Testing for Short Termism and Over-Valuation in The US Stock Market

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Abstract

In this paper we address the potential ineffectiveness of the empirical model for testing short termism (myopia) in Miles (1993) when the influence of over-valuation is present. Our results suggest that reverse long termism may appear in the US stock market by Miles's method since the effect of short termism could be dominated by over-valuation. We develop a modified econometric model to test short termism and characterize over-valuation in the US stock market. The empirical results conclude that there exist short termism and over-valuation since 1980.

Keywords: Short-termism, Over-Valuation, Asset Prices
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1. Introduction

This paper addresses the problem of whether short termism (myopia) exists in the US stock market. In Anglo-Saxon stock markets, potential irrationality of investors has received much attention from financial officials, such as former British Chancellor of the Exchequer Nigel Lawson and Federal Reserve Chairman Alan Greenspan. Despite the consensus of practitioners for short termism in the stock markets, there are limited studies dealing with rigorous testing for it. Miles (1993) first established modified present value models to test short termism in the UK stock market in 1980s and obtained significant evidences of short termism.

Relative research for the U.S. stock market should be well established. Probably few will doubt the anticipated myopia in the U.S. stock market, in which there are many short-term investors, as Jacobs (1991) described. In this paper we start to investigate the related periods in the US stock market in order to compare with Miles' study. However, based on his empirical models we have obtained unanticipated reverse results of long termism. This paper discusses the potential ineffectiveness of the previous study when over-valuation is presented. The reverse long termism result appears because the effect of over-valuation which has not been considered in Miles' model. Then we developed a modified present value model to test short termism and over-valuation in the US stock market. Significant results of short termism and over-valuation are founded in the 1980s. We find similar results in 1990s.

Over-valuation is observed intuitively sometimes in the stock market. For example, since December 1996 the Fed Chairman Alen Greenspan has warned investors of "irrational exuberance" several times. Theoretical literature also concerns itself about over-valuation, such as in Harrison and Kreps (1978) and Morris (1996), in which stock prices are higher than market fundamentals due to speculative trading. Speculation is observed from the evidence that there exists too much of large trading volume, e.g., see Law (1986). Many investors hold the stocks not for the long run, but sell better prices in the short term.

The principle-agent problem is the major argument for the existence of short termism, whereby there exists different objectives between the managers and the shareholders of the corporation (Law (1986), pp.80). For the nature of corporate management, managers often invest too much in the form of human capital in their company than the investors(company shareholders) do. On the contrary, investors may diversify risk well, as any modern portfolio theory suggests. However, most of them do not hold the stock for a long period of time. Inefficient resource allocation is the main concern of myopia in the theoretical arena. For example, Stein (1986) examines how threats of a take-over can lead managers to sacrifice a company's long-term interests and Narayanan (1985) discusses incentives for managers to be myopic.

This article also parallels with the literature of bounded rationality. The rational expectation hypothesis has received much criticism of various reasons from economists (see Conlisk, 1996). In the stock market this hypothesis is examined and rejected by several approaches. For example, Timmermann (1994) rejected the hypothesis that investors could learn to form rational expectations in the UK stock market. In this paper we study two departures from rational expectation, short termism and over-valuation. Both of them have been around in theoretic arenas for a long time, but incipient in empirical arenas. We point out that Miles' empirical model is a joint test which includes short termism and over-valuation. We investigated data in the U.S. stock market during the same period with previous study and the reverse long termism result is obtained by Miles' model because of the dominance of over-valuation. We also provide a generalized framework to study the effects of short termism and over-valuation. The empirical results suggest that short termism coexists with over-valuation in the U.S. stock market.

In Section 2 we address the potential problem in Miles' method, and then develop generalized empirical models. The evidences of reverse long termism by Miles' model and revised results by our modified models are presented in Section 3, and we conclude in Section 4.

2. Econometric Models for Testing Short Termism and Over-Valuation

Let the stock price, return of the stock, and dividend of the company j in period t be p_t^j, R_t^j, and d_t^j, respectively. Further, let r_t denote the risk-free interest rate and E_t the expectation operator at the beginning of the period t. It is obvious from many famous financial theories like CAPM, APT et al. that the stock return R_t^j is the expected return when investors buy the stock in the current period and anticipate selling it in the next period:

$$E_t(R_t^j) = E_t(\frac{P_{t+1}^j - P_t^j + d_{t+1}^j}{P_t^j}) = r_t + \pi_t^j \tag{1}$$

In the above equation π_t^j is the risk premium for investment in stock which is the difference between the expected return and the risk-free interest rate r_t. Rearranging the equation we have the representation

$$P_t^j = \frac{E_t(d_{t+1}^j + P_{t+1}^j)}{1 + r_t + \pi_t^j} \tag{2}$$

For simplicity, we assume that investors expect the interest rate r_{t+j} and the risk premium π^j_{t+j} perfectly in the next i period, then the equation of the market fundamental is derived by iterating the above equation,

$$P_t^j = \sum_{i=1}^{N} \frac{E_t(d^j_{t+i})}{\prod_{k=0}^{i-1}(1+r_{t+k}+\pi^j_{t+k})} + \frac{E_t(P^j_{t+N})}{\prod_{k=0}^{N-1}(1+r_{t+k}+\pi^j_{t+k})} \tag{3}$$

In the case with tax consideration, we omit the transaction tax and assume that investors expect the capital gain tax to be a constant τ. The market fundamental value of the stock, which should be equal to the stock price in the efficient market, has a similar representation as

$$P_t^j = (1-\tau)\sum_{i=1}^{N} \frac{E_t(d^j_{t+i})}{\prod_{k=0}^{i-1}(1+r_{t+k}+\pi^j_{t+k})} + \frac{E_t(P^j_{t+N})}{\prod_{k=0}^{N-1}(1+r_{t+k}+\pi^j_{t+k})} \tag{4}$$

We mention that here, how investors valuing the stock satisfies the hypothesis of rational expectation, from which in this paper we investigate two different deviations. The above market fundamental representation is the benchmark case.

Before going further with our empirical models, we should recognize the characters of short termism and over-valuation and then define how to identify them from the representation of the market fundamental in equation (4). Myopia is by definition intuitively lacking of any perspective for the future. Marsh (1992) suggests how myopia influences the stock price (pp. 447):

> If stock markets are short-termist, this implies that share prices place too much weight on short-term profits and dividends.

