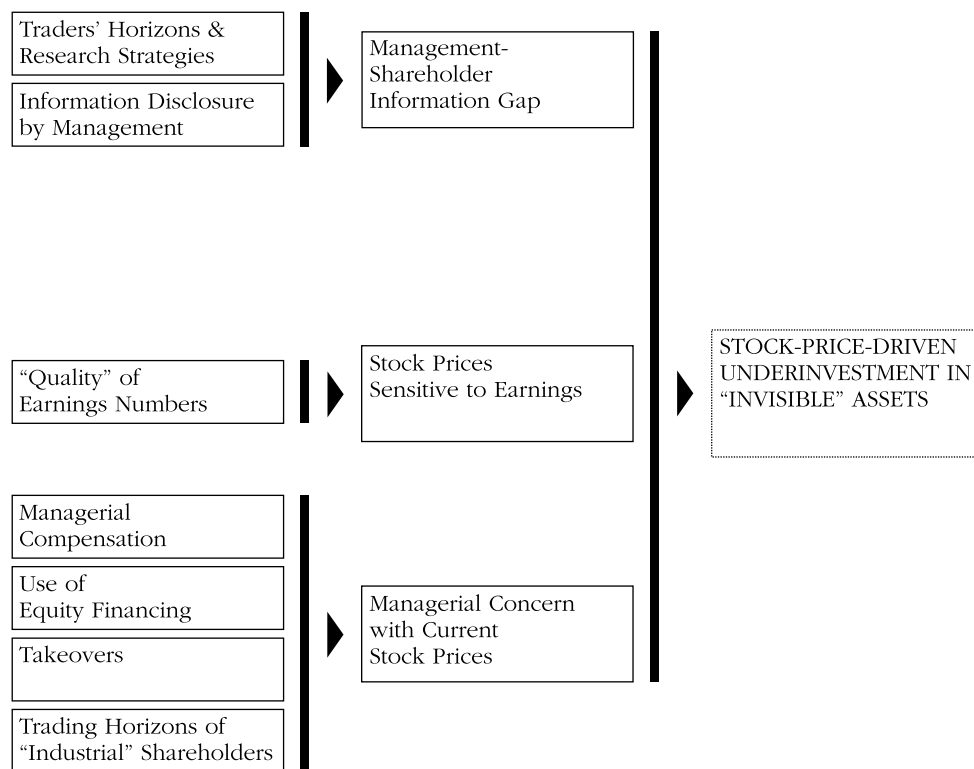
1. Managers must place some emphasis on current stock prices (as opposed to long-run stock prices) when evaluating investments.

2. The investment expenditure in question must suffer from an information gap—that is, shareholders must be less able than management to distinguish an

8. This logic is spelled out in more detail by Jeremy Stein in "Efficient Capital Markets, Inefficient Firms: A Model of Myopic Corporate Behavior," *Quarterly Journal of Economics*, 104 (November 1989), 655-669. See also Stewart Myers,

"Signaling and Accounting Information," NBER Working Paper no. 3193, December 1989.

FIGURE 7
INFORMATION-GAP VIEW
OF UNDERINVESTMENT



expenditure that will yield future returns from one that will not.

3. Stock prices must be sensitive to current measures of profitability—such as after-tax earnings—that are reduced by the investment expenditure in question.

In the rest of this section, we discuss each of these preconditions in more detail, identifying the specific economic factors that affect them and assessing the extent to which each is likely to hold. For example, we argue that managerial focus on current stock prices will be driven by such factors as the horizon of “influential” shareholders, the threat of hostile takeovers, the degree to which equity financing is used, and the nature of management compensation. The information gap between management and shareholders will be influenced by the quality of accounting and disclosure, as well as by the research strategies and trading horizons of shareholders.

A schematic depiction of the information-gap view of corporate underinvestment is contained in Figure 7. The figure underscores that while shareholder trading practices may be one ingredient in a theory of stock-price-driven underinvestment, they

are far from the only one—a point that is important to bear in mind when weighing policy alternatives.

