ON TESTING FOR STOCK MARKET RATIONAL SPECULATIVE BUBBLES: THE CASE OF LDC MARKETS

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1. **Introduction**

Since October 1987, a number of cautious researches of the stock market collapse have been prepared for developed markets. The stock market crash was a thoroughly world event and its global nature needs to be better understood. Studies have investigated the reasons for the crash and have made recommendations for preventing another such occurrence. Efforts of many researchers, most notably Hardouvelis (1988) examines the sentiment that the October crash was preceded by the build up of speculative price movement in major world stock markets. Indicating that it was difficult to make an empirical difference between bubble-type price movements and movements based on changes in fundamental values, Hardouvelis choose to test a specific theoretical model of speculative behavior, rational price bubbles. With this approach, he finds that the data are consistent with the existence of such speculative bubble in the United States in the period before the crash. He finds similar evidence in Japan, but concludes the case for a pre- October bubble in the United Kingdom is weaker.[1]

Few studies of this nature are available for stocks traded on less developed Country (LDC) markets primarily due to the lack of reliable data. Academic economists usually ascribe enormous oscillates in stock prices to the impact of significant economic news on financial markets. In addition, new information can cause investors to make severe reevaluations of the extent of future cash flows or the future discount rates at which these cash flows are capitalized.

Continuous market overvaluation followed by market collapse is often referred to as speculative bubbles. Speculative bubbles may be influenced by an external circumstance that is unconnected to fundamental economic conditions. One group of investors buys with the anticipation of an enormous capital gain and others follow suit without careful consideration of economic factors like interest rates and future dividends. If such behavior continues, it may generate on itself as continuous wave of buying increase prices. Speculative bubbles may explode very unexpectedly and this may set off a selling waves.

The traditional method of checking for speculative bubbles or market overvaluation estimates the number of unusually high returns during the suspected bubble period and calculates the probability that the total number of these high returns could have arisen

1. Other researchers include: Shiller (1987), Diba and Grossman (1988) and Santoni (1987). For more explanation on bubbles, see Blanchard and Watson (1982), Fama and French (1988), Hardouvelis (1988), and Hamilton (1986).

from chance.[2] Further, an unusually high return or a positive abnormal return is a return higher than the risk-free-rate (RFR) plus the risk premium (RP) need to reimburse risk-averse investors for the uncertainty related with their security returns.[3] Consequently a large number of unusually high returns makes indication compatible with the presence of speculative bubbles. However, the traditional test has low statistical power to detect speculative bubbles because stock prices are very volatile and their oscillates influence both large positive returns[4] (evidence of speculative bubbles) and large negative returns.

Following Hardouvelis, it may be justified to construct a more powerful test for detecting speculative bubbles by making a key assumption:

> investors know that the market is over valued and uninterested to sell off their positions and persist to buy or sell as they would in the absence of bubbles.[5] The presence of highly liquid futures markets, portfolio insurance and derivative equity instruments, such as convertible bonds and warrants led investors to the wrong impression that they could capitalize on large positive returns in a bull market yet still avoid suffering an enormous loss in a bear market.

The primary purpose of this paper is to study the rational speculative bubble for a sample of LDC markets. The evidence points to a positive and rising bubble premium before October 1987 world wide collapse of stock prices.[6]

2. See Hardouvelis (1988, p. 4).

3. The risk-free-rate reflects the basic time value of money assuming no probability of default. It is a function of the underlying investment opportunities in the economy, which are determined by the real growth rate of the economy. In turn, the real growth rate for the economy is a function of (a) the growth of the labor force; (b) the growth in number of hours worked per week; and (c) the growth of labor productivity. The risk premium explains the difference in the expected return for various grades of corporate bonds (AAA VS.AA VS.A) and different common stocks. It is possible to evaluate the risk of an asset on the basis of (1) internal factors (business risk, financial risk, liquidity risk), or (2) through market-determined risk measure (beta).

