Fundamental Stock Price and Investment

Changyong Rhee and Wooheon Rhee*

This paper examines the issue of whether a firm's investment decisions respond more to market fundamentals than to bubbles. Using firm level data from COMPUSTAT, we design various proxies for market fundamentals based on (i) the dividend approach, (ii) the dividend smoothing approach, and (iii) the earnings approach. From the aggregated micro data, we find that business investment responds more to market fundamentals than to bubbles. On the other hand, results from the panel regressions are inconclusive since most of the explanatory power of the investment regression is derived from the individual firm specific effect. (*JEL* Classification: E22)

I. Introduction

Stock prices and fixed investment should be closely related as long as stock market participants and corporate managers base their decisions on market fundamentals. Suppose, however, that stock prices are affected by irrational waves of optimism and pessimism, and do not solely reflect market fundamentals. When making investment decisions, should managers ignore stock prices if they believe that market prices deviate from fundamental values? As discussed in previous

*Department of Economics, Seoul National University, San 56-1, Shinrim-dong, Kwanak-ku, Seoul 151-742, Korea; Department of Economics, Kyung Hee University, 1 Hoeki-dong, Dongdaemoon-ku, Seoul 130-701, Korea. We would like to thank Olivier Blanchard, Larry Summers, seminar participants at the University of Rochester, Oberlin College and the AEA meetings. We are further grateful to William Brainard and Matthew Shapiro for providing us their RATS program for the construction of Tobin's q series and Thomas Cooley for letting us access COMPUSTAT Tapes at Simon School, University of Rochester. The detailed comments from anonymous referees are greatly appreciated. All the remaining errors are the authors' responsibility.
[**Seoul Journal of Economics** 1995, Vol. 8, No. 3]

studies (Galeotti and Schiantarelli 1990; Morck, schleifer, and Vishny 1990; Gilchrist and Himmelberg 1991; Blanchard, Rhee, and Summers 1993), the question raises many conceptual issues and theory alone does not provide an unambiguous answer. On the empirical side, the evidence is not clear either. In empirical studies, the use of a proxy for market fundamentals biases the estimates.[1]

This paper searches for clearer empirical evidence on the above question by exploring various measures of market fundamentals which are theoretically better founded than previous research. In measuring market fundamentals, three approaches are taken: (i) the dividend approach developed in Campbell and Shiller (1987, 1988); (ii) the dividend smoothing approach developed in Marsh and Merton (1986) and Mankiw, Romer, and Shapiro (1991); (iii) the earnings approach developed in Miller and Modigliani (1961).

Our empirical results are based on COMPUSTAT data of 297 companies existing between 1963 and 1988. From the aggregated micro data, we find that corporate managers respond more to fundamentals than to bubbles.[2] However, the explanatory power of bubbles is not negligible. The point estimates are significant, and its additional explanatory power is approximately one third of the power of market fundamentals. Whether this is due to a portion of market fundamentals not captured by our proxies, or a genuine effect of bubbles is an unsettled issue.

On the other hand, evidence from the panel regressions is inconclusive in clarifying the role of market fundamentals. In investment equations, the explanatory power of both fundamentals and bubbles is negligible, and most of the explanatory power is derived from the firm specific effect. The combined explanatory power of fundamentals and bubbles is at most eight percent. Before we have a theory of firm specific effects, we are reluctant to base our conclusions about the relative importance of fundamentals and bubbles on such small explanatory powers.

The rest of the paper is organized as follows. Section II lays out our test strategy. Various proxies of market fundamentals and the theories behind them are discussed in Section III. Section IV presents regression results and Section V concludes. The appendix, which is available

[1]The Euler equation testing strategy in Chirinko and Schaller (1991) is an exception.

[2]For brevity, "bubble" in this paper refers to any non-fundamental portion of stock prices, whether it is due to fads, rational bubbles, investors' sentiments, etc.

upon request, explains the construction of Tobin's q series and how we convert the book value of COMPUSTAT data into the replacement cost.