From Marsh's characterization, if myopia is considered, the stock price should reflects different weights across periods for future dividends, i.e., the weight in the short future should be higher relative to the weight in the long future. The econometric methods for testing short termism are developed from the traditional present value model to incorporate the hypothesis of "too much weight".

In this paper we provide modified empirical models, which are generalized from Miles (1993) and consistent with Marsh's characterization, to test the short termism and over-valuation in the stock market. In contrast to Miles' model, our framework provides a technique to characterize the effect of over-valuation. Over-valuation is defined as the situation in which stock prices are higher than market fundamentals. It occurs when the left side of the equality in equations (3) and (4) is higher than the right side. For simplicity, we assume that investors expect the risk premium in the future to be constant[1], then the representation of the market fundamental in equation (4) become

$$P_t^j = (1-\tau)\sum_{i=1}^{N}\frac{E_t(d_{t+i}^j)}{(1+r_{t,t+i}+\pi^j)} + \frac{E_t(P_{t+N}^j)}{(1+r_{t,t+N}+\pi^j)^N} \tag{5}$$

where $r_{t,k}$ is the annual yield of the risk-free bond from current period t to maturity in $t+i$ period. Short termism, with too much weight on short-run dividends, is presented in three different formations in our paper. The only difference in these formations is the specification of the weighting functions of the discounted future cash flows. In the first case we multiply function $f(i)$ in different periods $t+i$, as

$$P_t^j = (1-\tau)\sum_{i=1}^{N}\frac{f(i)\cdot d_{t+i}^j}{(1+r_{t,t+i}+\pi^j)^i} + \frac{f(N)\cdot P_{t+N}^j}{(1+r_{t,t+N}+\pi^j)^N} + \varepsilon_t \tag{6}$$

To compare the above equation with equation (4), it is natural to indicate $f(i)$ as the "relative weight" on dividends in period $t+i$. Thus, from Marsh's suggestion mentioned before we can define that there exists short termism if $f(i) \geq f(i+1)$ for $i=1$ to N in which at least one strict inequality holds. We describe short termism in this model as the decreasing property of $f(i)$. The decreasing weight indicates that the relative weight in the short run is larger than in the long run. We also present an alternative model in which there is a different presentation for "relative weight," as the equation below,

$$P_t^j = (1-\tau)\sum_{i=1}^{N}\frac{d_{t+i}^j}{(g(i)\cdot 1+r_{t,t+i}+\pi^j)^i} + \frac{P_{t+N}^j}{(g(N)\cdot 1+r_{t,t+N}+\pi^j)^N} + \varepsilon_t \tag{7}$$

Because $g(i)$ appears in the denominator of the weight in period i, the increasing property of $g(i)$, in contrast to the increasing property in the previous model, represents short termism because the relative weight in the short run is larger than the long run. In this model there exists short termism if $g(i) \leq g(i+1)$ for $i=1$ to N, whereby at least one inequality strictly holds. The main results in this paper are based on the above two equations which generalize the models in Miles (1993).

We also present the results by estimating Miles' models in the U.S. stock market. Most of them

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[1] Miles (1995) has provided robustness of this assumption, while Satchell and Damant (1995) have presented a comment of it. However, our results are robust when we replace this constant assumption with an alternative one whereby the risk premium is dependent on the value of beta and leverage. However, in this case with a time-dependent risk premium there are more convergence problems.

are special cases of the above two equations. In Miles' paper there exists a third alternative representation of relative weight. We have estimated this alternative and found that the results based on it are generally the same with the results estimated by the previous two representations. The only difference is that there are more convergence problems in the third alternative, so in our paper we have not presented the estimated results based on the third representation. However, for convenience to detail Miles' models for comparison, we give it in the following,

$$P_t^j = (1-\tau)\sum_{i=1}^{N} \frac{d_{t+i}^j}{(1+r_{t,t+i}+\pi^j)^{i\cdot h(i)}} + \frac{P_{t+N}^j}{(1+r_{t,t+N}+\pi^j)^{N\cdot h(N)}} + \varepsilon_t \tag{8}$$

With the same reason there then exists short termism in equation (8) if $h(i) \le h(i+1)$ for $i = 1$ to N, whereby at least one inequality strictly holds.

The above three generalized models include all empirical models in Miles (1993) except that he adds a constant term in these equations. The problem of the addition of a constant term is left to discuss later. The main results in Miles' (1993) are estimated by the equations (8) and (9) in his paper (pp. 1383), which are special cases of equations (8) and (6) in our paper with $h(i) = b$ and $f(i) = x^i$. He claims short termism happens when $x < 1$ and $b > 1$ in the two equations. The other three simple models presented in Miles, which are estimated only with data from 1984, are also special cases in our models.[2]

There are some potential problems in Miles' empirical models when over-valuation is included. First, there is no solid theoretical foundation to add the constant term α in the empirical models. It could be ambiguous that Miles discussed the ex-post return, which was too high with the result $\alpha < 0$ in his paper (pp. 1388), because there are mixed effects between under-valuation caused by $\alpha < 0$ and by short termism. Even if there is over-valuation or under-valuation in the market, for example, during a bull market or bear market the difference between the stock price with the rational expectation may not be a constant like α. It is not plausible that the stock market was generally under-valued by 13.5£ (the estimated value $-\alpha_0$ in his paper) for both the stock with price 100£ and the stock with price 5£.

Second, the two major equations (8) and (9) in his paper, which are represented as equations (12) and (13) in our paper, have an implicit assumption that short termism comes together with under-valuation. Consider equation (9) in his paper,

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[2] Equations (11)-(13) in Miles' paper could be considered as three special cases of equation (7), (12), and (8), respectively. The first one is considered as the case with $g(N) = 1+\alpha_0$ and $g(i) = 1$ for all $i < N$, and the second one corresponds to the case with $h(N) = \alpha$ and $h(i) = 1$ for $i < N$, and the last one is equal to the case with $f(N) = \lambda$ and $f(i) = 1$ for all $i < N$.

$$P_t^j = \alpha_0 + (1-\tau)\sum_{i=1}^{N} \frac{x^i \cdot d_{t+i}^j}{(1+r_{t,t+i}+\pi^j)^i} + \frac{x^N \cdot P_{t+N}^j}{(1+r_{t,t+N}+\pi^j)^N} + \varepsilon_t \qquad (12)$$

Miles claimed that $x<1$ in this equation will indicate the existence of short termism. His argument may leads to a potential ineffectiveness when the influence of over-valuation is presented. If we leave the outside constant term α_0 in equation (12), then short termism happening with $x<1$ also implies the fact that stock prices will be strictly greater than market fundamentals in equation (5). There exists the same problem in another major equation (13), too. Hence, we claim that Miles' model made the implicit assumption that short termism comes together with under-valuation, and long termism comes with over-valuation. In other words, Miles' model analyze joint effects of both short termism and over-valuation when over-valuation is considered.

