The Capital Structure of Listed Companies on the Securities Exchange of Barbados

by

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Presented at the Annual Review Seminar, Research Department,
Central Bank of Barbados
July 28-31, 1998

1. INTRODUCTION

The purpose of this paper is to analyze the capital structure of firms in Barbados. This study seeks to determine the factors which influence the choices firms make between debt and equity financing. The problem of debt equity choice of the firm will be examined as its choice of financing investment through debt in the form of bank loans and equity in the form of financing on the stock market.

Prior to Miller's work, debt was perceived as undoubtably evil. Thus, high leverage was perceived as detrimental to the growth opportunities of firms. However, perspective on debt has evolved to embrace the use of debt as a feasible financial instrument. Numerous studies on the virtues of debt financing have followed his work. Studies on the influence of debt have been mainly on its impact on the behavior of managers and their investment decisions. Myers (1977) demonstrated that too much debt as a percentage of total financing had a negative effect on the value of the firm as managers would forego investment opportunities with positive Net Present Values (NPV). This is now referred to as the 'under investment' problem of debt financing. Jensen's argument was that debt payments can reduce firms' investment in negative NPV projects. This has been referred to as the 'over investment' problem. Thus he found that debt financing had a positive effect on the value of the firm.

It is not yet explicitly clear whether low or high leverage is better for an economy as this has been an ongoing debate in finance. Miller (1991, pp 481) stated that we should not *"waste our limited worrying capacity on the second-order and largely self correcting problems of financial leverage."* Other economists, however, believe that leverage is not self correcting and the level may have serious implications on a firm's investment decision. A firm's ability to finance growth may be reduced by high leverage levels through liquidity effects.[1] We will therefore seek to outline the different effects of leverage on a company and determine the factors that influence a firm's decision on capital structure.

There have been numerous studies on debt equity ratios (leverage), particularly on developed countries. Studies by Titman and Wessels (1988), Zeckhauser and Pound (1990) on these firms indicate those firms in industrialized economies tend to operate with high leverage levels. They also argue that high leverage is beneficial to these firms. Studies on developing economies seem to violate these initial findings. These firms seem to operate with comparably lower leverage levels. Hussain's (1996) study of Indonesia finds that high leverage had a negative effect on firm

[1] See Bernarke, Gestler and Gilchrist (1993)

performance for the sample of listed firms.[2] Thus it is particularly interesting to determine what causes these entrepreneurs to choose relatively higher levels of equity financing in comparison with the entrepreneurs in develop economies.

The format of the paper as follows:

- a critical and in-depth analysis of the financial sector of Barbados is done in section 2,
- then the capital structure of firms is analyzed in section 3,
- the method and tests are outlined in section 4,
- the results in section 5
- and then our conclusions are given in section 6.

2. DESCRIPTION OF THE FINANCIAL SECTOR

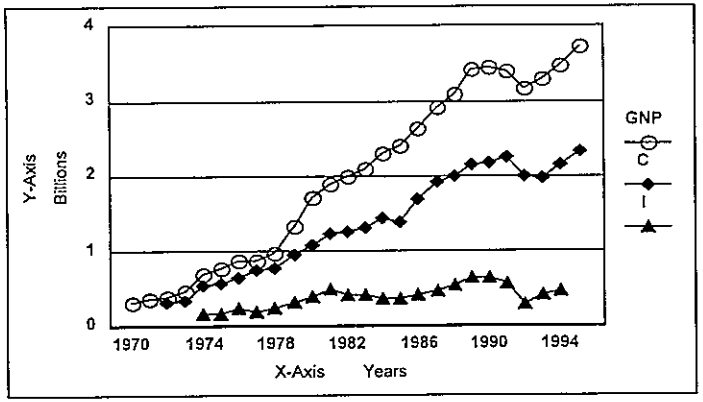
The financial sector of an economy is undoubtably one of the most important sectors in determining the growth of the economy. It is evident that financial institutions contribute significantly to the growth of an economy. The study by Goldsmith (1969) provided evidence to support the theory of a positive relationship existing between financial institution assets and GNP output per person. His analysis went even further to show *"that periods of more rapid economic growth have been accompanied, though without exception, by an above average rate of financial development"(pp. 48).* Levine (1991) also constructed a growth model in the spirit of the seminal work of Lucas(1988) and Roemer (1989) and found that a stock market could emerge to allocate risk and alter investment incentives thus changing the steady state growth rate of an economy.[3]

For a country to experience sustainable economic development, investment must increase relative to consumption as a proportion of the national income. From *fig 1.* we see the GDP of Barbados increased steadily from the formation of the securities exchange in 1982 and in 1987 when the exchange was officially registered, the impact on the growth of the economy became even more evident. Investment, however, has not increased as a proportion of GDP but has instead remained relatively constant and thus its proportion of GDP is decreasing. Thus it seems that the formation of the securities exchange has not had a significant positive impact on the level of investment in the economy.

