The Perfectly Inefficient Market

Joel C Gibbons
Logistic Research & Trading Co.
St. Joseph, Michigan, 49085

The theory of modern capital and risk markets has spawned a lively and highly informative investigation of the Perfectly Efficient Market. As important as are the insights that we derive from this inquiry and as valuable a tool as it is for research into the markets, it is increasingly clear that it does not actually describe financial markets at the present time. We need more tools, and toward this end I propose the Perfectly Inefficient Market hypothesis. Although this name may seem facetious, that is by no means the case. It is possible for a market in equilibrium to generate its own price variance in the absence of any information flow whatsoever. It is possible for a market to be perfectly inefficient, and that state once achieved would in fact be a stable equilibrium.

Inefficient Markets.

There is no need to reproduce a lengthy account of the Efficient Market Hypothesis because that is available from many sources. Since however the Inefficient Market Hypothesis is in some ways defined in contrast to it, a brief summary of efficient markets is a good place to begin.

In an efficient market, prices are informative. A market is, in Fama's terminology, efficient to the extent that market prices reflect all the available information which logically bears on the values which are being traded in the market. In the case of the stock market the sorts of pertinent information are things that bear on the earnings and profitability of the listed corporations and facts that shed light of the equity risk premium. In the case of agricultural commodities, information about crop yields and weather are important information. Efficiency is a matter of degree and it is difficult to be any more specific than this. In its purest form however, we can specify what is perfect efficiency. A market is perfectly efficient when prices reflect all available information and nothing else. That is to say, every price change is the result of new information entering the market. There is no trading noise at all; given the current information set the supply and demand for the entities being traded are perfectly elastic at the "Rational" price.

It is therefore easy to appreciate what is an inefficient market. It is one in which price changes are not entirely due to the arrival of new information. A market is inefficient to the extent that there is noise. A market is Perfectly Inefficient when there is **only** trading noise: when the flow of arriving information has no correlation with price at all. This contemplates a special case in which there is in fact no information to arrive. If prices in such a catatonic market never varied at all, the market would by default be perfectly efficient. In reality there will always be some noise, whether there is any information or not. Any price variation would therefore be due in this special case entirely to noise, and the market would be perfectly inefficient. This observation by itself is not terribly interesting. As long as the magnitude and persistence of noise are damped by a market process and are in fact small and brief, inefficiency of this sort would be a sort of minor annoyance. I will endeavor to make the case that under very natural market conditions market forces may magnify rather than damp the size and persistence of noise, and I will point out some of the features of markets at the present time that have that effect..

It has always been recognized that efficiency of any actual market is a matter or degree, lying somewhere between perfectly efficient and perfectly inefficient. Assessing the degree of efficiency is therefore an empirical chore which draws upon specific behavior of that market. There is little that one can say a priori; this important topic must be left for the econometricians. We can however explore the special case of Perfect Inefficiency. As we do so, we will gain a better appreciation of how inefficiency works and why it happens, and of why markets are not perfectly efficient.

Bid – Ask Spread and Efficiency.

Since the cause of inefficiency is the rational behavior of participants in a market, we can start the analysis by looking into the actions of market makers. There is a component of price which is generally accepted to be uninformative, and that is the bid – ask spread. Since the presence of a bid – ask spread is consistent with prices that are otherwise efficient, and since it exists because of the need to compensate market makers for their services, we do not ordinarily think of it as an inefficiency, but in principle it is. Transactions that take the price path back and forth across a bid – ask spread are price events that are not indicative of the arrival of information, and would not be found in a perfectly efficient market. More realistically, in an almost perfectly efficient market the bid – ask spread would be so small as to account for a negligible component of the total variance of price. It will serve us later on to invest some time here to think through the market makers' spread.