Precondition 1: Managerial Focus on Current Stock Prices

What is the appropriate goal for corporate managers to be pursuing? Many managers would answer they are in the business of creating “long-run shareholder wealth.” Yet many of these same managers might balk at the notion that they should do whatever they can to get today’s stock price as high as possible. In other words, there seems to be an operational distinction drawn between the goals of maximizing current as opposed to long-term stock prices.

As suggested above, such a distinction probably stems from outsiders not being able to understand certain aspects of the company as well as management. Without such an information gap between shareholders and management, the efficient markets paradigm tells us that short- and long-run stock price maximization would be one and the same thing. Anything management did that was good for long-

In contrast [to Japan and Germany], there is no large category of shareholders in the United States that can be counted on to hold shares for the long run.

run value would have an immediate positive effect on the stock price; conversely, any management actions that reduced long-run value would have an immediate negative effect on the stock price.

When management is better informed than outside stockholders, however, it may be able to increase current stock prices by skimping on certain “invisible” investments. This is because lesser-informed outsiders will interpret the resulting increases in reported earnings as good news about company profitability. One potentially important invisible investment is a penetration pricing strategy that sacrifices current revenues in an effort to gain economically valuable market share. The asset acquired in this case, market share, does not show up anywhere on a company’s balance sheet and may be hard for outside shareholders to ascertain.⁹

Of course, the existence of an information gap does not mean that all efforts to raise current stock prices are detrimental to long-run value. In many, perhaps even most cases, the two goals may still be congruent. Furthermore, maximization of stock prices at any horizon will be more desirable than many other potential managerial objectives, such as empire-building and perquisite consumption.

To the extent that there is a meaningful distinction between maximizing short- vs. long-run stock prices, what factors would cause managers to focus excessively on the short run? We first try to shed light on this question by examining the trading patterns of shareholders and various aspects of the institutional structure of the equity market.

Horizons of “Influential” Shareholders. Managers’ preferences for short-term vs. long-term stock price maximization are likely to be shaped in a very direct way by the preferences of their shareholders. One can imagine that if all the shareholders in a given company are planning to sell their stock in the next week, they will be more concerned with near-term price performance, and will do their best to communicate this concern to management. To the extent management is responsive to shareholders, it too will become more oriented towards the short term.

How can one gauge the preferences of shareholders? One crude way might be to look at the sort of turnover statistics touched on in the previous

section. For example, a turnover of 50%, corresponding to an average holding period of two years, might be interpreted as evidence that shareholder preferences will push management in the direction of focusing on (loosely speaking) a two-year horizon.

Such turnover statistics, however, can paint a misleading picture in terms of the influence of shareholder preferences on managerial behavior. For one thing, simply calculating the average holding period leaves out a lot of potentially relevant information about the overall composition of share ownership. It may be that what matters in terms of influencing managers is not the average holding period, but the distribution of holding periods across shareholders.

A simple example helps to clarify this point. Suppose we have a company where 10% of the stock changes hands extremely frequently, say five times a year. The other 90% of the stock is owned by investors who never trade it. The average turnover will thus be 50%. But the pressures on management to maximize short-term stock prices are likely to be substantially weaker than in a company where each individual shareholder expects to turn over his holdings once every other year. In the former case, the majority of shareholders have a very long horizon, and it is the wishes of this majority that are most likely to be transmitted to management.

This example is more than an idle abstraction. It captures an important aspect of the Japanese and German systems that is hidden in average turnover figures. As was noted in the previous section, turnover in Japan is comparable to that in the U.S., while turnover in Germany is substantially higher. But it would be wrong to conclude from this that management in Japan and Germany is subject to the same shareholder pressures as U.S. management.

The available evidence suggests that the distribution of share trading in Japan is highly skewed: the average turnover numbers encompass a relatively small group of extremely active traders (such as the so-called “Tokkin” funds) and a large group of very stable long-term investors. Analogously, in Germany, a large fraction of equity voting rights (and hence influence over management) has long resided with a few large banks.¹⁰ Therefore, it is likely to be

9. As F.M. Scherer emphasizes, underinvestment in this area could be particularly damaging, “since American industry is confronted by European and especially Asian rivals who ... practice penetration and learning-curve pricing—manifestations of a long-run strategy.” (F.M. Scherer, “Corporate Takeovers: The Efficiency Arguments,” *Journal of Economic Perspectives*, II (Winter 1988), 69-82.)

