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EFFICIENT MARKETS AND THE RATIONALE OF TAKEOVERS

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INQUIRY INTO CORPORATE TAKEOVERS IN THE UNITED KINGDOM

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The David Hume Institute has been commissioned by The Joseph Rowntree Memorial Trust to conduct an Inquiry into the issues raised by Corporate Takeovers in the U.K. This paper is the eighth of a series presenting the results of research undertaken in the course of the Inquiry, and also submissions of opinion received from individuals and organisations which are thought to be of wide general interest. The Institute hopes in this way to keep the public informed of work in progress. The Final Report will appear in the late Spring of 1991.

A note on the Institute and a list of its publications appear on pp .42-44.

The Institute has no collective views on any public policy question and is not committed to the views of any of its authors.

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EFFICIENT MARKETS AND THE RATIONALE OF TAKEOVERS

I. Introduction

This paper considers what economic theory can tell us about an important observable paradox, namely that mergers and takeovers are promoted in the expectation of monetary gains, but frequently such gains are not realised; Caves (1989), Firth (1980), Ravenscraft and Scherer (1987), Scherer (1988). Empirical evidence is not considered in this paper, except by way of illustration of analytical points. The point of departure in my analysis is the well known contention that free markets are efficient even though market participants normally pursue their own interests. These concepts (efficiency and self-seeking) have diverse meanings, and one purpose of the paper will be to make the various meanings clearer and to explore the analytical consequences of them. For example, market efficiency can be looked at in weak, semi-strong and strong terms, involving increasingly wide assumptions about the information on which economic agents act (i.e. their "information sets"). Self-seeking has different connotations depending on whether choices are, or are not, made when markets are cleared with supplies equal to demands (i.e. in equilibrium), on whether they are made at a point in time or over a sequence of time periods and on whether under conditions of certainty or uncertainty. Before becoming immersed in details of the theory of finance and industrial organization, I start with what is probably the most general framework within which efficiency and takeovers can be viewed.

II. Takeovers, Mergers and Games

Consider a collection of free individuals or economic agents, who may engage in voluntary economic activity either on their own account or in cooperation with others. Individuals seek

to do the best they can for themselves, and operate on the assumption that others do likewise. Motivations for undertaking actions, and the rewards for actions, are pecuniary.

If a group of individuals can agree to a form of contract that voluntarily binds them together, they may be said to constitute a coalition. The firm is an example of such a coalition. Its existence is purely voluntary, and provides members (e.g. employees, managers, directors) with monetary payoffs which are sufficient to keep the coalition cohesive in the face of an opposition of interests from other coalitions or individuals. Given that individual economic agents are self-seeking, a requirement which must be satisfied for any single agent is that the payoff he gets from his current coalition must not be less than the payoff offered in any other coalition, including the one-person coalition of himself alone (e.g. a sole proprietorship). Denoting a coalitional firm by A, a value can be attached to the coalition, this being the best it can achieve against the competing activities of other coalitions. In later discussion a more sophisticated view is taken of 'value' by discounting the expected value of future dividends but for the present we regard value as well-defined for a firm and denote it by V(A) for firm (or coalition) A. Consider a distinct firm B, voluntarily formed by a distinct coalition of individuals, having a value of V(B).

Now contemplate the possibility of a merger (with A and B making mutual approaches) or of a takeover (with, say, B approaching A) with the purpose of forming an enlarged firm C from the joint resources of each. Formally, C is the union of A and B. We need make no distinction at this point between vertical and horizontal merger, nor between merger and takeover. The simple question to be asked is what is the value of the union of the two firms?

What we have been talking about above is what game theorists call "many person, cooperative game theory in characteristic function form". The characteristic function is simply a way of

defining the value of any coalition. A general principle of cooperative game theory is **super-additivity**. That is, the value of the union of A and B cannot be less than (and may exceed) the sum of the values of A and B as independent coalitions (or firms). Thus, if the value of A is £5m and the value of B is £2m, the value of C (which is the union of A and B) cannot be less than £7m. It could be £9m, for example. Super-additivity is a simple and very appealing principle. In the corporate strategy literature it is encapsulated in less formal phrases like "synergy", "business fit", or "strategic bundling". There are new ways in which the personnel in the separate coalitions can interact productively, so that the potential value of their joint action exceeds that of the sum of their independent actions. In corporate strategy terminology once again, the satisfaction of this condition is said to imply a "positive value gap".

There might well be a presumption that *any* coalitional enlargement, by merger or takeover, should be value-enhancing, by the super-additivity assumption. In the case of firms, super-additivity might register its effect through economies of scale in production and marketing and/or economies of scope (lowering unit costs by exploiting complementarities of production in wider product ranges e.g. the production of plastic plumbing pipes *and* plastic bathroom fittings). However, game theorists who initially regarded super-additivity as a primary property of n-person cooperative games, have now come to doubt its importance. Thus Aumann and Dreze (1974) consider a variety of structural and psychological factors such as difficulties of communication between members of various coalitions, legal barriers, such as antitrust laws (which may cramp the extension of operations in certain product markets in conglomerate mergers, for example) and personal factors of family, race, geography, social status etc.. They conclude (p. 233) that super-additivity may not be a necessary property of cooperative games because "the very act of 'acting together' may be difficult, costly, or illegal, or the players may, for various 'personal' reasons, not wish to do so". Further, the mere act of forming a coalition and sharing

the gains may alter the nature of the conflict. Aumann and Dreze consider a simple example in which two independent farmers intend to merge their activities, sharing the proceeds. Once achieved, it is entirely possible that the farmers might both work with less energy and dedication, given the demise of the earlier form of conflict, thus producing a new total output which could be less than what they produced in total when working independently. Williamson (1985), makes a similar point by stressing the importance of "transactions costs" (i.e. the costs of writing and concluding contracts). Thus a new organization means an alteration in the whole management structure, with major effects on monitoring procedures and incentives, and should be analysed as a new entity in its own right, without necessary reference to any previous organizations out of which it grew. Reid and Jacobsen (1988) apply Williamson's argument to small entrepreneurial firms. If a larger firm takes over a small innovative firm the incentive to innovate may well be reduced as low-powered, bureaucratic incentives replace high-powered, market incentives.