Otherwise, in another Miles' major estimating equation (8),

$$P_t^j = \alpha_0 + (1-\tau)\sum_{i=1}^{N} \frac{d_{t+i}^j}{(1+r_{t,t+i}+\pi^j)^{i\cdot b}} + \frac{P_{t+N}^j}{(1+r_{t,t+N}+\pi^j)^{N\cdot b}} + \varepsilon_t \qquad (13)$$

he claims that $b>1$ indicates short termism. We replace it by an increasing function of $h(i)$ in equation (8) to format the ``relative weight'' to test short termism and over-valuation.

In order to separate the mixing effects of short termism and under-valuation, we distinguish the two effects by using the generalized empirical models as equations (6) and (7). Over-valuation is defined as that when the stock price is higher than the market fundamental value under rational expectations, that is, the left side in equation (5) is higher than the right side. It happens in equation (6) if $f(i)\geq 1$ with at least one equality strictly holding for some period i. In equation (7), over-valuation happens if $g(i)\leq 1$ with at least one strictly inequality holding for some i.[3] Certainly, in our model if $f(i)$, $i=1$ to N is not always greater than 1 or less than 1, then we cannot conclude anything about over-valuation or under-valuation. We parameterize the functions $f(i)$ and $g(i)$ in equations (6) and (7) as simple functions[4] $f(i)=a+b/i$ and $g(i)=p+q/i$. The two major equations that we estimate in our paper are the following,

[3]Equation (8) has a similar result but is more likely to have a convergence problem. We discuss this third alternative representation of relative weight just to include all the models in Miles for comparison. In fact, we do not suggest the method estimated by this equation because there appear more convergence problems to estimate the parameter in the exponent.

[4] We have similar results if functions $f(i)$ and $g(i)$ are replaced by exponential function $e^{A+B\cdot i}$. The results in this approach with exponential function specification have not been presented in our paper because there are more converging problems.

$$P_t^j = (1-\tau)\sum_{i=1}^{N} \frac{(a+b/i)\cdot d_{t+i}^j}{(1+r_{t,t+i}+\pi^j)^i} + \frac{(a+b/N)\cdot P_{t+N}^j}{(1+r_{t,t+N}+\pi^j)^N} + \varepsilon_t \tag{14}$$

$$P_t^j = (1-\tau)\sum_{i=1}^{N} \frac{d_{t+i}^j}{(p+q/i+r_{t,t+i}+\pi^j)^i} + \frac{P_{t+N}^j}{(p+q/i+r_{t,t+N}+\pi^j)^N} + \varepsilon_t \tag{15}$$

In equation (14), short termism happens when $b > 0$ holds because the relative weight $a+\frac{b}{i}$ is decreasing across period i, and the converse result of long termism will be concluded when $b < 0$. Over-valuation can be obtained in this model if $a+\frac{b}{i}$ is higher than 1 for all periods i. However, if the weight $a+\frac{b}{i}$ is not lower than 1 in some period, then we cannot conclude anything about over-valuation or under-valuation. In figure 1 we characterize six cases of equation (14) by the following:

- Case 1: $b > 0$, $a+\frac{b}{i} \geq 1$ for all i, and $a+\frac{b}{i} \geq 1$ for some i: short termism and over-valuation.
- Case 2 $b > 0$ but $a+\frac{b}{i} > 1$ for some i, and $a+\frac{b}{i} < 1$ for some i: short termism, but without conclusion of over-valuation.
- Case 3 $b > 0$, $a+\frac{b}{i} \leq 1$ for all i, and $a+\frac{b}{i} < 1$ for some i: short termism and under-valuation
- Case 4 $b < 0$, $a+\frac{b}{i} \geq 1$ for all i, and $a+\frac{b}{i} > 1$ for some i: long termism and over-valuation.
- Case 5 $b < 0$ but $a+\frac{b}{i} > 1$ for some i, and $a+\frac{b}{i} < 1$ for some i: long termism, but without conclusion of over-valuation.
- Case 6 $b > 0$, $a+\frac{b}{i} \leq 1$ for all i, and $a+\frac{b}{i} < 1$ for some i: long termism and under-valuation.

In equation (14) what the conclusion depends on is different from that in equation (13), because the relative weight $p+\frac{q}{i}$ is in the part of the denominator. In this case $q > 0$ means short termism and $p+\frac{q}{i}<1$ for all period i means over-valuation of the stock prices.

3. Data and Results

All non-financial firms available of the New York Stock Exchange over the period 1975 to 1999 were used. We start to estimate the sample period of 1980s, which is comparable to that of Miles' study. It includes 735 sample observations of firms in 1980s and accounts for almost 65% of the total market value of the New York Stock Exchange. To analyze the robustness, we also estimate the data in 1990s, where 955 same observations of firms are included. The resource of data is the COMPUSTAT database. Share prices are the closing prices at the companies' fiscal year-end. Dividends are measured as total cash dividends paid in the accounting year. Leverage is calculated by the level of debt of the firm divided by its market value. Beta values of firms are calculated using end-closing prices over the past 60 months. The risk-free return $r_{t,t+i}$ is assumed to be equal to the annual return of U.S. Treasure notes and bonds with maturity period $t+i$ at period t. The tax rate τ_t was calculated as the weighted average of the marginal tax rates of households, pension funds and insurance companies, with the marginal tax rate for households being calculated as the weighted average of the marginal tax rates of individual investors classified among five different income brackets. Data of tax rates comes from International Revenue Code and New York Exchange Fact Book. We estimate all the models from equation (9) to equation (15). The assumption of risk premium is adopted from Miles (1993) to be

$$\pi^i = c_b\beta^j + c_l L^j \quad , \qquad (16)$$

which is suggested by applying the result of Merton(1973).