[2] Hussain Q and Nivorozhkin E. (1997), IMF Working Paper,

[3] Roemer created a growth model where technology was determined inside of the model. This is now referred to as an *endogenous growth model.*

Fig 1. Gross Domestic Product, Consumption and Investment of Barbados



Source: IMF, 1998, International Financial Statistics

Capital formation has to be increased in real terms in order to sustain this current growth. One way to achieve this is through the development of the financial sector. It therefore means that methods of financial intermediation and their standards have to be increased.

Financial intermediation is very important in an economy as it efficiently allocates the pool of savings to facilitate investment opportunities for the prudent entrepreneur. If the financial sector is developed and functioning efficiently, it will afford these opportunities to the most productive recipients.

Financial markets, however, face the dilemma of being more susceptible to market failures. The fundamental base of efficient markets in welfare economics, is the existence of perfect information. The relatively faster response of financial markets to other markets in an economy has been alluded to by numerous economists.[4] Thus, in an economy with imperfect information, pareto optimal equilibria may only be attainable through market intervention in the form of monitoring corporation and regulatory laws to ensure the integrity and accessibility of the information.[5]

[4] This is the base assumption of the Dornbusch "sticky" price model on exchange rate determination.

[5] Stiglitz refers to this information as a public good, thus because of free riders, the market will not be able to efficiently provide this information.

2.1 Banking

Barbados has established itself as a major international financial sector, providing local and offshore banking services in a stable economic and political climate.

The Central Bank of Barbados was established in 1972 in accordance with decisions of Trinidad and Tobago, Guyana and Jamaica, on achieving political independence, to create an institution to facilitate autonomy over the domestic financial system. Under its mandate *"to foster the development of money and capital markets in Barbados"*[6] the central bank has managed to create this stable financial environment. In order to maintain this stable environment, the central bank has the very important task of monitoring all financial institutions. Commercial banks are guided to comply with the strict operating guidelines of The Basle Accord. All banks are also required to publish their accounts and follow business operational procedures that comply with the Financial Intermediaries Regulatory Act 1992 -13. It has been notable that many of these banks surpass these guidelines in the prudent operating procedures.

Unlike many developing nations the Barbadian financial system is dominated by privately owned institutions. Historically Commercial banks have dominated the financial system and are the main avenue through which financial intermediation has taken place in Barbados. Commercial Banks and Trust Companies have been able to provide the economy with the necessary services for growth, however, to maintain and sustain this growth, other financial intermediaries are needed.

2.2 Stock Market

The Securities Exchange of Barbados (SEB) was officially formed on April 1, 1987 with the Securities Exchange Act. It is currently a self regulatory institution governed by its own rules and standards. The securities industry in Barbados is also regulated through the Companies Act Cap.308, the Securities Act 1982 and to a lesser extent The Exchange Control Act. The institution is growing and its importance to the development of the economy is immeasurable. The development of a stock market to an economy is of utmost importance to the development of an economy as commercial banks cannot provide all the necessary financial services for the business sector. A stock market plays a very important role in lowering the risk investors face from a firm's volatile productivity cycle. The effect of the lower productivity risk is an increase in the welfare of investors which promotes higher levels of investment.