4. Volatility is a statistical characteristic of price behavior in a single market. It can be measured as the standard deviation of daily percent price movements (that is, the statistical measure of the amount of dispersion in a particular series of numbers). Correlation coefficient (that is, a statistic that varies between minus one and plus one — a value near zero means that daily percent movement in two markets bear essentially no relationship to each other during the period and a positive value means that when one market rises at more than its trend rate, the other on average rises above its trend rate as well) is measured as correlation coefficient between changes is price indexes for pairs of markets.

5. Shiller (1987) provides survey evidence indicating that before October 1987, 71.7% of individual investors and 84.3% of institutional investors thought that the market was overvalued at the time.

6. Bubble premium is the expected extra return when no bubble crash occurs. Bubble premium is both positive and increasing during the lifetime of the bubble. The returns are expectd to be higher than the risk-free-rate plus the risk premium in the absence of bubbles and enormous to reimburse them exactly for the probability of a bubble crash and an enormous one time negative return.

Section 2 presents the data. Section 3, explores the essence of rational speculative bubbles. Section 4 discusses the dimension of the bubble premium. Section 5 presents empirical evidence on rational speculative bubbles. Conclusions follow.

2. The Data

A diverse sample of LDCs spanning Africa, Asia, Europe, Latin America and the Middle East was selected. Some of these have long histories of established stock markets whereas others are newly emerging.

The resulting data consists of monthly prices, cash dividends and capitalization changes of eleven LDCs. End of period individual firm data for most actively traded securities was gathered to avoid spurious positive serial correlations that result from the averaging process or aggregate indices. The time period covered in most cases is from December 1980 through December 1987. Monthly return series were computed in the usual way.[7]

3. The Essence of Rational Speculative Bubble

The magnitude of the expected rate of growth is the aspect that makes speculative bubble rational. The expected rate of growth of rational speculative bubble is such that stockholders know that the bubble may collapse and that they will not liquidate their positions, but they remain in the market because of the likelihood that the bubble will persist to grow bringing them large capital gain or windfall profit.

The mechanics of rational speculative bubble is very simple to illustrate. Assume, for example, that stockholders require a rate of return of 10 percent in order to invest in the stock market. This required rate of return of 10 percent equals the risk-free-rate, such as, in government T-bills plus an additional return that represents a compensation for the uncertainty. This additional required return is referred to as a risk premium that is added to the nominal RFR. Assume, in addition that stockholders anticipate to receive a constant dividend equal $4.00 each year. From the present value model of stock prices, the bubble-free price of the stock is $4.00/0.10 = $40.00. The price will

7. See Ekechi (1986, p.4)

stay at \$40.00 as long as the required rate of return and the expected dividend remain unchanged.[8] The stockholders' expected rate of return over their holding period equals the expected dividend of \$4.00 plus the Zero expected capital increase or decrease, divided by \$40.00.

Hence the expected and the required rate of return remain at 10 percent and the stockholders are contented.

Assume that the bubble component on the stock price and the market price are \$3.00 and \$40.00 respectively. Specifically, assume a one-year holding period and the probability that the bubble will collapse to zero during the year is say, 1/3 and the probability that it will persist after the holding period is 2/3. Usually, if stockholders know the stock price is overvalued by \$3.00, they will endeavor to sell the stock, forcing its price down to the fundamental level of \$40.00. Although, rational speculative bubbles mean that stockholders know the market is overvalued and have no motive to sell because they expect the bubble component to grow and compensate them for the uncertainty. If the bubble persists, it will reach a peak of \$3.45 at the end of the year. The expected level of bubble at the end of the holding period equals the probability of bubble collapse times the value of zero plus the probability of a bubble collapse times \$3.45 that is 1/3 \$0.00 + 2/3 \$3.45 = \$3.30. The expected rate of return from the stock is \$(4.00 + 0.3) / \$43.00 = 10 percent which is the rate of return required to satisfy stockholders.[10]

In the previous example, the expected return in case of a bubble does not collapse is \$(4.00 + 3.45)/\$43.00 = 10.35 percent, and hence the bubble premium is 0.35 percent. With the presence of a positive bubble premium stockholders will be compensated for the negative excess return in case the bubble crashes. However, in case of a bubble collapse, the expectd return is \$(4.00-\$3.00) / \$43.00 = 2.33 percent which implies a negative excess return of - 7.67 percent.

