Stock Prices and Economic Growth in the UK, 1949-99

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ABSTRACT

There are widely varying perspectives on the relationship between stock market fluctuations and economic growth. Clearly shares are an important component of capital markets and capital markets are important to investment and economic growth. But the large secondary market in shares clouds the relationship. To theorists attracted by the notion of information efficiency in financial markets the stock market acts as something of a barometer, centralising information from multifarious sources on the state of the economy; share prices tend to anticipate changes in economic growth. Others, less enamoured by the efficiency of financial markets, see share prices as more reactive to past events in the real sector.

This study examines both perspectives in the context of the UK economy, testing a mediating mechanism between the share market and the real sector proposed by Shaikh (1995). This focuses on changes to the discount rate associated with short-term profitability rather than the lifetime perspective favoured by most fundamentalist approaches.

Regression analysis of UK national accounts and FTSE annual data for the 1949-99 period provides support for this proposition, with the relationship between share price movements and economic growth strongly mediated by the incremental profit rate in the real sector.

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There are widely varying perspectives on the relationship between stock market fluctuations and economic growth. Clearly shares are an important component of capital markets and capital markets are important to investment and economic growth. But the large secondary market in shares clouds the relationship. To theorists attracted by the notion of information efficiency in financial markets the stock market acts as something of a barometer, centralising information from multifarious sources on the state of the economy; share prices tend to anticipate changes in economic growth. Others, less enamoured by the efficiency of financial markets, see share prices as more reactive to past events in the real sector. This study examines both perspectives in the context of the UK economy. In particular a mediating mechanism between the share market and the real sector proposed by Shaikh (1995) is tested.

Capital markets are critical sources of investment for business, and consequently economic, growth. As Table 1 demonstrates, large amounts of funds are raised by British firms from equity and bond markets, £35.2 billion in 2002 alone. While varying greatly from year to year, generally half of these capital market funds come from the issue of ordinary shares.

Yet the funds raised from capital markets by firms comprise only a small proportion of their total capital funding. Retained earnings and borrowing from banks are much more significant sources of funds for businesses, accounting generally for approximately 80% of total capital funding (Howells & Bain, 2000). Further, business investment is only a minor outcome of the activity in capital markets. The vast bulk of activity in the share market, for example, is secondary market trading of already issued shares, as shown in Table 2. The relationship between capital markets and business investment, and thus economic growth, then, appears rather tenuous.

Yet, as Howells and Bain (2000) note, despite the weakness of direct relationships between capital markets and business investment there are powerful indirect influences. In particular, alternative sources of funds remain in competition with

Table 1. Net amount raised by UK borrowers in sterling capital markets, 1986-2002, £m

Year	*Ordinary Shares*	*Preference Shares*	*Bonds & Notes*	*Total*	*Ordinary/ Total*
1986	7675	70	6692	14437	53%
1987	15390	823	4401	20614	75%
1988	5614	817	8446	14877	38%
1989	3457	858	11320	15635	22%
1990	3405	554	7381	11340	30%
1991	10849	978	9367	21194	51%
1992	5939	220	6043	12202	49%
1993	16652	837	9482	26971	62%
1994	14064	603	6265	20932	67%
1995	9777	2067	23	11867	82%
1996	9934	651	6380	16965	59%
1997	8093	-417	6802	14478	56%
1998	4505	-483	8011	12033	37%
1999	8804	-575	17292	25521	34%
2000	19345	21	17657	37023	52%
2001	18347	695	22604	41646	44%
2002	16391	150	18659	35200	47%

Source: Office of National Statistics, Time Series Data, Series fsf: 6.2G: DELU – DELY. Available: http://www.statistics.gov.uk/statbase/TSDtimezone.asp. After Howells & Bain (2000, p. 170).

Table 2. Issues of Ordinary Shares and Stock market Turnover, 1998-2002, £m

Year	*Gross Issues of Ordinary Shares*	*Total Turnover*	*Issues / Turnover*
1998	4637	2985464	0.0016
1999	10127	2938000	0.0034
2000	19517	3587906	0.0054
2001	18734	4046301	0.0046
2002	16391	4034451	0.0041

Source: Office of National Statistics, Time Series Data, Series fsf: 6.2A: DEBV and fsf: 6.3A: ARVB. Available: http://www.statistics.gov.uk/statbase/TSDtimezone.asp. After Howells & Bain (2000, p. 182).

funding from capital markets. Firms evaluate the use of retained earnings for investment against the yields available from placing these funds in capital markets. Similarly, borrowing from banks for investment is attractive only when the costs of this are less than those from the issue of securities in capital markets. Thirdly, share prices influence investment decisions whenever corporate acquisition is cheaper than new investment in plant and equipment (Keynes, 1936). Further, revaluation of corporate pension liabilities in response to share price movements affects the amount of retained earnings available for investment (Mahdavi & Sohrabian, 1991).