We use the GMM (Generalized Method of Moments, ref. McCallum, 1976, Hansen, 1994, and Wickens, 1982) estimation method and it is more robust and efficient than the two-stage nonlinear least-square method used by Miles (1993). The covariance structure of the disturbance terms may be quite different from the i.i.d. assumption that is required in the two-stage nonlinear least-square method. For example, it is widely known that the industry factor may cause the stock prices of firms in the same industry to move together. Hence, the disturbance terms may not be independent across firms. Furthermore, heteroskedasticity may be present due to the large differences in the level of stock prices. As a result, we argue that the GMM method is more suitable for the estimation of this model. For details of the GMM estimator, see Hansen (1982). The instrumental variables were stock price, dividend per share, and earnings per share for five lag periods. All estimations are executed by TSP 4.3 program. Equations (9) to (13) include all the estimating methods in Miles (1993), and the results of estimation are shown in Tables 1 to 3, relative to Tables 3 to 5 in Miles' paper.

Table 1 presents estimation results of equations (9), (10) and (11). They are estimated only in year 1984, as in Miles (1993). The dependent variable P_{84} is the stock price in year 1984. Short termism is suggested by Miles (1993) if $a_0 > 0$ holds in equation (9). The estimation value $\hat{a}_0$ is -0.0876, with significant t-value -2.72. Thus, conversely long termism is suggested in equation (9). Estimations of equation (10) are also presented in Table 1. In this case short termism happens when α is greater than 1. Estimation value $\hat{\alpha}$ is 0.1046. Long termism happens in this case too, since $\hat{\alpha}-1$ is significantly less than zero. In Equation (11) short termism happens when $\lambda < 1$. Although the estimation value $\hat{\lambda}$ is 1.0178, greater than 1, it is not significantly less than 1. There is thus no significant evidence of short termism.

Table 2 and Table 3 are relative to the main results of Miles (1993). Equation (12) and equation (13) are estimated respectively. Data is used to estimate in each year from 1980 to 1988. In equation (12) Miles suggests that short termism exists when x is less than 1. From Table 2 we obtain the reverse result of long termism in each year. Since $\hat{x}$ is significantly greater than 1 in each year except year 1988 in which x is greater than 1 insignificantly, reverse long termism results are significantly suggested. In equation (13) Miles suggests that short termism happens when b is greater than 1. The estimation value $\hat{b}$ is significantly less than 1 for each year, so long termism is also suggested in this case.

The results in the previous 3 tables indicate that reverse long termism is suggested by Miles' method in the U.S. stock market. As we discussed early, Miles' method may produce potential ineffectiveness when over-valuation is considered. Short termism disappears since the effect of over-valuation dominates the estimation. It leads to reverse long termism results. This evidence provides us motivation to develop general models to consider over-valuation as well.

In our generalized framework the effects of over-valuation and short termism are separated. The main results are from the estimation of equation (14) and equation (15) and are presented in Table 4 and Table 5. In equation (14) short termism happens when b is greater than zero and over-valuation is suggested if $a+\frac{b}{i}\geq 1$ holds for each period i, with at least one inequality strictly holding. In each year, period i indicates the next i year, and the final period N refers to year 1989. We thus have a different number of independent variables. The result in year 1988 is not presented in Table 4 since there is the identification problem. Estimation value $\hat{b}$ is significantly greater than zero in each year, so short termism is suggested for each year.

In tables we only present the initial period $a+b$ and the final two periods $a+\frac{b}{N-1}$, $a+\frac{b}{N}$ for simplicity. If they are not less than 1 and at least one of them is strictly greater than 1, then we can conclude over-valuation for the monotone property of $a+\frac{b}{i}$. Over-valuation is suggested for each year from Table 4 because the estimation values $\hat{a}+\frac{\hat{b}}{i}$ for each period i are less than 1, with at least one inequality strictly holding. From the above discussion both short termism and over-valuation are suggested by Table 4. In equation (15) short termism happens when $q<0$ holds and over-valuation is suggested if $p+\frac{q}{i}-1\leq 0$ holds for each period i. From Table 4 the estimation value $\hat{q}$ is significantly less than zero and $\hat{p}+\frac{\hat{q}}{i}-1\leq 0$ holds for each period i with at least one inequality strictly holding significantly.

Next is the result for the US stock market in 1990s. Short termism is concluded in Table 7 and 8, with Model I and II, respectively. Whether the stock market is over-valuation or under-valuation could not determined by Model I, as shown in Table 7. However, we have obtained significant over-valuation by Model II, as in Table 8.

All results in our generalized framework suggest both short termism and over-valuations in the U.S. stock market during the 1980s. In contrast, reverse long termism results are obtained by Miles' method in the U.S. stock market, because the effect of over-valuation, which is ignored, dominates the effect of short termism.

4. Concluding Remarks

The hypothesis of rational expectations has been challenged in many theoretical studies, but there is still limited empirical literature which studies short termism directly. In this paper we modify Miles' (1993) empirical models to test short termism and over-valuation in the US stock market with a GMM method. We suggest that Miles' method may lead to ineffective estimations when the influence of over-valulation is considered. Miles' ignorance of over-valuation for testing for short termism leads to the reverse conclusion of a significant long termism result in the U.S. stock market during 1980s, the same period with his study, and 1990s as well. Empirical evidences suggest the existences of short termism and over-valuation in the U.S. stock market in our generalized models.

References

Conlisk, J., 1996. Why Bounded Rationality? Journal of Economic Literature 34, 669-700.

Grossman, S., Shiller, R.J., 1981. The Determinants of the Variability of Stock Market Prices. AEA Papers and Proceedings 71, 222-227.

Hansen, L.P., 1982. Large Sample Properties of Generalized Method of Moments Estimators. Econometrica 50, 1029-1055.

Harrison, M., Kreps, D., 1978. Speculative Investor Behavior in a Stock Market with Heterogeneous Expectation. Quarterly Journal of Economics 92, 323-336.

Jacobs, M.T., 1991. Short-Term America: The Causes and Curses of Our Business Myopia. Harvard Business School Press.

Jensen, M., 1978. Some Anomalous Evidence Regarding Market Efficiency. Journal of Financial Economics 6, 95-101.

Law, W.A., 1986. A Corporation is More than its Stock. Harvard Business Review, May-June, 80-83.

Marsh, P., 1993. Short-Termism. The New Palgrave Dictionary of Money and Finance, ed. by Newman, P., Milgate, M. and Eatwell, J.. The Stockton Press.

