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AND
CORPORATE INVESTMENT HORIZONS

Kenneth A. Froot
Andre F. Perold
Jeremy C. Stein

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SHAREHOLDER TRADING PRACTICES AND CORPORATE
INVESTMENT HORIZONS

ABSTRACT

We investigate how shareholder trading practices might be linked to corporate investment horizons. We examine two possible linkages and analyze a range of data relevant to them. 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. Excess volatility could lead to a higher cost of capital, and thereby reduce long-term corporate investment.

The second linkage derives from an information gap between management and outside shareholders. In the presence of such a gap, maximizing short-run and long-run stock prices are not the same thing. 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.

With respect to excess volatility, our basic conclusions are that neither changes in trading practices over time nor differences in trading practices across countries contribute significantly to any underinvestment problem. There is no evidence to indicate that measures to reduce trading volume (such as transactions taxes) would lower stock-price volatility in a way that would stimulate investment.

With respect to the information gap hypothesis, we find "circumstantial" evidence consistent with certain preconditions for underinvestment. This is not, however, evidence of underinvestment itself. In addition, many of the forces that can lead to underinvestment - - such as hostile takeovers - - are also related to other, positive aspects of economic performance. Policy responses therefore involve a difficult set of tradeoffs.

Kenneth A. Froot
Sloan School of Management
Massachusetts Institute of Technology
50 Memorial Drive
Room E52-449
Cambridge, MA 02139

Andre F. Perold
Harvard University
Cambridge, MA 02138

Jeremy C. Stein
Massachusetts Institute
of Technology
Cambridge, MA 02139

Shareholder Trading Practices and Corporate Investment Horizons

1. Introduction

In recent years, the manner in which corporate equities are bought and sold has been dramatically 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 1974, just prior to the deregulation of broker commissions, the rate of turnover of the average share on the New York Stock Exchange was 16%. NYSE turnover more than quadrupled 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, 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: indexing, portfolio insurance, index arbitrage, etc.

There is sharp disagreement over the economic effects of these changes in trading practices. 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 -- an increase in turnover from 20% to 50% means that the average holding period has fallen from 5 years to 2 years. And many are of the view that shorter horizons for stockholders inevitably lead to shorter horizons for managers when they evaluate investment opportunities.

Although such a link between stockholders' trading horizons and managers' horizons for physical investment may at first glance seem intuitively natural, it is actually quite hard to pinpoint the mechanisms behind it. In a world of perfect markets, shareholder trading horizons would have no effect on either stock prices or corporate investment. In this idealized world, there are no discrepancies between the information about company performance available to managers and shareholders. Moreover, prices are forward-looking and accurately reflect all this information, however far into the future. As a result, the announcement of a new investment project, even one that does not pay off for many years, can have an immediate and positive impact on a company's stock price, as investors quickly adjust their forecasts of future cashflows. Thus, 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 that it intends to spend \$100 million on plant modernization. The cost savings from the modernization will not start to accrue for two years, so the current impact on cashflow is negative. However, 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 should jump by \$200 million (the net value of the investment) in value 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—even those with the shortest of holding periods benefit from the company's long-term investment.

To understand the links between shareholder horizons and corporate investment, one must therefore identify those aspects of the issue 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 realistic channels through which short trading horizons might compromise 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, maximizing short run and long run stock prices are not the same thing. 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.

The paper is organized as follows. Section 2 investigates the excess volatility question, examining empirically whether changes in trading intensity

have raised volatility in a way that might compromise corporate investment. Section 3 elaborates the information gap view, and analyzes a range of data relevant to it. Section 4 concludes and offers policy implications.

2. An "Excess Volatility" Link Between Trading and Investment?

Ideally, fluctuations in stock prices should be driven solely by news about fundamental economic factors. However, it is unclear 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 — 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 the added risk.² From the perspective of the corporation, this translates into a higher cost of capital that must be applied when evaluating prospective

¹ See Shiller (1984) and Black (1986) for early discussions of how noise traders might affect stock prices. DeLong, Shleifer, Summers and Waldman (1990) show how less-than-fully-rational noise traders can survive economically when trading with rational buy-low-sell-high traders.

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.

investments, thereby reducing the aggregate level of investment. See Figure 1 for a schematic depiction of this argument.

A substantial body of empirical evidence has been assembled which suggests that stock prices are indeed "excessively" volatile relative to fundamentals -- that is, investor sentiment also appears to play some role in moving stock prices. The evidence is controversial, however, in part because excess volatility is hard to detect with statistical confidence.³

Because statements of how much volatility ought to be generated by fundamentals are so open to question, we do not attempt to measure excess volatility here. However, for our present purposes, the overall amount of excess volatility may be irrelevant. For even if one accepts that a large component of volatility is attributable to investor sentiment, it in no sense follows 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, noticing that stocks are undervalued relative to fundamentals, increase their demands. However, because this form of arbitrage can be very risky (stocks may take a long time to come back to fundamental values, and may

³ See West (1988) for a survey of the literature which asks whether stock prices are too volatile. Fama and French (1988), Poterba and Summers (1988), and Cutler, Poterba, and Summers (1990) find evidence that is consistent with excess volatility, and Froot (1990) finds a component of excess volatility that is systematic. None of these results are decisive. See Summers (1986), for the argument that excess volatility is likely to be very hard to detect in prices, even if it is an important source of volatility.

actually get further away from them before they get closer) the offset by the smart money traders is 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, the remainder of this section is devoted to an empirical investigation of a wide range of asset price data, to see what can be learned about the actual relationship between trading behavior and volatility.

