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SOME STYLISED FACTS ABOUT THE JAMAICA STOCK MARKET

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Abstract

This paper presents some stylised facts about the Jamaica Stock Index price movements. First, stock returns tend to be positively correlated at short horizons. Second, they are weakly negatively correlated over long horizons. Third, short-term interest rates are positively correlated with excess returns.

1. INTRODUCTION

Understanding the behaviour of stock prices in markets of both developed and less developed countries is a topic of much concern to researchers, policy makers and stock market analysts among others. See for example the studies by Fama (1965), Cutler, Poterba and Summers (1991) for the United States of America market, Niarchos (1972), Jennergen and Korsvold (1975), Guy (1977), Alexakis and Petrakis (1991) for European markets, Errunza (1979), Errunza and Losq (1985), Kitchen (1986) for Latin American and Caribbean markets, Ekechi (1989) and Ahmed and Ayogu (1992) for the Nigeria and Sub-Saharan markets, Hardouvelis and Peristiani (1992), Cheong (1992) and Ma (1992) for Asian markets, among many.

In previous research on this topic, several approaches were used to understand stock price movements. One approach involves testing the randomness of returns. The absence of patterns in stock returns is frequently adduced in support of the efficient market hypothesis. This

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is the approach adopted by Koot, Miles and Heitman (1989) in their examination of the Jamaica Stock Exchange. Building on the papers by Jackson (1986) and Kitchen (1986), they present evidence based on runs tests, suggesting that stock price changes on the exchange were not random for the period *1969-1986* and *1969-1976*. Furthermore, the hypothesis of randomness could not be rejected for the subperiod 1977-1986. They interpreted this as meaning that the stock market has become more efficient in the recent years. In support of this position they present a partial list due to Jackson and Kitchen on a number of structural changes that occurred in the Jamaican market since the 1983-1984 period. The changes seen as necessary conditions for an efficient market are listed below:

(i) a large number of new investors;
(ii) a large increase in trading, both in volume and in value;
(iii) a more effective use of information by market agents; and
(iv) a tendency for stock prices to more readily reflect important market information.

This paper continues the tradition of investigating the behaviour of stock prices on the Jamaica Stock Exchange (JSE), by providing evidence on the speculative dynamics of stock returns on the exchange. Subject to the caveat of Kim, Nelson and Starz (1991), there is growing evidence supporting the view that stock market returns are predictable. Examples of this are to be found in the papers by Shiller (1984), Fama and French (1988a, b) for the U.S. market, Poterba and Summers (1988), Cutler, Poterba and Summers (1991) for U.S. and European markets and Sentana and Wadhwani (1991) for the Japanese market, among many.

Fama and French (1988a) and Poterba and Summers (1988) show that there appears to be evidence for a mean-reverting, stationary component in stock prices, which tends to induce negative autocorrelation in returns, especially at long horizons.[1] This temporary component could either result from variations in expected returns, or could be consistent with the "fads" model of Shiller (1984), representing long temporary swings away from fundamental values. In considering the later hypothesis Cutler, Poterba and Summers (1990, 1991) argue that variations in ex ante returns and asset market volatility arise primarily from "speculative dynamics" — interactions between different types of traders, some of whom are not rational in the conventional sense of trading on the basis of all relevant publicly available information. It has been difficult to construct tests discriminating between these two alternatives, though the evidence in Cutler, Poterba and Summers (1991) can be interpreted as favouring the hypothesis emphasising speculative dynamics.

Their evidence on the characteristic speculative dynamics of returns on stocks, bonds, foreign exchange, real estate, collectibles, and precious metals led to the following stylised facts. First, returns tend to be positively serially correlated at high frequency. Second, returns are weakly negatively serially correlated at high over long horizons. Third, deviations of asset values from proxies for fundamental value have predictive power for returns. Fourth, short-term interest rates are negatively correlated with excess returns on other assets.

The plan of this paper is as follows. Section 2 presents a brief overview of the Jamaica Stock Exchange. Section 3 presents the empirical results. Using monthly data on stock prices and short-term Treasury bill rates covering the period 1969.07 to 1992.12 from the Jamaica Stock Exchange, I follow the general approach of Cutler, Poterba and Summers (1991), and report results on the serial dependence of returns on stock prices and the relationship between short-term interest rates and return predictability. Section 4 has conclusions.