McCallum, B., 1976. Rational Expectations and the Natural Rate Hypothesis: Some Consistent Estimates. Econometrica 44, 43-52.

Merton, R.C., 1973. An Intertemporal Capital Asset Pricing Model. Econometrica 41, 867-887.

Miles, D., 1993. Test for Short Termism in the UK Stock Market. The Economic Journal 103, 1379-1396.

Miles, D., 1995. Test for Short Termism in the UK Stock Market: A Reply. The Economic Journal 105, 1224-1227.

Morris, S., 1996. Speculative Investor Behavior and Learning. Quarterly Journal of Economics 111, 1111-1133.

Narayanan, M.P., 1985. Managerial Incentives for Short-term Results. The Journal of Finance 40, 1469-1484.

Satchell, S.E., Damant, D.C., 1995. Test for Short Termism in the UK Stock Market: A Comment. The Economic Journal 105, 1218-1223.

Stein, J., 1988. Takeover Threats and Managerial Myopia. Journal of Political Economy 96, 61-80.

Timmermann, A., 1994. Can Agents Learn to Form Rational Expectations? Some Results on Convergence and Stability of Learning in the UK Stock Market. The Economic Journal 104, 777-97.

Wickens, M.R., 1982. The Efficient Estimation of Econometric Models with Rational Expectations. Review of Economics Studies 49, 55-67.

Table 1: Result I in Miles' Models

<table>
<tr><td colspan="7">Equation (9)
$$P_t^j = \alpha_0 + (1-\tau)\sum_{i=1}^{N}\frac{d_{t+i}^j}{(1+r_{t,t+i}+\pi^j)^i} + \frac{P_{t+N}^j}{(1+r_{t,t+N}+\pi^j+\alpha_0)^N} + \varepsilon_t$$
$$\pi^i = c_b\beta^j + c_l L^j$$
Short termism if $a_0 > 0$</td></tr>
<tr><td></td><td>$\hat{a}_0$</td><td>$\hat{\alpha}_0$</td><td>$\hat{c}_b$</td><td>$\hat{c}_l$</td><td>$\bar{\hat{\pi}}$</td><td>$\hat{a}_0$</td></tr>
<tr><td></td><td>-0.0876</td><td>-1.0838</td><td>0.0405</td><td>0.0913</td><td>0.0876</td><td>-0.0876</td></tr>
<tr><td>t-value</td><td>-2.72</td><td>-1.06</td><td>1.12</td><td>3.57</td><td></td><td>-2.72</td></tr>
<tr><td colspan="7">Equation (10)
$$P_t^j = \alpha_0 + (1-\tau)\sum_{i=1}^{N}\frac{d_{t+i}^j}{(1+r_{t,t+i}+\pi^j)^i} + \frac{P_{t+N}^j}{(1+r_{t,t+N}+\pi^j)^{N\cdot\alpha}} + \varepsilon_t$$
$$\pi^i = c_b\beta^j + c_l L^j$$
Short termism if $\alpha - 1 > 0$</td></tr>
<tr><td></td><td>$\hat{a}$</td><td>$\hat{\alpha}_0$</td><td>$\hat{c}_b$</td><td>$\hat{c}_l$</td><td>$\bar{\hat{\pi}}$</td><td>$\hat{a}-1$</td></tr>
<tr><td></td><td>0.1046</td><td>-0.7704</td><td>1.0481</td><td>1.1374</td><td>1.5913</td><td>-0.8954</td></tr>
<tr><td>t-value</td><td>4.61</td><td>-0.71</td><td>5.53</td><td>1.65</td><td></td><td>-39.50</td></tr>
<tr><td colspan="7">Equation (11)
$$P_t^j = \alpha_0 + (1-\tau)\sum_{i=1}^{N}\frac{d_{t+i}^j}{(1+r_{t,t+i}+\pi^j)^i} + \frac{\lambda\cdot P_{t+N}^j}{(1+r_{t,t+N}+\pi^j)^N} + \varepsilon_t$$
$$\pi^i = c_b\beta^j + c_l L^j$$
Short termism if $\lambda - 1 < 0$</td></tr>
<tr><td></td><td>$\hat{\lambda}$</td><td>$\hat{\alpha}_0$</td><td>$\hat{c}_b$</td><td>$\hat{c}_l$</td><td>$\bar{\hat{\pi}}$</td><td>$\hat{\lambda}-1$</td></tr>
<tr><td></td><td>1.0178</td><td>-2.6387</td><td>-0.0468</td><td>0.0455</td><td>-0.0181</td><td>0.0178</td></tr>
<tr><td>t-value</td><td>6.25</td><td>-2.63</td><td>-1.63</td><td>1.31</td><td></td><td>0.11</td></tr>
</table>

Note: The dependent variables are P_{84}, the stock price in year 1984.

Table 2: Result II in Miles' Models

Equation (12) $$P_t^j = \alpha_0 + (1-\tau)\sum_{i=1}^{N} \frac{x^i \cdot d_{t+i}^j}{(1+r_{t,t+i}+\pi^j)^i} + \frac{x^N \cdot P_{t+N}^j}{(1+r_{t,t+N}+\pi^j)^N} + \varepsilon_t$$ $$\pi^i = c_b\beta^j + c_l L^j$$ Short termism if $x-1<0$					
Year	$\hat{x}$	$\hat{\alpha}_0$	$\hat{c}_b$	$\hat{c}_l$	$\hat{x}-1$
1980	1.1426	-2.7538	0.0926	0.0723	0.1426
t-value	62.09	-1.90	3.64	3.92	7.75
1981	1.1276	-1.6849	0.0788	0.0689	0.1276
t-value	55.27	-1.53	2.86	3.95	6.25
1982	1.0638	-1.4745	0.0279	0.0410	0.0638
t-value	56.22	-1.69	1.25	3.02	3.37
1983	1.0827	-0.7033	0.0350	0.1117	0.0827
t-value	42013	-0.67	1.13	4.48	3.21
1984	1.0847	-0.9433	0.0466	0.1126	0.0847
t-value	33.44	-0.92	1.15	3.43	2.61
1985	1.1041	-1.6713	0.0511	0.1325	0.1014
t-value	33.51	-1.62	1.29	3.41	3.16
1986	1.1180	2.0753	0.0949	0.1006	0.1180
t-value	36.62	2.65	3.17	3.35	3.87
1987	1.1636	0.7595	0.1144	0.4220	0.1636
t-value	21.48	0.94	1.77	4.70	3.02
1988	1.0542	-0.5085	0.0563	0.2898	0.0542
t-value	20.44	-0.61	0.45	2.26	1.05