10. This is true even though German shares are themselves widely held, because voting rights are regularly delegated to banks. According to one source, at the end of 1984, the three big German banks controlled the voting rights of 43% of all portfolios. See Hermann Kallfass, “The German Experience,” *Columbia Business Law Review*, (1988) 775-791.

TABLE 1
DECOMPOSITION OF
SHARE TURNOVER FOR 12
MONTHS ENDING
SEPTEMBER 30,1990

	Equity Holdings ^a (12/89, \$bil)	Percent Ownership	Percent Turnover ^b	Dollar Turnover ^c (\$bil)	Share of Volume ^d	Time Horizon ^e (years)
Pension Funds ■ Active	766	20.0	53	406	29.9	1.9
■ Passive	191	5.0	14	28	2.0	7.1
■ Total	957	25.0	45	434	32.0	2.2
Foundations/Endowments	82	2.1	22	18	1.3	4.5
Households ■ Self-directed	1,723	45.0	21	361	20.0	4.8
■ Bank trust dept.	332	8.7	26	86	6.4	3.8
■ Total	2,055	53.7	22	447	33.0	4.5
Insurance Companies	211	5.5	40	84	6.2	2.5
Mutual Funds	240	6.3	52	127	9.4	1.9
Foreign	257	6.7	91	234	17.3	1.1
Other/Unexplained	11	0.3	103	11	.8	1.0
Total for Non-members	3,813	99.6	36	1,356	100.0	2.8
Member Firms	14	.4	3,211	449	24.9	.03
TOTAL	3,827	100.0	47	1,805	100.0	2.1

a. Taken from Federal Reserve Flow of Funds data; shares held by foundations, endowments and bank trust departments was estimated by Birinyi Associates.

b. Institutional turnover estimated from CDA Spectrum data covering \$1,245 billion in equity assets: Passively managed pension assets, \$123 billion; mutual funds, \$108 billion; investment advisors, \$483 billion; insurance companies, \$81 billion; foundations and endowments, \$25 billion; in-house pension funds, \$146 billion; and bank trust departments, \$280 billion. Households (self-directed) are assumed to account for 20% of total volume (estimate by Birinyi Associates). Foreign turnover is the 1989 rate reported by Salomon Brothers in International Equity Flows, 1990 Edition. Turnover for member firms was provided by the Securities Industry Associates. Aggregate turnover was provided by the NYSE.

c. Percent turnover times equity holdings.

d. Share of non-member volume for all rows but the last two.

e. Reciprocal of percent turnover.

the preferences of these long-term shareholders that are relevant for shaping managerial behavior in Germany and Japan.

In contrast, there is no large category of shareholders in the United States that can be counted on to hold shares for the long run. Evidence on this point is provided in Table 1, which breaks out the approximate distribution of U.S. share ownership and trading volume as of the end of 1989. As can be seen from the table, large financial intermediaries in the U.S. are not typically long-run investors. If anything, these institutional investors tend to turn over their equity portfolios more rapidly than do individuals. For example, pension and mutual funds together comprise about 31% of equity ownership,

but about 41% of non-member-firm trading volume.¹¹ The bulk of this trading is attributable to pension funds with “actively managed” portfolios. These portfolios have an average turnover of approximately 53%, or equivalently, an average holding period of just under two years.

This turnover figure is only moderately higher than the overall non-member-firm average of about 36% (a holding period of about 3 years). But simple turnover statistics may tend to understate the intensity of professional money managers’ concern with short-term performance. Because of the agency relationship between money managers and the beneficial owners of the stock, there can be a distinction between the length of the actual holding

11. As shown in Table 1, approximately 25% of total trading volume is accounted for by member firms (i.e., specialists, floor traders, and brokerage

houses). Much of this trading volume represents market making activities, which by their nature involve a large amount of turnover.