A higher bubble component implies a larger loss in case of a bubble collapse. To explain this point, let us continue with the previous example. Assume that at the end of the year the bubble reaches the level of \$3.45, which implies new stock price of \$43.45. If the bubble collapses at the end of second year stockholders expect to make a return of \$(4.00-3.45) / \$43.45 = 1.27 percent which implies a negative excess return of -8.73

8. Simply the required rate of return is the discount rate.
9. See Hardouvelis (Ibid; p.7) for more detail.
10. See Hardouvelis (Ibid; p. 9).

percent. This expected loss larger in absolute terms than the corresponding excess return of -7.67 percent of the first year result to a larger bubble premium. However, the new bubble premium should be such that 2/3 times the bubble premium of (3/2 (1/3) 8.73 percent = 4.37 percent which is larger than the previous bubble premium of 0.35 percent.

In the example, the realized abnormal return (RAR) at the end of the year is the same as the bubble premium, a subjective expected abnormal return at the beginning of the year; hence, realized abnormal returns are positive and growing over time. The October 1987 stock market crash may have been a particularly crucial illustration of traders' rapid response to international price changes not easily explained by adverse news or economic fundamentals. Large price swings in one market may consequently lead directly to similar large swings in another. Note that the bubble premium is unaffected directly by the volatility of the stock market.

4. Dimension of the Bubble Premium

The bubble premium is the additional compensation that stockholders anticipate to receive while the bubbles continue to grow.

Let RRR be the realized or the required rate of return of a stock which includes the sum of cash dividends paid during the interval and the realized capital gain or loss at the end of the interval. During the lifetime of the bubble, R can be decomposed as follows:

$$RRR = RFR + RP + BP + E \qquad [1]$$

Where

RFR = risk-free-rate
RP = risk premium
BP = bubble premium
E = Unexpected random disturbance arising from unforeseen circumstances.
RRR = RFR + RP
RAR = BP + E
ERNC (excess return from the absence of no crash) =
BP + RP
RER (realized excess return) = RRR - RFR

Therefore the difference between the actual and the expected excess return is the unexpected random disturbance E which cannot be predicted at the beginning of the period and has an expected value of zero.

RP + BP can be evaluated by regressing the RRR minus RFR on variables known to market participants at the beginning of the period. The regression equation is as follows:

$$RRR\text{-}RFR = (a + b_1x_1 + \ldots + b_jx_j) + E \qquad [2]$$

Where x_1m ..., x_j are variables known to market participants at the beginning of the period. The information variables were selected to maximize explanatory power over the entire sample period. Hence, the equilibrium financial variables gives information about the risk premium and the bubble premium.

The holding period over which returns are estimated is assumed to be either 3 or 12 months.[10] The large swings in stock prices over short horizons would disguise any evidence of a positive and increasing bubble premium.[11]

Table 1 presents summary statistics of the realized excess return. It indicates that excess rates of return are less volatile in the 12- month horizon than in the 3- month horizon. Note that after March 1985, excess rates of return increased, an important step of detecting speculative bubbles.

Table 2 presents summary data from introductory regressions using the entire sample, including after collapse information. The explanatory power of the data variables estimated by the R^2 statistic is much higher in the twelve - month holding period. This result is congruous with the finding of Fama and French, Hardouvelis and others that stock returns are more predictable over longer periods. Also the results shows that all slope coefficients

$b_1, \ldots, b_j$ are jointly zero:

$b_1 = \ldots b_j = 0.$

This would mean that the risk premium (RP) plus bubble premium (BP) is constant overtime.