Table 3: Result III in Miles' Models

Equation (13) $$P_t^j = \alpha_0 + (1-\tau)\sum_{i=1}^{N}\frac{d_{t+i}^j}{(1+r_{t,t+i}+\pi^j)^{i\cdot b}} + \frac{P_{t+N}^j}{(1+r_{t,t+N}+\pi^j)^{N\cdot b}} + \varepsilon_t$$ $$\pi^i = c_b\beta^j + c_l L^j$$ Short termism if $b-1>0$					
Year	$\hat{b}$	$\hat{\alpha}_0$	$\hat{c}_b$	$\hat{c}_l$	$\hat{b}-1$
1980	0.1337	-3.3123	0.3437	0.5583	-0.8663
t-value	0.56	-2.62	0.35	0.34	-3.61
1981	0.1830	-2.0300	0.3732	0.4415	-0.8170
t-value	1.00	-1.96	0.58	0.60	-4.48
1982	0.4822	-1.4540	0.0634	0.0901	-0.5178
t-value	2.96	-1.65	0.85	1.55	-3.18
1983	0.2061	-0.6720	0.1951	0.7252	-0.7939
t-value	0.42	-0.56	0.23	0.27	-1.62
1984	0.1667	-0.8725	0.4305	1.0169	-0.8332
t-value	0.43	-0.90	0.26	0.26	-2.15
1985	0.0473	-2.3495	0.5855	5.9260	-0.9527
t-value	0.68	-2.15	0.64	0.31	-13.62
1986	0.1256	1.4970	1.0493	1.2600	-0.8744
t-value	3.61	2.05	2.33	1.44	-25.13
1987	0.1007	-0.7485	-0.4145	7.7808	-0.8993
t-value	1.92	-0.93	-1.09	1.06	-17.16
1988	0.0639	-1.0834	-0.3663	9.3718	-0.9361
t-value	0.35	-1.16	-0.12	0.16	-5.20

Table 4: Testing for short termism and over-valuation ---Model I in 1980s

Equation (14)

$$P_t^j = (1-\tau)\sum_{i=1}^{N}\frac{(a+b/i)\cdot d_{t+i}^j}{(1+r_{t,t+i}+\pi^j)^i}+\frac{(a+b/N)\cdot P_{t+N}^j}{(1+r_{t,t+N}+\pi^j)^N}+\varepsilon_t$$

$$\pi^i = c_b\beta^j + c_l L^j$$

Short termism if $b>0$

Over-valuation if $a+b/i-1\geq 0$ for all period i

Year	$\hat{a}$	$\hat{c}_b$	$\hat{c}_l$	$\hat{b}$	$\hat{a}+\hat{b}-1$	$\hat{a}+\frac{\hat{b}}{N-1}-1$	$\hat{a}+\frac{\hat{b}}{N}-1$
1980	2.1567	0.1181	0.2419	7.1181	8.2748	2.0464	1.9476
t-value	2.95	3.93	2.89	2.17	2.94	3.87	3.61
1981	1.4383	0.0766	0.1863	5.6967	6.1350	1.2521	1.1503
t-value	2.05	2.19	3.44	2.09	2.84	2.95	2.56
1982	0.2078	4.4849	-0.0371	4.8494	4.0571	0.0160	-0.0995
t-value	0.41	2.57	-0.92	2.57	2.89	0.07	-0.39
1983	0.1250	-0.0253	0.2225	5.9061	5.0311	0.3063	0.1094
t-value	0.1608	-0.49	3.50	1.98	2.25	1.23	0.34
1984	-0.3667	0.0050	0.3032	7.7966	6.4299	0.5824	0.1926
t-value	-0.45	0.10	3.41	2.50	2.75	2.63	0.6973
1985	-0.2910	0.0604	0.3568	8.1586	6.8676	1.4285	0.7486
t-value	-0.32	1.97	3.39	2.35	2.66	4.25	3.50
1986	-0.6156	0.0120	0.1515	4.9280	3.3124	0.8484	0.0271
t-value	-0.62	0.30	2.59	1.80	1.89	2.17	0.24
1987	-2.7968	0.0283	0.5646	7.9922	4.1954	4.1954	0.1993
t-value	-1.14	0.46	3.99	1.67	1.79	1.79	1.60

Note: The period $t+N$ in all the above estimating equations refers to year 1989.

Note: We do not present the estimation of the year 1988 because of the identification problem.

Table 5: Testing for short termism and over-valuation ---Model II in 1980s

Equation (15)

$$P_t^j = (1-\tau)\sum_{i=1}^{N}\frac{d_{t+i}^j}{(p+q/i+r_{t,t+i}+\pi^j)^i} + \frac{P_{t+N}^j}{(p+q/i+r_{t,t+N}+\pi^j)^N} + \varepsilon_t$$

$$\pi^i = c_b\beta^j + c_l L^j$$

Short termism if $q < 0$

Over-valuation if $p + q/I < 1$ for all period i

Year	$\hat{p}$	$\hat{c}_b$	$\hat{c}_l$	$\hat{q}$	$\hat{p}+\frac{\hat{q}}{1}-1$	$\hat{p}+\frac{\hat{q}}{N-1}-1$	$\hat{p}+\frac{\hat{q}}{N}-1$
1980	1.1004	0.0455	0.1208	-1.2111	-1.1108	-0.1510	-0.0342
t-value	22.48	2.33	5.18	-23.02	-279.02	-0.20	-0.79
1981	1.0951	0.0474	0.1229	-1.2157	-1.1206	-0.0786	-0.0569
t-value	31.42	2.64	8.45	-25.71	-62.27	-2.75	-1.94
1982	1.1964	-0.0369	0.0874	-1.1701	-0.9737	0.0014	0.0293
t-value	30.43	-1.52	6.03	-18.70	-26.21	0.04	0.90
1983	1.2070	-0.0198	0.1764	-1.2221	-1.0152	-0.0374	0.0033
t-value	24.50	-0.71	8.66	-19.54	-33.32	-0.97	0.08
1984	1.2991	0.0088	0.1928	-1.3790	-1.0799	-0.0456	0.0233
t-value	25.74	0.44	9.19	-27.20	-81.35	-1.19	0.57
1985	1.8594	0.0296	0.2483	-3.5745	-2.7151	-0.3321	-0.0342
t-value	21.59	1.50	9.31	-17.10	-21.69	-0.48	-0.95
1986	1.5631	-0.0035	0.1903	-1.5650	-1.0019	-0.2197	0.0414
t-value	24.16	-0.1683	7.62	-18.79	-35.54	-7.97	1.06

Note: The period $t+N$ refers to the final period 1989 in all estimations.