Even though professional money managers do not appear to trade much more frequently than the average investor, their interests as agents may be considerably more skewed toward short-term stock price performance. Foreshortened performance horizons on the part of money managers may also have important implications for their research strategies.

period and the length of the “performance horizon.” Clearly, if an individual investor plans on selling his stock at the end of two years, he will be most interested in the stock price being maximized over a two-year horizon. But a money manager who is subject to quarterly performance evaluation may be much more interested in the stock’s movements over the nearer term, even if he is also planning on holding it for two years.

Thus, even though professional money managers do not appear to trade much more frequently than the average investor, their interests as agents may be considerably more skewed toward short-term stock price performance.¹² As we will argue later, foreshortened performance horizons on the part of money managers may also have important implications for the research strategies they pursue. This may, in turn, affect the magnitude of the information gap between shareholders and management.

In fairness to professional money managers in the U.S., it is hard to come up with statistical evidence to support the notion of a shortened performance horizon. And it would be even more difficult to draw an unambiguous link between their horizons and any adverse influences on corporate investment. Indeed, one might well argue that much of the “pressure” that money managers place on corporations is for the better; as suggested earlier, an added focus on stock price maximization at any horizon can be healthy to the extent it discourages corporate empire-building and other value-reducing managerial practices. Still, the above logic does suggest that there is far more to understanding the effects of delegated money management on corporate investment than simply measuring turnover.

In sum, it is difficult to prove statistically whether institutional investors in the U.S. communicate more intense short-horizon preferences to corporate managers than do individuals. Probably most relevant for international comparisons, however, is not the distinction between individuals and institutions in the U.S., but rather the fact that no influential U.S. investors exhibit the stable shareholding practices characteristic of Japan and Germany.

Takeover Threats. Another obvious influence on managers’ horizons for maximizing stock prices is the threat of hostile takeover.¹³ The incidence of hostile takeovers differs dramatically between the U.S. and its major competitors. Until recently, hostile takeovers were quite common in the U.S. In the 1980s alone, roughly 10% of the Fortune 500 companies were acquired in transactions that initially started as hostile. Hostile bids have also been frequently seen in the U.K. In contrast, there has to this date been virtually no hostile activity in Germany and very little in Japan.¹⁴ This is consistent with the presence of the large groups of “stable” long-term shareholders, and suggests there is likely to be less pressure on Japanese and German managers to maximize short-term stock prices.

These observations about the potential underinvestment consequences of takeovers should, however, be taken with a number of caveats. Even if takeover pressure really does have an adverse impact on certain types of investment, one absolutely cannot conclude that takeovers are on net harmful, or that Japan and Germany are somehow more competitive than the U.S. because of an absence of hostile takeovers.

Seen in a broader context, hostile takeovers are one of many possible instruments of corporate governance. Many analysts have argued that the prominence of hostile activity in the U.S. reflects a fundamental failing of other governance mechanisms—notably, the board of directors. If this is the case, then the U.S. may be better off with takeovers than without, even if takeovers exact some costs in terms of underinvestment. Without an active takeover market, there might be few checks on value-reducing behavior by corporate management. Similarly, a lack of takeovers in other countries will be beneficial only to the extent that alternative forms of governance succeed in exerting a measure of discipline and control over management.

Therefore, when thinking about policy implications, any linkage between takeovers and underinvestment cannot be considered in a vacuum. If reforms are to be undertaken, these reforms should

12. For a detailed argument as to how agency problems may lead money managers to be particularly concerned with short-term stock-price performance, see Andrei Shleifer and Robert Vishny, “Equilibrium Short Horizons of Investors and Firms,” *American Economic Review*, 80 (May 1990), 148-153.

13. These arguments are discussed by Jeremy Stein in “Takeover Threats and Managerial Myopia,” *Journal of Political Economy*, 96 (February 1988), 61-80.