II. Test Strategy

What should managers do when stock price and perceived fundamentals differ? Detailed discussion of why theory provides an ambiguous answer can be found in Morck et al. (1990) and Blanchard et al. (1993). To resolve the question empirically, this paper considers a simple regression model in which investment responds to market fundamentals and/or bubbles.[3]

$$I/K = \alpha_1 + \beta F + \gamma B + u, \tag{1}$$

where F and B represent market fundamentals and bubbles, respectively. If F and B were observable, hypothesis testing would be simple. Under the hypothesis that managers respond only to market fundamentals (the managerial perception hypothesis), only F should be significant, i.e., $\beta > 0$ and $\gamma = 0$. Under the hypothesis that investments respond to the stock market valuation (the market perception hypothesis), which is the sum of F and B, both β and γ should have the same effect on investment, i.e., $\beta = \gamma > 0$.[4] We can also think of a weak version of the managerial perception hypothesis in which the managers respond more to market fundamentals than to bubbles, i.e., $\beta > \gamma > 0$. In this paper, we are more interested in testing the weak version of the managerial perception hypothesis.[5]

Unfortunately, F and B are unobservable. What we observe are the stock market's assessment of firms' investment (denoted by M) and a proxy for market fundamentals (denoted by T). Then, by definition,

$$M = F + B, \tag{2}$$

and

[3]Our regression equation is basically identical to the specification in Blanchard et al. (1993). The difference between our approach and those of Blanchard et al. is the method for constructing measures of market fundamentals. The specification in Morck et al. (1990) is very similar to the equation (1) in spirit. However, their specification is not based on the q theory of investment.

[4]Assume that each variable is log transformed so that coefficients β and γ measure elasticities which are independent of the units of F and B.

[5]It is our prior that the case $\beta < \gamma$ is highly implausible.

$$T = F + e, \tag{3}$$

where e represents measurement or specification error. Using the equations (2) and (3), we can rewrite the equation (1) to eliminate the unobservable F and B.

$$I/K = \alpha_1 + \alpha_2 T + \alpha_3 M + \upsilon, \tag{4}$$

where $\alpha_2 = \beta - \gamma$, $\alpha_3 = \gamma$, and $\upsilon = -(\beta - \gamma)e + u$.

Thus, by regressing I/K on M and T, we can test a weak version of the managerial perception hypothesis ($\beta > \gamma > 0$ or α_2, $\alpha_3 > 0$) versus the market perception hypothesis ($\beta = \gamma > 0$ or $\alpha_2 = 0$ and $\alpha_3 > 0$) by examining the signs of the estimated coefficient α_2. However, in the equation (4), T is correlated with υ and the estimated coefficient α_2 could be biased. Under the market perception hypothesis that $\beta = \gamma$, the estimated coefficients are unbiased, but under the (weak version of the) managerial perception hypothesis, they are downwardly biased. Therefore, if the estimated coefficient of α_2 is significantly positive, the result reinforces the conclusion for the weak version of the managerial perception hypothesis. On the other hand, if the point estimate of α_2 is not significantly different from zero, our approach cannot provide a conclusive answer. It can be either due to a portion of fundamentals which is not captured by the proxy T, or a genuine effect of bubbles. Within this limitation, we examine various proxies for market fundamentals.

III. Construction of Market Fundamentals

In estimating the equation (4), we construct "Tobin's q" and "fundamental q" as a proxy for market valuations and market fundamentals, respectively. To construct the fundamental q series, we first estimate the fundamental stock prices based on three different approaches. The estimated fundamental stock prices allow us to calculate the fundamental equity value of a firm. The fundamental debt value of a firm is assumed to be equal to its market value.[6] Then, the fundamental q is defined as the ratio of the sum of the fundamental value of equity and debt to the replacement cost of capital. In contrast, Tobin's q measures the ratio of the sum of the market value of equity and debt to the

[6]This assumption seems to be innocuous. Since bonds have fixed maturities and their dividends (coupons) are known *a priori*, there exists little room for bubbles in bond prices.

replacement cost of capital.