2. INSTITUTIONAL SETTING

In this section provide a brief overview of the Jamaica Stock Exchange and an overview of the trend path of the Jamaica Stock Market common Stocks Index for the period under investigation.[2]

The Jamaica Stock Exchange was incorporated as a limited organisation in September 1968 and opened for trading on 3rd February 1969. The organisation is owned by the broker-members, who delegate their powers to a National Council.

Three types of securities are listed on the exchange — Ordinary/common shares, preference shares and debentures (corporate bonds). Government Stocks are not listed, but are traded in an over-the-counter market regulated by the Bank of Jamaica. The exchange currently trades 43 ordinary stocks. These may be placed into

six major industrial groups as follows: Banking, Financing and Insurance Services (11); Manufacturing (16); Transport, Storage and Communications (4); Distributive Trades/Conglomerate (6); Agriculture/Agri-business (2); and Tourism and Entertainment Services (4). The JSE Common Stock Index embraces all the ordinary shares listed on the market, weighted according to their relative market capitalisation. The prices used in calculating the common index are the closing prices of the stocks. The base date is June 1969, when the index stood at 100. The listing and delisting of stocks have changed the composition of the index over the study period. Prior to 1975 utilities were excluded, leaving the index to be based on only the industrials. Since then a more general index has been used for computing the price index. In June 1969 there were 34 listed companies compared to 44 companies in December 1991. From June 1969 to February 1978 the trend path of the index was downwards, reaching 35.84 on 10 February 1978. This general decline in the index led to significant decline in total market capitalisation during the seventies. Since March 1978 the trend path has been generally upwards. By December 1989, the index reached a high of 2592 points. Concern about low interest rate and a fallen exchange rate led the government to raise interest rates. At the end of 1991 the index stood at 7,681.50. In 1992 the IFC ranked the Jamaica stock market as among the top ten world equity markets based on the performance of the Common Index in 1991. Market Capitalisation on the Jamaica Stock Exchange stood at US$3.45 billion dollars at the close of trading on December 29, 1992. This figure represents a growth of over 245 percent compared to 1991, when market capitalisation was US$1.16 billion dollars.

3. EMPIRICAL RESULTS

I examine the autocorrelation structure of excess returns on the Jamaica Stock Market Common Index for the period January 1970 to December 1991.[3] The Jamaica Stock Exchange provided the stock index and the data on the Treasury Bill rates are from the Bank of Jamaica.[4]

Results for different definitions of returns were employed in this paper.[5] I calculate monthly excess returns:

$$ER_t = logP_t - logP_{t-1} - log(1 + i_t), \quad (1)$$

where P_t denotes the stock price index for month t and i_t denotes the monthly Treasury Bill rate. I also consider a formulation based on actual returns given by

$$R_t = logP_t - logP_{t-1}, \quad (2)$$

where P_t denotes the stock price index for month t.

Figures 1 to 4 show the stock price index, actual returns, excess returns, inflation rate and the Treasury Bill rate for the period under study. These figures show that since 1977, the stock index has generally increased in value, both the excess returns and actual returns tend to move together, and the inflation rate has been highly volatile with an unusually high rate during the 1978/1979 period and the end of the 1991/1992 period. The general trend of the Bill rate has been up-