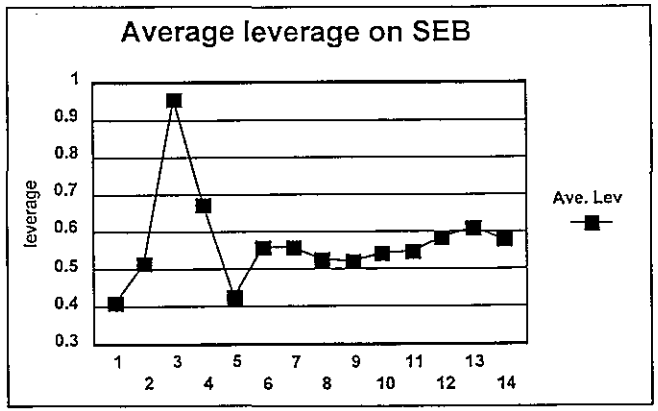
The stock market plays some very important roles;

- It increases the pool of resource available to investors by complementing the resources in the banking system with those in the financial markets.
- By allowing individuals to diversify risk through investing in numerous companies, the stock market increases firm efficiency by eliminating the premature withdrawal of capital.
- Stock markets also play an important role in stabilizing the existing pool of savings.

With the formation of SEB, the pool of resource for investment opportunities has increased tremendously. From *fig.2* it is evident that the formation of the exchange had a dramatic impact on the leverage levels of firms. The year 1987 saw average debt equity ratios falling drastically as the market made available a viable alternative financial instrument. Since the formation, however, leverage levels have risen. The average level is about 55 percent, which is much higher than the levels found in other studies on developing countries.

Stiglitz (1998) spoke of the stock market's liquidity and depth as only a crude measure of the effectiveness and development of a country's financial system. The major stock markets in the region, Barbados, Trinidad and Jamaica, are undoubtably still in their developmental stage. The three still display the characteristics of emerging markets. The total market capitalization is relatively small, a very small number of stocks dominate trading, stock ownership is highly concentrated and the corporate accounting standards are still not yet in line with international standards.

These factors have hindered the development of regional financial markets. Empirical research by Singh(1993) showed that stock markets in developing countries tended to be more volatile than those in developed economies. This volatility coupled with the relatively underdeveloped equity market will tend to undermine the effectiveness of the stock market and the financial system as a whole. Instead of increasing investment, these market failures may reduce investment from risk averse individuals and raise the cost of capital.



[6] See Central Bank Act Cap. 323 C.

3. CAPITAL STRUCTURE OF FIRMS

The fact that firms choose a mixture of financial instruments to finance their projects makes it important for us to understand what determines, a firm's capital structure. What are the factors that influence a firm in its choice between debt and equity financing? More specifically, what determines the optimal debt to equity ratios a firm should employ in financing its projects.

Debt and equity have distinctively different advantages and disadvantages. The study by Jensen and Meckling (1992) identified three main reasons for a firm to choose a mixture of instruments for financing. These are;

- the incentive effects of high leverage firms,
- the monitoring cost these incentives engender
- and the high costs associated with bankruptcy.

The *incentive effects* of high leverage refer to the willingness of creditors to lend more money to an entrepreneur whose capital structure includes a very high percentage of debt financing relative to his equity. Such an investor would have a great incentive to engage in activities which promise very high returns irrespective of the probability of success because he captures most of the gains if he is successful and the creditor bears most of the cost if it is not.

Because of the risk involved in providing debt in some high leverage situations creditors would have to impose stipulations on the companies operations and monitor the investor to make sure he complies with these stipulations. Thus, *monitoring costs* are increased in high leverage situations.

Perhaps the most important cost of high leverage are the *costs associated with bankruptcy.* Bankruptcy involves a costly adjudication process which consumes a portion of the remaining value of the firm's assets leaving fewer resources to compensate creditors. Thus as the probability of bankruptcy increases (i.e., leverage ratio increases), the propensity of creditors to provide loans decreases. The revenue and operating cost of the firm may also be adversely affected by increasing the probability of bankruptcy.

3.1 The Determinants of Capital Structure.

There have been many views on the factors that affect some firms choice of capital structure. The factors that have been attributed to the firms optimal leverage ratios are profitability, growth rate, age, ownership, asset structure and size of the firm.

The conventional approach to determination of a company's capital structure is to posit that a firm selects its capital structure based on the relative costs and benefits of these factors on debt and equity financing.

Myers (1984) referred to a pecking order theory of investment financing. This theory states that firms prefer to finance projects from internal resources and that debt was preferred to equity as an external financing instrument. It is from this theory that we will seek to outline the impact of these attributes on a firm's optimal capital structure.

4. METHOD AND TESTS

4.1 Data

Because SEB is relatively young and comprises a small number of firms, we face the obvious problems of having too small a sample. This small sample will pose estimation difficulties because of the limited degrees of freedom and collinearity between the firm's behavior in a small economy.