A. The Dividend Approach

A simple present value model describes fundamental stock prices as the present value of expected future dividend payments:

$$P_{t,i} = \sum_{j=0}^{\infty} \delta^{j+1} E_t D_{t+1+j,i}, \tag{5}$$

where δ is the discount factor, E is the mathematical expectations operator, $D_{t,i}$ is the dividend per share during the year t, and $P_{t,i}$ is the stock price of firm i at the end of the year t. To simplify the notation, the subscript i will be omitted in the rest of the paper unless it is required. When D_t is first difference stationary, Campbell and Shiller (1987, 1988) show that the present value model (5) implies that P_t and D_t are cointegrated and satisfy the relation

$$S_t \equiv P_t - \left(\frac{\delta}{1-\delta}\right) D_t = \left(\frac{\delta}{1-\delta}\right) \sum_{j=0}^{\infty} E_t(\delta^{j-1} \Delta D_{t+j}). \tag{6}$$

The right hand side of the equation is the weighted average of expected future changes in dividends and will be denoted as S_t hereafter. To derive fundamental stock prices using the equation (6), we first estimate S_t by assuming that a column vector $X_t \equiv [\Delta D_t, S_t, O_t]$ follows a second order VAR. O_t denotes other potential predictors of future changes in dividends such as earnings and interest rates. Then, in a succinct companion form, the above assumption can be written as

$$Z_t = AZ_{t-1} + u_t, \tag{7}$$

where $Z_t \equiv [\Delta D_t, \Delta D_{t-1}, S_t, S_{t-1}, O_t, O_{t-1}]$.

The vector autoregressive process (7) implies that

$$E_t[\delta^{j-1} \Delta D_{t+j}] = \delta^{j-1}\, e1' A^j Z_t, \tag{8}$$

where $e1$ is a column vector whose number of elements is equal to the number of variables in Z_t, and all the elements in $e1$ are zero except for the first element, which is unity. Then, the weighted average of expected future changes in dividends S_t, in (6) can be represented as;

$$S_t = \left(\frac{\delta}{1-\delta}\right) \cdot e1' \; A[I - \delta A]^{-1} Z_t. \tag{9}$$

By substituting $\hat{A}$, an unrestricted VAR estimate of the companion matrix A, into (9), we can get $\hat{S}$ which denotes the estimate of S. Then, from the equation (6), our fundamental stock prices P can be estimated by;

$$\hat{P}_t = \hat{S}_t + \left(\frac{\delta}{1-\delta}\right) D_t. \tag{10}$$

By multiplying $\hat{P}_t$ with the number of outstanding shares, we estimate the fundamental value of equity, which is a part of the numerator in deriving the fundamental q series. In our empirical implementation, the BAA rate and earnings per share variable are included in the VAR analysis as O_t, along with dividends per share and stock prices to reflect the cost of capital and the ability of earnings to forecast changes in dividends. For the discount factor δ_i, we use the average real return of holding company i's stock. Using the PPI as a price index, the average return for the whole sample is 7.48 percent.[7]

B. The Earnings Approach

Whether earnings or dividends determine the underlying value of a firm is a controversial issue in finance. Miller and Modigliani (1961) show a case where the underlying value of a firm is determined by earnings, independently of the dividend payments. Under their assumptions, the value of equity is given by;

$$V_t = \sum_{j=0}^{\infty} \delta^{j+1} E_t(\varepsilon_{t+j+1} - I^n_{t+j+1}), \tag{11}$$

where ε_t and I^n_t are earnings and net investment, respectively.[8] We apply the same cointegrated VAR method adopted in the dividend approach to the equation (11). In other words, we assume that $X_t \equiv \{\Delta(\varepsilon_t - I^n_t),\ V_t - \delta(\varepsilon_t - I^n_t)/(1-\delta)\}$ follows a second order VAR and forecasts the future changes in $(\varepsilon_t - I^n_t)$. Using the unrestricted VAR estimates,

[7]Using the CPI as a price index, the corresponding figure is 4.03 percent. Choosing high discount rate versus low discount rate is one of the central issues in the debate on stock market volatility (Campbell and Shiller 1987). It did not, however, qualitatively affect our empirical results. Campbell and Shiller (1987) use the discount rate inferred from the cointegration regression. Their method was not applicable to our firm level data since the estimated discount rates were negative for one fifth of the data set.

[8]Since our earnings variable does not include interest payments on bonds, equation (11) measures the value of equities instead of the value of a firm.

the fundamental value of equity is calculated as in the equation (9). Note that V_t and ε_t are total, *not per share*, values. Therefore, this approach estimates the fundamental value of equity of a firm directly rather than estimating the fundamental stock prices.