III. The Stock Market

The stock market differs in many important respects from what economists conventionally conceive of as a market, in terms of supply and the way in which price is established to bring about an equality of supply and demand (i.e. an equilibrium). What is being bought and sold is not a physical commodity or a service but a paper title. The entitlement one purchases is to a dividend stream from stock issued by a company. The dividend stream is uncertain and depends upon the fortunes of the company concerned. If future prospects of the company are enhanced, the improvement to the prospective dividend stream may create the possibility of capital gain. Stock is not produced, in the sense of having a flow production rate (like thousands of gallons of lager per week), but effectively is fixed in supply, being the sum of stock issues in the past, taking account of scrip issues and stock splits. In such circumstances, price is largely demand determined. Price is established by an

experienced market specialist (the market maker in U.K. terminology) and his role is to find a price which balances requests to buy and sell, for which he is remunerated by a small gap between the bid and offer prices. Thus the condition which rational expectations theorists call "continuous market clearing" is most probably best approximated to in the stock market, of all markets. Trading at what Walras[1] called 'false' (i.e. non-equilibrium) prices is not a characteristic feature of stock markets; or at least, trading at 'very false' prices would be pathological. The setting of prices in the stock market probably best approximates to the Walras's idea of 'tâtonnement' ('groping'), and indeed there is evidence that Walras got the notion from observing the workings of the Paris Bourse (i.e. Stock Exchange). The flow of information on to the market is plentiful and of widely varying quality. Some is directly relayed to market traders, and the rest is provided by a complex network of economic, political and financial intelligence as found, for example, in company accounts and company announcements; financial and investors' newspapers, journals, radio and television programmes; and specialised consultancies varying from long-established merchant banks, brokers and banking research units to newly-arrived economic and financial consultancies. Finally, there is information of the more informal sort: rumour, and 'market opinion'. This information affects expectations about dividends and growth, and thus price. Given the volume of information, adjustments to expectations and thus of prices are common, implying that markets in which trading is thin are the exception rather than the rule, though they certainly do exist.

Investors in the stock market are private individuals working on their own behalf or for financial institutions seeking to maximize financial gains. According to Keynes, at least in his *Treatise on Money*, and a succession of writers (Hicks, Tobin, Markowitz, Sharpe, Lintner and Mossin), they will achieve their goal by a diversified portfolio. In constructing a portfolio of stock market securities, the investor aims to achieve an optimal balance between risk and return. By the very fact that

each agent's portfolio is diversified, the relevant form of economic analysis is of the 'general equilibrium' variety, that is to say, one is interested in how continuous market clearing is achieved in *all* relevant markets. In short, the stock market is peopled by self-seeking investors, who are sensitive to new information flows, seeking to create optimal portfolios in a general equilibrium world of continuous market clearing.

IV. Optimizing

The way in which individuals or institutions are assumed to determine their optimum portfolios must be investigated. The most widely used method of appraisal of the efficacy of takeovers and mergers [see for example, Franks and Harris (1989) for the U.K.] uses a capital asset pricing model to examine whether returns are above or below average. The starting point is again with a full set of markets, all of which are cleared (i.e. a 'general equilibrium').

We suppose first of all that markets are cleared for labour and consumption goods, and that financial markets are never far from being cleared, and rapidly become so. Then the capital asset pricing model of Sharpe (1964), Lintner (1965) and Mossin (1973) has the following assumptions: economic agents are averse to risk and for each time period try to maximize the utility they expect to get from choosing among alternative portfolios of assets on the basis of both the average value of returns and of their variability or riskiness; investors can borrow as much as they wish at the going, risk-free, interest rate; all investors have the same estimates of the distribution of returns of, and among, all assets; all assets are infinitely divisible and transactions costs are zero; all investors take asset prices as given parameters; the total quantity of each and every asset is given; the endowments of wealth of each investor are given, and are distributed amongst assets to maximize utility; and there are no taxes. The assumptions are clearly rather strong, though this is not uncommon in economic models. Further, one cannot criticize a model solely on the unrealism

of its assumptions, for the nature of the model is too abstract. However, given the widespread use of the capital asset pricing framework as a practical policy tool, frequently with little or no reference to its underlying rationale, it is as well to be reminded of the abstract structure on which its principal analytical devices rest. As regards the robustness of the model to relaxation of its assumptions, some results are available in Elton and Gruber (1984). It is difficult to abandon the so-called "homogeneous expectations" assumption, which says that all investors make identical estimates of the distributions of returns; Lintner (1969), Jensen (1972). However, if borrowing and lending do not take place at risk-free rates, this is reasonably easily accommodated. Extensions and modifications of the basic capital asset pricing model abound. An important extension to arbitrage pricing theory (APT), due to Ross (1978), says that when all markets are cleared the expected return on a risky asset depends on a set of fundamental factors whose individual influences may be appropriately weighted and then added together to give their full effect. Deviations of actual riskiness from those predicted by fundamental factors will lead to arbitrage (e.g. selling if the asset is overpriced).

The logic of the capital asset pricing model is as follows. Given a rate of return, the portfolio of assets that minimizes risk for this specified rate of return can be determined. If a risk-free asset is available, at a rate determined by the desired level of borrowing and lending, general economic conditions and monetary policy (i.e. by the rest of the general equilibrium system), the investor determines the optimum portfolio of risky assets with which the risk-free asset can be combined. Then, when all markets are unfettered and have cleared (i.e. under full general equilibrium) **the market rate of return on a risky asset is equal to the risk-free rate plus a risk premium**. This risk premium may be expressed as an asset's **beta coefficient** (β) multiplied by the market risk premium (i.e. the excess of the expected return on the market portfolio over the risk-free rate). Expressed simply, in market equilibrium:

[Asset Risk Premium] = β [Market risk premium]

where on the left hand side we have the risk premium on the asset (i.e. the excess of the expected return on the asset over the risk-free rate). The β is specific to this asset and depends on the riskiness of an asset in relation to the market as a whole. If an asset has a beta coefficient of one, for example, it has the same riskiness as the market. Thus if the market fell by 10% this asset would also fall on average by 10%. If the beta coefficient were less than one, then if the market rose by 10% this asset would rise by less than 10% on average. Many stockbroking and investment advisory houses can provide statistical estimates of beta coefficients, and there are publications which give the past values of beta coefficients for a wide range of stocks.

The above provides the basis for a technique of evaluating takeovers and mergers which in the last decade, as Caves (1989, p. 151) has observed in a recent survey "has swept the intellectual market place". He went on to say it is "theoretically well grounded, cheap to execute, and able to evade the problem of holding constant other factors that plague *ex post* studies": in short "a better product ... at a lower price". In fact Caves' admiration for the technique is by no means shared in an unqualified way by standard texts on finance, and indeed the conditions required for the theory to hold should warn us against over-enthusiastic application of it.

The form in which the capital asset pricing model is applied is known as the market model. In this variant, the expected return on an asset is expressed as the sum of three terms: a constant (or intercept) (α), the beta coefficient (β), measuring the systematic risk between the asset and the market, multiplied by the expected return on the market portfolio; and an error term, or residual, which is the difference between actual and predicted return on the asset. Formally speaking, if a graph of the relationship between the predicted expected return on the asset and the expected return on the market portfolio is drawn