So investment rates are likely to be strongly influenced by capital market yield rates even if a firm does not make direct use of these as a source of funds. This may be exacerbated by the liquidity of the secondary market: greater volumes traded lower the unit cost of trading and thus increases the opportunity cost of retained or banked funds, making these more responsive to stock market returns. Further, in a liquid stock market, because it is easy to trade shares, it is less risky to make funds available, increasing the availability of funds for long-term investment and at a lower cost. Thirdly, a liquid equities market is likely to force business investment; firms that do not match the shareholder returns of other companies are likely to find themselves subject to takeover and managers replaced (Howells & Bain, 2000; Levine, 1996). However, more liquid markets may reduce the incentives for investors to monitor the use of funds, allowing greater scope for inefficient investment and thus weakening the relationship between share prices and economic growth (Shleifer & Vishy, 1986; Bhide, 1993; both cited by Levine & Zervos, 1998).

More broadly, returns from capital markets provide a source of income and financial assets a source of wealth. The capital markets generate income and wealth effects which influence demand, confidence and willingness to lend or borrow. These have indirect effects on business investment and economic growth (Howells & Bain, 2000).

A close relationship between capital markets and economic growth is implicit in the notion of financial development (Schumpeter, 1911; McKinnon, 1973; Shaw, 1973). Sophisticated, efficient financial systems, including liquid share markets, have been found associated with investment, productivity and economic growth in a number of cross-national studies (see Atje & Jovanovic, 1993; King & Levine, 1993; Levine, 1996; Levine & Zervos, 1996, 1998). Levine (1996) found share market liquidity, but not size or volatility, associated with economic growth. Further Levine and Zervos (1998) found share prices more strongly associated with indicators investment and productivity than with economic growth itself, suggesting share prices lead rather than reflect growth.

But the methodology of cross-country regression used in such studies is widely criticised, prioritising cross-country ‘average’ commonalities over individual differences and being highly sensitive to small variations in conditioning information

and the heterogeneity of coefficients across countries (Arestis & Demetriades, 1997; Demetriades & Hussein, 1996). With a minor modification of Atje and Jovanovic's (1993) methodology, for example, Harris (1997) found only weak evidence of a relationship between stock market activity and investment and only for developed countries. Similarly, using King and Levine's (1993) own data, Arestis and Demetriades (1997) found the contemporaneous relationship between their proxy for financial development and growth stronger than a lagged relationship, which would not be expected from a causal relationship.

The relationship between capital markets and economic growth more directly underlies the inclusion of share price movements in the U.S. Index of Leading Indicators and other such series (Mahdavi & Sohrabian, 1991). US share price movements have been found to lead economic growth positively and significantly (Barro, 1989; Fisher & Merton, 1984; Peek & Rosengren, 1988; all cited by Mahdavi & Sohrabian, 1991). Mahdavi & Sohrabian (1991) employ a Granger-causality test to determine the direction of causation between share prices and GNP growth in the US economy, finding that changes in share prices are more predictive of changes in economic growth than are past changes in economic growth, with no reverse causation.

Yet finance theory conceives share prices as fundamentally reflecting *expectations* of future corporate earnings, rather than driving these. While share prices may vary, buyers and sellers of shares will tend to converge around the "fair price", reflecting expectations of dividends paid to the shareholder (Blake, 2000).

The return from shares is actually a function of dividends paid and capital gains or losses on the share price. For a single period, t, the return on shares, r_{st}, comprises the dividends paid over that period, d_{t+1}, and the change in the price of the shares, $\Delta p = p_{t+1} - p_t$:

$$r_{st} = \frac{(p_{t+1} - p_t) + d_{t+1}}{p_t} \qquad (1)$$

Because of the tendency for rates of return in competitive markets to equalise, the rate of return on shares will tend to equal the market discount rate, $r_t = r_{st}$.

Thus, in this "dividend discount model", the valuation of "fair price" is a function of dividend earnings, capital gains (or losses) and the market discount rate. After Blake, (2000):

$$P_0 = \frac{E(d_1)}{1+r} + \frac{E(P_1)}{1+r} \qquad (2)$$

where P_0 = fair price of the share

$E(d_1)$ = expected annual dividend per share at the end of year 1

$E(P_1)$ = expected price of share at the end of year 1

$E(\ )$ = expectations based on all current information

r = market discount rate

In the next period, the equation will be similar:

$$P_0 = \frac{E(d_2)}{1+r} + \frac{E(P_2)}{1+r} \qquad (3)$$

Substituting (3) into (2):

$$P_0 = \frac{E(d_1)}{(1+r)^1} + \frac{E(d_2)}{(1+r)^2} + \frac{E(P_2)}{(1+r)^2} \qquad (4)$$

Or more generally:

$$P_0 = \sum_{t=1}^{T} \frac{E(d_t)}{(1+r)^t} + \frac{E(P_T)}{(1+r)^T} \qquad (5)$$

And since $E(P_\infty)$ is finite, the capital gains remainder tends to zero with time, leaving share price a function of the stream of expected dividend earnings and the market discount rate[1]:

$$P_0 = \sum_{t=1}^{\infty} \frac{E(d_t)}{(1+r)^t} \qquad (6)$$

[1] More accurately, this should be the spot rate on a risk-free bond adjusted by a risk premium for the particular firm (Blake, 2000).