C. The Dividend Smoothing Approach

This section extends the dividend approach described in Section III.A by introducing a specific assumption on dividend payment policy. As in Marsh and Merton (1986) and Mankiw, Romer, and Shapiro (1991), we assume that managers change dividends only when permanent earnings change and that the actual change in dividends is represented as a proportion of the desired change;

$$\Delta D_t = a + (1 - \mu)(\rho\eta_t - D_{t-1}) + \zeta_t, \tag{12}$$

where ρ and μ are the long-run target payout ratio and the speed of adjustment, respectively, and η_t is the earnings per share during the year t. We assume that the earnings process, η_t, follows a logarithmic random walk. Then by incorporating the dividend process (12) into the simple present value model in the equation (6), the fundamental stock price can be derived as;

$$P_t = \delta\left\{\frac{\mu}{1-\delta\mu}(D_t - \rho\eta_t) + \rho\eta_t\frac{1}{1-\delta}\right\}. \tag{13}$$

In our sample, the *mean* of the speed of adjustment and the target payout ratio turn out to be 0.9 and 0.6, respectively. These figures are similar to those estimated by Fama and French (1988) using the CRSP data.

IV. Empirical Evidence

Our sample consists of the 297 companies on the COMPUSTAT tape from 1963 through 1988. After adjusting for the lead and lags in the VAR, the sample period covers 1966 to 1987. In the appendix, available upon request, we describe our sample exclusion criteria, definitions of the variables, and the construction of Tobin's q series.[9]

[9]Brainard and Shapiro kindly provided their RATS program for the construction of Tobin's q. Our construction is based on their method with minor modifications.

TABLE 1
DESCRIPTIVE STATISTICS

	Total Sample
Number of firms	297
mean $q1$	1.32(1.33)
mean $q2$	1.38(1.32)
mean $q3$	0.48(0.77)
mean $q4$	1.50(2.07)
mean Investment/K	0.10(0.05)
mean net cash flow/K	0.06(0.03)
mean debt/K	0.25(0.20)
mean dividend/K	0.03(0.05)
mean earnings/K	0.08(0.10)
mean dividend/earnings	0.48(0.63)

1. Figures in parenthesis are standard errors.
2. All variables are evaluated by market values, not book values.
3. $q1$: Tobin's q.
   $q2$: fundamental q from the dividend approach.
   $q3$: fundamental q from the dividend smoothing approach.
   $q4$: fundamental q from the earnings approach.

Some descriptive statistics are reported in Table 1.[10] The variable $q1$ denotes Tobin's q, $q2$, $q3$, and $q4$ are the fundamental q series based on the dividend approach, the dividend smoothing approach, and the earnings approach, respectively. The time series of the cross section average of each q series are plotted in Figure 1. All of them exhibit downward trends during the 1970s and mixed behavior in the 1980s. The downward trend of the 1970s may be due either to the slow decay of bubbles or fundamentals. However, many economists believe that the downward trend in the 1970s is due to the decline of market fundamentals caused by oil shocks. The correlation coefficients between Tobin's q and $q2$, $q3$, $q4$ are 0.77, 0.27, and 0.61, respectively.[11]

[10] To check for possible sample selection bias, we compare the time series of our micro data with the Flow of Funds data used in Blanchard et al. (1993). The correlation coefficient between the cross section average of our micro $q1$ and its macro counter part is 0.83. The correlation between micro and macro investment capital ratios is 0.76.

[11] The low mean of $q3$ might be understood by observing the extremely smooth behavior of $q3$ in Figure 1. In estimating $q3$, we explicitly incorporate the dividend smoothing hypothesis. As a result, $q3$ is the smoothest series among them, implying that investors might regard $q3$ as being the safest investment project