Consider, as the most elementary case, a market in which the equilibrium price does not change at all over time, and in which it is well known that it does not change. Imagine moreover that market makers are competitive price takers. There will still be a spread between bid and ask because of the time cost of money and uncertainty about the flow of orders. Specifically, when an offer hits the market, market makers will bid somewhat below the equilibrium price because whoever winds up taking the offer will have to hold an inventory for some length of time. He is financing the party that came in to sell the asset. He has some uncertainty, moreover, that represents a significant component of his cost. At some indeterminate future time, other parties will arrive to buy the asset, but the market maker confronts two unknowns. He does not know how long he will have to hold his inventory before a buyer comes to the market, and he does not know if he will be the one to hit that bid when it does arrive. If another market maker fills the new bid, by shorting the asset, the long will have a choice either to wait for another buyer, or to sell to his colleague, the short, at some price between the bid and ask that they quote to the public. How large is the cost associated with this uncertainty depends on the size of the block that he initially took down. The larger it is, the longer he will have inventory and the more vulnerable he is to his colleagues.

This dynamic can expanded upon to incorporate the effect of bunching of orders that enter the market. In practice orders are bunched both temporally and in magnitude. By temporal bunching I mean that intervals of time when the vast majority of orders are

on one side or the other of the market. In the case of the stock market for instance, it is not unusual for retail supply or demand to dominate for as long as a week at a time. That is to say, it is not unusual for the vast majority of transactions to consist either of net sales to the public or net purchases from the public for an entire week running. Bunching in magnitude connotes the actual size of the net retail bid or ask over a period of time. The risk to a market maker of hitting a bid which leaves him short the asset is that not only will it be impossible for him to cover for a long time – understanding "long" to be measured in the highly myopic time scale of the trading world – but that subsequent buy orders will move the price increasingly far from the fixed equilibrium.

In the artificial framework we adopted here, in which the equilibrium price does not change and is known and agreed upon by market makers, the extent of bunching is constrained by the patience of retail supply and demand. The random incidence of non-informational trades will introduce some bunching. Bunching is especially prevalent when non-economic entities are present. What the public sees is a price path that exhibits persistent deviations from what is in fact the unchanging price equilibrium, because the market makers adjust to persistent order imbalance. It is highly likely, if not positively certain, that the public will endeavor to discern some deeper meaning in these price bubbles. As long however as the fixed equilibrium holds, one would expect the public to become more patient in the face of what they perceive to be largely transient, irrational price fluctuations. The willingness and ability of the public to wait, coupled with the capital base of the market makers will enforce a bound on the magnitude of deviations from equilibrium price, although non-informational trades are also generally driven by decisions with a high degree of urgency.

There is a force opposed to this one however. The market maker has only one lever – his bid and ask – to rationalize two different risks – uncertainty about the price at which he will unwind the position he acquires and uncertainty about when he will unwind it. Specifically, the faster he wants to close out his position, the lower must his bid be, and the higher the ask. This is quite an intuitive proposition. If he is unwilling to hold an open position for very long and if he wants to enter the position at a price that provides a good chance of profit, he will have to widen his bid – ask. If he is buying, for instance, he will have to pay a small enough price that he is likely to sell higher within his short time frame. If he was more patient, on the other hand, he could bid more aggressively, confident that his price would be reached. This dynamic introduces the essential connection between risk and the bid – ask spread.

The more unwilling the market maker is to hold an open position, the less aggressively he will bid and the more aggressively he will offer.

To the degree that orders to buy and sell are unrelated to the arrival of information, the price path will be characterized by a volatile transitory component. The presence of this component has two effects, one direct and one indirect. The direct effect is to make market making a more risky venture and therefore to shorten the market maker's horizon. He will want to exit positions rapidly. The indirect consequence is therefore that he will widen his bid – ask spread. But at this turn there is a dangerous

feedback, because it is the bid – ask spread that supports or causes the transitory component in the first place. Thus, the attempt of the individual market maker to restrain his risk makes this market less efficient, and forces all the other market makers to take similar action. The essential question that we want to investigate is whether inefficiency can be self-justifying, and whether it can actually be explosive.

A Model of a Perfectly Inefficient Market.