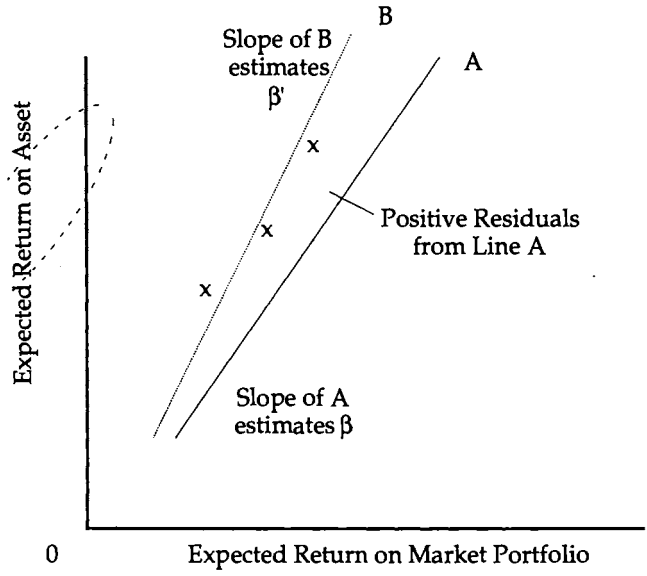

Figure 1

it will be a straight line sloping upwards; (see Figure 1 above). To the extent that the actual return on an asset exceeds the predicted, an observation will lie above this straight line (a **positive** residual), and to the extent that it is less than predicted, below this line (a **negative** residual). Because the optimizing individual economic agent of the capital asset pricing model is assumed to be 'representative', in the sense that all others share his estimates of the distribution of returns, the market model is applicable at the aggregate market level. Then the **event-study** method originated by Mandelker (1974) involves obtaining estimates α and β using data from before news of the intended takeover. Typically, as in Borg *et al.* (1989), the estimates are a regression of the asset's monthly holding period return against the return on a broad-based portfolio of assets. The method argues that the 'event' of a takeover attempt will cause a temporary deviation of the actual return on the asset from its expected value, based on estimates of α and β. If the market evaluates the prospect of the event favourably, the actual return should exceed the expected, and the residual

will be positive. So long as the market is attempting to digest the information content of the event, the residuals will remain positive. The cumulative residuals thus provide a measure of the present value of expected future net benefits from the takeover. For example, if α were estimated to be zero and β to be 1.1, and market return were 0.01, then predicted return would $0 + (1.1) \times (0.01) = 0.011$. If the actual return were 0.019, the residual would be $0.019 - 0.011 = 0.008$, a positive value, indicating a favourable market evaluation of the event of a prospective takeover. A sequence of such positive residuals would indicate an adjustment over time to the event, and/or the unfolding of information about the event, which was favourable.

The schema in Figure 2 indicates the nature of the event-study method:

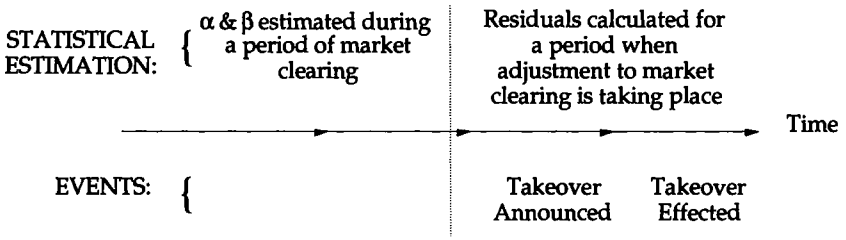

Figure 2

Following Jarrel and Peltzman (1985), Ruback (1988) and Borg et al. (1989) the market value of a firm which may be the subject of a takeover is:

$$\begin{pmatrix}\text{Value of Firm with}\\ \text{Current Managers}\end{pmatrix} + \begin{pmatrix}\text{Change of Value from}\\ \text{Change of Control}\end{pmatrix} \times \begin{pmatrix}\text{Probability of}\\ \text{Change of Control}\end{pmatrix}$$

Here the probability of takeover is defined for a unit period like a month. If the takeover occurs, the stock market price will rise by the unexpected component of the gain from change of control, that is by (1 - probability of change of control) x (change in value from change in control). Only if the takeover were entirely unexpected would the stock market price rise by the full value of the change of control. The stock market reaction is therefore a measure of the extent to which the takeover was unanticipated during the month. Caves is correct in suggesting that the event-study method has been widely applied. Franks and Harris (1989), for example, provide recent evidence on 1,800 takeovers in the U.K. using a variant of the event-study method. They report that it indicated gains to target firms at the time of announcement of 25-30%, with zero or modest gains to the bidder. However, the limitations of the event-study method have not been widely discussed, nor have alternative explanations of patterns of residuals been given prominence in the literature. Victor Morgan (1987) in his recent study of economic issues in merger policy expresses some disquiet with the use of the capital asset pricing model, and feels that instability of beta coefficients has been overlooked. He quotes an example of four major U.K. banks with beta coefficients close to one which would imply that, in the absence of changes specific to individual banks, their share values would move closely in line with one another and with the market as a whole, an expectation which is not reflected in the data of bank share prices. I have illustrated his point in the diagram of Figure 1. Line A is assumed to have been fitted to expected returns data during a presumed market clearing (i.e. equilibrium) period, and the slope of this line provides a beta coefficient estimate of β. Crosses (x) above line A denote measured positive residuals during the presumed disequilibrium (i.e. non-market-clearing) period after announcement of the takeover, under the assumption that the equilibrium beta coefficient still holds true. Line B gives a different (higher) beta coefficient estimate, β' consistent with an increase in systematic risk, but eliminating the pattern of

positive residuals. Conn(1985) provides a detailed analytical critique of the event-study method and, amongst a variety of weaknesses unearthed, the most significant one relates to the actual operating and/or financial risks of both the acquiring and acquired firms. Thus, if a takeover increases a firm's beta coefficient during the presumed disequilibrium period (i.e. there is an increase in systematic risk) the cumulative residuals would indicate a gain from the takeover, even though risk-adjusted returns may have stayed the same. In short, we have no way of disentangling the effects of changes in systematic risk from changes in expected returns. Given the sensitivity of beta coefficient estimates to the rather short sample periods typically used, one is left with a considerable feeling of discomfort with the way a very special theoretical result, based on full general equilibrium reasoning, under the assumption of identical estimates of the distributions of returns by all agents, has been asked to provide a simple answer to the complicated question of whether a takeover or merger is wealth creating. However, one is likely to get consulting advice which is based on beta coefficient methodology.

Ultimately, the particular use of the capital asset pricing model is not so important as the wider presumption of stock market efficiency. There are many (possibly, even superior) portfolio models one could construct under the assumption of efficiency, but efficiency itself usually goes unchallenged. In the last few years this itself has started to change.