10. See Hardouvelis (Ibid; p. 9).
11. Ibid; p. 10

Table 1:

REALIZED EXCESS STOCK RETURNS (PERCENT RETURN IN DOMESTIC CURRENCY)

Three Month Holding Period

December 1980 to May 1985:

	Argentina	Brazil	Chile	Greece	India	Jordan	Korea	Mexico	Nigeria	Thailand	Zimbabwe
Mean	25.1	27.3	21.2	15.3	17.0	19.8	12.5	20.4	26.7	21.6	24.9
Standard Deviation	48.3	45.6	44.1	27.0	25.4	23.1	39.2	43.1	45.6	38.2	47.8
correlation with											
Argentina	1.00										
Brazil	0.68	1.00									
Chile	0.90	0.79	1.00								
Greece	0.45	0.54	0.51	1.00							
India	0.57	0.73	0.64	0.37	1.00						
Jordan	0.43	0.48	0.24	0.41	0.12	1.00					
Korea	0.35	0.37	0.36	0.35	0.21	0.15	1.00				
Mexico	0.41	0.58	0.47	0.63	0.15	0.17	0.35	1.00			
Nigeria	0.58	0.49	0.75	0.34	0.23	0.21	0.32	0.16	1.00		
Thailand	0.31	0.51	0.67	0.42	0.25	0.36	0.31	0.21	0.23	1.00	
Zimbabwe	0.53	0.49	0.81	0.35	0.31	0.43	0.41	0.23	0.25	0.15	1.00

September 1979 to May 1985:

	Argentina	Brazil	Chile	Greece	India	Jordan	Korea	Mexico	Nigeria	Thailand	Zimbabwe
Mean	20.5	22.3	19.4	13.2	15.7	16.3	10.2	15.7	19.2	20.1	23.2
Standard Deviation	32.1	33.3	35.6	20.5	21.2	22.0	15.8	20.5	31.2	30.5	37.3
correlation with											
Argentina	1.00										
Brazil	0.70	1.00									
Chile	0.93	0.57	1.00								
Greece	0.73	0.68	0.51	1.00							
India	0.55	0.65	0.73	0.51	1.00						
Jordan	0.73	0.88	0.81	0.45	0.35	1.00					
Korea	0.54	0.65	0.76	0.63	0.41	0.38	1.00				
Mexico	0.63	0.55	0.67	0.53	0.40	0.41	0.39	1.00			
Nigeria	0.71	0.58	0.73	0.47	0.37	0.38	0.33	0.43	1.00		
Thailand	0.57	0.45	0.69	0.36	0.43	0.44	0.30	0.51	0.42	1.00	
Zimbabwe	0.77	0.65	0.75	0.49	0.48	0.41	0.31	0.31	0.63	0.37	1.00

Note: Excess stock returns are realized total returns, including dividends minus the 3-month (12-month) eurodeposit of 3(12) months carter: All returns are annualized.

Cont'd **Table 1:**

June 1985 to December 1987:

	Argentina	Brazil	Chile	Greece	India	Jordan	Korea	Mexico	Nigeria	Thailand	Zimbabwe
Mean	35.6	31.2	20.1	26.5	16.3	30.2	20.4	15.3	20.1	25.0	36.6
Standard Deviation	60.3	53.4	40.2	35.6	20.1	50.7	44.3	41.2	31.8	43.2	67.3
correlation with											
Argentina	1.00										
Brazil	0.79	1.00									
Chile	0.96	0.83	1.00								
Greece	0.48	0.53	0.61	1.00							
India	0.63	0.85	0.67	0.42	1.00						
Jordan	0.57	0.53	0.31	0.45	0.24	1.00					
Korea	0.43	0.42	0.43	0.37	0.25	0.27	1.00				
Mexico	0.58	0.63	0.40	0.72	0.30	0.35	0.37	1.00			
Nigeria	0.70	0.57	0.51	0.53	0.27	0.42	0.45	0.15	1.00		
Thailand	0.47	0.68	0.67	0.45	0.31	0.51	0.27	0.17	0.33	1.00	
Zimbabwe	0.80	0.61	0.71	0.61	0.32	0.47	0.38	0.27	0.38	0.27	1.00