FIGURE 1:
JAMAICAN STOCK PRICES RETURNS: 1970.01 - 1992.12

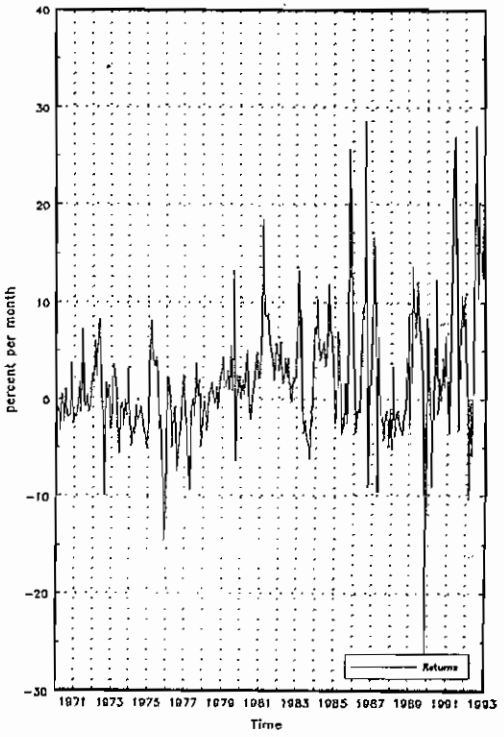


FIGURE 2:
JAMAICAN STOCK PRICES EXCESS RETURNS: 1970.01 - 1992.12

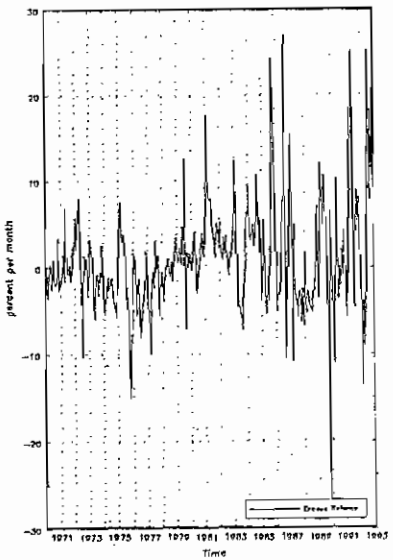


FIGURE 3:
JAMAICAN MONTHLY INFLATION RATE: 1970.01 - 1992.12

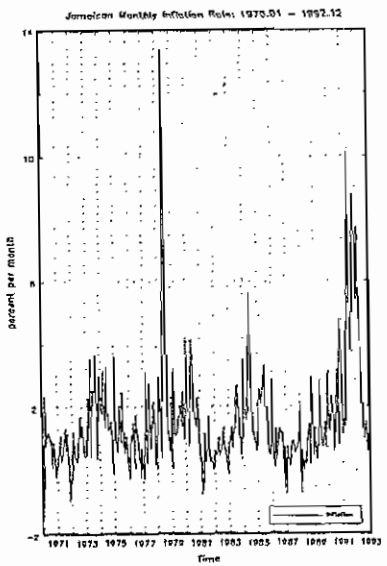
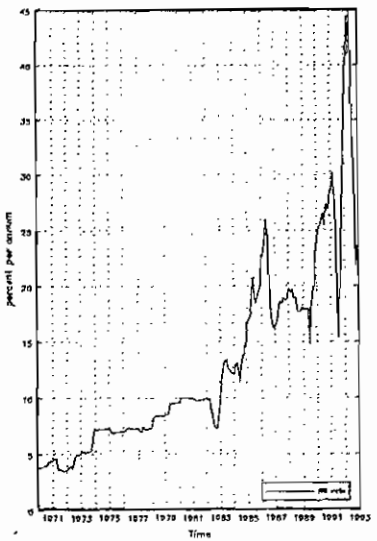


FIGURE 4:
JAMAICAN TREASURY BILL RATE: 1970.01 - 1992.12



wards. Various descriptive statistics are reported in Table 1 including: mean and variance, maximum and minimum. In general both the mean and standard deviations of the excess returns are smaller than those of actual returns, and the inflation rate is very volatile.

TABLE 1: SUMMARY STATISTICS ON THE JAMAICAN ECONOMY: 1970.01-1992.12

Variable	Mean	Std. Deviation	Minimum	Maximum
Stock Index	1212.15	2859.63	37.07	25745
Excess Returns	0.9545	6.6052	-27.66	28.64
Returns	2.032	6.752	-26.026	30.551
Inflation	1.542	1.763	-1.538	13.345

Individual autocorrelations of excess returns and returns are shown in Tables 2 and 3. (They are corrected for small sample bias by adding 1/(T-j) to the jth correlation, where T is the sample size). I also

TABLE 2: AUTOCORRELATIONS OF RETURNS, 1970(1)-1992(12)
JAMAICAN STOCK MARKET

	Excess	Real
ρ_1	0.468	0.490
ρ_2	0.257	0.289
ρ_3	0.069	0.110
ρ_4	0.042	0.090
ρ_5	-0.013	0.040
ρ_6	0.036	0.089
ρ_7	-0.056	0.004
ρ_8	0.023	0.081
ρ_9	0.050	0.105
ρ_{10}	0.081	0.131
ρ_{11}	0.037	0.084
ρ_{12}	0.018	0.063
$\rho_{1\text{-}12}$	0.008	0.134
$\rho_{13\text{-}24}$	0.069	0.098
$\rho_{25\text{-}36}$	0.027	0.046
$\rho_{37\text{-}48}$	0.001	0.023
s.e. (ρ_j)	0.073	0.073
Q(12)	41.658	129.31
	($P < .001$)	($P < .001$)
Q(24)	71.917	192.48
	($P < .001$)	($P < .001$)
Q(36)	90.384	214.04
	($P < .001$)	($P < .001$)