Empirical Evidence

Some observers would claim that 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 might start by pointing to the rash of "big days" seen in the past few years, including the October 1987 crash, the October 1989 "minicrash", and a handful of other days when prices moved very substantially. As Figure 2 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 — and this is true of every other measure of risk that we look at

below -- that the Great Depression is associated with by far the most dramatic fluctuations in stock prices yet seen.)

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 on their shares. What should matter to investors is the total risk they expect to bear over their 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 2 years), the chances are that the big days may simply "wash out" in terms of the risks they create for most investors.

Figure 3 helps to illustrate this point. It is analogous to Figure 2, except that it focuses on "big months" rather than on big days. As can be seen, 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 not atypical 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.⁴ 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 risk borne by an investor. Figure 4 displays a more broad-based measure of risk, the standard deviation of all (not just the biggest) stock price changes. This measure is the one most commonly used to quantify volatility, and indeed the terms "standard deviation" and "volatility" are often used interchangeably.

In Figure 4, this calculation of volatility is done using stock price changes over month-long intervals. This is in keeping with the logic sketched above—that what matters for investors is risk over a holding period of a reasonable length. As the figure illustrates, 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 volatility 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, say, 1988 and 1989. Thus Figure 4, using a very different measure of risk than Figure 3,

⁴ For a discussion of such policy measures see, for example, The Report of the Presidential Task Force on Market Mechanisms (1988), the Interim Report of the Working Group on Financial Markets (1988), and the NYSE Market Volatility and Investor Confidence Report (1990). For more detailed analysis of some of these measures see Greenwald and Stein (1988).

comes to a similar conclusion — at holding periods of reasonable length, there is not much evidence that the risk borne by equity investors has increased with recent innovations in trading behavior.

What about volatility over shorter holding periods? The evidence on big days seen above suggests that there has been some increased tendency for extreme stock price movements to be compressed into short periods of time. We might also expect that 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 4. This is done in Figure 5, 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 further into the past). There is a clear upward trend in the ratio—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 4) there may have been a trend increase in very short-horizon volatility on the order of 40%.

It is perhaps this very short-horizon volatility—the potential for large price adjustments in a matter of minutes—that market participants and observers are thinking of when they express concerns about the developments of the past several years. However, many of these concerns may be 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 that 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--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 bit of a lag. Thus 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, the sluggish adjustment property 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 if longer-horizon volatility is unchanged. There is nothing inherently troubling about this compression phenomenon, as it just represents a technological enhancement to the market's ability to digest information rapidly.⁵

One can measure the short-run sluggishness of the S&P 500 index directly, 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

⁵ See Froot and Perold (1990) for a detailed treatment of these issues.

to move in the same direction for several 15-minute intervals in a row.

Figure 6 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. By 1986, sluggishness is virtually eliminated.⁶ Figures 4 through 6 therefore reinforce the point we have been making: that the primary consequence of innovations in trading technology has been a reduction in short-run sluggishness, and 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 many studies that document a positive association between measures of volume and volatility.⁷ However, 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.⁸ 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

⁶ 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 which occurred over this period.

⁷ For a survey of this large literature, see Karpoff (1987).

⁸ For example, French and Roll (1986) document that volatility is lower in weeks when the market is closed on one business day. In other words, volatility is lower when there is only four fifths the usual current trading volume. Schwert (1989) finds that volatility is correlated with divergences in volume from recent trend levels.

1990. After all, the market's capacity is much greater in 1990—what would have been a big 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 (e.g., through the use of transactions taxes, higher margin requirements, etc.) However, this belief would be mistaken, because it implicitly disregards adjustments in trading capacity. Figure 6 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 buy-low, sell-high smart money traders. The net effect on volatility is likely to be close to zero.

Similar conclusions about the relationship between average rates of turnover and volatility follow from an examination of other countries and other asset markets. Figure 7 contains a scatter plot that compares rates of turnover in different countries' stock markets to the volatility in these markets over the period 1986-88.⁹ There does not appear to be any noticeable correlation between the two. 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

⁹ 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.

substantial transactions tax and relatively low turnover.¹⁰ 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.

Our discussion of the relationship between volatility and turnover has not singled out those classes of institutional shareholders, such as pension funds, which have grown in importance over the last decade and which are often accused of rapidly "churning" their portfolios.¹¹ However, with the connection between total turnover and volatility so weak in the first place, the case for a link between pension-fund trading and volatility seems even weaker. Indeed, there is no evidence that volatility tends to be higher for stocks with larger institutional or pension holdings than for others.¹²

The lack of correlation between average turnover and volatility that characterizes stock markets can also be found in asset markets as diverse as those for foreign exchange and real estate. Figure 8 shows the number of exchange rate futures contracts traded on four major currencies: the pound, Deutsche mark, Swiss franc, and yen. Futures volume has clearly grown at a dramatic pace (volume of trade data in the much larger spot market for foreign exchange is not as reliable, but shows a similar upward trend) since the mid-

¹⁰ 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.

¹¹ Light and Perold (1987) and Brancato (1990) document the growing importance of institutional investors in U.S. capital markets.