The grounding of share prices in expectations of earnings reflects the manner in which investment decisions create a demand for capital funding; firms issue securities to fund projects often already initiated (Robinson, 1952). There has been empirical support for the concept that economic growth leads capital markets rather than vice-versa. Using a range of causality tests, (Demetriades & Hussein, 1996) found economic growth leading financial development in six developing or semi-developed countries, including Greece, Portugal, South Africa and Turkey. Similarly using an advanced causality test,[2] but with particular regard to stock markets, (Arestis & Demetriades, 1997) found changes in real GDP per capita in the United States contributing positively to stock market liquidity and negatively to share price volatility, but no evidence of a reverse relationship.

In reality, the relationship between financial markets and economic growth is likely to be changeable. The operation of financial markets may promote investment and growth at times but may hinder this at other times. Some regulatory policies may support a virtuous relationship while others may promote a vicious one. At times efficient markets may readily provide funds for investment; at other times investment decisions may create demand for funding (Arestis & Demetriades, 1997; Demetriades & Hussein, 1996; Jung, 1986; Patrick, 1966).

Both models of share price valuation relate current share prices to fundamental features of the economy, whether interest rates or GDP growth; common methods of estimating the growth rate of earnings, g, are either general predictions about the future of the firm or more general expectations of growth of the economy in general (Howells & Bain, 2000). But the difficulty of identifying the relationship between capital market movements and economic growth has been highlighted by the debate around the efficient market hypothesis. Under the efficient market hypothesis, by which prices fully reflect all available information, there is little room for share prices to respond to changes in economic growth, such changes are fully anticipated (Fama, 1970). While recent empirical work has cast doubt on this, identifying persistent technical and fundamental influences on share price movements,[3] estimates of a

[2] A Johansen cointegration analysis (see Johansen, 1988).

[3] These include price volatility in excess of dividend yield expectations (Campbell & Shiller, 1987; Shiller, 1989; Mills, 1993), a relationship between prices, returns and the business cycle (Fama & French, 1989), and evidence of autocorrelation in prices (Fama, 1991).

suitable discount rate have proved illusive as this rate turns out to be highly volatile (Shaikh, 1995; Shiller, 1989; see Barsky & Long, 1993; Campbell, 1991; Fama, 1991).

Shaikh (1995) proposes that this difficulty in identifying the discount rate can be resolved with a focus on short-term rates of return rather than the lifetime perspective. Such a focus would expect volatility in the discount rate or the required rate of investment because of the many contingencies of short run disequilibrium that are the heartbeat of competitive rivalry, as well as being intrinsic to stock market investment itself (Geroski & Mueller, 1990, cited by Shaikh, 1995). Stock market investment, then, is likely to be highly sensitive to short-term returns in the real sector.

Shaikh (1995) notes that a firm's current profits (Π_t) are the sum of the return from past investments (Π'_t) plus the return from new investments ($r_t I_{t-1}$):

$$\Pi_t = \Pi'_t + r_t I_{t-1} \tag{8}$$

The single period rate of return on the new investment (Blake, 2000, p. 100), after Shaikh (1995) is:

$$r_t = \frac{\Delta \Pi_{t+1}}{I_t} \tag{9}$$

In summary, then, on the basis of the literature a number of hypotheses are proposed. First, since share prices are likely to be influenced to some extent by the accumulation of information about changing economic conditions and share prices influence the rate of capital formation that influences growth, share price movements are likely to anticipate changes in economic growth to some degree:

H_1: real lagged share price growth is significantly associated with real GDP growth.

H_0: there is no significant association between real lagged share price growth and real GDP growth.

Second, since share prices are unlikely to be exclusively forward looking, share price movements are also likely to reflect past economic growth to some degree:

H_2: real lagged GDP growth is significantly associated with real share price growth.

H_0: there is no significant association between real lagged GDP growth and real share price growth.

Third, since share trading is only a minor component of the capital funding of investment, the relationship between gross fixed capital formation and economic growth is likely to be greater than the relationship between share price movements and economic growth:

H_3: the association between real gross fixed capital formation and real GDP growth is stronger than the association between real lagged share price growth and real GDP growth.

H_0: the association between real gross fixed capital formation and real GDP growth is the same or weaker than the association between real lagged share price growth and real GDP growth.