June 1985 to December 1987:

	Argentina	Brazil	Chile	Greece	India	Jordan	Korea	Mexico	Nigeria	Thailand	Zimbabwe
Mean	43.5	45.1	35.7	40.8	37.5	55.3	39.7	91.3	48.9	40.3	53.7
Standard Deviation	25.1	30.2	27.3	21.7	17.3	19.5	17.3	20.7	30.3	28.1	35.5
correlation with											
Argentina	1.00										
Brazil	0.59	1.00									
Chile	0.63	0.43	1.00								
Greece	0.71	0.51	0.43	1.00							
India	0.75	0.59	0.60	0.39	1.00						
Jordan	0.63	0.73	0.47	0.53	0.61	1.00					
Korea	0.51	0.41	0.42	0.43	0.57	0.38	1.00				
Mexico	0.67	0.48	0.51	0.47	0.41	0.25	0.37	1.00			
Nigeria	0.71	0.45	0.44	0.53	0.48	0.24	0.41	0.15	1.00		
Thailand	0.55	0.61	0.46	0.47	0.37	0.30	0.43	0.21	1.23	1.00	
Zimbabwe	0.78	0.58	0.47	0.48	0.43	0.35	0.55	0.36	0.39	0.23	1.00

Note: Excess stock returns are realized total returns, including dividends minus the 3-month (12-month) eurodeposit of 3(12) months carter: All returns are annualized.

Table 2 also indicates that the presence of bubbles can influence mutability, but the opposite is not true: the presence of mutability does not necessarily imply the presence of speculative bubbles. Coefficient mutability can be influenced by many factors, such as, the downward slide of the dollar in March 1985 as well as the high international interest rates that caused recession in most countries.

To evaluate risk premium over the period from April 1985 through September 1987, one simply uses the estimated parameters a, b_1, ..., b_j from September 1980 through March 1985 sample together with the data variables of the April 1985 through September 1985 sample.

Constructing bubble premium, includes calculating a fresh set of parameters a, b_1, b_2,..., b_j over the period from April 1985 through September 1987. The bubble premium is estimated utilizing the difference between the fresh estimates a, b_1, ... b_j and the original estimates a, b_1,..., b_j, together with the data variables of the later period. This method of estimation allows for possible mutability in the regression coefficients through the use of a rolling regression: starting from June 1985 and recalculated every month with a new month added to the sample each time.[12].
Specifically, these coefficients together with information variables of each month give an empirical proxy of RP + BP.[13] Note that the realized excess return for these countries are positive from 1986 through 1987. Evidence for the presence of speculative bubble would be a positive and increasing bubble premium. Recall that the bubble premium is the additional compensation that stockholders anticipate to receive while the bubble continues to grow.

Table 3 presents the time trend in the bubble premium:

$$BP = C + D\ TIME + Y \qquad [3]$$

The slope coefficients are positive and significantly different from zero and hence substantiate the existence of rational speculative bubbles. The dependent variable is the realized abnormal return, BP + E in contrast with the expected abnormal return BP. The noise term E creates superfluous volatility and appears to disguise the upward trend.

12. Same method was adopted following Hardouvelis (Ibid; p. 13).

13. The presence of bubbles should augment the riskiness of holding stocks. In a rational speculative bubbles, stockholders anticipate the volatility of stocks to augment as the bubble develops because the amount of the potential loss (and gain) rises with time.