V. Market Efficiency

Twenty years ago, when I first cultivated a research interest in this area, Reid (1970), the "random walk hypothesis" of stock market prices had virtually no falsificatory evidence stacked against it. It held that prices were moved by information coming on to the market randomly and independently, and were very quickly adjusted to incorporate the effects of news into the current market value. Thus changes in price, period by period, were a pure random series, sometimes called a

"white noise process"[2]. There was no formal justification of the economic model lying behind this reasoning, and indeed the statistical modelling, of which there was plenty, was almost entirely imported from physics, particularly from the theory of Brownian motion in ideal gases. Much of the statistical testing used stock market indices which were averages, usually of the geometric sort, of prices of highly marketable shares. The tests themselves were "parametric", that is to say based on strong, and untested, assumptions about the underlying probability distribution of stock price changes. I developed clear views on (a) testing procedures and (b) theory concerning the random walk hypothesis. Concerning testing, I felt, firstly, that economic theory ran in terms of specific markets and indeed specific transactions, so the date one used for tests should approximate as closely to this as possible. In a joint work, Kemp and Reid (1971), on U.K. equity prices, daily closing prices for individual shares were used. Secondly, in taking the random walk of prices as a maintained hypothesis, one should think in terms of specific forms of non-randomness as the alternative (e.g. too many reversals of price changes), rather than *any* form of non-randomness. The latter procedure is bound to favour acceptance of the random walk hypothesis. In Kemp and Reid (1971) a variety of tests were used to detect different, and specific, forms of non-randomness. Thirdly, on the principle of Occam's Razor (*viz.* do not compound hypotheses unnecessarily) one should avoid making unverified assumptions about the distribution of stock price changes. The tests used in my work with Alex Kemp made no such assumptions. What we discovered, for a representative sample of U.K. equities, were widespread departures from the random walk hypothesis. Some of these were clearly caused by what we would now call excess volatility, which we illustrated at the time by a diagram. Though it was flattering that this work became 'enshrined' in a standard text of finance, Samuels and Wilkes (1980), it is amusing to recall that by far the greatest attention was paid to it by non-economists: academics in finance; market practitioners who thought they could detect

departures from the random walk; and even by a physicist, commending to me some useful results from the Itô stochastic calculus! It seemed that most economists did not want to address the possibility that departures from the random walk could occur, even though market folklore has always suggested otherwise, quite apart from the new evidence. Concerning theory, my view was that an appropriate and explicit economic model lying behind the random walk hypothesis should be developed. Here I was influenced by Stigler (1964) and most of all by William Baumol (1965) whose little monograph *The Stock Market and Economic Efficiency* is an under-rated gem of economic analysis. My idea in Reid (1972) was to use a continuous market clearing supply and demand model, where the reservation prices of buyers and sellers were subject to period by period revision as information relevant to the evaluation of market values appeared. This acquisition of information was explicitly modelled by random variables. In Reid (1971) I obtained appropriate expressions for the equilibrium random prices series and derived conditions under which a random walk result or an excessive reversal result would obtain. The random walk result was obtained in a model in which the current period's price embodied all previous information. An enormous amount of work has been done in the area since my early involvement, and I would not wish to pretend that my contributions can lay claim to any special attention, other than to observe (gratefully) that they might explain in part why I am being allowed the opportunity to write this piece. However, one rarely has the opportunity in economics to say "I thought that would happen" and be proved right, even if it would have happened anyway. For what has happened at the research level is, firstly, that the random walk result has been widely falsified, using techniques that derive from those developed by Shiller (1981) in discovering "excess volatility" in stock market prices; and secondly, that the hypothesis itself has been embodied in an efficient markets framework, according to which optimizing agents rationally utilize new information, and markets are

continuously cleared, with prices fully reflecting that information.

Widespread though the random walk literature had become by the end of the 1970s, it remained unsatisfactorily mechanistic. When the random walk hypothesis was confirmed, it suggested that unexploited profitable opportunities did not exist, or at least did not exist for anything but very short periods of time. What was missing was an account of the role of tastes, technology and individual agent optimization within a market clearing framework. Le Roy (1989) has argued that the random walk model itself was too restrictive to be accommodated to this framework, though something in the spirit of the random walk approach could be obtained with the use of a **martingale** model (so called after a betting system in Martigues, France, to ensure a win by doubling stakes after every loss). Let there be a set of information available to economic agents at a given time period. Then if no variables in economic agents' information sets, including past returns, can be used to predict future returns, the martingale property is said to be satisfied. Put another way, if return on a stock is a martingale, then the best forecast of the next time period's return that could be constructed on the basis of the current set of information (which includes the current period's return) would be simply the current period's return.

The importance of the martingale property became apparent after a paper by Samuelson (1965) linking it to market efficiency ideas, and an influential survey by Fama (1970). The martingale in question is the value of a mutual fund which reinvests whatever dividends it receives in further purchases of stock. The price of stock in this fund is equal to the discounted present value of the sum of the future price and dividends. Price expressed in this way is said to satisfy the 'fair game' assumption. For such a model the price of a stock is simply equal to the expected present value of future dividends. This price is said to be equal to the 'fundamental' or 'intrinsic'

value of the stock, in the sense that it faithfully reflects the underlying wealth-creating or productive capacity of the firm issuing the stock. In what follows, it is this intrinsic value that is being referred to when mention is made of fundamental value, fundamentals or simply value.

Le Roy (1989) describes Fama's (1970) survey as "a high point for capital market efficiency". Fama's survey took the martingale approach to market efficiency and distinguished three forms of efficiency: **weak**, for which agents information sets are just historical prices, **semi-strong**, for which information sets include all public information (e.g. annual earnings, stock splits); and **strong**, for which information sets became extended to include confidential price-sensitive information. He concluded that the weak-form of efficiency is strongly supported by evidence, that the semi-strong form has considerable support, and that even the strong-form has some support. The last he preferred to think of as a benchmark, against which deviations from efficiency could be judged. Evidence on deviation from strong-form efficiency arose for cases in which economic agents had monopolistic access to information. Examples included specialists on security exchanges [Niederhoffer and Osborne (1966)] and corporate insiders [Scholes (1969)]. However, even strong-form efficiency is not readily refuted. For example, mutual fund managers may have access to exclusive, non-public classes of information. Thus, at the time of takeover, managers may confer with the main stockholders. However evidence suggests they do not acquire portfolios that systematically outperform the market; [Jensen (1968)]. For these reasons, Fama (1970) reached the conclusion that available evidence was much in favour of market efficiency.

Since then, there has been an accumulation of evidence which casts serious doubt on that conclusion. Although there had been occasional popular reference to the apparent tendency of stock prices to move too far in relation to the significance of new information (so-called 'excess volatility'), academic work

by Le Roy and Porter, and by Shiller, in the 1970s confirming this sort of departure from market efficiency did not initially attract the attention it deserved. Since the paper by Shiller (1981) this situation has changed: the arguments against "excess volatility" have since been paraded, but Shiller's discovery has withstood searching criticisms. The point at issue is very simple, as is indeed the test methodology. If, as implied by the martingale model of market efficiency, returns are unforecastable, it should be the case that stock prices have a volatility which is less than that of dividends. This inequality is the subject of empirical tests. Suppose p^* is the price of a stock that would prevail if future dividends could be perfectly forecasted. Then market efficiency says that actual price p is the expected value of p^*, conditional on all information at the time of measurement. Put another way, actual price p is an optimal forecast of p^*. Measuring p^* as the present value of actual subsequent dividends and using the past century's U.S. stock price data, Shiller found that the predicted inequality (i.e. stock prices less volatile than dividends) was strongly refuted. Based on Standard and Poor's data (*cf.* a widely based index in the U.K. like the FT All Share Index) from 1871 to 1979 volatility was actually over five times greater than forecasted, and based on Dow Jones Industrial data (*cf.* a narrowly based index in the U.K. like the FT Thirty Share Index) from 1928 to 1979, volatility was thirteen times greater than forecasted. In a U.K. context, Bulkley and Tonks (1989) have replicated the above test methodology for the U.K. stock market, using the de Zoete and Wedd annual Equity Price Index (which consists of thirty blue chip stocks) for the time period 1918-1985. They confirm the excess volatility result (i.e. refute the predicted inequality) and also construct a trading rule to exploit it which gives a post-tax excess return of 1.5%.