Lastly, after Shaikh (1995), the relationship between share price movements and economic growth is likely to be strongly mediated by the incremental profit rate in the real sector. Share prices are strongly influenced by expectations of share yields. Both the dividend capacity underlying these expectations and economic growth in general are underpinned by the incremental profit rate in the real sector. And the returns from shares will tend towards the returns from investment in the real sector because of competition for funds in capital markets.

H_4: the association between real returns on shares and real returns on new investment is stronger than the association between real lagged share price growth and real GDP growth.

H_0: the association between real returns on shares and real returns on new investment is the same or weaker than the association between real share price growth and real GDP growth.

Data

Data on annual calendar year GDP, investment and real sector profits were gathered from national accounts data from the Office of National Statistics. Data on GDP for the 1948-1999 period (ONS Series BB1.1YBHA) was deflated by the GDP deflator (ONS Series BB1.4YBGB), in 1995 prices. Real investment, in 1995 prices, was drawn from data for total gross fixed capital formation (ONS Series BB1.2NPQX) less general government gross fixed capital formation (ONS Series BB5.1.7NNBF), deflated by the gross fixed capital formation deflator (ONS Series BB1.4YBFU). Corporate profits, in 1995 prices, were calculated from total operating surplus (ONS Series BB1.2ABNF) less general government operating surplus (ONS Series BB1.2NMXV), plus consumption of fixed capital, total (ONS Series BB1.1NQAE) less general government (ONS Series BB5.1.6NMXO). As the result was predominantly determined by the latter, the series was deflated by the gross fixed capital formation deflator (ONS Series BB1.4YBGE). The incremental rate of profit in the real sector was calculated using Equation 9.

Data on share prices and yields was drawn from the Barclays Equity Index (Barclays Capital, 2000). This comprises an equity price index, an equity earnings price index, and a yield annual series for the period December 1899 to December 1999. The price index is a market-capitalisation-weighted arithmetic index. For the period 1935-1961 the FT Actuaries 30 Share Index figure for each December is used, and since 1962 the FT Actuaries All Share Index figure for each December has been used. The earnings index for the period to 1961 is calculated from dividends paid to the Barclays Equity Fund in the year to December by the 30 largest companies by market capitalisation. From 1962 onwards, the index is calculated from the yield on the FTSE Actuaries All-Share Index is used; the effect of the discontinuity is claimed to be minimal (Barclays Capital, 2000: 107-109).

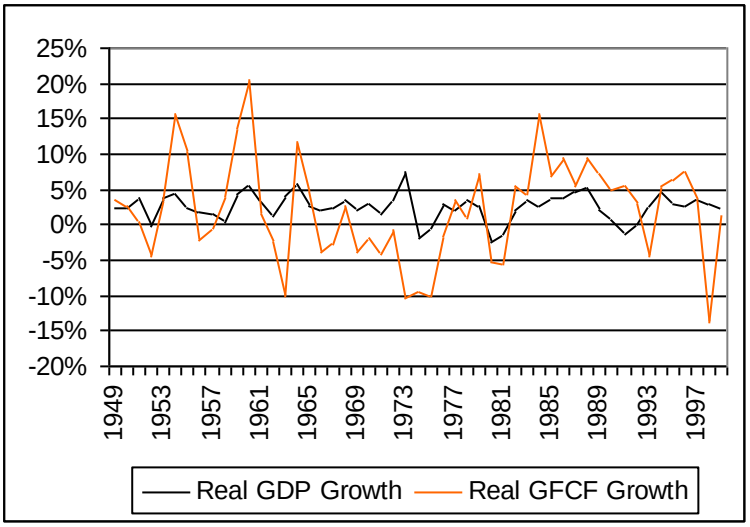
For consistency with the national accounts data, the share price and earnings series were deflated by the gross fixed capital formation deflator. The equity rate of return

was then calculated using Equation 1. Because the corporate profitability data are net of interest, the share earnings were converted to net figures by deducting the real interest rate. After Shaikh (1995), the real interest rate was estimated as the difference between the Treasury-bill discount rate and the rate of growth gross fixed capital formation deflator. The Treasury-bill discount rate series, compiled by Officer (2003b) is a composite of data from the London and Cambridge Economic Service 1948-1969, the Office of National Statistics' *Annual Abstract of Statistics* 1970-1974 and the Bank of England 1975-1999, the latter two annualised via two-year moving averages (Officer, 2003a). Again, there is a small discrepancy between the March termination point of the gross fixed capital formation deflator and the annual average interest rate data.

Results

As Figure 1 demonstrates, there appears to be a reasonably close relationship between investment and economic growth during the period of study. GDP grows in a similar pattern to private sector gross fixed capital formation. The relationship was analysed in more detail, using Microfit 4. As Table 3 reports, the two series have similar means but capital formation displays greater variance. The two series are moderately correlated ($r = 0.3603$) and the regression reported in Table 4 shows that the relationship is statistically significant; a 1% increase in real private capital formation is associated with an increase in real GDP growth of almost one tenth of a percent. The associations accounts for nearly 13% of the variation in the data.