Note: There are identification problems in the years 1987 and 1988 due to not enough dependent variables.

Table 6: Testing for short termism and over-valuation ---Model I in 1990s

Equation (14) $P_t^j = (1-\tau)\sum_{i=1}^{N}\frac{(a+b/i)\cdot d_{t+i}^j}{(1+r_{t,t+i}+\pi^j)^i} + \frac{(a+b/N)\cdot P_{t+N}^j}{(1+r_{t,t+N}+\pi^j)^N} + \varepsilon_t$ $\pi^i = c_b\beta^j + c_l L^j$ Short termism if $b > 0$ Over-valuation if $a + b/i - 1 \geq 0$ for all period i							
Year	$\hat{a}$	$\hat{c}_b$	$\hat{c}_l$	$\hat{b}$	$\hat{a}+\hat{b}-1$	$\hat{a}+\frac{\hat{b}}{N-1}-1$	$\hat{a}+\frac{\hat{b}}{N}-1$
1990	-0.528	-0.0016	0.0014	7.293	5.765	-0.617	-0.72
t-value	-6.72	-0.19	0.39	14.03	12.9	-21	-22.7
1991	-0.635	-0.0046	0.007	7.758	6.12	-0.342	-0.527
t-value	-12	-2.52	2.65	24.24	22.69	-26.3	-42.6
1992	-0.513	-0.0036	0.0024	6.398	4.89	-0.447	-0.599
t-value	-9.13	-1.35	0.192	20.02	18.4	-33.8	-37.6
1993	-1.29	0.0016	0.0016	10.12	7.83	-0.268	-0.605
t-value	-15.9	3.72	3.72	24.18	23.09	-18.7	-35.4
1994	-1.873	0.0007	0.0007	11.17	8.299	-0.08	-0.64
t-value	-19.3	1.18	1.18	25.58	24.4	-4.47	-41.6
1995	-3.143	0.006	0.006	14.32	10.18	0.63	-0.562
t-value	-19.3	3.25	3.25	23.45	22.72	14.9	-36.9
1996	-4.96	0.0059	0.0059	16.28	10.32	2.18	-0.53
t-value	-16.4	2.19	2.19	18.74	18.17	16.1	-19.1
1997	-12.4	0.0013	0.0013	26.24	12.84	12.84	-0.28
t-value	-14.8	3.13	3.13	15.97	15.89	15.9	-8.17

Note: The period $t+N$ in all the above estimating equations refers to year 1999.

Note: We do not present the estimation of the year 1998 because of the identification problem.

Figure 1

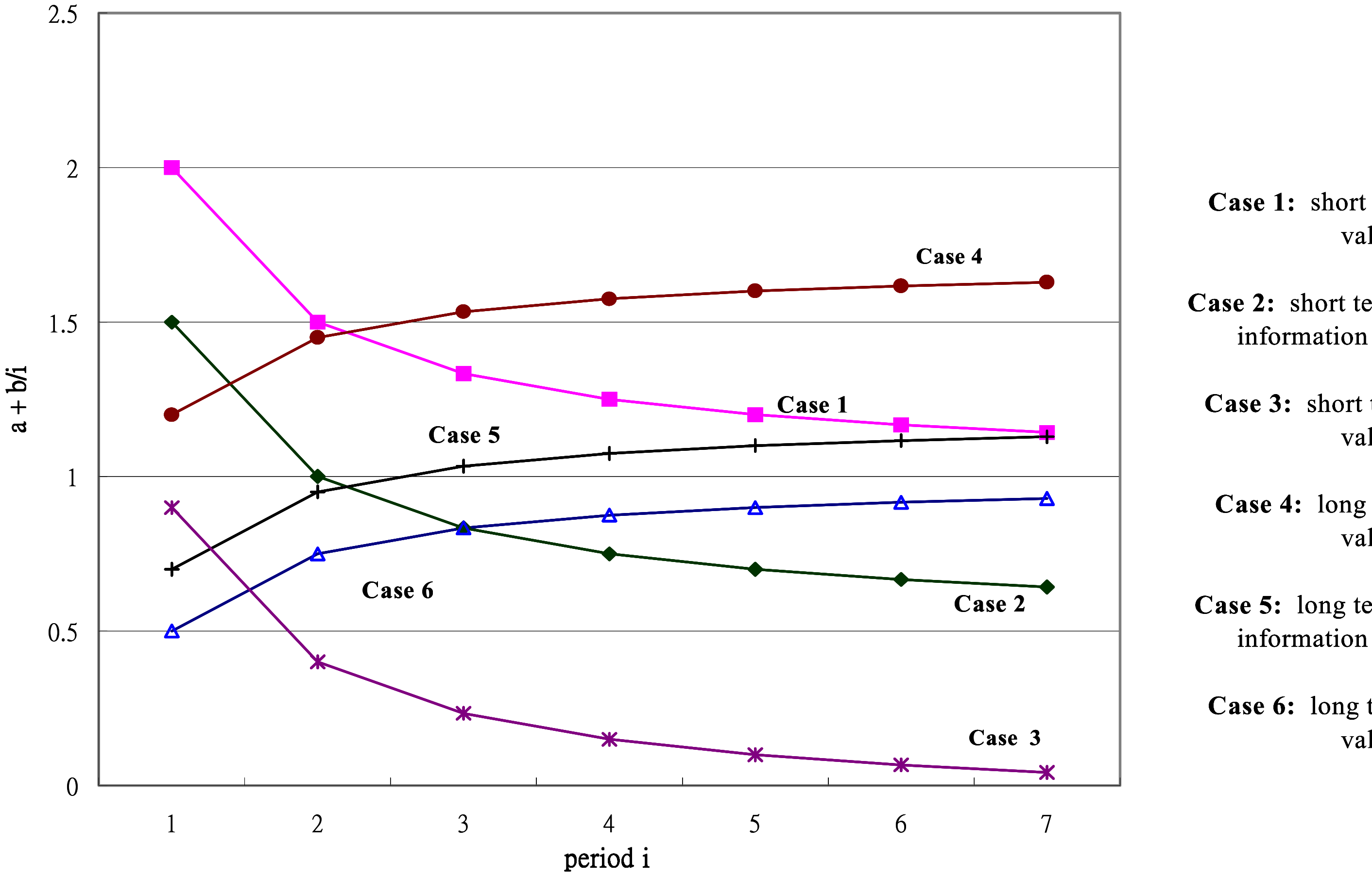


Table 7: Testing for short termism and over-valuation ---Model II in 1990s

Equation (15)