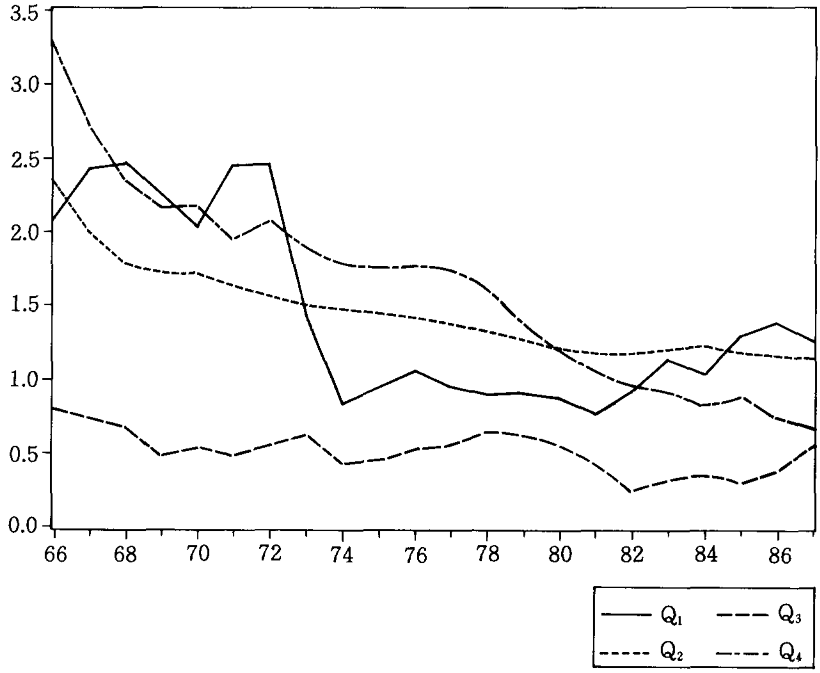

FIGURE 1

Table 2 compares the performance of our fundamental q series in explaining investment. To compare our results with those based on macro data (Blanchard et al. 1993), we first estimate investment equations using the aggregated micro data.[12] Regressions are run in the first difference of logarithms, since disturbance terms are highly correlated in level specification.[13] Recall that our hypothesis test needs logarithmic specification, not the level specification, for the coefficients of the regressions to be independent of the size of regressors. In order to

among the various q's. It implies that the risk premium for $q3$ should be small, relative to the risk premium for other fundamental q's. However, we applied the same discount factor. This suggests that the discount rate applied to the construction of $q3$ is overvalued, and, accordingly, the mean of $q3$ is undervalued.

[12]The aggregated micro data refer to the sample averages of firm level data in each year. Using the aggregate micro data has the advantage that we can exploit the better information available at firm level such as individual stock prices.

[13]Schaller (1990) shows that aggregation, rather than dynamic misspecification, is largely responsible for the high serial correlation found at the aggregate level.

TABLE 2

REGRESSION WITH THE AGGREGATED MICRO DATA

Dependent Variable: $\Delta\log(I(t+1)/K(t))$ Sample Period: 1967-87

Independent Var:	1	2	3	4	5	6	7
$\Delta\log(q1(t))$	0.33				0.31	0.30	0.32
	(0.13)				(0.14)	(0.11)	(0.12)
$\Delta\log(q2(t))$		0.96			0.44		
		(0.95)			(0.90)		
$\Delta\log(q3(t))$			0.31			0.29	
			(0.11)			(0.09)	
$\Delta\log(q4(t))$				0.71			0.67
				(0.39)			(0.34)
R^2	0.24	0.05	0.30	0.14	0.25	0.50	0.37
D.W.	1.68	2.16	2.22	2.01	1.92	1.94	1.92

1. Figures in parenthesis are standard errors.
2. Constant terms are not reported.
3. $q1$: Tobin's q.
   $q2$: Fundamental q from the dividend approach.
   $q3$: Fundamental q from the dividend smoothing approach.
   $q4$: Fundamental q from the earnings approach.

consider a time to build and to avoid simultaneity problems, investment to capital ratio during year t is regressed on market q or fundamental q variables at the end of year $t-1$. Including more lagged independent variables, or including current independent variables and running instrumental variable regressions, leave the main results unchanged. The results reported in the first four columns show that the fundamental q series perform reasonably well, except the dividend based $q2$ which is too smooth to explain the highly volatile investment process. This finding is analogous to the well known result that actual stock prices are too volatile to be explained by a simple present value model in the equation (6) (Campbell and Shiller 1987, 1988). Among the q series, $q3$ which is based on the dividend smoothing approach, performs best.

In the last three columns in Table 2, we test the main hypothesis of this paper by comparing the relative performance of Tobin's q and fundamental q series in explaining investment. The OLS regression results show that the coefficients of both the fundamental q variables and the market q are significantly positive, except for the fundamental q based on the dividend approach ($q2$). Considering a possible downward bias due to measurement error, the positive coefficients of $q3$ and $q4$ variables provide evidence favoring the hypothesis that investment responds more to market fundamentals. However, after controlling for $q3$ and $q4$, the effect of the market q is significant, indicating that bubbles still have some effect on investment.[14] Whether this is due to a portion of market fundamentals not captured by our proxies, or a genuine effect of bubbles is an unsettled issue.[15] In summary, these results are qualitatively the same as those found in the previous literature based on NIPA and Flow of Funds data.