Table 2:
THE PREDICTABILITY OF EXCESS STOCK RETURNS

$$RRR\text{-}RFR = a + b_1 x_1 + \ldots + b_j x_j + E$$

SAMPLE: December 1980 - December 1987, 201 Observations

			Chow Tests			
			Test of Periods period		periods	
Three-Month Holding Period	R^2	SEE	$b_1 = \ldots = b_j = 0$	1 vs. (2 + 3)	1 vs.2	2 vs.3
Argentina	.39	60.3%	.365	.663	.521	.327
Brazil	.28	56.1	.255	.532	.326	.221
Chile	.26	35.8	.121	.738	.433	.324
Greece	.27	42.9	.321	.832	.632	.435
India	.29	45.3	.423	.473	.543	.223
Jordan	.35	47.7	.342	.763	.431	.201
Korea	.27	58.9	.231	.896	.362	.233
Mexico	.28	59.1	.132	.821	.367	.216
Nigeria	.39	68.2	.143	.837	.385	.321
Thailand	.28	69.3	.261	.732	.393	.210
Zimbabwe	.40	75.1	.243	.943	.401	.217
Twelve-Month Holding Period						
Argentina	.75	30.1%	.211	.200	.100	.123
Brazil	.85	32.6	.321	.201	.090	.103
Chile	.68	20.5	.431	.236	.135	.089
Greece	.72	15.5	.311	.217	.087	.093
India	.81	25.6	.428	.228	.075	.063
Jordan	.85	26.1	.328	.217	.088	.067
Korea	.86	30.2	.127	.206	.091	.073
Mexico	.93	26.1	.120	.219	.075	.081
Nigeria	.78	28.7	.188	.128	.068	.093
Thailand	.68	25.2	.217	.139	.081	.083
Zimbabwe	.73	36.4	.300	.240	.093	.073

Note: R^2 is the coefficient of determination adjusted for degrees of freedom; SEE is the regression standard error. Significant level lower than .070 constitute evidence for rejecting the null hypothesis. RRR is the annualized total gross return and RFR is the risk-free rate, that is, the 3-or 12 -months eurodeposit rate. Period 1 runs from December 1980 through May 1983, Period 2 from June 1983 through May 1985 and Period 3 from June 1985 through December 1987. The information variable x_i are as follows: 3 -month horizon, lagged dependent variable, spread between long-term government bond yield and the volatility of LDC stock prices; in the 12 - month horizon: lagged dependent variable, eurodollar rate, spread between long-term government bond yield and the currencies/dollar exchange rate volatility.

Table 4 presents the realized abnormal returns, BP + E for the 3 - month holding period. From the result, one cannot reject the null hypothesis that these abnormal returns were created by chance.

Finally, it should be observed that the hypothesis of rational speculative bubbles cannot forecast how much a market would crash once a bubble erupts. However, in October 1987, Argentina, Brazil, Chile, Greece, India, Jordan, Korea, Mexico, Nigeria, Thailand and Zimbabwe that had earlier indicated weak bubble evidence fell, nonetheless the latter had indicated strong bubble evidence.[14].

5. Conclusion

This paper examines the rational speculative bubbles in LDC securities markets. The results suggest that bubble premium is positive and increasing with time and the realized abnormal returns are also positive and growing over time only in an average sense. Specifically, the bubble premium is positive because it compensates stockholders for the negative excess return in case the bubble collapse.

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14. For a comprehensive account, see Hamilton (Ibid, p.52)

Table 3:
TIME TREND IN THE BUBBLE PREMIUM

Sample: January 1986 to Sept. 1987, 36 Observation
BP = C + D TIME + Y
BP + E = C' + D' TIME + Z