14. For a discussion of hostile takeovers in the U.S., see Andrei Shleifer and Robert Vishny, “Value Maximization and the Acquisition Process,” *Journal of*

Economic Perspectives, 2 (Winter 1988), 7-20. The European experience with takeovers is examined by Julian Franks and Colin Mayer in “Capital Markets and Corporate Control: A Study of France, Germany and the U.K.,” *Economic Policy* (April 1990). For a discussion of takeovers in Japan, see Carl Kester, *Japanese Takeovers: The Global Contest for Corporate Control* (Boston: Harvard Business School), 1991.

TABLE 2
GROSS DOMESTIC EQUITY
ISSUANCE AS A
PERCENTAGE OF GDP

Year	United States	Japan	Germany
1982	0.81	0.30	0.20
1983	1.14	0.19	0.25
1984	0.48	0.25	0.17
1985	0.84	0.14	0.21
1986	0.64	0.12	0.84
1987	0.74	0.39	0.60
1988	0.42	0.68	0.35
AVERAGE 1982-85	0.82	0.22	0.21
AVERAGE 1986-88	0.60	0.40	0.60

Source: Goldman Sachs International Limited and authors' calculations.

be broad-based and directed at achieving an overall system of corporate governance that does a better job in terms of both managerial discipline and investment incentives.

As noted above, there is a paucity of definitive empirical evidence linking takeover pressure to underinvestment. A number of studies can be cited as providing some support for the underinvestment hypothesis, but these generally do not lead to unambiguous conclusions.¹⁵ On the one hand, this suggests further caution in formulating policies that take as their premise a direct link between takeovers and underinvestment. On the other hand, one should probably not take the lack of positive evidence for underinvestment as a strong signal that there is no problem.

As emphasized above, even if there is considerable pressure on managers to maximize short-term share prices, the information-gap view does not imply that all types of assets will suffer from an underinvestment problem. "Visible" investments that show up clearly on a company's balance sheet—for example, expenditures on a new factory—are probably the least likely to be sacrificed in the quest for higher stock prices. And these are exactly the sorts of investments that empirical researchers using accounting data are most likely to focus on in attempting to measure underinvestment. In contrast, the invisible investments most subject to

underinvestment—say, the costs associated with penetrating a market and developing customer loyalty—do not show up in accounting data. Thus empirical research that uses such data may fail to turn up a problem even if a serious one in fact exists.

Reliance on Equity Financing. Shareholder preferences and takeovers are not the only factors that can lead management to focus more heavily on current stock prices. A strong reliance on new issues of equity as a source of financing can have a similar effect. If a company is likely to turn to the equity market for funds sometime in the near future, current stock prices become more important, since they will dictate the terms on which existing stockholders sell a stake of the company to new owners. As shown in Table 2, companies in the bank-dominated economies of Japan and Germany have historically tended to rely less on the equity market as a source of financing. From 1982 to 1985, U.S. equity issuance as a fraction of GDP was approximately four times that of Japan and Germany. This difference among countries reinforces our earlier statement about the relative indifference of Japanese and German managers to current stock prices as compared to their American counterparts.

Nevertheless, an analysis of recent trends in financing also suggests that, over time, the environment facing Japanese and German companies may come to resemble that in the U.S. in some respects.

15. To take one example, Steven Kaplan finds that firms involved in leveraged buyouts tend to reduce their capital expenditures. (S. Kaplan, "The Effects of Management Buyouts on Operating Performance and Value," *Journal of Financial Economics*, 24 (October 1989), 217-254. However, as Michael Jensen has argued,

this may not necessarily represent underinvestment, but rather a curtailment of wasteful "excessive" investment expenditures. (M. Jensen, "Agency Costs of Free Cash Flow, Corporate Finance and Takeovers," *American Economic Review*, 76 (May 1986), 323-329.

The invisible investments most subject to underinvestment—say, the costs associated with penetrating a market and developing customer loyalty—do not show up in accounting data. Thus empirical research that uses such data may fail to turn up an underinvestment problem even if a serious one in fact exists.