To overcome these difficulties, we will be using panel data for our estimation. Perhaps the most attractive feature of panel data is that it gives *more informative data, more variability, less collinearity between the variables and more degrees of freedom.* This makes parameter estimates more reliable as long as the data is poolable.

Panel data also allows for the construction and test of more complicated behavioral models than pure cross section or time series data.

The problems associated with panel data are mainly due to data collection and the bias in parameter estimates which may result from these errors. It may also be plagued with missing points since information on all the explanatory variables may not be available on all the individuals used in the sample.

The data set is usually on annual figures over a short period for each individual. This reduces the strength of arguments of asymptotic unbiasedness. This problem can however, be reduced by increasing the number of individuals in the study.[7]

Thus, the data set used in the model comprises all the listed firms of the SEB during the period 1983 -1995. The set was however reduced to only fifteen firms as those firms with incomplete data sets for the period were eliminated to facilitate estimation.

[7] For a more detailed analysis of the advantages and disadvantages of panel data see Baltagi (1995)

4.2 The Model

The individual firms listed on the stock exchange are used to form the panel.

$$y_{it} = \alpha + X'_{it}\beta + u_{it} \qquad i=1,2,...,N;\ t=1,2,...,T, \ (1)$$

where i denotes the firm, t is the time subscript, α is the scalar constant, β is a K x 1 matrix of parameters and X_{it} is the itth observation on the Kth explanatory variable. The error component is assumed to take the form

$$u_{it} = \mu_i + \lambda_t + \nu_{it} \qquad (2)$$

where μ_i is time invariant and denotes the unobserved firm specific effect and ν_{it} captures the remaining disturbance. This is a two-way error component model. This structure resulted from a Breusch-Pagan test which produces a Lagrange Multiplier statistic to test the hypothesis that;

$$H_0; \sigma^2_\mu = \sigma^2_\lambda = 0.$$

The test statistic

$$LM = \sum_i \left[\frac{T}{2s^2} \left(\frac{s_i^2}{s^2} - 1 \right) \right]^2 \left[\frac{2s^4}{T} \right]$$

$$= T \quad \frac{s_i^2}{} \_ 1 \quad ^2$$

$$LM = \sum_i \frac{T}{2s^2} s$$

$$2 \sum_i \left[\frac{}{s^2} \right].$$

$$= 6 \times (9.0227)$$
$$= 54.1364$$

where $LM \sim \chi^2$

and s_i^2 is the variance of the individual firms from Ordinary Least Squares (OLS) on the pooled regression and s^2 is the overall variance of the pooled regression. From our calculated value, we had to reject H_0 and conclude that the errors are heteroscedastic and vary with the time and the individual firm.[8]

We also tested the poolability of the data using a Chow test. Although it seems that the Chow test is not applicable if the variance is hetroscedastic, the model can be transformed by the covariance matrix of the regression to make the errors homoscedastic. Performing a Chow test on this transformed regression is then valid. The test was to determine whether the parameters of the individual firms were statistically equal to the parameters of the pooled regression. The calculated F-statistic was equal to 1.987, thus we fail to reject the null that the parameters are equal and thus conclude that the data is poolable and will yield unbiased efficient estimates.

To test our *a priori* assumption that the explanatory variables would be highly correlated in such a small economy we construct a cross-correlation matrix of the average yearly values of the panel data set. The results seen on Table 1 overwhelmingly confirms this assumption. Most of the explanatory variables are highly correlated. The cross-correlation between TA and SAL is 0.9854 thus they are almost perfectly correlated. The cross-correlation between SAL, TA and AGE is 0.898 and 0.917 respectively. All the other explanatory variables have moderate cross-correlations (i.e. cross-correlations of approximately 0.5. This would pose serious problems of biased and inefficient estimates if OLS is applied.

The traditional approach to this form of analysis, is to state a simple linear relationship between the firms capital structure and the attributes which the researcher proposed explained the firms leverage levels. OLS was then employed to estimate the impact of the attributes on the leverage. This method of estimation had serious problems which could have resulted in biased estimates. The proxies used in the regression are usually correlated and may actually be determined concurrently with the leverage of the firms. It also could not be applied to our sample because the variables violated the underlying assumptions that make OLS the Best Linear Unbiased Estimator (BLUE).