Figure 1. Growth Rates of Real Private GFCF and Real GDP, UK Economy 1949-99



Source: Office of National Statistics, Time Series Data, Series BB1.1YBHA, BB1.4YBGB, BB1.2NPQX, BB5.1.7NNBF, BB1.4YBFU. Available: http://www.statistics.gov.uk/statbase/TSDtimezone.asp

Table 3. Real Private GFCF Growth and Real GDP Growth, UK 1949-99, Descriptive Statistics

Variable(s)	*Real GDP Growth*	*Real Private GFCF Growth*
Maximum	.076000	.20300
Minimum	-.023000	-.13800
Mean	.025176	.021529
Std. Deviation	.019548	.071656
Skewness	-.37026	.075748
Kurtosis - 3	.58680	-.014525
Coef of Variation	.77642	3.3283

Correlation Coefficient: .36030

Table 4. Ordinary Least Squares Regression of Real Private GFCF Growth on Real GDP Growth

Dependent variable is Real GDP Growth 51 observations used for estimation from 1949 to 1999			
Regressor	*Coefficient*	*Standard Error*	*T-Ratio[Prob]*
INTP	.023060	.0026954	8.5554[.000]
Real GFCF Growth	.098288	.036354	2.7037[.009]
R-Squared	.12981	R-Bar-Squared	.11205
S.E. of Regression	.018420	F-stat. F(1, 49)	7.3097[.009]
Mean of Dependent Variable	.025176	S.D. of Dependent Variable	.019548
Residual Sum of Squares	.016625	Equation Log-likelihood	132.3649
Akaike Info. Criterion	130.3649	Schwarz Bayesian Criterion	128.4331
DW-statistic	1.6486		

	Diagnostic Tests	
Test Statistics	*LM Version*	*F Version*
A:Serial Correlation	CHSQ(1)= 1.5753[.209]	F(1,48)= 1.5299[.222]
B:Functional Form	CHSQ(1)= 2.1211[.145]	F(1,48)= 2.0830[.155]
C:Normality	CHSQ(2)= 8.5110[.014]	Not applicable
D:Heteroscedasticity	CHSQ(1)= 4.1879[.041]	F(1,49)= 4.3836[.041]

A:Lagrange multiplier test of residual serial correlation

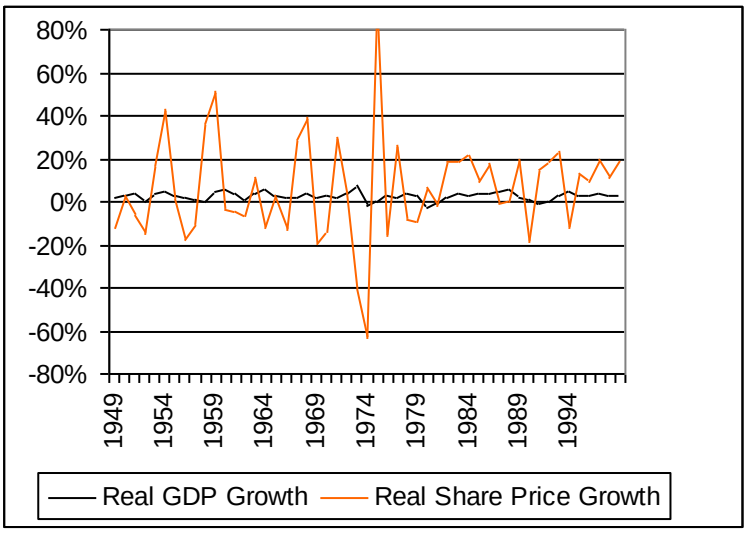
B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

But while economic growth is associated with investment, the relationship with the funding of that investment is less clear. Figure 2 presents the relationship between growth rates of real share prices and real gross domestic product. Share price volatility is much greater than changes in economic growth and no clear relationship between the two is apparent. As Table 5 reports, the mean share price growth figure is much lower than the real GDP growth mean and the two series are only weakly and negatively correlated. A regression of the two series shows no significant association (see Table 6).

Figure 2. Growth Rates of Real Share Prices and Real GDP, UK Economy 1949-98



Source: Office of National Statistics, Time Series Data, Series BB1.1YBHA, BB1.4YBGB. Available: http://www.statistics.gov.uk/statbase/TSDtimezone.asp; (Barclays Capital, 2000).