¹² Jones, Lehn, and Mulherin (1990) examine the correlation between volatility and institutional ownership and find that volatility is lower for stocks with greater institutional holdings. While institutional ownership is doubtless proxying for a variety of fundamental factors, their findings do not support the view that institutional investors tend to destabilize prices.

1970s. Figure 9 shows the corresponding annualized monthly volatilities for these same four currencies. While the rate of turnover in foreign exchange has grown astronomically in recent years, there are no discernable trends in currency market volatility.

Whereas the foreign exchange market is one of the most liquid in the world (currently, over \$430 billion changes hands daily), the real estate market probably lies at the other end of the liquidity spectrum. This market is characterized by substantial transactions costs and relatively low turnover. Yet casual empiricism suggests that real estate prices can be extremely volatile, at times without any obvious connection to underlying economic fundamentals.¹³

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 through a volatility/cost of capital channel. 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.

3. 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 somehow does not "understand"

¹³ For a discussion of the efficiency and volatility properties of the single-family home market, see Case and Shiller (1989).

certain investment decisions because it does not possess the right information about corporate strategy and prospects. If it is the market's lack of information that 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.¹⁴

While differences in the quality of information available to shareholders may not leave a trace in volatility statistics, they can nonetheless 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 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 exactly the same scenario as that described in the Introduction.)

Things are more complicated with Company B. Here, shareholders are not as well-informed as management. They see that current earnings have been reduced

¹⁴An example may help to illustrate this point. Imagine that there are two biotechnology companies, X and Y, which are alike in every respect except one—Company X stock is held by well-informed investors, and Company Y stock is held by rational, but less well-informed investors. When Company X undertakes a new research project, its stockholders have enough data to immediately assess the project's economic value, and Company X's stock price adjusts accordingly. In contrast, when Company Y undertakes a new project, nothing happens to its stock right away, since its stockholders have no good advance information about the project's value. Indeed, they may not even be aware that a new project has been undertaken. However, once the project reaches maturity and its value is plain for everybody to see, the stock does eventually adjust. It is clear in this example that the two stock-price paths will be similar, except that X's stock will lead Y's stock. This simply reflects the fact that the market gets information about X sooner. Therefore, if one were to calculate volatility statistics for the two price series, they would be the same.

by \$100 million, but do not know for sure that this earnings drop represents a valuable economic investment. Instead, shareholders may reason, it could come from an erosion in the profitability of ongoing business, due, for example, to rising costs. Given their lack of information, it can be perfectly rational for Company B shareholders to draw a negative inference from the decline in earnings, and to 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.¹⁵

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

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

ii) The investment expenditure in question must suffer from an information gap -- shareholders must be less able than management to distinguish an expenditure that will yield future returns from one that will not.

¹⁵ This logic is spelled out in more detail in Stein (1989) and Myers (1989).

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

In the remainder of this section, we discuss each of these preconditions in more detail. In each case, we attempt to identify the specific economic factors that affect these preconditions, and to evaluate the extent to which each precondition 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 10. 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 that 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 v. 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 that management did that was good for long-run value would have an immediate positive impact on the stock price. And conversely, anything that management did that was not in the interests of long-run value would have an immediate negative effect on the stock price.

When management is better informed than outside stockholders, however, they may be able to increase current stock prices by undertaking certain actions that they view as "myopic", in the sense that these actions actually hurt the long-run value of the company. Examples include skimping on needed maintenance or R&D expenditures, in the expectation that lesser-informed outsiders will interpret the resulting increases in reported earnings as good news about company profitability. (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, or even most cases, the two goals may still be congruent. Furthermore, maximization of stock prices at any horizon can be more desirable than many other potential managerial objectives, such as empire building, perquisite consumption, etc.)

If there is indeed a meaningful distinction between maximizing short vs. long-run stock prices -- as there will be in the presence of an information gap -- what factors work to tilt managers' focus in the former direction? 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 that management is responsive to the shareholders, they 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.

However, such turnover statistics 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 shareownership. 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 5 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 are hidden in average turnover figures. As was noted in the previous section, turnover in Japan is comparable in magnitude 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 pressures from shareholders as management in the U.S.

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.¹⁶ Analogously, in Germany, a large fraction of equity voting rights (and hence influence over

¹⁶These stable shareholders include financial intermediaries and other corporations which own significant shares of their customers, suppliers, and business partners. See, e.g., Abegglen and Stalk (1985).

management) has long resided with a few large banks.¹⁷ Therefore, it is likely to be 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.¹⁸ The bulk of this trading is attributable to pension funds with "actively managed" portfolios. These portfolios have an average turnover of approximately 53 percent.

This turnover figure is only moderately higher than the overall non-member-firm average of about 36 percent.¹⁹ However, 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

¹⁷This is true even though German shares are themselves widely held, because voting rights are regularly delegated to banks. According to Kallfass (1988) at the end of 1984, the three big German banks controlled the voting rights of 43% of all portfolios.

¹⁸As the Table shows, approximately 25 percent 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.

¹⁹Including the high-frequency trading of member firms, the average overall turnover rises to 47 percent.

between the length of the actual holding 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 regular 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.