The model that follows is in the nature of a purely hypothetical model of a market. It could be any financial market, either a market for financial assets or a market for risk positions. The actual characteristics of the traded objects are not important. What is important is the constraints which bear on the players in the market. The objective of this exercise is to draw conclusions about how prices would evolve. I will simplify the analysis by assuming that there is in fact no relevant information whatever, but that there is an asynchronous flow of orders to buy and sell. There is always some valuable information entering a market, but as we will see subsequently, it may not pay to trade on it. In any case, at this juncture we wish to focus on the noise. I will moreover focus attention on an hypothetical market maker who is attempting to accommodate this flow. Our goal is to establish, in a general and theoretical way, that even as extreme a result as Perfect Inefficiency is possible.

While Perfect Inefficiency is possible, it is not at all normal or common. The normal state of affairs in any asset or risk market is some compromise between efficiency and inefficiency. It is only natural therefore that some unusual conditions must obtain so support Perfect Inefficiency, and I will have to appeal to them. To be specific, I will assume two facts about the retail order flow.

1. I will assume that a large component of orders are non-economic, in the sense that they are not motivated by profit-seeking motives.

2. I will further assume that many of the economic agents in the market – the market makers themselves and many of the "public" as well – are leveraged speculators. Note moreover that agents we think of as "investors" are for this purpose truly speculators: they are price takers who seek to profit from future price corrections.

Before proceeding it will be useful to define and explain these assumptions more fully.

Non-economic Agents.

A non-economic agent is simply an entity that trades in the market for reasons unrelated to profit. The most noted example is the Federal Reserve Bank, through its Federal Open Market Committee. The Federal Reserve Bank is in fact an enormously profitable enterprise. It is actually by far the most profitable single corporation in the

world, but its profits do not come from its trading activities. They come from the seignorage profits that fall from its monopoly of the right to create high powered money. It prints money, at essentially no cost to itself, and with this money it purchases assets that pay interest. The resulting interest flow is gigantic. In a recession, which is characterized by financial distress amongst financial institutions, it is not rare for the profits of the Federal Reserve to approach the combined profits of all other financial institutions.[1] The Fed's open market actions are not however gauged to enhance its profits. They reflect policy decisions that are motivated by the needs of member banks and ultimately by a view of the national interest.

At the present time there are many other non-economic agents, or agents with very mixed motives. The other two great central banks – the Bank of Japan and the Central Bank of Europe – are the largest of them. Many entities that hold large positions on common stock are also essentially non-economic. While our federal government does not own stocks, many foreign governments invest in our equity markets. The petro-dollar funds are immense, and so are entities like the Singaporean national retirement fund. While they surely prefer more investment returns to less returns, their decisions are swayed by, or even dictated by, political calculations. Political agents – those like the Fed that report directly to political governance – have their freedom constrained by the needs of their governors.

The Federal Reserve System in the United States has an established tradition of operational rules that make its policy decisions predictable to a degree, but that degree is not really very large. The extreme volatility of interest rates both before and after meetings of the Open Market Committee must dispel any notion that the markets are able to anticipate what action will be taken. Other government entities, both in America and abroad, are far less predictable. Their attitude seems to be that market makers and speculators are paid generously to take risk, and so that is what they should do, while governments do whatever is necessary to promote the national interest.

Leverage.

Leverage forces agents who are otherwise models of economic acquisitiveness to make uneconomic trades of two kinds. Leveraged speculators take position that, if they go wrong, can consume all the agent's capital in a very short time. For this reason, very few speculators survive for very long. We need not dwell on the mystery of why they keep trying. It is a fact of life.

When a speculator's position is going against him, he must be ready to close it out simply to avoid risk to his survival. This is far from easy to do, because most of the time he would have been better off, ex post, defying the fates and sticking to his position. He can not do that very often however because failure is a terminal state. He can win many showdowns with the odds, and generate a handsome income along the way, but he can

[1] In the depression of 1980 – 82, profits of the Fed exceeded the combined profits of all depository institutions.

only lose one. He has to recognize the necessity for stops.[2] On the other side, when a position is working, he has an analogous problem which is to know when to take a profit. It is an enticing option, one would think, simply hold onto any position that is working, but that is sure to lead to ruin, for reasons that are really quite obvious.