To determine the influence of the aforementioned attributes on the firms capital structure, we adapt an Iterative Three-Stage Least Squares (I3SLS) estimation procedure. This is in keeping with the method referred to as *linear structural modeling* which was used by Titman and Wessels (1988) in their study of the capital structure of firms.[9] Linear structural modeling is a simultaneous equation estimation technique. Thus it overcame the problem of simultaneity bias, and inefficiency that would result from the correlation of the residuals and the variables. This procedure yielded a Full Information Maximum Likelihood (FIML) estimate of the regression parameters. The I3SLS

[8] Details of this test procedure can also be found in Baltagi (1995)

[9] The paper by Bentler(1983) which examined latent variable models gives a very detailed analysis of the technique employed by Titman and Wessels

procedure converges at different point but on convergence, it yields FIML.[10] For our estimation we use the total assets of the individual firm as the instrumental variable.

The model is specified as follows;

$$\text{Leverage} = f(\text{Age, Ownership, Profitability, Asset Structure, Growth})$$

estimated as a simple linear function;

$$LV = \beta_1 + \beta_2 NP + \beta_3 SAL + \beta_4 GRW + \beta_5 COMPDUM + \beta_6 AGE + \beta_7 ATRAT + \varepsilon$$

Proxies are;

NP	The net profit after tax to reflect the profitability of the firms
SAL	The firms yearly sales or turnover to reflect the firms size
GRW	Growth rate of the firm calculated as the rate of increase of the net total assets
COMPDUM	Dummy variable to reflect company ownership (locally owned =1, and foreign owned =0)
AGE	The age of the firm. This is calculated from the date it was established until 1995
ATRAT	This is the acid test ratio of the firm which reflects the firms asset structure.

5. THE RESULTS

Our parameter estimates obtained from employing this technique are all highly significant as can be seen in the output on table 2. By highly significant we mean that the calculated t-Statistic for all the explanatory variables are greater than the critical t-Statistic at all levels of significance. Also notable is the fact that the standard errors of all the estimates also very small. Thus the I3SLS technique has produced efficient statistical estimates.

The first variable in our regression, NP, represents the net profit after tax of the firms. This is the proxy which represents the profitability of the firm. The coefficient is very close to zero which would imply that the profitability of the firm is not an important determinant of the leverage of a firm. The sign on the coefficient is negative, which would imply that more profitable firms rely on more equity to finance their investments than they do on debt. This is in keeping with Myers' pecking order assumption that firms prefer internal financing to external financing. The profitability of the firm enables them to finance projects through retained earnings. The past profitability of the firm also would be reflected in the price of the company's shares thus equity financing will become cheaper as the firm becomes more profitable.

We use the variable SALes as a proxy for the size of the firm. Total assets was also used in another regression but as in the study by Titman and Wessels we found that sales and total assets were highly correlated and using either as a proxy for size gave almost the same results. Sales however had a lower correlation with the other explanatory variables than total assets thus using it as a proxy produced a better regression result. Titman postulated that small firms pay more to issue equity than larger firms thus if this is the case, the size coefficient should be negative. Our results were again very close to zero. The interesting result, however, is that the coefficient for Barbados is positive. This result implies that if such a size effect exists in Barbados, it is the smaller firms that are utilizing more equity financing than the larger firms. This probably is a result of the relative efficiency of the banking system to the stock exchange. Thus larger firms will utilize more debt as they can access bank loans easier than a smaller and perhaps less profitable institution.

The variable GRW was used as the proxy for the growth of the firm. This was calculated as a simple rate of increase of the firms total assets. This coefficient is large in comparison with the other parameter estimates and thus implies that this has the greatest influence in determining the leverage levels of the firm. The coefficient is however positive and perhaps differs from the findings of Titman for the reasons we outlined for the SALes coefficient.

COMPDUM is a dummy variable used to reflect the ownership structure of the firm. It is used to differentiate between locally and foreign owned firms. The coefficient is also large relative to the other parameter estimates thus indicating that the ownership of the firm also has a significant impact in the determination of the leverage levels of the firm. It also has a negative sign which would imply that locally owned firms utilize lower debt equity ratios than foreign firms.