These results may be explained partly by variations in the discount rate over time. But even for quite large variations in the expected real rate of interest, in relation to actual variations over the same period, the volatility of p^* is not raised sufficiently to confirm the predicted inequality.

The discovery of excess volatility has led to many criticisms of the above method. Firstly, if economic agents are averse to risk, then stock prices are more volatile than under Shiller's assumption of neutrality towards risk. Correcting for aversion to risk makes the refutation less strong, but still convincing. Secondly, biases arising from estimates of volatility based on small samples could account for some of the reversal of the expected inequality. However, the bias could not account for all of it. Thirdly, the inequality test is meaningless if the time series of dividends or prices are trending over time. Whether or not this is true is still being debated, but the criticism is potentially important. There are other potential points of weakness in early excess volatility studies [see Le Roy (1989)], which would take me too far from my purpose of discussing theory alone, but on balance the evidence does seem to be overwhelmingly in favour of the phenomenon of excess volatility.

The breakthrough achieved by the excess volatility literature was that it therefore appeared legitimate to develop theories which explained the deviations of stock prices from intrinsic or fundamental values. Summers (1986) points out that the large volume of earlier literature confirming market efficiency suggests that it is still difficult to make abnormal returns using only public information. What is now more clearly in dispute is whether market prices should be regarded as rational assessments of fundamental or intrinsic values. Black (1986) defines efficient markets as those in which price is within a factor of two of intrinsic value, and claims that on this basis almost all markets are efficient almost all of the time. However, this clearly leaves considerable scope for departures of price from intrinsic values. He is aware of this, and is specifically critical of the event study method, which is widely used to appraise the efficiency of mergers and takeovers, saying (p. 537): "If there were no noise in stock prices, this could be a very reliable way to find out how certain events affect firms. In fact, though the stock price reactions tell us how investors think the events will affect firms, and investors' thoughts

include both noise and information".

Here, Black is contrasting noise with genuine information, for noise is a kind of pseudo information which from an objective point of view traders would be better off ignoring, rather than using to modify their trading positions. If markets fail rationally to reflect fundamental values this takes us into areas explored by Keynes, in terms of "animal spirits", and by decision theorists and psychologists in terms of over-reaction to new information, and also into a new literature which is just emerging on nonstandard models of expected returns. It is to the last-named that I now turn.

VI. Bubbles and Fads

Following the recent study by Camerer (1989), theories that predict a deviation of price from intrinsic values may be classified into bubbles and fads. Informally speaking, bubbles and fads have a long history and are a part of contemporary market folk lore. In a bubble, prices rise rapidly without apparent good reason, trading volumes accelerate, and prices finally crash. The bubble is growing even though traders may be aware of an increasing divorce of price from intrinsic value. They go along with, and hence contribute to, the growing bubble, because they expect price will continue to rise. Well-known examples include the tulip mania and the South Sea Bubble; Garber (1990). In the Netherlands at the end of 1636 and early in the new year of 1637 bulb prices collapsed, having previously risen precipitously, and bulbs could not even be sold at a tenth of their peak value. In 1720, the South Sea Company had shares quoted at £120 in January, rising rapidly to £775 in August, and collapsing to £290 by October. Camerer (1989) gives a contemporary example: the yearling thoroughbred horse bubble in the USA in the 1970s and 1980s. Prices rose to a maximum of $13 million for well-bred yearlings, most of which never won any races, before a marked decline, amounting to a relatively 'soft landing', caused by intervention of the organization of breeders after 1984. In a fad, social

convention or fashion makes certain assets desirable. These may take a variety of forms of which two examples are fads in utility and fads in belief. A utility fad arises because of what Camerer (1989, p. 16) calls "psychic dividends". Works of art (e.g. the Scottish colourists) and other collectibles are prone to fads of this sort, for the utility derived from the asset varies with cultural norms and conventions about good taste. A belief fad arises because of changes in market psychology regarding the intrinsic value of an asset. For example, news of a scientific breakthrough might cause a high technology stock price to rise rapidly, even though the means of implementing the breakthrough in an economic and financial sense may be non-existent. There are other types one could distinguish (e.g. asset return fads), and it makes a difference as to which type one is confronted with, from a policy perspective. For example, a utility fad might best be restrained by capital gains taxation, whereas a belief fad might be better restrained by a policy aimed at lowering the cost of information.

A characteristic of this new literature on fads and bubbles is that it is both rigorous, and aimed at presenting an alternative to the efficient market model. An interesting feature of growing bubbles is that if they are self-fulfilling, they are sustained. It is quite difficult for some economists to accept the idea of a rational bubble, partly because they may tend to think of traders as being averse to risk (though even here bubbles may exist if they grow fast enough) and partly because their existence has unpalatable consequences for rational expectations theory.

Adopting the usual rational expectations assumption that economic agents are identical, infinitely long-lived, maximizers of a utility defined over time, leads to a simple condition of equilibrium. It says that if an investor should be contemplating selling his stock, he will do so up to the point at which the marginal gain in utility from selling the stock in the current period, and consuming the proceeds, is equal to the current period value of the marginal decline in utility arising from

reduced consumption in the next time period. If traders are neutral in attitude to risk this reduces to the simple condition that the current price of a stock is equal to the current value of the sum of the expected dividend and price in the next time period, conditional on the current period's information set. This characteristic was described earlier as the martingale property. The rational bubbles literature recognizes that this condition for utility maximization may also be satisfied by a bubble which grows at a rate equal to the rate of discount. The bubble must grow in order to give a return to those who participate in it, and hence sustain it. Then the rational price can be expressed as:

$$\text{Rational Price} = \text{Intrinsic Value} + \text{Bubble}$$

where, as usual, intrinsic value is the discounted present value of the expected future dividend stream, conditional on the current information set. The bubble can be regarded as an extraneous event which only affects stock prices because market traders believe it will. The bubble term can be zero, but the new literature treats this as a special case. The important point about bubbles so defined is that they are consistent with a rational expectations world in which markets clear and fully informed economic agents maximize utility. They do not deny the informational efficiency of markets, nor do they offer opportunities for excess profits (i.e. no arbitrage possibilities exist). However, they can cause major departures from intrinsic value, which again is a caution against assuming that the rational price of a stock, as viewed, for example, from the perspective of a potential acquirer in a takeover, is a good measure of fundamentals. Quite the reverse, a growing bubble will encourage inefficiently high levels of supply at high prices and will make asset prices poor signals of intrinsic value. West (1988) argues that rational bubbles are consistent with the 1987 stock market rise and crash, and that they provide a possible explanation for excess volatility.