Table 5. Real Share Price Growth and Real GDP Growth, UK 1949-98, Descriptive Statistics

Variable(s)	*Real GDP Growth*	*Real Share Price Growth*
Maximum	.076000	.92400
Minimum	-.023000	-.63200
Mean	. 025180	.05920
Std. Deviation	. 019746	.24303
Skewness	-.36715	.51952
Kurtosis - 3	. 51675	2.6638
Coef of Variation	. 78420	4.1053

Correlation Coefficient: -.055339

Table 6. Ordinary Least Squares Regression of Real Share Price Growth on Real GDP Growth

Dependent variable is Real GDP Growth 50 observations used for estimation from 1949 to 1998			
Regressor	*Coefficient*	*Standard Error*	*T-Ratio[Prob]*
INTP	.025446	.0029012	8.7710[.000]
Real Share Price Growth	-.0044962	.011709	-.38399[.703]
R-Squared	. 0030624	R-Bar-Squared	-.017707
S.E. of Regression	.019920	F-stat. F(1, 48)	.14745[.703]
Mean of Dependent Variable	.025180	S.D. of Dependent Variable	.019746
Residual Sum of Squares	.019047	Equation Log-likelihood	125.8750
Akaike Info. Criterion	123.8750	Schwarz Bayesian Criterion	121.9629
DW-statistic	1.5535		
	Diagnostic Tests		
Test Statistics	*LM Version*	*F Version*	
A:Serial Correlation	CHSQ(1)= 3.0780[.079]	F(1,47)= 3.0831[.086]	
B:Functional Form	CHSQ(1)= 2.6001[.107]	F(1,47)= 2.5782[.115]	
C:Normality	CHSQ(2)= 2.1664[.339]	Not applicable	
D:Heteroscedasticity	CHSQ(1)= 5.0638[.024]	F(1,48)= 5.4090[.024]	

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

Yet if share prices are sensitive to the dynamics of the broad capital markets that provide the funding for investment, then growth of share prices might be expected to precede economic growth. This might occur because share prices reflect expectations based on generally efficient accumulation of information by the market. Alternatively, it might reflect the role of shares as a component of the capital markets, their price influenced by the supply and demand for funds and the tendency for returns from different markets to equalise.

When real GDP growth is compared to real share prices lagged by one year, the series are much more closely and positively associated; the correlation coefficient r = .42488 (See Table 7). As the regression results reported in Table 8 indicate; a 1% increase in real share prices is generally followed by a 0.034% increase in real GDP growth. The relationship is weaker than that between real private gross capital formation and economic growth, but it is significant and accounts for more of the variation in the data. Further, because of the lagged nature of the association, this relationship could potentially be used as a predictive indicator of growth.

These results are consistent with the first and third hypotheses. The first null hypothesis that there is no significant association between real lagged share price growth and real GDP growth must be rejected. Real lagged share price growth is significantly associated with real GDP growth. The third null hypothesis that the association between real gross fixed capital formation and real GDP growth is the same or weaker than the association between real lagged share price growth and real GDP growth must also be rejected. The association between real gross fixed capital formation and real GDP growth is stronger than the association between real lagged share price growth and real GDP growth.

Table 7. Real GDP Growth and Real Share Price Growth (Lagged one year), UK 1950-99, Descriptive Statistics

Variable(s)	*Real GDP Growth*	*Real Share Price Growth (Lagged)*
Maximum	.076000	.92400
Minimum	-.023000	-.63200
Mean	. 025220	.05920
Std. Deviation	. 019744	.24303
Skewness	-.37340	.51952
Kurtosis - 3	.52154	2.6638
Coef of Variation	.78285	4.1053

Correlation Coefficient: .42488

Table 8. Ordinary Least Squares Regression of Real Share Price Growth (Lagged one year) on Real GDP Growth

Dependent variable is Real GDP Growth 50 observations used for estimation from 1950 to 1999			
Regressor	*Coefficient*	*Standard Error*	*T-Ratio[Prob]*
INTP	.023177	.0026300	8.8125[.000]
Real Share Price Growth (lagged 1 year)	.034517	.010615	3.2518[.002]
R-Squared	.18053	R-Bar-Squared	.16345
S.E. of Regression	.018058	F-stat. F(1,48)	10.5742[.002]
Mean of Dependent Variable	.025220	S.D. of Dependent Variable	.019744
Residual Sum of Squares	.015652	Equation Log-likelihood	130.7819
Akaike Info. Criterion	128.7819	Schwarz Bayesian Criterion	126.8699
DW-statistic	1.6481		

	Diagnostic Tests	
Test Statistics	*LM Version*	*F Version*
A:Serial Correlation	CHSQ(1)= 1.5331[.216]	F(1,47)= 1.4867[.229]
B:Functional Form	CHSQ(1)= 3.2653[.071]	F(1,47)= 3.2839[.076]
C:Normality	CHSQ(2)= 1.2659[.531]	Not applicable
D:Heteroscedasticity	CHSQ(1)= .064974[.799]	F(1,48)= .062457[.804]

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

Of course, the strong correlation between real GDP growth and lagged real share price growth may simply reflect share market *reaction* to economic growth. Thus the relationship between real share prices and lagged real GDP growth also needs to be tested. As Table 9 reports, the correlation is slightly stronger but negative. Real economic growth is generally followed by decline in real share price growth, and vice versa. The regression reported in Table 10 shows the relationship to be significant; a 1% increase in GDP growth being generally followed by a 5.3% decline in share price growth. Further, the lagging of GDP growth accounts for slightly more of the variation between the two series than the lagging of share price growth.