Surprisingly, however, the results are drastically different at the firm level compared with the results form the aggregated micro data. In Table 3, we report the results from the panel regressions with time invariant firm-specific effects (the 'fixed effects' model).[16] Since our test needs a logarithmic specification, the data includes 187 companies after excluding all the firms that have observations of negative q's. The first four columns compare the individual performance of Tobin's q and fundamental q series. The fundamental q variables perform well when they enter panel regressions without Tobin's q: the coefficients of the fundamental q variables, including $q2$, are significantly positive and their R^2's are comparable with those of Tobin's q. The last three columns in Table 3 show that the estimated coefficients of the market q are still positive and significant whereas the estimated coefficients of the fundamental q variables become marginally negative when Tobin's q is also included in the panel regressions. These results seem to support the market perception hypothesis and are in sharp contrast to the evidence from the aggregated micro data.

However, interpretation of the results is not so simple. The regression equation (1) in the paper has the (nonlinear) generated regressor problem because of the cointegrated VAR method employed in generating the fundamental value of stock prices.[17] Consider a person who believes the market perception hypothesis to be true. Then, estimated

[14]In fact, the additional explanatory power of the market q is impressive: even after controlling for the market fundamentals, $q3$, the market q variable increases R^2 by 20 percent, which is 40 percent of total R^2.

[15]This may be also due to fundamental misspecification in the model so that marginal and average q are not equal. If marginal and average q are not equal then the fundamentals and stock prices may provide separate information and be significant in the investment regressions.

[16]The 'random effect' model provides the qualitatively same results.

TABLE 3
PANEL REGRESSION WITH FIXED EFFECTS

Dependent Variable: $\Delta\log(I(t+1)/K(t))$ Sample Period: 1967-87

Independent Var:	1	2	3	4	5	6	7
$\log(q1(t))$	0.25				0.27	0.24	0.29
	(0.02)				(0.02)	(0.02)	(0.02)
$\log(q2(t))$		0.11			−0.07		
		(0.03)			(0.04)		
$\log(q3(t))$			0.13			−0.02	
			(0.03)			(0.03)	
$\log(q4(t))$				0.04			−0.10
				(0.02)			(0.02)
R^2							
Fixed Effect Only:	0.36	0.36	0.36	0.36	0.36	0.36	0.36
Indep. Variables:	0.08	0.05	0.01	0.04	0.08	0.08	0.08
Total:	0.39	0.37	0.37	0.36	0.39	0.39	0.39

1. Figures in parenthesis are standard errors.
2. Constant terms are not reported.
3. $q1$: Tobin's q.
   $q2$: Fundamental q from the dividend approach.
   $q3$: Fundamental q from the dividend smoothing approach.
   $q4$: Fundamental q form the earnings approach.

coefficients would be unbiased estimates of true parameters, and the evidence from the panel regression would confirm his prior. On the other hand, suppose that one believed that the managerial perception hypothesis were true and the constructed fundamental q's do not reflect all the information about fundamentals. Then, one could interpret the results of panel regressions as still supporting the managerial hypothesis, since the negative estimated coefficients of fundamental q's may be due to the downward bias discussed in Section II. Thus, while we wish it were otherwise, the conclusions reached depend on one's initial prior.

[17]If measurement errors are different across firms, the heteroskedasticity problem may arise. We estimated White's (1984) autocorrelation heteroskedasticity consistent standard errors and found that there were no qualitative differences. However, it is important to understand that correcting for heteroskedasticity cannot solve the intrinsic problem, i.e., the simultaneity problem. Therefore, for simplicity, we just report the results from the OLS.

However, we have serious doubts on the power of our tests in the panel regressions. The R^2's in Table 3 show that the explanatory power of Tobin's q, not to mention proxies for market fundamentals. is negligible in panel regressions. Even though the total R^2's are fairly high (39 percent), the explanatory power is derived mainly from individual firm specific dummies as shown at the bottom of the table. The incremental explanatory power of all other variables, including Tobin's q, is less than 8 percent. Including more lagged independent variables does not help significantly.[18] As explained in Schaller (1990), the low explanatory power of q theory at the firm level may reflect aggregation bias arising from incorrectly assuming that all firms have the same adjustment cost function. If the adjustment cost parameters are firm specific, the coefficient of q should vary over firms. Though not reported, however, we find that allowing heterogeneity in adjustment cost parameters does not improve average R^2 in our regressions.