A fad arises when, for psychological or sociological reasons,

economic agents use "irrational" trading rules and over-react to news. As a consequence, expected returns vary widely. Cutler, Poterba and Summers (1990) develop a model which has different types of traders, including 'feedback traders' who base their demands on past returns alone. They find it may display high variability of returns, and of price about fundamentals, because of feedback traders, even when other traders have rational expectations or trade on fundamentals. Other models which recognize the existence of heterogeneous traders include Kyle (1985), Grinblatt and Ross (1985), and (in amusing form) Sinclair (1990). A fad may be thought of as a factor due to noise which is added to the intrinsic price, and which gradually reverts to an average value of zero. Thus

$$\text{Price} = \text{Intrinsic Value} + \text{Fad}$$

where the fad has a certain rate of decay over time. They are not rational since the reversion to an average value of zero implies that the faddish part of the price has an expected return less than the discount rate on the intrinsic part of the price. Hence investors would sell this stock, encouraging the disappearance of the fad, though with a slow decay on the fad it is not easy to profit by betting on its ultimate disappearance. Whilst fads are clearly not rational, participation in them by some market traders may be rational. Suppose clients of professional investors judge their own portfolio manager in relation to rival portfolio managers. Then each portfolio manager keeps his eye on his rivals' performance records, trading much as they do, and not betting against the fad because this puts his relative performance at risk. Whilst portfolio managers are utility maximizing if they behave in this way, their clients are not, because their tendency to drop apparently relatively poor managers is based on a small sample of performance data. Given this client irrationality, the participation in fads by portfolio managers is rational, and this helps to explain their persistence. De Bondt and Thaler (1990) present evidence that even the most professional of predictions is characterised by generalised overreaction.

The fad model presents an alternative to the efficient market model, but not one which many experts in finance find satisfactory. As Le Roy (1989) points out it is really a way of attaching a name to unexplained variation in a stock price. What we require from a theory is also a degree of explanation: what causes fads to come and go; and what evidence would be inconsistent with fads?

It is not my brief to consider statistical evidence, but it should be mentioned that the phenomenon of belief fads is quite well confirmed, though of course this does not help us understand how beliefs are formed. De Bondt and Thaler (1989) provide a review of the evidence, which is to the effect that the stock market may over-react: stock prices which have experienced large declines tend to bounce back and earn positive excess returns; and those which have had large increases tend to flag and earn negative returns. Further, De Bondt and Thaler (1990) report on evidence pertaining to security analysts who make regular forecasts of individual company earnings. They studied data from 1976 to 1984 for Lynch, Jones and Ryan, a member of the New York Exchange (NYSE). They find an unrealistic optimism in forecasts which led to market overreaction. Similar results have been reported by Elton *et al.* (1984) also using NYSE data, and by Froot and Frankel (1989) for exchange rate forecasts.

VII. Agency Effects

An agency cost may be defined as the difference between the value of a corporation were monitoring to be costless, and the actual value of it. Monitoring and governance mechanisms are installed within a corporation because of the classic problem of incomplete compliance between owners (as principals) and managers (as agents of the principals). Adam Smith's caution, that the managers of other people's money cannot be expected to watch over it with the same "anxious vigilance" with which they watch over their own, can be given modern expression in terms of the economic theory of principal and agent, or simply

"agency theory". This theory, as applied to the corporation, was first developed by Jensen and Meckling (1976). It is of particular relevance to an analysis of efficiency and takeovers because of the existence of what Manne (1965) first called "the market for corporate control". In the present context, it can be thought of as a "takeover market". Clearly corporations do not operate in a world of perfect competition, but Manne argued that something like an efficient outcome may nevertheless arise, given a takeover market, because the control of a corporation is in itself a valuable asset (quite apart from the tangible assets like inventories, plan, equipment etc.) for which buyers are willing to compete. A fundamental premise of Manne (1965) is that this competition will bring about a strong positive association between corporate managerial efficiency and share price. Modern auction theory would suggest a caution to Manne's efficiency argument because of the so-called "winner's curse", that is, the tendency to overbid to gain control. Theory predicts that the level of winning bids rises as the number of bidders rises. There certainly is experimental evidence for this effect, based on studies of human subjects bidding under controlled laboratory conditions. Gilberto and Variya (1989) find some evidence from acquisitions of failed banks in the U.S.A. that winners were cursed and over-bid, being encouraged to do by increased competition. However, in the real world of the takeover market the strict conditions of a sealed-bid auction, which are required for the winner's curse to apply, do not hold. Therefore one can say no more than that in some circumstances some bidders may overestimate the gains to be achieved by a takeover, and may discover, after the conclusion of it, that they are cursed.

The market for corporate control, or "takeover market", is one of several market mechanisms which may reduce agency costs, thus enhancing efficiency. In this market, the makers of takeovers (i.e. potential acquirers) may try to acquire control by attempting to purchase a majority of shares, often at a premium on current market price. Their willingness to do so acts as a discipline on managers, encouraging them to pursue

the goal of maximizing the wealth of stockholders, for if they do not, they may be dismissed after a successful takeover, to be replaced by more efficient managers hired by the acquirer. This corporate control or takeover market is a check on both the competence and effort of managers. As Ryngaert (1988, p. 378) has put it, the takeover market allows shareholders to vote on who they believe can run the corporation most efficiently, or to sell to the party willing to pay the most for control of it. There is no clear choice between the direct governance of the takeover market and internal incentive mechanisms within the corporation which attempt to mimic the effects of the takeover market. In the pursuit of efficiency, a mixture of market and bureaucratic governance mechanisms is typically used. The extent to which the one or the other is favoured is a matter of comparative institutional analysis, with the aim being to identify the more efficient institutional design.

A good example of the application of agency theory in such situations is Knoeber's (1986) analysis of hostile tender offers (i.e. offers made directly to targets, shareholders, without seeking approval from, or even notification to, the board of directors). He argues that such offers, being non-coercive, can be analysed in terms of voluntary contract and exchange. For mutually beneficial exchange to occur, the acquiring firm and the shareholders of the target firm should benefit, but so too should the managers of the target. Knoeber looks at two voluntary measures which may be adopted by firm's shareholders: **golden parachutes**, which are contractual agreements with managers to pay substantial sums to those who leave when the change of control takes place; and **shark repellants** which are the voluntary adoption, by shareholder votes, of amendments to corporate charters or by-laws which inhibit tender offers (e.g. super-majority voting on mergers and sales of assets.)

There has been public criticism of such forms of voluntary contract, but it is perhaps not well founded. It is true that a market for corporate control provides a sanction on managerial

inefficiency, and takeovers will be a vehicle for attenuating it, but in the same way as this voluntary, self-seeking act may promote efficiency, so too many voluntary contracts to defend a target achieve an efficiency gain. As Knoeber (1986, p. 156) correctly puts it: "Quite simply, the same argument used to advocate tender offers can also be made to advocate voluntarily adopted restrictions on hostile tender offers. Doing so casts a considerably different light on recent proposals to regulate such actions as the use of golden parachutes and shark repellant amendments to corporate charters".