The speculator will exit any given position at some time. There can in theory be exceptional cases where a speculator has latched onto a position so profitable that he lets is run until the day he retires, but they are so infrequent as not to merit our attention. The speculator is going to close out his position. Now, there are only two possibilities: either he leaves with a profit or he leaves with a loss. If he never settles on a profit target, he is sure to exit on a stop. Now, he may still have a profit, because once he has accrued a profit he can place a stop behind himself at a point where he still has a profit even if his stop is hit, but a policy always to exit on stops is almost surely headed for disaster. Exiting only on stops is a virtual formula for losses. Even seasoned traders are head to complain that "the only thing stops ever did for me was to stop me from making money."

There is a vast lore which purports to tell speculators where to take profits and where to set stops, but despite claims to the contrary it is not very effective. If it was, most speculators would survive and profit, whereas in reality most fail. In practice, stops are set at the point where a tolerable loss becomes intolerable. Limits – exit points on the favorable side[3] – are similarly set where some profit target is hit. The point is that stops and limits are almost entirely independent of any amount of information about the asset or the position that is being taken. They must necessarily be rigid rules that do not bend to developments in the market, because they are dictated not by trading judgements based on specific information, but by the business needs of the trader.

The combination of stop and limit orders creates a dynamic that is similar to and reinforces the bid – ask spread. Consider a speculator who has hit his stop and sold his long position. He still believes in the thesis that underlies his position; he still believes that the long position should be profitable. His problem is to know where to get back into the market. He stopped himself out because he feared that the risk of further decline had become intolerable. He is accordingly unlikely to get back in at a lower price. The fact that the price continues to fall reaffirms the wisdom of his stop. He is unlikely to get back in until the market has regained some upward momentum, as evidenced by breaking through the point where he was stopped out. The gap – the difference between his stop and the higher price where he reopens his position – is a pure cost of the stop and it is analogous to an adverse bid – ask spread. To sum up this point, the speculator almost never buys at the bottom – it is too risky there – or sells at the top.

[2] A Stop is a standing order to close out an open position at a pre-set price. For instance, a trader who shorted a stock at $50 might enter a buy-stop at a higher price, say $60, to limit his loss if the shares start to against him.

[3] That is, a standing order to close out an open position at a more favorable price. The trader who shorted stock at $50 might enter a limit order to buy at $40, in order to bank his $10 gain.

Putting It Together.

The inefficiency of a market is pure risk. The greater the inefficiency that is present, the more risky it is to take positions in the market. Since however inefficiency does not enhance the expected gain from trading and investing, it is uncompensated risk.

This proposition should be self-evident. An efficient market is one in which risk is only the unavoidable risk associated with the flow of new information about the asset or position that is being traded. That is the smallest degree of risk that there could be. Inefficiency is risk, and it is very "pure" risk in the sense that there is no associated return.

A market is inefficient to the degree that little is known about the future of traded assets and risk positions, and in the extreme – in the Perfectly Inefficient Market – nothing is known about even the proximate future.

Consider a market that is hit at random times by orders from non-economic agents. These orders are furthermore generally large in relation to the market because the purest non-economic agents are very large institutions. Since these orders are placed by agents without regard to predictable economic factors and without regard to the cost of executing them, they hit like bolts out of the blue. Faced with an order of this sort, the market maker must still come up with a bid and ask. In doing so, his only source of information is the historical price distribution. It actually makes no difference that he knows that the equilibrium price has not actually changed, and that the order is hand is perfectly uninformative. Any trade in this market is by definition irrational; investors would simply not buy or sell assets or take risk positions in which there is no prospect of gain or loss. Since the order in hand is, therefore, inherently irrational it is difficult to know what is the rational response to it. Lord Keynes had a saying for cases like this: "Nothing is more irrational than a rational policy in an irrational world." The market maker does not have the option of surrendering to irrationality however. He has to do his best under the circumstances, and the best he can do is to refer to the historical distribution of prices.