Finding low R^2 in panel regressions is not uncommon. For example, Morck et al. (1990) notice that "Because investment is extraordinarily volatile, especially at the micro level, even fairly large regression estimates of the marginal effect of stock returns on investment do not amount to explaining much of the variation of investment." Therefore, one may say that one does not need to worry about the low R^2 in the panel regressions. But, we think, it is particularly problematic to our methodology which tries to break the explanatory power of Tobin's q into two parts; fundamentals and bubbles. The low R^2 is evidence of the low power of our tests and we are reluctant to compare the relative importance of fundamentals and bubbles based on such a small explanatory power.

V. Conclusion

In making investment decisions, do managers follow the signals given by the stock market even if their own valuation of the investment project does not coincide with the stock market valuation? The previous literature on this topic finds ambiguous answers, and their use of theoretical proxies for market fundamentals has been criticized as possible reasons for the ambiguity. This paper searches for clearer evidence by investigating theoretically rigorous procedures for separating funda-

[18] Schaller (1990) also reports that the incremental explanatory power of Tobin's q in his panel regressions for investment is between 4 to 7%.

mentals and bubbles.

From the aggregated COMPUSTAT micro data, we find evidence that corporate managers respond more to market fundamentals than to market valuations. Results from the panel regressions, on the other hand, do not support the above conclusion. However, we believe our test is not powerful at the firm level considering the poor performance of a standard q theory in explaining investment. In investment equations, the explanatory power of both fundamentals and market valuations is negligible. Since most of the explanatory power of the investment regression is derived from the individual firm specific effect, we are reluctant to form any conclusion at the individual firm level.

(Received February, 1995; Revised September 1995)

References

Blanchard, Olivier J., Rhee, Changyong, and Summers, Lawrence H. "The Stock Market, Profit and Investment." *Quarterly Journal of Economics* 108 (February 1993): 115-36.

Brainard, William C., Shapiro, Matthew D., and Shoven, John B. "Fundamental Value and Market Value." mimeo, Yale University, 1990.

Campbell, John Y., and Shiller, Robert J. "Cointegration and Tests of Present Value Models." *Journal of Political Economy* 95 (October 1987): 1062-88.

____________. "Stock Prices, Earnings, and Expected Dividends." *Journal of Finance* 43 (July 1988): 661-76.

Chirinko, R.S., and Schaller, H. "Bubbles, Fundamentals, and Investment: A Multiple Equation Testing Strategy." mimeo, University of Chicago Business School, 1991.

Fama, Eugene F., and French, Kenneth R. "Dividend Yields and Expected Stock Returns." *Journal of Financial Economics* 22 (October 1988): 3-25.

Galeotti, M., and Schiantarelli, F. "Stock Market Volatility and Investment: Do Only Fundamentals Matter?" mimeo, Boston University, 1990.

Gilchrist, Simon, and Himmelberg, Charles. "Tobin's Q, Fundamental Q, and Corporate Investment: A Comparison using panel Data." mimeo, New York University, 1991.

Mankiw, N.G., Romer, David, and Shapiro, M.D. "Stock Market Forecastablility and Volatility: A Statistical appraisal." *Review of Economic Studies* 58 (May 1991): 455-77.

Marsh, Terry A., and Merton, Robert C. "Dividend Variability and Variance Bounds Tests for a Rationality of Stock Market Prices." *American Economic Review* 76 (June 1986): 483-503.

Miller, Merton H., and Modigliani, Franco. "Dividend Policy, Growth, and the Valuation of Shares." *Journal of Business* 34 (October 1961): 411-33.

Morck, Randall, Shleifer, Andrei, and Vishny, Robert W. "The Stock Market and Investment: Is the Market a Sideshow?" *Brookings Papers on Economic Activity* 2 (1990): 157-215.

Schaller, Huntley. "A Re-Examination of the Q Theory of Investment using U.S. Firm Data." *Journal of Applied Econometrics* 5 (1990): 309-25.

White, Halbert. *Asymptotic Theory for Econometricians*, New York: Academic Press. 1984.