As usual in the agency framework as applied to the corporation, made familiar by Jensen and Meckling (1976), the stockholders are the 'principals' and the managers the 'agents'. Both are utility maximisers. Stockholders, if neutral to risk, wish to maximize the value of their stockholdings. Managers maximize utility, which rises both with income and with 'on-the-job' consumption (i.e. shirking and perquisites, which I shall abbreviate as 'perks'). A widespread misconception in the industrial organization literature is that perks are not in the interests of the owners of the company. The logic of this has been shown to be faulty by Demsetz (1983). Here I follow the slightly more formal treatment by Knoeber (1986).

What the shareholder wishes to do is to permit perks by managers up to the point where the marginal benefit to the manager is equal to the marginal cost to the stockholder. Essentially, compensation by perks is an alternative to compensation in cash, and stockholders, in seeing a cost-minimizing compensation package for management should try to determine the optimal level of perks. Until it is reached, the cheaper form of remuneration is perks rather than income. A problem clearly arises when managers, as agents, seek to obtain a higher level of perks than the optimum. This leads to an agency cost, which is to say a cost which arises from providing managers with an inappropriate incentive structure. The solution to this agency problem is to attach a price to perks. In the simplest case in which one assumes that the level of

perks can be observed without error the remuneration for the manager might be in the form of a fixed salary less a £1 penalty for each unit of perks chosen by the manager. If the level of perks is observed with error, but on average correctly, this scheme will also lead to an optimal choice of perks, if managers are neutral towards risk.

In practice, shareholders are unlikely to be able to gauge the extent of perks and managers may be averse to risk. To achieve managerial compliance will involve managers bearing greater risk. For example, if the manager's remuneration is his fixed salary less a £2 penalty for each estimated unit of perks chosen (rather than £1 as above) the incentive to economize on perks is increased, but so also is the variability of his net income, given that perks are estimated, rather than precisely known. If managers are averse to risk, they must be compensated for bearing the extra risk implied by a contract that increases the variability of remuneration. That is to say, there is an agency cost attached to increasing the incentive to economize on perks. An optimal contract is one that maximizes stock-holder wealth, subject to the constraint that managers maximize utility and receive no less than they would in their best outside option. It has the characteristic that the marginal risk[3] of changing the price of perks is equal to the marginal agency cost.

Other things being equal, the greater the precision of estimation of perks, the greater is stockholder wealth. Increasing precision lowers agency cost and/or managerial remuneration, given the optimal contract. Suppose, of two situations, in the first one the level of perks was estimated using only current information on the performance of the firm, whilst in the second both current and future information were used. The precision of estimation of perks would generally be better in the second case, and stockholder wealth correspondingly higher, implying stockholder preference for this case.

One way of proceeding to the preferred arrangement would be to make an initial payment to managers based on current

information, but to make a future adjustment, positive or negative, as future information became available. This, however, might encourage opportunism after conclusion of the contract, for managers are provided with an incentive to resign if the initial payment is based on an underestimate of what they know to be their true level of perks. A superior contract would make a small payment based on initial estimated perks and then later an additional bonus payment (or "deferred compensation") which was not negative, as future information became available. Paying a bonus in this way amounts to posting a bond, which is to say a sum of money which is sacrificed if good performance is not achieved. This form of precommitment removes the incentive for opportunism. The contract in question would be 'implicit' as there is no simple and cheap way of writing down what the future holds and how one will react to it, so no explicit enforceable contract arises. However, it is self-enforcing because should shareholders renege on it, the firms, through the actions of the board of directors, would incur reputational costs which would make it difficult to hold or to recruit managers.[4]

Should a hostile takeover be contemplated, which bypasses the board of directors and goes directly to the shareholders, there is an incentive for shareholders to behave opportunistically. After the transfer of ownership has been accomplished, incumbent managers may be dismissed and receive no deferred compensation. Shareholders, being anonymous, suffer no reputational damage and neither does the acquiring firm, for it is not mistreating its own managers. Knoeber (1986) sees devices like the golden parachute and shark repellants as mitigating opportunism when contracts are implicit, long-term and involve deferred compensation. The golden parachute mitigates opportunism at the stage of transfer of control because should an attempt be made to appropriate the deferred compensation of the incumbent managers, the golden parachute must be paid. It is thus a bond posted by stockholders which is forfeited in the event of opportunism.

The shark repellant, which operates through devices like super-majority voting (i.e. requiring more than fifty per cent of votes) on mergers and sales of assets, effectively raises the cost of hostile takeover, and therefore encourages a friendly offer which, because it must be approved by managers, mitigates opportunism.

In the extant literature which tends to look with disfavour at golden parachutes and shark repellants, the emphasis is on the costs of such devices, for they apparently put restrictions on the market for corporate control. Of course there are costs, but the point of the contractual framework specified above is that there are benefits as well. Indeed, as the contracts considered are voluntary, they will, if adopted, entail net benefits. These arise because, firstly, managers are more willing to agree to implicit contracts that protect them from opportunism, and secondly stockholders are able to increase the precision of measurement of perks, thus raising their wealth. As ever, voluntary contracting is mutually beneficial.

The adoption of golden parachutes and shark repellants is part of a larger set of **resistance strategies** or **defence measures** against takeovers which may be adopted. These two resistance strategies will not lower stockholder wealth, and might deter a takeover bid. A basic proposition in evaluating resistance or defensive measures is that those which are not submitted to stockholders will tend to lower the wealth of stockholders, whilst those that are approved by stockholders will have no wealth effect, on average, and might avoid unnecessary, and ultimately costly, ownership changes. The difficulty arises that the choice which incumbent managers have over resistance strategies might have efficiency implications for the takeover. One is forced therefore to be quite specific about the resistance strategy which is adopted before conclusions can be drawn about efficiency. The possibilities are numerous, so I shall concentrate on those that seem of particular importance or interest. Specifically, I shall look at poison pills, greenmail, capital restructuring and the reassigning of voting rights.

The poison pill is a type of security that imposes a financial burden on the acquirer which is triggered when there is a change of control caused by a takeover. This increases the power of the board of directors and raises the cost of hostile takeover. It has been said, in favour of poison pills, that they help the board of directors get the best deal for shareholders, but as against this they may be no more than a device for entrenching managerial interests and withholding potential gains from stockholders. Popular as this defence mechanism has been, its net benefits are uncertain. They are destructive, for example, of the two-tier scheme proposed by Grossman and Hart (1980) to deter "free riders" who will not sell to potential acquirers at less than the post-acquisition bid. What Grossman and Hart suggested is that this could be overcome by the acquirer offering *over* the post-acquisition bid for just half the stock and *under* it for the rest. The result should be an incentive for all stockholders to sell rather than hold out, because only half can actually get paid at a premium, and the rest at a discount, on the post-acquisition bid, implying an average payment per share which still leaves profit for the acquirer. Poison pills, by imposing additional costs on the acquirer which are triggered by the change of control, essentially erode this profit which two-tier bids attempt to ensure, and hence discourage the takeover. Malatesta and Walking (1988) have looked at over one hundred poison pill defence cases and find clear evidence that such defences reduce the wealth of the stockholders by a statistically significant amount. The defence is more likely to be attempted when there is a high probability of takeover and when managers have relatively small personal stockholdings in the company. That is, the adoption of a poison pill defence in itself may be a signal of a poorly managed and unprofitable company. Ryngaert (1988) examined 380 firms that had adopted poison pill defences, and whilst not all clearly entrenched management, the most restrictive clearly did so.