Almost all active investment management in the United States is delegated to outside investment advisors, who are closely monitored by pension staffs and their consultants. Even though accounts tend to be terminated only after relatively long periods of poor performance (3 to 5 years is typical), evaluation is frequent (usually quarterly). Short-term investment performance can weigh heavily in these evaluations. Frequent monitoring is not only rational -- short-term performance is correlated with long-run performance -- but in the case of pension funds it may be seen as implicitly required under the fiduciary standards of ERISA. Thus, even though professional money managers do not appear to trade much more frequently than does the average investor, their interests as agents may be considerably more skewed toward short-term stock price performance.²⁰

In fairness to professional money managers, it is hard to come up with systematic evidence to support the notion of a shortened performance horizon.

²⁰In Japan, where corporate pension assets are still relatively small, accounts are just now beginning to be awarded on the basis of investment performance. Until April 1990, pension funds could only be managed by trust banks and life insurance companies, and accounts were awarded on the basis of business relationships. While performance is beginning to be more closely scrutinized, termination of accounts for reasons of poor performance has thus far been rare. However, such terminations are expected to increase in the future.

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 noted earlier, an added focus on stock price maximization at any horizon can be healthy when it leads to a reduced emphasis on other value-reducing objectives. 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 say whether institutional investors in the U.S. communicate more damaging short-horizon preferences to corporate managers than do individuals. However, what is probably most relevant for international comparisons is not the distinction between individuals and institutions in the U.S., but rather the fact that no influential U.S. investors exhibit the kinds of stable shareholding practices which are characteristic of Japan and Germany.

Takeover Threats

Another obvious influence on managers' horizons for maximizing stock prices is the threat of hostile takeover. A high probability of a takeover can increase the importance of current stock prices to managers for a couple of reasons. First, if managers are simply acting on behalf of existing shareholders, they must recognize that there is a good chance that these shareholders will be forced to sell their holdings to a bidder in the near future. The higher is the near-term stock price, the higher is the likely level of the takeover bid, and hence the better off are the shareholders.

Second, if managers are to some degree self-interested and concerned with keeping their jobs, they may also hope to deter a potential bidder by raising the stock price to a level that makes the acquisition unattractive.²¹

The incidence of hostile takeovers varies dramatically between the U.S. and its major competitors. Hostile takeovers have been quite common in the U.S. In the 1980s alone, roughly 10% of the Fortune 500 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.²² This is consistent with the presence of the large groups of "stable" long-term shareholders, and points to a similar conclusion--there is likely to be less pressure on Japanese and German managers to maximize short-term stock prices.

The hypothesis that Japanese managers are less concerned with current stock prices than their U.S. counterparts is confirmed by survey evidence. In one survey of about 500 major corporations, U.S. executives ranked share price increases as their second most important objective out of nine choices, while Japanese executives ranked this as the least important of the nine objectives.²³

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, (an issue that is far from being empirically resolved, as we discuss below) one

²¹These arguments are discussed by Stein (1988).

²²For a discussion of hostile takeovers in the U.S., see, for example, Shleifer and Vishny (1988). The European and Japanese experiences are examined by Franks and Mayer (1990), and Kester (1991), respectively.

²³See Abegglen and Stalk (1985).

absolutely cannot conclude that takeovers are on net harmful, or that Japan and West 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 (e.g., 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 non-value-maximizing behavior by corporate management. Similarly, a lack of takeovers in other countries will only be beneficial to the extent that alternative forms of governance succeed in exerting a measure of discipline and control over management.

A comprehensive analysis of the structure of corporate governance is beyond the scope of this paper. (See the contribution by Kester in this volume.) Our point here is simply that when thinking about policy implications, any linkage between takeovers and underinvestment cannot be considered in a vacuum. Rather, if reforms are to be undertaken, these reforms should 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 concrete empirical evidence linking takeover pressure to underinvestment. A few studies can be cited as providing some support for the underinvestment hypothesis, but these studies generally do

not lead to unambiguous conclusions.²⁴ On the one hand, this suggests further caution in formulating policies that take as their premise an intimate 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 discussed above, the information gap view implies that underinvestment is most likely to be associated with "invisible" investments—e.g., the costs associated with penetrating a market and developing customer loyalty. Since these invisible investments do not show up anywhere on a company's balance sheet, empirical research that uses accounting data will fail to turn up a problem even if there is a serious one.

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, as they will dictate the terms on which existing stockholders sell a stake of the company to new owners. Table 2 presents some data on gross equity issues in the U.S., Japan, and Germany. As can be seen, 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

²⁴For example, Kaplan (1989) finds that firms involved in leveraged buyouts tend to reduce their capital expenditures. However, as Jensen (1986) has argued, this may not necessarily represent underinvestment, but rather a curtailment of wasteful "excessive" investment expenditures.

fraction of GDP was approximately four times that of Japan and Germany. This differential across countries reinforces the conclusions drawn above — that there has been less reason for managers in Japan and Germany to be concerned with current stock prices than those in the U.S.

However, 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. more closely. 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 these 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.²⁵

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. Specifically, one might expect a weakening of the system of stable shareholdings, and a concomitant increase in the focus by Japanese managers on short-term stock price movements.

Another factor that might influence the degree of focus on current stock prices is managerial compensation. While we do not address this topic here (see the contribution by Gibbons and Murphy in this volume), our conceptual

²⁵See The Economist (1990).

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.