Note: Autocorrelations ρ_j are bias-corrected by adding 1/(T-j). $\rho_{1\text{-}12}$ is the average of the first 12 autocorrelations, $\rho_{13\text{-}24}$ is the average of the next 12, etc.
Q(k) is the Box-Pierce Q statistic for the first k autocorrelations and P is the associated probability level.

follow Cutler, Poterba and Summers in reporting results on the average of autocorrelations 1-12, 13-24, 25-36, and 37-48. It is necessary to report this, since with limited samples individual autocorrelations may be difficult to distinguish from zero, and persistence deviation may yield stronger evidence of serial dependence.

These results show greater serial dependence of returns over the full sample period than for the post 1977 period. The Q statistics are significant at below the 0.1 percent level for the first 12, 24 and 36 autocorrelations. Over the full sample the serial dependence is positive for all horizons. This is to be contrasted with the post-1977 sample period reported in Table 3. In Table 3, both returns exhibit similar patterns to that observed in other more developed markets; positive

TABLE 3: AUTOCORRELATIONS OF RETURNS, 1977(1)-1992(12)
JAMAICAN STOCK MARKET

	Excess	Real
ρ_1	0.436	0.445
ρ_2	0.228	0.242
ρ_3	0.026	0.044
ρ_4	-0.004	0.022
ρ_5	-0.069	-0.038
ρ_6	0.004	0.038
ρ_7	-0.117	-0.079
ρ_8	-0.038	0.001
ρ_9	-0.019	0.018
ρ_{10}	0.002	0.032
ρ_{11}	-0.044	-0.018
ρ_{12}	-0.033	-0.011
$\rho_{1\text{-}12}$	0.037	0.063
$\rho_{13\text{-}24}$	0.028	0.033
$\rho_{25\text{-}36}$	-0.018	-0.025
$\rho_{37\text{-}48}$	-0.045	-0.048
s.e. (ρ_j)	0.073	0.073
Q(12)	38.959	36.578
	($P < .001$)	($P < .001$)
Q(24)	64.637	61.771
	($P < .001$)	($P < .001$)
Q(36)	84.108	82.692
	($P < .001$)	($P < .001$)

Note: Autocorrelations ρ_j are bias-corrected by adding 1/(T-j). $\rho_{1\text{-}12}$ is the average of the first 12 autocorrelations, $\rho_{13\text{-}24}$ is the average of the next 12, etc.
Q(k) is the Box-Pierce Q statistic for the first k autocorrelations and P is the associated probability level.

serial dependence in the short run and negative dependence for longer periods, as in Cutler, Poterba and Summers (1991) and Fama and French (1988a). These patterns are consistent with the idea that prices temporarily move away from fundamentals. Given these results, I examine the relationship between short-term interest rates and returns predictability for the post-1977 period. Interest in such relationship dates back to Froot (1990) who documents that the level of short rates forecasts the excess return on foreign exchange, some commodities, as well as U.S. stocks and bonds. I find some evidence in support of predictability. Tables 4 and 5 report regression results relating the one-month excess return on stocks to the once lagged short-term

TABLE 4: REGRESSION OF ONE-MONTH EXCESS RETURN ON ONCE-LAGGED SHORT-TERM INTEREST RATE, 1977.02-1992.12

$$ER_t = \alpha + \beta i_{t-1} + \varepsilon_t$$

α	0.34 (1.131)
β	0.089 (0.062)
SE of regression	7.028
$\bar{R}^2$	0.005

Note: Standard errors are in the parentheses.
SE is the standard error of regression.