Greenmail is a payment by a company to repurchase stock at a substantial premium over market price once a takeover bid

has been fought off. The favourable view of this is that it protects the interests of nonparticipating shareholders; and the unfavourable one is that greenmail is paid because managers feel threatened, and they make premium payments to entrench their own interests. Klein and Rosenfeld (1988) have shown that companies which pay greenmail and then change management show greater subsequent signs of poor management-stockholder relations than those that do *not* change management. In general, top management turnover does tend to increase following greenmail payment, which suggests it is symptomatic of managerial entrenchment rather than protective of shareholder interests.

There are other defence mechanisms or resistance devices which can be looked at in an agency framework, including capital restructuring (notably by increasing the debt-equity ratio) [Harris and Raviv (1988a), Stulz (1988)] and the reassigning of voting rights; [Harris and Raviv (1988b), Stulz (1988)]. Harris and Raviv (1988a) argue that because control of a corporation in itself is valuable, there is an incentive for incumbent managers who are stockholders to attempt to maintain control by exchanging debt for equity before potential rivals can purchase equity. The aim is to maximize the value of the incumbents, shareholding as well as consolidating control. It is a slightly double-edged sword in that increasing debt, whilst conferring greater control, diminishes the benefit of control. Thus it raises the probability of bankruptcy, may (by covenant) restrict management actions, and involves an obligation to service debt. But, rationally pursued, this action entails a net benefit calculation, which determines the extent to which capital restructuring should be pursued. Harris and Raviv (1988a) conclude by suggesting that nonvoting securities are a quite potent anti-takeover device which if better understood from the viewpoint of the theory of finance might be more widely used. In a related paper by Harris and Raviv (1988b) on the optimality or otherwise of voting rights, it is argued that there is an incentive for managers to issue securities with restricted voting rights to acquire more votes with limited

wealth. This partly explains lobbying to change stock exchange listing rules to permit the issue of new, nonvoting or restricted voting, classes of ordinary shares.

Clearly capital structure and voting rights are not unrelated. Thus Stulz (1988) analyses how the managerial control of voting rights can affect the firm's value and its financing policy. He emphasises the significance of the fraction (γ), of the voting rights controlled by management. In itself, equity ownership by management helps to align managerial and shareholder incentives. However, an ability to change γ, possibly through capital restructuring as discussed already, but also through other devices like changes in the corporate charter, enables management to influence the value of the firm itself and this confers further control For example, in a takeover Stulz (1988) shows that an increase in γ raises the premium offered. This occurs because increasing γ raises the expected marginal cost of increasing the premium.

VIII. Conclusion

What I have sought to do in this paper is to lay bare the theoretical argument for the efficient markets approach to takeover activity. A fundamental postulate is that mergers and takeovers should be of benefit to both the target and the acquiring firm, or at least should leave neither worse off. Indeed, given the likelihood of substantial transactions costs, not all of which are readily identifiable, the stronger condition of measurable net benefit to target and acquirer is arguably the more appropriate. Available evidence, of the event-study form, or otherwise, suggests the generic case has potential benefit for the target and zero benefit for the acquirer. Further, potential benefits do not always materialise, and divestment is not uncommon some time after takeover; Ravenscraft and Scherer (1987). This casts *prima facie* doubts on the level of takeover activity, at least so far as the efficiency motive goes. In terms of the vocabulary of games which I introduced, the super-additivity condition seems to be violated quite

frequently: more mergers and takeovers are being undertaken than can be justified by appeal to efficiency criteria.

The values of coalitions under the games approach could of course be approached using stock market values, for firms are no more than coalitions of self-seeking individuals. However, the question must be asked as to whether the stock market values are in any practical sense close to fundamental or intrinsic values. The event-study methodology assumes that they *are*, that before the event of takeover a general equilibrium prevailed, with all markets clearing at prices which fully reflect information, and all economic agents being in their chosen asset portfolio positions. However, although the event-study method, based on the capital-asset pricing model, is quick and inexpensive, and the basis of financial advice available from many economic and financial consultancies, it is simplistic and potentially misleading. It is based on only one of a number of sensible portfolio models, and its conclusions in the practical domain very much hinge on whether beta coefficients genuinely are stable across periods of history during which takeovers are contemplated and concluded.

Even if a more satisfactory portfolio analysis were undertaken, there remains a difficulty with the background assumption of market efficiency. Although by 1970, market efficiency, in its martingale rather than random walk expression, appeared difficult to refute, the evidence qualifying it since then has become substantial. And is if to put the cap upon doubters, Black Monday arrived in October 19th, 1987 with trillions of pounds and dollars being lost in U.K. and U.S. stock markets, and other major stock exchanges throughout the world, with no apparent corresponding change in fundamentals. Whatever biases may exist in detecting excess volatility in stock market prices, the evidence for it is overwhelming. Not only that, but January effects, weekend effects, and even Wednesday effects have been detected in stock market price movements; Thaler (1987). Thus not only portfolio models, but the underlying assumption of full, efficient market clearing are suspect. Laffont

and Maskin (1990) is representative of the new literature which seeks theoretical explanations for this in terms of large traders who find it advantageous to conceal private information.

It is clear that we must consider bubbles and fads as distinct empirical possibilities; Lehmann (1990). If this sort of effect puts values out of line with fundamentals, it could partly explain the excessive level of takeovers. Indeed the general evidence of excessive volumes of trading on the stock market, with no apparent advantage to agents' asset positions can suggest analogies in the market for takeovers. Here, is it not possible that 'noise trading'[5] is also going on, with pathological propensities to 'do a deal' over-riding considerations of net benefit, and thus of efficiency? If this is the case, then the strengthening of takeover defences to limit 'churning' in the market for takeovers might have advantages. Doing so by statutory measures has its drawbacks; King and Roell (1988). However, doing so by contractual innovation (e.g. golden parachutes) and by financial innovation (e.g. issuing restricted voting rights securities) has the advantage of minimizing interference in the market whilst at the same time promoting its efficacy in the sense of leaving its incentive structure, the pursuit of profit, intact.

Notes

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1 M. Léon Walras (1834-1910), French economist who in his *Elements of Pure Economics* (1874) first produced a multi-equation model of the economy in which all markets were cleared by a flexible price system, a model known today as general (competitive) equilibrium.

2 Formally, if ΔP_t is the first-difference of price at time

period t, we have $E(\Delta P_t) = 0$ for all t and $E(\Delta P_t \Delta P_\tau) = 0$ for $t \neq \tau$, where E denotes mathematical expectation.

3 That is, the change in the variability of net income for a change in the price of perks. Again, I have use the term 'variability' in place of the more formally correct 'variance'.

4 These costs are assumed to be much higher than the benefits of defaulting on the bonus payments.

5 For an informal account of 'noise trading', see *The Economist*, June 2nd 1990, p. 103. A non-technical but rigorous account from the perspective of the modern theory of finance is Shleifer and Summers (1990).

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