To summarize: a number of factors seem to operate in the direction of making U.S. managers more likely to focus on short-term stock prices than their Japanese or German counterparts. However, there are good reasons to believe that the future may not mirror the past in this regard. In particular, it is quite possible that the next several years will witness a 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 shown in Figure 10: the existence of a management-shareholder information gap. To many observers it seems intuitive that a company's management will know more about its inner workings and prospects than will outside shareholders. For example, management may be in a better position to judge when certain expenditures (e.g. on maintenance, advertising, R&D, pricing for market share) represent solid investments that will pay off in the future, as opposed to just wasteful "fat." 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 also a wealth of empirical evidence supporting the existence of an information gap. Much of this evidence comes from the significant observed 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.²⁶ By effectively putting its money where its mouth is, management seems able to communicate an additional degree of truthfulness about its (optimistic) outlook which would not be possible using mere words. In other words, dividends appear to act as a credible "signal" of management's superior information.

The larger a firm's information gap, or the greater its concern with current share prices, the more it may rely on dividends to signal information about its future prospects. A firm with shareholders that can monitor performance directly may be able to avoid large dividend payments with little cost to current share prices. By contrast, a firm with passive and dispersed shareholders may not have this luxury. In this vein, it is interesting to note that Japanese dividend yields are much lower than those in the U.S. — 1.2% as compared to 4.6% in the 1980s. Although there are many possible explanations for this differential, it may in part reflect a greater concern on the part of U.S. companies with the timely transmission of information to outside shareholders.

²⁶ See, for example, Asquith and Mullins (1983).

Equity issues are a second example of a financial policy which affects stock prices. The announcement of a seasoned equity offering (in the U.S.) leads on average to a decline of about 3 percent in a firm's stock price.²⁷ With no information gap, such an announcement would have no effect on the market's expected present value of firm cash flows. Consequently, share prices would be unaffected.

However, if managers know more about the company than does the market, an attempt to raise funds by selling off ownership (as opposed to selling bonds) may induce the market to revise downward its expectation of future cash flows. That is, equity issues may be perceived as a pessimistic signal from management about the intrinsic value of the company.²⁸

Changes in dividends, equity offerings and repurchases, and stock transactions by corporate insiders all effect stock prices in the way suggested by information-gap hypothesis. Thus all the available evidence confirms the intuitive view that there will always be some information gap between management and outside shareholders. However, the magnitude of this gap -- and hence the scope for underinvestment -- depends on a number of factors.

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

²⁷ Similarly, stock prices increase by about 3 percent upon the announcement of a stock repurchase. These effects are not small: in dollar terms they amount to about 31 percent of the value of the equity issue or repurchase. For evidence on the relationship between stock prices and equity transactions see, for example, Asquith and Mullins (1986) and Vermaelen (1981).

²⁸ Myers and Majluf (1984) study how the choice between debt and equity finance can be a signal of information held only by management.

shareholders figure out that at least some of the costs embody an element of investment, and should be expected to generate cashflows in the future.

Still, no accounting and disclosure system can, through simple reports from management to shareholders, eliminate 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 a total waste?

The limitations of disclosure through standard financial reports are underscored by the importance corporations place on "investor relations." For example, prior to an equity issue, a company and its investment bankers will typically embark on a "road show" which is intended to better educate the market about the company's future prospects. Indeed, such efforts to manage the information gap are an important service provided by investment banks.

But 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 pursue -- the quality and diversity of information that they uncover through their own efforts -- will be key determinants of the information gap.

One can imagine several forces that might influence the nature of this research. Trading horizons are a likely influence. It seems believable 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 thereby be impounded in the company's stock price) before the end of the trading horizon. As Brennan (1990) puts it: "Pity the man who alone knows how to value a gold mine, for his reward shall be slight." Or, as one foreign exchange trader noted, "I can't afford to be five steps ahead of everybody else in the market. That's suicide."²⁹

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 trading horizons may tend to skew research incentives. Rather than trying to develop an in-depth understanding of the subtler aspects of corporate strategy (which would place them "five steps ahead" of the market), 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

²⁹ Wall Street Journal, September 23, 1988.

again do not provide much fundamental information about the company in question.³⁰

This reasoning suggests that in the presence of an information gap, short trading horizons can impact 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 in Figure 10 is that stock prices are sensitive to measures of performance like current earnings. 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,

³⁰ Froot, Scharfstein and Stein (1990) provide an explicit model of the above argument, showing 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 have nothing to do with fundamentals. See also Shleifer and Vishny (1990) for analysis of the causes and consequences of short trading horizons.

across a wide variety of industries and countries.³¹ 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.

Another potentially important set of factors has to do with the variability of industry profitability 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.

On the other hand, the same logic does not apply to, say, a mature industrial company, where 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 decline in the stock price. Thus even if the start-up is subject to an information gap and its management is concerned with current stock prices, the temptation to underinvest so as to boost current earnings may not be as severe as for the mature company. This phenomenon is apparently familiar enough among members of the money management community to have

³¹ See Choi and Levich (1990), pages 21-23, for references to this literature.

inspired the following piece of stock-picking wisdom: "Don't worry about current earnings--until they turn positive."

4. 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. (However, this is not to say that concerns over 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 difficult, however, to move from the theory to an airtight demonstration of its empirical validity. Because the theory is all about information problems and "invisible" investments, it is hard to assemble unambiguous evidence in its favor. 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 -- our

evidence has borne more on the preconditions for underinvestment than on underinvestment itself.

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. 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.