	C	D	R^2	SEE	C'	D'	R^2	SEE
Three-month holding period								
Argentina	-20.40*	.90*	.55	6.4	78.32**	-1.47	-.03	40.9
	(6.45)	(.32)			(45.28)	(1.61)		
Brazil	-26.70*	.85*	.46	5.3	13.65	-1.10	-.07	31.2
	(5.34)	(28)			(20.23)	(1.26)		
Chile	-0.83*	.53*	.39	1.0	-99.35*	3.38*	-.09	35.6
	(1.24)	(0.5)			(47.28)	(1.40)		
Greece	-15.89*	.60*	.57	2.1	65.28**	2.10*	.15	45.1
	(5.61)	(.07)			(33.40)	(1.23)		
India	-0.36	.78*	.58	3.5	70.71**	-1.89	.12	37.8
	(1.13)	(.25)			(40.24)	(1.73)		
Jordan	-21.75*	.45*	.53	6.7	8.23	-5.10	-.05	35.3
	(8.30)	(.18)			(17.36)	(1.28)		
Korea	-28.49*	.71*	.49	7.4	-83.24*	-1.45	.22	39.4
	(8.30)	(.22)			(39.35)	(1.27)		
Mexico	-0.31	.57*	.47	7.8	(10.41)	.73**	.17	17.8
	(1.23)	(.04)			(19.25)	(.25)		
Nigeria	-20.35*	.99	.51	7.1	57.27**	.97*	-.08	20.1
	(5.18)	(.35)			(32.23)	(.45)		
Thailand	15.26*	.83*	.56	8.3	11.81	.83**	.28	30.2
	(5.31)	(.33)			(20.10)	(.37)		
Zimbabwe	-25.71	.98*	.64	7.9	61.29**	3.21*	-.06	15.8
	(8.21)	(.35)			(47.43)	(1.36)		
Twelve month holding period								
Argentina	-15.21*	.73	.88	2.2	15.31	.88**	.19	20.2
	(5.30)	(.21)			(5.28)	(.45)		
Brazil	-21.12*	.89	.90	1.4	8.96	.83	.18	15.7
	(4.8)	(.25)			(4.68)	(.44)		
Chile	-0.35	.65	.70	0.8	17.81	1.80	.35	20.1
	(1.10)	(.15)			(14.78)	(.78)		
Greece	12.86*	52	.75	0.6	-13.36	.95**	.13	15.8
	(4.72)	(.18)			(12.13)	(.49)		
India	0.12	.20	.71	3.2	11.28	.91**	.16	25.3
	(1.12)	(.07)			(13.20)	(.53)		
Jordan	-15.35*	.35	.89	2.5	12.88	1.56*	.36	21.4
	(5.36)	(.18)			(13.89)	(.63)		
Korea	-0.39	.44	.85	0.7	7.36	1.62*	.39	13.2
	(1.02)	(.21)			(4.61)	(.53)		
Mexico	-0.44	.35	.77	0.9	8.21	1.73*	.42	15.7
	(1.13)	(.19)			(4.75)	(.75)		
Nigeria	-12.24*	.21	.87	1.3	-13.27	.73	.37	16.2
	(3.45)	(.05)			(12.22)	(.37)		
Thailand	-0.55	.80	.78	1.5	-14.28	.86	.28	26.3
	(1.03)	(.26)			(12.81)	(.40)		
Zimbabwe	-13.65	.75	.79	2.1	-15.41	1.85*	.41	10.2
	(4.83)	(.23)			(13.83)	(.88)		

* Significant at the 5 percent level.
** Significant at the 10 percent level.

Note: BP is the bubble premium the expected abnormal return conditional on no bubble collapse taking place, and BP + E is the realized abnormal return R2 is the coefficient of determination adjusted for degrees of freedom. SEE is the regression standard error. Numbers in parentheses are corrected OLS standard errors; the correction is due to overlapping intervals.

Table 4:

REALISED ABNORMAL RETURNS - JUNE 1985 TO SEPTEMBER 1987

	Three-Month Holding Period (In Percent)										
Date	Argentina	Brazil	Chile	Greece	India	Jordan	Korea	Mexico	Nigeria	Thailand	Zimbabwe
1985											
June	—5.92	7.80	40.8	6.94	—9.35	13.35	—15.85	10.35	—5.61	23.60	—19.23
July	—3.41	8.63	—41.3	—8.23	—13.61	—14.26	—19.23	—11.37	—2.40	40.21	—25.60
August	—2.65	—6.81	—35.7	9.41	15.62	18.81	25.61	13.65	—3.36	45.31	—14.21
September	—4.98	—4.36	—34.5	—16.23	—18.21	—16.63	—37.83	—40.21	40.36	—13.60	—35.44
October	—30.21	—5.71	—26.8	—17.41	—21.36	19.31	—40.86	—45.37	—22.81	—14.56	—39.36
November	—25.61	36.23	—11.5	28.36	—24.03	—14.27	37.81	37.26	35.41	—15.37	—41.40
December	—12.33	24.40	16.7	39.44	35.34	—16.29	39.63	—40.26	—27.35	—18.40	—15.36
1986											
January	—18.99	15.84	—12.21	17.36	—18.23	—25.61	25.73	—18.43	—12.11	—15.81	—13.83
February	—12.80	13.66	—14.42	22.41	—19.45	—27.80	21.83	—13.26	—14.23	—19.23	—19.36
March	—60.21	40.81	—15.16	35.61	—13.36	—30.25	43.46	—15.83	—16.41	—23.88	—41.23
April	—70.88	41.23	—17.23	40.32	—14.86	—25.61	47.37	—16.24	—18.24	—40.23	—44.87
May	—60.21	45.36	—27.81	15.41	—15.21	—33.63	13.24	—17.21	—22.83	—36.75	—19.20
June	—15.80	22.81	—21.36	10.26	—17.87	—37.81	10.21	—18.31	—25.73	—44.37	—30.26
July	—3.61	15.80	—30.21	11.21	—19.23	—39.36	8.26	—17.68	—36.81	—48.60	—41.27
August	—8.36	11.23	—41.37	35.36	—21.45	—40.41	25.88	—35.40	—42.45	—37.41	—35.60
September	—17.80	37.86	—55.23	37.38	—25.01	—42.34	35.61	—45.36	—56.71	—21.20	—38.40
October	—25.63	—24.71	—60.23	31.21	—37.80	—45.46	45.34	—47.28	—62.31	—15.56	—39.35
November	—22.87	34.21	—40.44	40.01	—45.21	48.85	—15.81	—50.21	—35.20	—10.28	—40.20
December	—22.31	—13.87	—12.36	38.21	—50.28	—47.73	—21.27	57.44	—21.79	12.84	45.36
1987											
January	—88.86	25.60	20.46	12.86	—15.31	48.61	—17.85	24.48	37.23	23.40	—19.23
February	85.60	31.23	21.13	13.81	—16.11	47.20	18.21	35.60	30.40	31.13	—35.30
March	70.91	60.42	—25.36	12.36	—17.27	36.27	23.48	31.47	39.23	36.40	37.20
April	65.68	65.23	—26.81	13.03	19.33	49.31	29.37	35.63	78.21	38.20	45.36
May	92.01	37.41	37.85	19.23	—18.41	17.06	50.23	15.37	45.37	26.13	—12.14
June	89.23	38.45	53.16	18.41	—19.23	16.23	—43.81	—14.41	—40.88	35.30	55.41
July	77.27	43.11	64.23	15.23	—35.24	55.41	31.85	—49.60	—33.43	—13.23	50.35
August	38.21	18.23	63.83	16.21	60.35	56.37	35.78	55.32	—39.60	11.24	—41.28
September	60.40	39.63	12.41	35.81	65.31	61.23	39.85	—12.80	—40.23	—15.26	—15.20
October	25.23	15.80	15.23	40.21	70.24	57.82	40.73	—15.91	—41.33	20.88	—19.36
November	39.41	41.03	17.41	47.23	35.61	59.23	35.81	—21.36	50.60	—25.96	—20.30
December	75.36	—8.93	18.24	49.61	40.23	63.21	31.23	—40.21	55.31	—35.51	—18.30

Realized abnormal returns refer to BP + E. They are annualized.

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Abstract

This paper empirically examines the rational speculative bubbles in LDC securities markets. The evidence points to a positive and multiplying bubble premium before the October 1987 stock market crash. Generally, the evidence is congruous with the hypothesis of rational speculative bubbles.