The parameter on the AGE coefficient is also very close to zero but the sign of the coefficient is negative. Thus older firms utilize more debt in their financing than younger firms in contrast to Hussain'study on Polish firms. The reason however could be the same if our assertion that the banking system in Barbados is a more attractive method of finance relative to debt is true. Older firms with stronger reputations would therefore find it easier to access credit from the bank.

Perhaps the most influential of all the variables is ATRAT. It is a well known accounting fact that for a business to successfully continue its operations, it must have enough cash to meet its commitments as they arise. Most investors or creditors to an institution usually consider the firms liquidity ratio as a good indication of the firms ability to fulfill these commitments. Our analysis shows that there exists a negative relationship between the leverage level of the firm and its liquidity.

[10] A detailed look at the asymptotic properties of FIML and I3SLS see Hendry 1993 pg 296-298.

Thus as the acid test ratio of the firm gets higher the, they will find it more difficult to acquire bank loans in order to finance their investments. Thus the acid test ratio has a positive relationship with the marginal cost of acquiring debt financing and thus lowering the relative cost of financing through debt. The firms alternative is therefore to issue equity in order to finance any expansions in production.

Table 1.

CROSS-CORRELATION MATRIX

	AGE	ATRAT	GRW	LV	NP	RESID	SAL	TA
AGE	1							
ATRAT	0.552698	1						
GRW	0.138667	-0.244088	1					
LV	-0.30349	-0.115608	-0.54126	1				
NP	0.339449	-0.44464	0.613243	-0.525085	1			
RESID	2.27E-013	-0.219308	4.21E-015	0.442276	2.39E-014	1		
SAL	0.898348	0.169019	0.352292	-0.317187	0.664824	4.14E-014	1	
TA	0.916761	0.259141	0.329029	-0.222599	0.554757	2.01E-014	0.9854	1

Table 2.

Estimation Method: Iterative Three-Stage Least Squares
Date: 07/15/98 Time: 10:08
Sample: 1983 1995
Convergence achieved after 222 iterations

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1.697085	0.037958	44.70907	0.0000
C(2)	-2.17E-05	3.37E-06	-6.425664	0.0000
C(3)	3.61E-07	1.07E-07	3.379110	0.0009
C(4)	0.728471	0.029664	24.55734	0.0000
C(5)	-0.657406	0.031359	-20.96392	0.0000
C(6)	-0.001566	0.000190	-8.237238	0.0000
C(7)	-0.850084	0.029826	-28.50117	0.0000

Determinant residual covariance 9.61E-25

6. CONCLUSIONS

In our study of the capital structure of firms in Barbados we introduced an estimation technique which overcomes many of the problems of estimation which may occur in analyzing the limited and often problematic data available in small developing economies. While the results of our analysis does support most of the existing theory on the determination of debt equity ratios, it also reveals some interesting differences between the decisions of firms in a developed and a developing financial environment. These results could have serious implications on the policies employed in developing economies with regards to sustainable development through development of the financial sector.

The role of profitability as a determinant of leverage is minimal. However, our results do support the theory that firms do prefer to finance their projects from internally generated funds rather than relying on outside sources of funds. Firms in Barbados seem to prefer debt to equity in financing their projects externally in keeping with the pecking order theory of Myers. Hussain's study of Polish firms did support this theory but as it is evident that older and more rapidly expanding firms exhibit contrasting behaviors with those in Barbados. Myers's theory does support the findings of our study on Barbados but perhaps for different reasons.

The results would imply that the more established firms, whether through age or growth record, prefers debt financing to equity. This could mean that the stock market has not yet established itself as a viable method of finance. Investment has also not risen as a proportion of GDP as one would expect. This has policy implications for governments to try to correct the factors that have been hindering the development and establishment of the equity market. The Central Bank has produced several informative publications to explain and promote SEB to the nation but perhaps the structure of the exchange has to be modified in order to promote the confidence needed for the exchange to grow.

Our results also show that firm ownership, whether domestic or foreign has a significant impact on the leverage level of the firm. It would therefore be interesting to determine the reasons which would explain the use of relatively more debt my foreign owned firms.

Our study also has implications on the efficiency of the stock market. The results seem to confirm James' view that inefficient stock markets can undermine the entire financial system and may actually raise the cost of capital to firms. It therefore means that greater steps will have to be taken to improve the efficiency of the market in order to reap the benefits that the market can give to an economy.

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