As we have seen, shareholder trading practices are only one element of the information-gap view of underinvestment. They are inextricably linked with hostile takeovers, corporate financing patterns, and other capital-market considerations. But here, once again, hastily-drawn policy conclusions may do more harm than good.

Hostile takeovers provide an illustration of this principle. Though they may at times promote underinvestment, a ban on takeovers could remove an important disciplinary mechanism in the U.S. system of corporate governance. In an effort to improve the terms of the discipline/underinvestment tradeoff, a number of observers have suggested measures to enhance the independent influence of corporate boards of directors. A stronger board of directors could conceivably provide many of the disciplinary benefits associated with takeovers, without the attendant costs.

Japan and Germany offer many interesting lessons about alternative systems of shareholder relations and corporate governance. As we have argued, these systems do not appear to display strong evidence of the preconditions for underinvestment. Yet it is far from obvious that U.S. policymakers should attempt to duplicate the Japanese or German financial environment. If

anything, market forces seem to be driving other countries toward the U.S. model, not vice-versa. And while these changes may increase the scope for information-gap-driven underinvestment, the very fact that they are taking place suggests that they also entail compensating benefits.

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Figure 1

Excess-Volatility View of Underinvestment

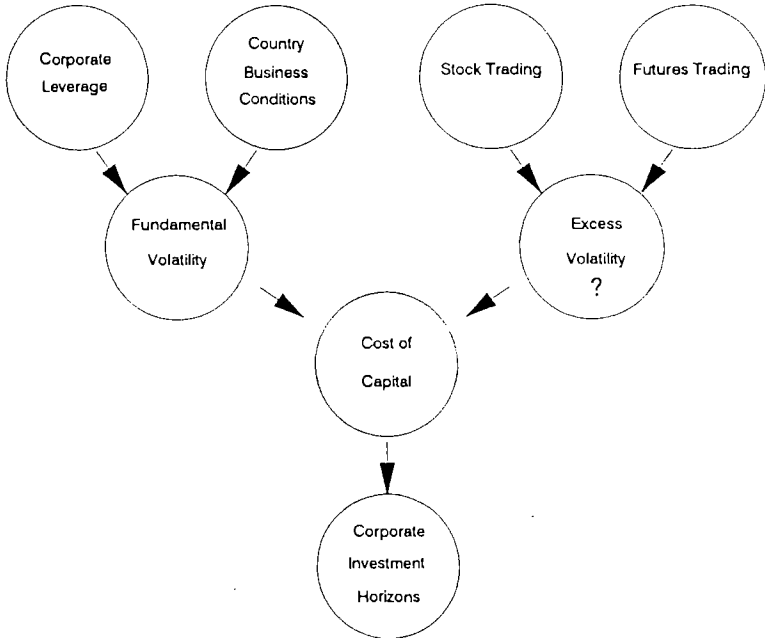
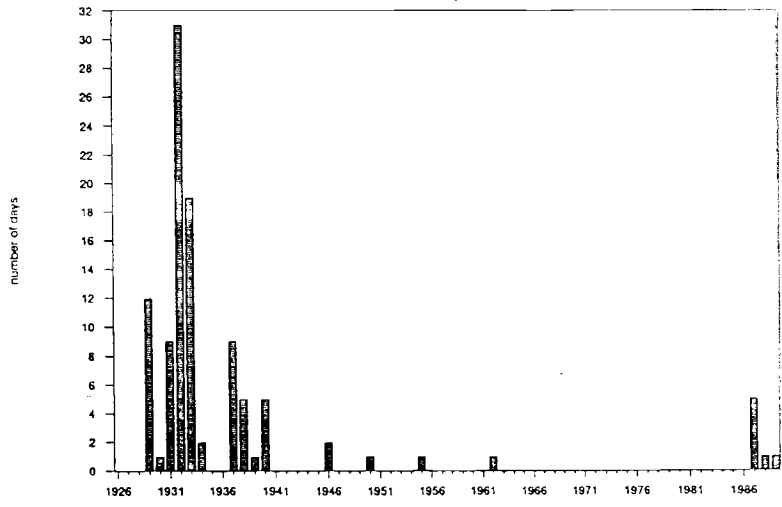
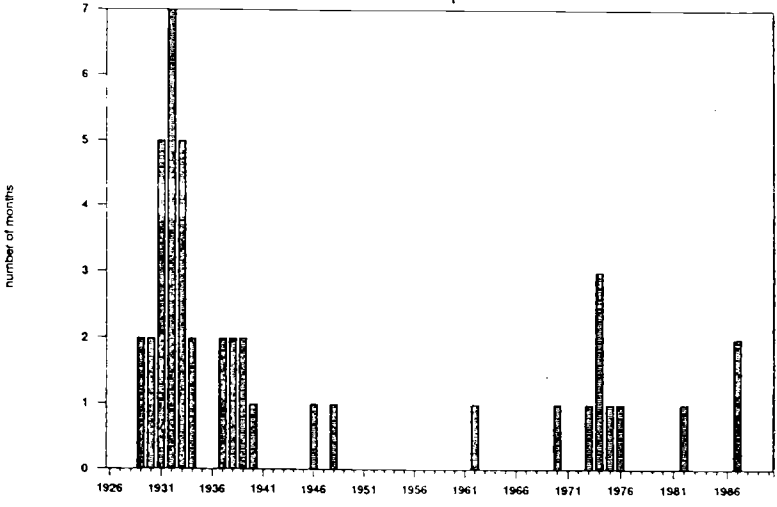