For example, Table 2 also shows that during the period 1986-1988, there has been a pronounced convergence across countries in the reliance on equity issues. Indeed, the table may actually understate the extent to which Japanese companies have recently been tapping the equity market. From 1987 to 1989 alone, such companies issued \$115 billion—almost 4% of GDP—of hybrid instruments such as convertible bonds and bonds with warrants, which contain a significant equity component.¹⁶

Managerial Compensation. Another factor that might influence the degree of focus on current stock prices is managerial compensation. While we do not address this topic here, our conceptual framework does offer one insight. In the presence of an information gap, incentive compensation schemes that link pay to stock price performance should attempt whenever possible to incorporate stock price performance over a long horizon. Tying pay to near-term stock price levels can create problems if management is better-informed than outside shareholders and thus can pump up prices by taking actions that do not maximize long-run value.

In sum, there are a number of factors that could make U.S. managers more likely to focus on short-term stock prices than their Japanese or German counterparts. But there are also reasons to believe that the future may not exactly mirror the past in this regard. In particular, it is quite possible that the next several years will witness some convergence of the Japanese (and possibly German) systems in the direction of our own.

Precondition 2: The Information Gap Between Shareholders and Management

We now turn to an examination of the second precondition for underinvestment: the existence of a management-shareholder information gap. Given the separation of ownership and control, it is natural that management will know more about a company's inner workings and prospects than will outside shareholders. For example, management may be in a better position to judge whether certain expendi-

tures—on maintenance, advertising, R&D, penetration pricing—represent solid investments or waste of shareholder capital. As argued above, it is precisely these “invisible” investments that are most likely to be sacrificed by managers seeking to boost current stock prices.

There is a wealth of empirical evidence supporting the existence of an information gap. Much of this evidence comes from the significant responses of stock prices to announcements of changes in financial policies (as opposed to changes in operating policies). If these changes were purely financial and if the market knew as much about the firm as did management, then the announcements would be expected to have no effect on stock prices.

Dividends are one example of such a change. It is well known that stock prices respond favorably to the announcement of an increase in dividend payments, even if no other information is announced simultaneously. By effectively putting its money where its mouth is, management seems able to communicate its optimism about the future more forcefully than would be possible using mere words. In other words, dividends appear to act as a credible “signal” of management's superior information.

Equity issues are a second example of a financial policy that affects stock prices. Announcements of equity offerings by U.S. companies result, on average, in a 3% decline in stock prices. Conversely, stock prices increase by about 3% upon the announcement of stock repurchases. These effects are not small; on average they amount to over 30% of the value of the equity issue or repurchase. In short, both equity issues and repurchases appear to function as signals of management's confidence in the future of the company.¹⁷

Thus, the stock market reactions to dividend changes, equity offerings and repurchases, and stock transactions by corporate insiders all lend support to the intuitive view that there is an information gap between management and outside shareholders. The magnitude of this gap, however, and hence the scope for underinvestment, depends on a number of factors.

16. More broadly, the deregulation of the Japanese capital markets has led to a distinct movement away from bank financing and in the direction of securities issuance. From 1971 to 1975, Japanese companies raised 84% of their external funds from banks. A decade later, this fraction had fallen to 57%, and it continues to decline to this day. This general trend towards greater use of the arm's-length securities market may portend convergence towards the U.S. model along a number of dimensions.

17. For a formulation of the theory of how the choice between debt and equity finance can be a signal of information held only by management, see Stewart Myers and Nicolas Majluf, “Corporate Financing and Investment Decisions when Firms Have Information That Investors Do Not Have,” *Journal of Financial Economics*, 13 (June 1984), 187-221. For a summary of empirical evidence on the price impacts of financing decisions, see Asquith and Mullins, *Financial Management*, Autumn 1986, pp. 27-44.

One obvious way for the gap to be narrowed is through timely, comprehensive accounting and disclosure policies. For instance, when companies disclose R&D expenditures separately from other costs, this can help shareholders figure out that at least some of the costs embody an element of investment, and should be expected to generate cash flows in the future. Still, no accounting and disclosure system can eliminate, through simple reports from management to shareholders, all informational problems. Even if R&D costs are broken out separately, how can shareholders distinguish the good research projects from the bad ones? What line on an accounting statement enables investors to judge whether a company's expenditures to penetrate a new market represent money well spent or wasted?