I will assume that the historical distribution is a reasonably stable distribution with finite variance. This is the blandest possible starting point and it suffices for the purposes of this analysis. The distribution that is relevant to the market maker is the predictive distribution, the distribution of price change starting from the current last price. While deviations from the fixed equilibrium price are transitory, the rate of return is slow and uncertain, judged from the perspective of a market maker, so the mean of the distribution is close to the last price. The stochastic properties of this distribution are derived as some sort of convolution of the uninformative orders, so this amounts to assuming that they follow some stationary and reasonably well behaved distribution. In any case, the market maker recognizes that as long as he is exposed to the market, he is running very high risk from further bolts of lightening. He must bid low enough – in terms of a number of standard deviations below the historical mean – and offer high

enough to be confident of getting to safety in a short time. This process is potentially explosive because one of these quotes is going to wind up as the next observation in the historical distribution. It is impossible, for instance, for every market maker to fix his bid at minus three standard deviations and his ask at plus three. That would result in a distribution that had all its weight beyond the three standard deviation mark! In order for the distribution to be stable, market makers have to be more aggressive, or less paranoid, than that. In any case, it is clear that a market with only market makers and uneconomic agents would be perfectly inefficient. That is not perhaps a very interesting example however, because in any real market there are also speculators present.

Adding speculators to the cast actually does not improve the efficiency of this market at all although it may lessen the cost of market making. The market is inefficient because some agents continue to trade – the non-economic agents – even though there is no informational reason to do so. The question that we need to address here is whether speculators might at least serve to reduce the variance of prices. The answer is no.

Speculators do not reduce price variance because, quite simply, they are irrational traders.

It is a given in our model market that speculators have no actual information that the other agents are lacking. Actually, the market makers, who at least get to see the order flow, have all the meager information that is present in the market. It is for that reason that they are able to earn a living on the bid – ask spread. The speculators have a general sort of information, which is that over time the price tends to return to the unchanging equilibrium. When it is below this point, they may be inclined to buy. To the extent that they bid more aggressively than the market makers do they take on some of the market making risk. It is nearly as likely in practice that speculators will do the opposite, which is to sell when the price appears to be trending down and buy when it appears to be trending up. It is in any case not necessary to attempt here to characterize speculative trading strategies. The point is that they are guessing.

Periodically, they will as a group has an accumulated profit in their position, and they will start to close out positions for that reason. Assume for the sake of argument that the speculators are long. The price will start to fall accordingly, and any laggards will be motivated to sell also. At other times they, speculators, will have accumulated losses, and they will start to hit stops. Both events are also entirely unpredictable and generate waves of orders from speculators. From the perspective of the market makers, orders from this source are no different in any way from orders from non-economic agents. The net effect is to increase the variance of net supply and demand, and therefore to increase the variance of the price.

Not only do speculators introduce an essentially random component of orders, but their orders are highly bunched. When stops are hit the price starts to move for no discernable reason, and other speculators are forced to their stops sequentially. As a result orders come in surges of buying or selling.

In the very long run, speculators can not survive in an inefficient market because they have no informational advantage, and they have to pay out the bid – ask spread that keeps market makers going. It is fair to ask, indeed, why they will have started in the first place. The reason is accidental. In any market, because of runs of net buying or selling, the price will exhibit trend. This is in a sense more pronounced in an efficient market, both because the equilibrium price can have a trend component and because traders and investors do not fully appreciate the implications of a trend when it first appears. It is not immediately evident in which markets the equilibrium price is in fact constant. Accidental runs, or more often runs generated as a matter of policy by non-economic agents, will in any case give the appearance of trend even in the absence of a trend in fundamentals. At that point, speculators who have been riding the trend will have embedded profits. Other speculators will want to share in the bonanza and will enter to take positions on the same side. This of course reinforces the trend, and sets in motion a transient wave that is fundamentally similar to a Ponzi scheme. As with any Ponzi scheme, the latecomers are ultimately fleeced, and only the nimble come out with a profit.

To summarize, a market that consists of three sorts of agents – market makers, speculators, and non-economic players – will support in equilibrium a positive variance of price even in the absence of any information flow. The price path will ultimately be highly mean reverting. Price action is all transitory. The random and inexplicable nature of price shocks will make it highly undesirable for economic agents to hold inventory of any positions. Market makers will widen their bid – ask spreads so as to be able to exit positions at a profit in a short time. Speculators too will adapt to the price shocks by progressively shortening their holding period: taking profits more aggressively and tightening their stops. Only non-economic agents can hold inventory, because they are immune to cost.