This result is consistent with the second hypothesis. The null hypothesis that there is no significant association between real lagged GDP growth and real share price growth must be rejected. Real lagged GDP growth is significantly associated with real share price growth.

Table 9. Real Share Price Growth and Real GDP Growth (Lagged one year), UK 1950-99, Descriptive Statistics

Variable(s)	*Real GDP Growth (Lagged)*	*Real Share Price Growth*
Maximum	.076000	.92400
Minimum	-.023000	-.63200
Mean	. 025180	.065480
Std. Deviation	. 019746	.24247
Skewness	-.36715	.45628
Kurtosis - 3	.51675	2.6614
Coef of Variation	.78420	3.7029

Correlation Coefficient: -.43057

Table 10. Ordinary Least Squares Regression of Real GDP Growth (Lagged one year) on Real Share Price Growth

Dependent variable is Real Share Price Growth 50 observations used for estimation from 1950 to 1999			
Regressor	*Coefficient*	*Standard Error*	*T-Ratio[Prob]*
INTP	.19861	.050992	3.8949[.000]
Real GDP Growth (lagged 1 year)	-5.2872	1.5997	-3.3052[.002]
R-Squared	.18539	R-Bar-Squared	.16842
S.E. of Regression	.22111	F-stat. F(1,48)	10.9241[.002]
Mean of Dependent Variable	.065480	S.D. of Dependent Variable	.24247
Residual Sum of Squares	2.3467	Equation Log-likelihood	5.5285
Akaike Info. Criterion	3.5285	Schwarz Bayesian Criterion	1.6165
DW-statistic	2.3404		

	Diagnostic Tests	
Test Statistics	*LM Version*	*F Version*
A:Serial Correlation	CHSQ(1)= 1.5632[.211]	F(1,47)= 1.5168[.224]
B:Functional Form	CHSQ(1)= .50879[.476]	F(1,47)= .48318[.490]
C:Normality	CHSQ(2)= .65854[.719]	Not applicable
D:Heteroscedasticity	CHSQ(1)= 10.0022[.002]	F(1,48)= 12.0034[.001]

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

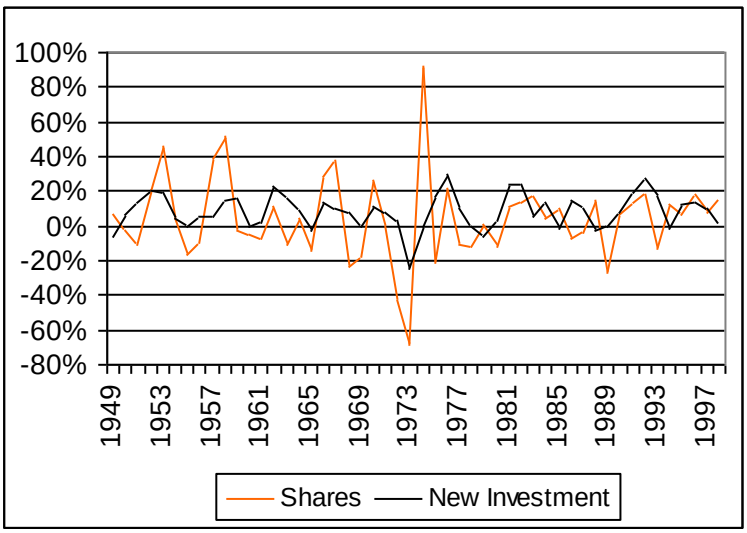
C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

Finally, to determine whether share prices act primarily as conduits of information that help anticipate economic growth or whether they are formed in the dynamics of the funding of investment for growth the mechanism proposed by Shaikh (1995) is tested. Figure 3 presents the relationship between share market returns and the return on new investment in the real sector. As reported in Table 11, share returns are more volatile and the mean return is half that of new investment. However there is a moderate positive correlation between the two series. The regression reported in Table 12 shows a strong significant association, with a 1% rise in returns on new investment associated with a similar, 0.91%, rise in returns on shares. This supports the notion of

a tendency for returns in different markets to equalise. Only 13.5% of the variation in the data is accounted for, however.

Figure 3. Real Share Returns and Real Returns on New Investment



Source: Calculated from Office of National Statistics, Time Series Data as described in text and (Barclays Capital, 2000).