Efforts to enhance investor relations, like other forms of management-initiated disclosure, inevitably suffer from a credibility problem. Thus, some of the burden of information production must fall on the shoulders of shareholders themselves. This implies that the research strategies that shareholders or their agents pursue—the quality and diversity of information that they uncover through their own efforts—will be key determinants of the size of the information gap.

One can imagine several forces that might influence the nature of this research. Trading horizons (or in the case of money managers, performance horizons) are a likely influence. It seems plausible that traders with relatively short horizons will be less inclined to study certain aspects of corporate strategy and performance than traders with longer horizons.

A simple example helps make this point clear. Imagine that a trader in a company's stock can devote his research efforts to one of two tasks: trying to predict next week's earnings announcement or trying to achieve a solid understanding of the company's R&D portfolio. If the trader is planning to turn over his position in the near future, the latter strategy may be unattractive. Even if understanding R&D is very important to understanding the intrinsic

value of the company, there is probably little short-term gain to be had from trading on R&D information. The information is just not likely to become common knowledge, and thus reflected in the company's stock price, before the end of the trading horizon.¹⁸

Trading ahead of an earnings announcement, on the other hand, can be a very attractive strategy for someone with a short horizon. If he predicts the announcement correctly, the game is over and he takes his profit within a few days. There is no need to wait a long time for the market price to reflect the information that he chose to study.

Thus it is quite possible that short horizons may tend to skew research incentives. Rather than trying to develop an in-depth understanding of the subtler aspects of corporate strategy, traders may, paradoxically, focus on variables like earnings announcements that will soon be made public anyway. Or they may use other research approaches (like various charting techniques) that can be helpful in predicting near-term order flows and price changes, but that again do not provide much fundamental information about the company in question.¹⁹

This reasoning suggests that in the presence of an information gap, short horizons on the part of shareholders or their agents can affect corporate investment horizons through two distinct channels. First, as discussed earlier, shareholders with short horizons may communicate their preferences for near-term price increases directly to corporate managers. Second, short trading horizons may alter research incentives in a way that widens the information gap and therefore increases the scope for underinvestment.

Precondition 3: Sensitivity of Stock Prices to Changes in Earnings

The last of the preconditions for underinvestment is that stock prices are sensitive to measures of performance like current earnings. This precondition is clearly linked to the previous one; the extent to which earnings are used as an indicator will

18. As Michael Brennan puts it: "Pity the man who alone knows how to value a gold mine, for his reward shall be slight." (M. J. Brennan, "Latent Assets," *Journal of Finance*, 45 (July 1990), 709-730.)

19. An explicit model of the above argument is provided by Kenneth Froot, David Scharfstein, and Jeremy Stein in "Herd on the Street: Informational Inefficiencies in a Market with Short-Term Speculation," *Journal of Finance*, 47, September 1992. They show how short horizons can lead traders not only to ignore

certain pieces of fundamental information, but even to devote research time to "chartist" strategies which use only technical analysis based on historical prices, and have nothing to do with fundamentals. For empirical evidence of a correlation between trading volume and the relative popularity of chartist (as opposed to fundamental-based) forecasts sold by forecasting services, see Jeffrey Frankel and Kenneth Froot, "Chartists, Fundamentalists, and Trading in the Foreign Exchange Markets," *American Economic Review*, 80 (May 1990), 181-185.

Short horizons may tend to skew research incentives. Rather than trying to develop an in-depth understanding of the subtler aspects of corporate strategy, traders may, paradoxically, focus on variables like earnings announcements that will soon be made public anyway.

depend partly on investors' knowledge (or lack thereof) about the inner workings of the company.

Given that an information gap exists, some expenditures that represent economic investments will not be recognized by shareholders as such. All that will be seen is the charge to current earnings. Clearly, the ultimate effect on stock prices, and thus the incentive to underinvest, depends on the sensitivity of stock prices to changes in earnings.

There is a large empirical literature that studies how stock prices react to unexpected "surprises" in earnings. This work finds a significant correlation between changes in earnings and subsequent changes in stock prices across a wide variety of industries and countries.²⁰ At the very least, this suggests that our third precondition is likely to be satisfied in a broad range of circumstances.