Figure 2
Daily Changes in the S&P 500
in excess of 5 percent



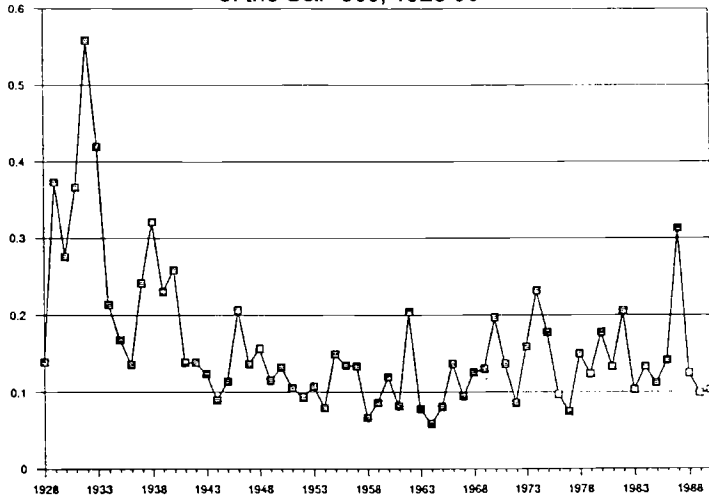
Source: Standard and Poors and authors' calculations.

Figure 3
Monthly Changes in the S&P 500
in excess of 10 percent



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

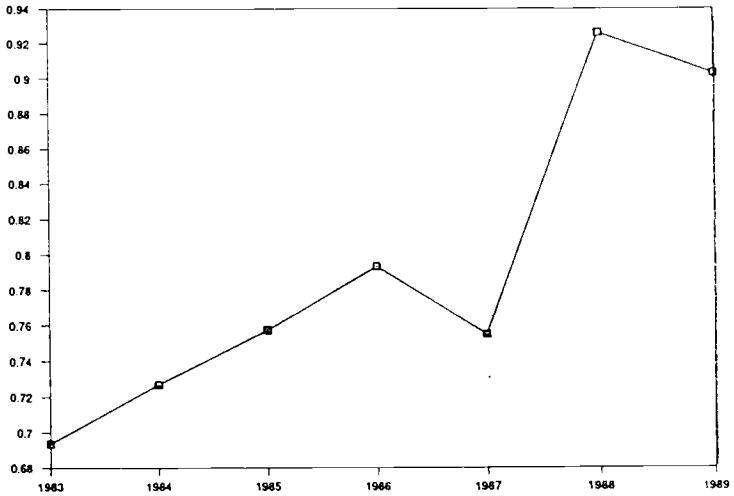
Figure 4
Average Monthly Volatility
of the S&P 500, 1928-90



Note: Data for 1990 include January through June only.

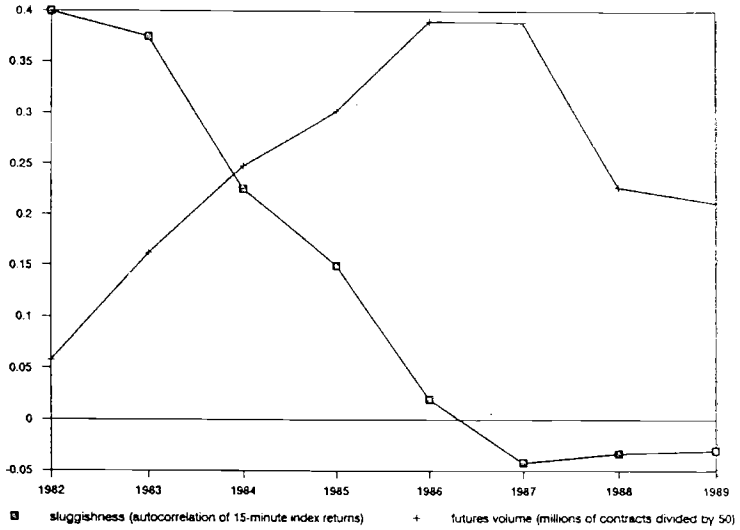
Source: Standard and Poors and authors' calculations.

Figure 5
Ratio of Annualized 15-Minute to Weekly Volatility
S&P 500, 1983-89



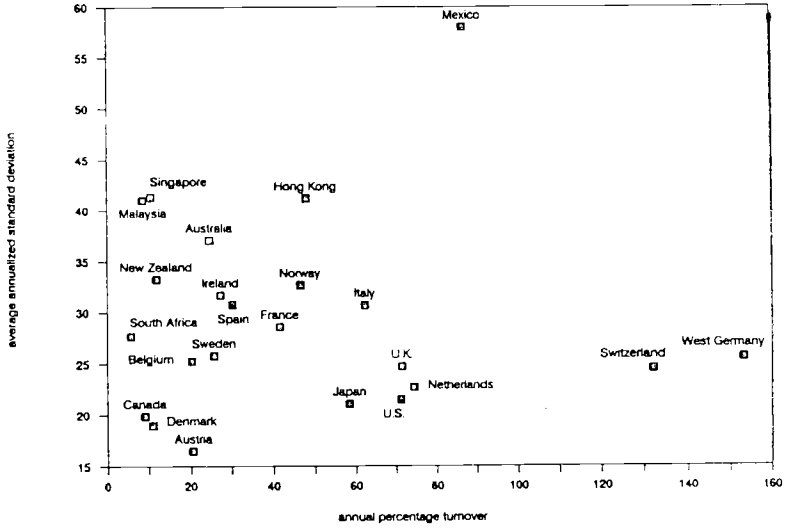
Source: Standard and Poors, NYSE, and authors' calculations.