TABLE 5: REGRESSION OF ONE-MONTH RETURN ON ONCE-LAGGED SHORT-TERM INTEREST RATE, 1977.02-1992-12

$$R_t = \alpha + \beta i_{t-1} + \varepsilon_t$$

α	0.383 (1.125)
β	0.169 (0.062)
SE of regression	6.99
$\bar{R}^2$	0.033

Note: Standard errors are in the parentheses.
SE is the standard error of regression.

interest rate. The coefficients on the lagged short rate are .09 and 0.16 for excess returns and total returns respectively. I find a positive dependence between returns and lagged short-term rate. This is similar to the sign reported by Cutler, Poterba and Summers (1991) for six of the equity markets they examined, even though the sizes of the coefficients reported in this paper are considerably less than theirs.[6]

4. CONCLUSION

Understanding stock price movement is important for academics, stock exchange analysts and government policy makers. In this paper I re-examine the evidence on the efficiency of the Jamaica Stock Exchange based on the serial correlation of excess returns. I found evidence in support of the view that stock prices temporarily drift away from fundamentals. This may be viewed as supporting the position that the market is inefficient, although it need not be the case, since this test has low statistical power. Nevertheless, this paper presents some stylised facts about the Jamaica Stock Index price movements. First, stock returns tend to be positively correlated at high frequency. Second, they are weakly negatively correlated over long horizons. Third, lagged short-term interest rates are positively correlated with excess returns. The results are based on monthly stock price and Treasury Bill rates data for the period January 1977 to December 1992, and are sensitive to sample period. The result based on a sample period covering January 1970 to December 1992 suggests that stock returns are positively correlated for short and long horizons.

NOTE

1. A given change in price tends to be reversed over the next several years by a predictable change in the opposite direction.
2. The interested reader may wish to consult Kitchen (1986) and Jackson (1986), among many, for detailed discussions on the Jamaica Stock Exchange.
3. In this paper I focus on the autocorrelogram rather than the variance ratio statistics that have been used in other studies of the structure of excess returns. See for example the papers by Kim, Nelson and Startz (1989), Lo and Mackinlay (1988), Poterba and Summers (1988) and Singh (1994), among many. It is well known that the variance ratio is a weighted sum of

autocorrelations. It is not a weighted average, however, since the sum of the weights increases with the horizon being considered. Furthermore, since changes in variance ratios at different horizons do not shed light on changes in autocorrelations over the same horizons, it is more useful to work with autocorrelations.

4. The Treasury Bill rate is also reported in the **International Financial Statistics**, of the International Monetary Fund, various issues. I am grateful to Gene Leon and Angeliki Kourelikis for providing me with this data.

5. A correct definition of excess returns includes dividends, D_t. That is

$$ER_t = log(P_t + D_t) - logP_{t-1} - log(1 + i_t),$$

where P_t denotes the stock price index for month t, D_t is dividend payments at time t, and i_t denotes the monthly Treasury Bill rate. In order to avoid serious measurement error due to data irregularity, I omitted the dividend series available to me. The sizes of dividend payments were unusually small, for those companies reporting dividends in my series. The resulting errors in measured returns as a result of omitting dividends are likely to be small.

6. The six equity markets are Australia, Belgium, France, Italy, Sweden and United Kingdom.

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FIXED EXCHANGE RATES AND EXCHANGE CONTROLS IN THE SMALL UNDIVERSIFIED OPEN ECONOMY

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Abstract

Unless there are significant long run changes in the structures of Caribbean-type economies, fixed exchange rates backed by appropriate monetary and fiscal policies will always be more conducive to welfare maximisation. The fixed regime provides a measure of insurance against the increased risks and price uncertainties which surface under a flexible system. In a flexible environment an interventionist policy can foster an equivalent measure of stability, but the practice would be extremely costly, and quite beyond the reach of regional central banks.

INTRODUCTION

Aside from having to defend a policy of fixed exchange rates that may be considered counter-intuitive by external bodies like the IMF, regional policy makers are also constantly called upon to address the objections raised by the users of the fixed rate mechanisms. User objections are usually expressed vis-à-vis displeasure at exchange controls, sometimes in oblivion to links between the controls and the exchange rate. Having regard to this, we solidify the policy makers' defence of exchange controls and by extension and fixed rate regime.

The defence lies in the advancement of a welfare maximising argument, in which risk-averse individuals agree to endure the inconveniences of fixed rate regimes — viewing them as insurance measures against volatile swings in exchange rates — in order to enjoy stable patterns of real consumption. We examine the common assumptions underlying arguments for flexible exchange rates, which

* The views expressed in this paper are those of the author alone and not the Central Bank of Bahamas