Of course, the magnitude of the correlation will vary with a number of factors. Stock prices should respond more strongly to earnings when earnings numbers are more informative about the true economic value of the company. Thus differences in accounting conventions and in the propensity for managers to "smooth" earnings could be expected to affect the sensitivity of prices to earnings.

Other factors that are important in determining stock-price sensitivity to earnings include the variability of industry profits and the "maturity" of the company in question. For example, if a start-up drug company has a single bad earnings number, this is unlikely to cause a strong revision in the market's assessment of company value. After all, most of the company's value depends on the outcome of experiments still in progress, and this quarter's earnings shed no light on these experiments. The same logic does not apply, however, to a more mature company with an established pattern of earnings. Here, a drop in earnings might be taken as a signal of a permanent decline in the profitability of ongoing operations, and thereby lead to a significant drop in the stock price.

The information gap view, therefore, implies that underinvestment will be more of a problem (1) in some types of industries than in others; (2) at particular points in a given company's or industry's life cycle; and (3) for specific types of investment projects. Michael Porter argues, for example, that

although the U.S. environment has been well-suited to newly emerging companies, capital market pressures often prevent more established companies from investing as aggressively in market share as their foreign competitors.²¹

SUMMARY AND POLICY IMPLICATIONS

This paper has examined two possible linkages between shareholder trading practices and corporate investment. The first linkage, that engendered by the "excess volatility" hypothesis, is both straightforward and relatively amenable to empirical assessment. Our basic conclusion here is that neither changes in trading practices over time nor differences in trading practices across countries contribute significantly to any underinvestment problem through a volatility/cost-of-capital channel. (This is not to say, however, that concerns about the integrity of stock-market microstructure are misplaced.) Transactions taxes, increased margin requirements, and similar measures might well reduce the volume of trade, but there is no evidence to indicate that they would lower stock-price volatility in a way that would stimulate investment.

The information gap hypothesis is, in many ways, a much richer paradigm, and is probably much closer to capturing realistic aspects of any underinvestment problem. It is also more subtle in that it does not apply across the board to all investment projects in all firms.

Because the information-gap theory focuses on particular "invisible" investments, it is difficult to use conventional accounting measures of investment to test directly its empirical validity. Rather than attempting to measure directly the extent to which corporate investment suffers from the existence of an information gap, we have taken a more "circumstantial" approach by examining the preconditions for underinvestment rather than underinvestment itself. We leave to future research the direct examination of those investment projects that the theory predicts will suffer. Such examinations will likely take the form of careful and detailed case-by-case analysis rather than the usual aggregative analysis of variables downloaded from financial databases.

20. For references to this literature, see Frederick Choi and Richard Levich, *The Capital Market Effects of International Accounting Diversity*, New York: Dow Jones-Irwin, 1990, pages 21-23.

21. Michael E. Porter, *The Competitive Advantage of Nations*, Free Press (1990). The life-cycle aspect of the short-termism phenomenon is also apparently familiar

to members of the money management community. Indeed, it seems to have inspired the following piece of stock-picking wisdom: "Don't worry about current earnings—until they turn positive."

Even if we had stronger evidence of an underinvestment problem, our analysis cautions against drawing superficial policy conclusions. Many of the forces that can lead to underinvestment are also related to other, positive aspects of economic performance. For example, while increases in turnover might conceivably be associated with shortened managerial horizons, they can also be signs of enhanced market efficiency in such areas as risk management and hedging.

Hostile takeovers also embody this kind of tradeoff. Though such takeovers may at times shorten shareholder horizons and promote underinvestment,

a ban on them would remove an important discipline on U.S. companies' managements.

As this last example suggests, shareholder trading practices are only one element of the information-gap view of underinvestment. Other important factors include methods of and institutions for corporate governance, relationships between companies and their financial intermediaries, the nature of accounting and disclosure, and the structure of managerial compensation. The subtle interplay among these forces implies that a policy change directed narrowly at any one of them may not achieve the desired end, and may even be counterproductive.

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