Other agents.

There are admittedly not many purely non-economic agents in the world. Even though several of them are immense, they represent in total only a small portion of all orders that enter any actual market. There are however far more agents of what we might term ambiguous motives. Take for instance the case of a large industrial corporation that is issuing new bonds. They are by any measure an economic agent, but their costs and benefits are only marginally dependent on the daily level of interest rates. They are issuing because they want or need the proceeds of the underwriting. They are going to get the money. They would prefer a lower coupon to a higher one, but that is almost sure to be a relatively minor consideration. So if their balance sheet demands it, they will issue when yields are high. They are fully economic agents, but their rationale is very different from, and is essentially independent of, the reasoning of an investor or speculator in bonds.

There is another class of agents who are also fully economic, but whose rationale also differs from the accepted model of the investor or trader. These are large agents who

have to recognize the price impact of their actions, and who, on the other hand, have some capacity to manipulate markets in their favor. The degree of concentration of trading in many markets is not widely appreciated. It is estimated that one mutual fund complex, Fidelity, is so large that it is either the buyer or seller in one quarter of all equity transactions. One quarter of the time one of us goes to buy or sell shares, we are buying them from or selling them to Fidelity. This is of course the extreme example. There could hardly be two institution of that magnitude, but the concentration of trading extends beyond that. In the stock market, the widespread use of passive index funds has taken a large portion of all existing shares out of the daily trading float. Shares that attract a wide retail following – the technology stocks for instance – still have a large trading float held by investors, but the old blue chip names are not widely held in tradable accounts. A very large portion of the tradable float of those names – especially the Dow Industrial names – is in the hands of a small number of large institutions, and the market for those shares is very different from the usual model presented in the Finance literature.

What these agents have in common is that their decisions are not solely driven by information of the type envisioned in the theory of financial markets. They make decisions, and have their impact on price, to some degree independently of any information about underlying value, and so their decisions hit the market much like decisions made by non-economic agents.

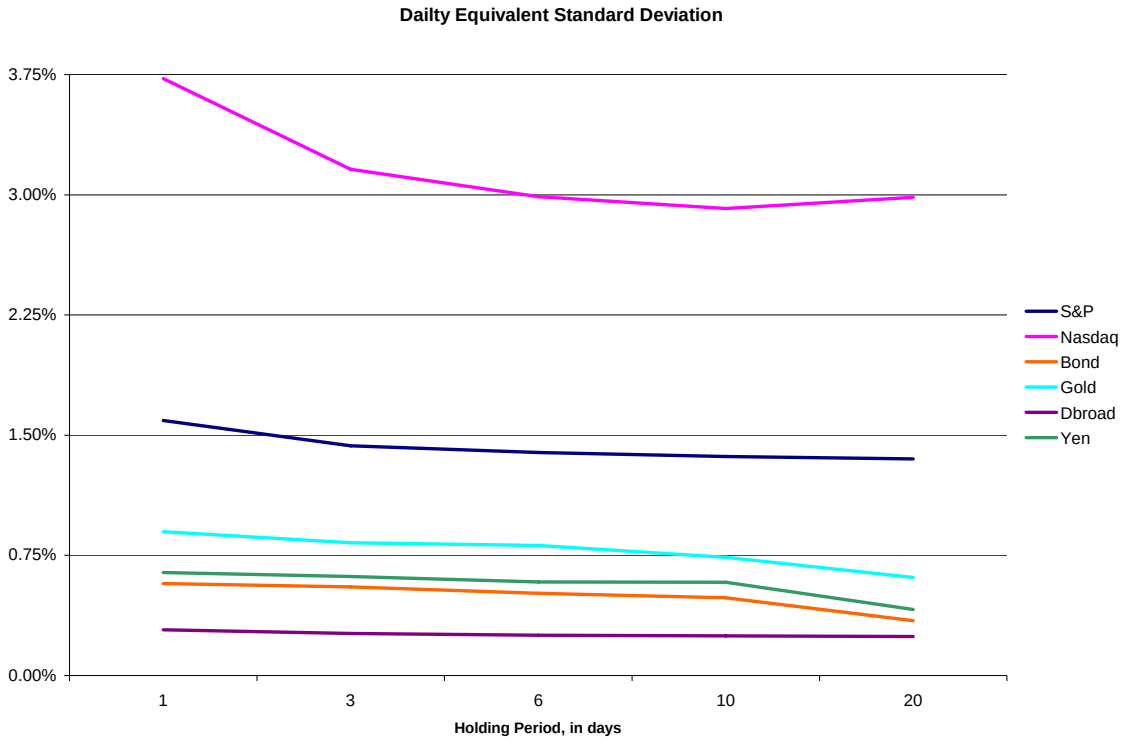
To sum up this account, I would like to present some empirical evidence on daily market patterns.