$$P_t^j = (1-\tau)\sum_{i=1}^{N}\frac{d_{t+i}^j}{(p+q/i+r_{t,t+i}+\pi^j)^i}+\frac{P_{t+N}^j}{(p+q/i+r_{t,t+N}+\pi^j)^N}+\varepsilon_t$$

$$\pi^i = c_b\beta^j + c_l L^j$$

Short termism if $q<0$

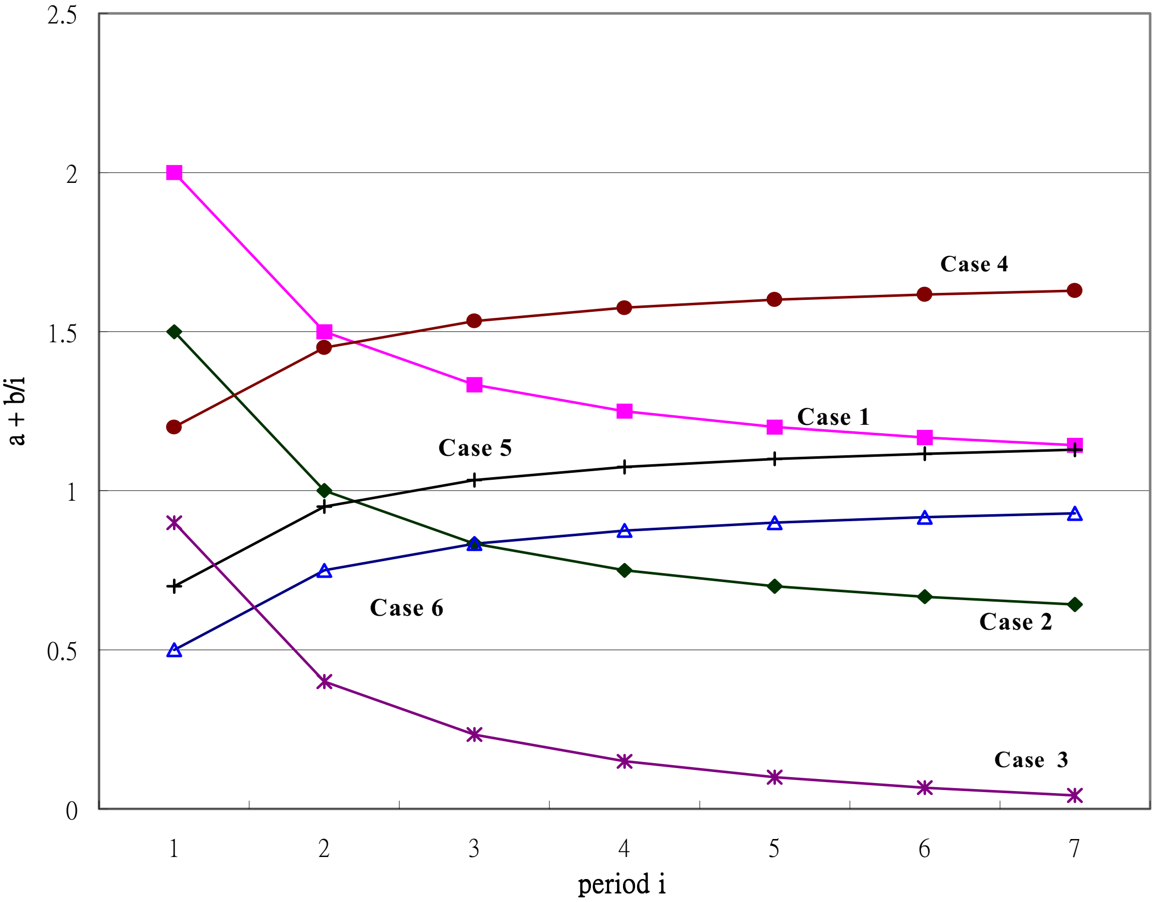
Over-valuation if $p+q/I<1$ for all period i

Year	$\hat{p}$	$\hat{c}_b$	$\hat{c}_l$	$\hat{q}$	$\hat{p}+\frac{\hat{q}}{1}-1$	$\hat{p}+\frac{\hat{q}}{N-1}-1$	$\hat{p}+\frac{\hat{q}}{N}-1$
1990	0.408	-0.11	0.0048	-1.29	-1.89	-0.754	-0.736
t-value	32.7	-14.1	2.54	-68	-144	-69	-66
1991	0.39	-0.7	0.011	-1.305	-1.91	-0.792	-0.769
t-value	56.6	-23	6.63	-119	-305	-139	-131
1992	0.39	-0.0065	-0.065	-1.24	-1.85	-0.816	-0.787
t-value	31.9	-5.16	-7.4	-87	-222	-78	-74
1993	0.389	-0.007	-0.0014	-1.32	-1.93	-0.875	-0.831
t-value	40.9	-3.95	-1.58	-103	-398	-123	-110
1994	0.538	-0.008	0.0047	-1.51	-1.97	-0.84	-0.76
t-value	44	-3.01	0.76	-103	-492	-97	-81

1995	0.64	-0.0014	0.0052	-1.62	-1.98	-0.899	-0.76
t-value	42	-1.42	2.42	-89	-460	-96	-70
1996	-6.59	-0.0052	0.0056	20.2	12.6	2.50	-0.86
t-value	-0.15	-0.33	1.8	0.16	0.15	0.12	-47

Note: The period $t + N$ refers to the final period 1999 in all estimations.

Figure 1



Case 1: short termism and
valuation

Case 2: short termism but no
information about valuati

Case 3: short termism and
valuation

Case 4: long termism and
valuation

Case 5: long termism but no
information about valuati

Case 6: long termism and
valuation

Note: There are identification problems in the years 1997 and 1998 due to not enough dependent variables.