Table 11. Real Return on Shares and Real Return on New Investment, UK 1949-98, Descriptive Statistics

Variable(s)	*Real Return on Shares*	*Real Return on New Investment*
Maximum	.91900	.29900
Minimum	-.68100	-.24800
Mean	.044360	.083300
Std. Deviation	.24784	.10055
Skewness	.47687	-.35626
Kurtosis - 3	2.8494	.98488
Coef of Variation	5.5871	1.2071

Correlation Coefficient: .36788

Table 12. Ordinary Least Squares Regression of Real Return on New Investment on Real Return on Shares

Dependent variable is Real Return on Shares
50 observations used for estimation from 1949 to 1998

Regressor	*Coefficient*	*Standard Error*	*T-Ratio[Prob]*
INTP	-.031177	.042940	-.72606[.471]
Real Return on New	.90681	.33083	2.7410[.009]

Investment			
R-Squared	.13534	R-Bar-Squared	.11732
S.E. of Regression	.23285	F-stat. F(1,48)	7.5130[.009]
Mean of Dependent Variable	.044360	S.D. of Dependent Variable	.24784
Residual Sum of Squares	2.6025	Equation Log-likelihood	2.9415
Akaike Info. Criterion	.94147	Schwarz Bayesian Criterion	-.97056
DW-statistic	2.4138		

	Diagnostic Tests	
Test Statistics	*LM Version*	*F Version*
A:Serial Correlation	CHSQ(1)= 2.5249[.112]	F(1,47)= 2.4996[.121]
B:Functional Form	CHSQ(1)= 2.5238[.112]	F(1,47)= 2.4985[.121]
C:Normality	CHSQ(2)= 53.2485[.000]	Not applicable
D:Heteroscedasticity	CHSQ(1)= .063720[.801]	F(1,48)= .061249[.806]

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

The result is consistent with the fourth hypothesis. The null hypothesis that the association between real returns on shares and real returns on new investment is the same or weaker than the association between real share price growth and real GDP growth must be rejected. The association between real returns on shares and real returns on new investment is stronger than the association between real lagged share price growth and real GDP growth.

Discussion

Support was found for each hypothesis proposed. Real lagged share price growth is significantly associated with real GDP growth, suggesting share price movements may anticipate changes in economic growth to some degree. However, a slightly stronger relationship was found between real lagged GDP growth and real share price growth, suggesting that share prices respond more to past economic growth. Further, as was expected, given the limited role of share trading in capital funding, the association between lagged share price growth and real GDP growth was weaker than that between gross fixed capital formation and economic growth. This focuses attention on the mediating effect of the investment process between capital markets and growth.

Evidence of the mediating mechanism proposed by Shaikh (1995), and tested with US data, was found in this UK data. The relationship between share price movements and economic growth was strongly mediated by the incremental profit rate in the real

sector. The return on shares, which underpins share prices, are closely associated with returns on new investment in general, most likely competition in capital markets forces an equalisation of rates of return. It is this incremental profit rate in the real sector that drives investment and growth.

Still, the equalisation of rates of return explains only part of the relationship between share price movements and economic growth; most of the variation in the data on share and investment returns was unexplained. The higher mean and greater volatility in share returns than in new investment returns to 1974 points to other influences in this earlier period; after 1974 the relationship is closer and similar to Shaikh's (1995) results for the US throughout the 1947-93 period, with very close means and standard deviations.

A further oddity in the results is the direction of the association between lagged real GDP growth and real share prices. Positive economic growth is associated with a subsequent decline in share price growth and vice versa. Positive economic growth might be expected to produce investor confidence and thus an increase in share prices, rather than a decline in their growth. One explanation for the negative relationship might be supply effects; investor confidence may be associated with a greater supply of shares relative to demand, leading to a slowdown in price rises, but there is no prime face reason why demand would not increase proportionately. Alternatively, the decline in the growth of share prices following a rise in economic growth may represent traders' expectations of the slowdown phase of the business cycle.

In general, however, the results provide strong support for the notion of share prices responding to investment decisions rather than acting as a forward monitor of economic health.

Conclusion

This study has examined the relationship between economic growth and stock market fluctuations in the UK. The study has concentrated on the role of shares as part of the capital market and their relationship with investment decisions. This has been contrasted to the view of the stock market as primarily a channel for information on economic activity more generally.

Evidence from the UK economy for the 1949-1999 period points to the centrality of investment decisions in the relationship of share prices and economic growth. Evidence of share price movements anticipating economic growth was found to be slightly weaker than that suggesting share prices responded to economic growth. Both effects, however, were weaker than the relationship between capital investment and growth, suggesting the relation between share prices and growth may be mediated by the dynamics of the capital markets. In this context, Shaikh's (1995) theory that share returns and, by implication, prices, are closely related to returns on new investment was tested. Generally similar results were found in the case of the UK as in his original study of the US.

The relationship between economic growth and stock market fluctuations in the UK appears to be a consequence of the tendency for returns in different markets to equalise. The returns from shares will tend towards the returns from investment in the real sector because of competition for funds in capital markets. This influences share prices because these are strongly influenced by expectations of share yields. Further, both the dividend capacity underlying these expectations and economic growth in general are underpinned by the return on new investment, or the incremental profit rate, in the real sector.

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