Figure 6
**Stock-Index Sluggishness and Futures Trading Volume,
 S&P 500, 1982-89**



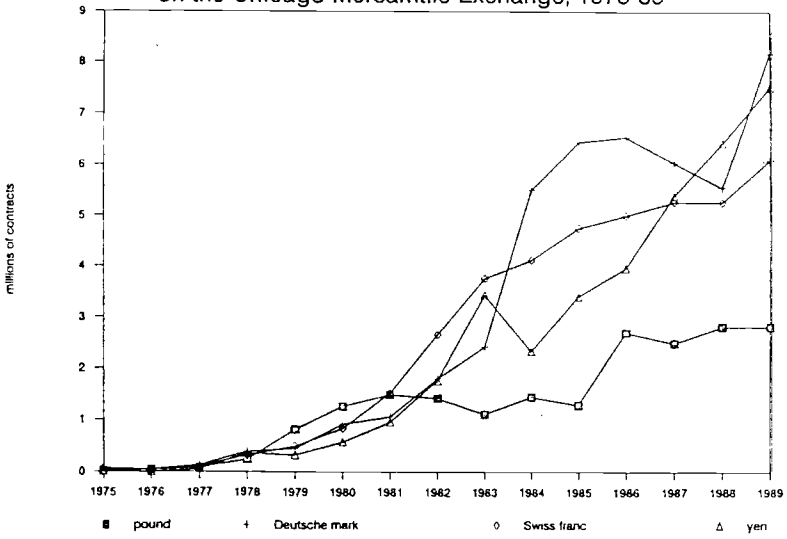
Source: Standard and Poors, NYSE, CME, and authors' calculations.

Figure 7
 Relationship Between Stock Market Volatility and Turnover
 by country, 1986-88



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

Figure 8
Trading Volume in Exchange Rate Futures
 on the Chicago Mercantile Exchange, 1975-89



Source: CME and authors' calculations.

Figure 10
Information-Gap View of Underinvestment

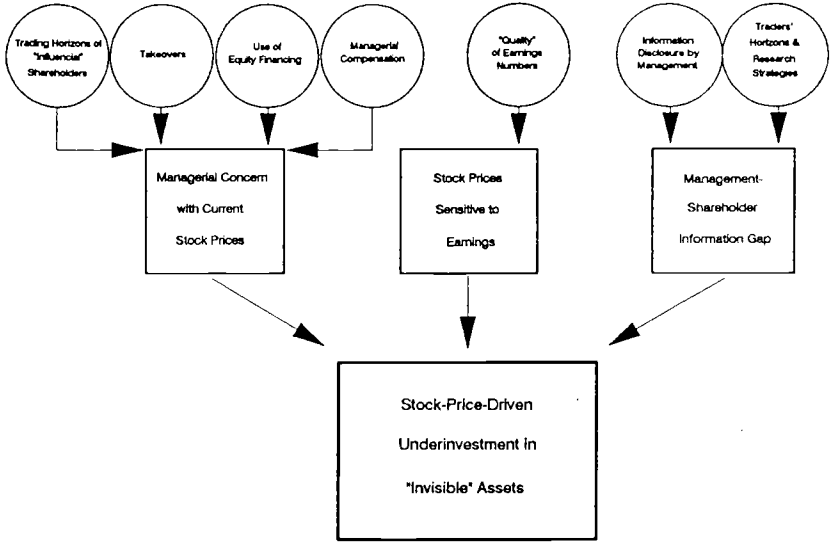


TABLE 1
Decomposition of Share Turnover
(12 months ending Sept 30, 1990)

	Equity Holdings* (12/89,\$bil)	Percent Ownership	Percent Turnover ^b	Dollar Turnover ^c (\$bil)	Share of Volume ^d	Time Horizon (years) ^e
Pension funds						
Active	766	20.0	53	406	29.9	1.9
Passive	191	5.0	14	28	2.0	7.1
Total pension funds	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 depts	332	8.7	26	86	6.4	3.8
Total households	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	53	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

*Data from Federal Reserve Flow of Funds data; shares held by foundations, endowments and bank trust departments was estimated by Birming Associates.
^bInstitutional turnover estimated from CIA Spectrum data covering \$1,246 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 Birming Associates).
^cForeign turnover is the 1989 rate reported by Salomon Brothers. Internal Equity Flows, 1990 Edition. Turnover for member firms was provided by the Securities Industry Associates. Aggregate turnover was provided by the NYSE.
^dPercent turnover times equity holdings.
^eTurnover for non-member firms was provided by the NYSE.
^fShare of non-member volume for all rows but the last two.
^gReciprocal of percent turnover.

Table 2
 Gross Domestic Equity Issuance as a % of GDP

<u>Year</u>	<u>United States</u>	<u>Japan</u>	<u>Germany</u>
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	<u>0.42</u>	<u>0.68</u>	<u>0.35</u>
Average 1982-85:	0.82	0.22	0.21
Average 1986-88:	0.60	0.40	0.60

Source: Goldman Sachs International Limited and author's calculations.