Evidence of Transitory Shocks in Price.

There are now many statistical tests designed to detect a transitory component of a time series of data. I will use one which is simple and intuitive. Any time series – like a stock or index price series – which exhibits only permanent shocks has the property that the variance of the price grows linearly with the length of the holding period. That is to say, if we observe the price each day and compute the variance of one-day prices changes, we will get an estimate of the one day price variance. If we instead observe the price only at two day intervals and compute the variance of two day price changes, we should get two times that number. In general, the variance over periods of N days should be N times the one day variance. If the price series contains a transitory component which persists for several days, the computed variance over shorter intervals of time will be larger because shocks that contribute to the variance over short intervals have washed out over longer ones. To the extent that there is a transitory component of price, when we calculate price variance over longer intervals, therefore, the estimate should decrease as the holding period grows. We have to scale our estimate however so that regardless of the actual holding period, what we are measuring is in units of an equivalent one day variance.

I applied this test to six very liquid markets: the S&P and Nasdaq stock indices, the Bond contract, Gold, the Federal Reserve's index of the world value of the dollar, and

the Yen / dollar exchange rate. The Fed index is of course not traded as such, but the component currencies are. The results of this test are summarized in the accompanying chart.



In every case, the measured daily variance is smaller over longer holding periods. The data used in these calculations was for the latest three hundred trading days, but the result is not sensitive to the historical period chosen. Comparable statistics calculated using the period since December 1st, 1995 exhibit exactly the same characteristic.

For all series except the Fed index of the value of the dollar, actual daily price variance is larger than the average daily price variance calculated from longer holding periods, and in fact the per day variance decreases steadily as the holding period is lengthened.

No one would leap from these findings to the conclusion that any of these markets is Perfectly inefficient, but it is equally hard to ignore the presence of transitory price shocks that are inconsistent with market efficiency.

Conclusion.

The proposition that transitory volatility is symptomatic of inefficiency is not novel. It is in fact simply the converse of the well known random walk characterization of

the efficient market. What has not been adequately appreciated up to the present time is that, undesirable as it may be, inefficiency is also an equilibrium phenomenon, and a persistent transitory component of volatility is not at all unlikely. The reason for this, to summarize the argument I have made above, is that inefficiencies punish agents who hold inventory of open positions. The resulting attempt to earn and to take profits quickly has two effects: it exacerbates the volatility of price and it undermines the forward-looking incentives of agents, which promote efficiency.

Historically, the stock market has been the most efficient market in America, because the market participants are most clearly motivated by trading and investing profits. The market for government securities – the Treasury yield curve – has been less efficient because of the impact of decisions by our Treasury and Federal Reserve, and also companion moves my foreign Treasuries and central banks. The market for foreign exchange is the least efficient because it is the one that is most consistently and aggressively managed by policy decisions of governments.

Governments and their various agencies are not very sympathetic to the havoc that they wreak in capital markets. It is their position that the markets exist to serve the needs of the nation, which is principally to take up bonds when the government wants to borrow. Policy makers in the government assume that the markets are up to the task, because there is no appetizing alternative than to assume that. Whether it is always true however remains to be seen.

4052 Niles Road
Saint Joseph, Michigan, 49085
Tel: 269-408-1511
E-mail: jgibbons@logisticresearch.com
On the Web: www.logisticresearch.com