Chapter 5

Results and Discussion

5.1 Introduction

The research reviewed thus far suggests that a well-functioning financial system is crucial for sustained economic growth. This led in the previous chapter to the advancement of a hypothesis that the development of the JSE Securities Exchange has stimulated the country's economic growth. That chapter also dealt with the data and variables to be used and how indexes will be constructed, clarifying the validity for each of them. It discussed the empirical framework of cointegration, error correction and vector autoregression specifying how these techniques were to be used in testing for causality.

However, it should be noted that by including both an index for stock market development and credit extension, the data the variables convey need to be understood from the various differences each of these financial intermediaries have, for the functioning of the financial system as a whole. That is where this chapter begins. It then leads in Sections 5.3 and 5.4 to a descriptive and then inferential analysis of the statistical results arrived at and, entertains a broader discussion of these results in Section 5.6. Section 5.7 concludes.

5.2 The Arguments Thus Far

An important and long-standing issue in corporate finance has been the relative merits of banks and financial markets as providers of capital. A macroeconomic version of this question is whether the financial architecture of a country – *i.e.,* the degree to which its financial system is bank oriented or market based – has any impact on economic performance in the real sector. Certainly the variables used in this study require an understanding of their comparative and contrasting roles. The theoretical literature is sparse in its predictions whereby, lacking a unified approach, different theories emphasise specific features of banks and markets. Opinions range from the position that financial architecture has no real

consequences, to arguments emphasising the inherent superiority of either market-based systems (*e.g.,* Macey, 1998) or bank-based systems (*e.g.,* Gilson & Roe, 1993). A *via media* is to argue that the effectiveness of a particular architecture depends on a host of country-specific factors. These may include the contractual environment of the country (*e.g.,* Rajan & Zingales, 1998b), the informational structure of participating firms (*e.g.,* Boot & Thakor, 1997) or the technological characteristics of the economy (Allen & Gale, 1999b; Rajen & Zingales, 1998b).

Financial markets and banks perform vital functions in an economy that may include capital formation, facilitation of risk sharing, information production and monitoring. The case for either bank-based or market-oriented systems is made based on the relative effectiveness with which markets or banks execute these common functions. Some argue that financial architecture is inconsequential to the real sector of the economy with the belief that banks and markets are complementary in providing financial services with neither of them having a natural advantage in the provision of all services. According to this view, it is the quantity and quality of these financial services in an economy that matter, not the venue by which they are provided (Levine, 2002).

Recent theoretical discussion on the issue takes a middle ground position by suggesting that financial system architecture may matter, in that markets or banks may have a comparative advantage in delivering particular financial services depending on the economic and contractual environments of the country. This perspective relies on distinct differences, rather than similarities, in the types of services provided by markets and banks. A key attribute of financial markets is that equilibrium prices formed in markets provide valuable information (about the prospect of investment opportunities) to real decisions of firms. This is known as the 'information feedback' function of markets. The relative importance of a given financial architecture (market vs. bank based) depends therefore on how effectively markets perform this information feedback function (supply side

argument) and the value of market information to decision making in the firm (demand side argument).

On the supply side, the relative merits of markets versus banks depend on the effectiveness with which markets can perform their information feedback function. Well functioning markets rely on contracts and their legal enforceability. Weak legal systems and poor institutional infrastructure impede the functioning of markets, reducing the supply of information feedback as a market function. Rajan & Zingales (1998b) argue that bank-based architecture survives and is more effective in these situations, because banks can use their legal power, in the absence of effective legal provision, to protect their interest. Hence, market-based systems work better where stronger contractual environments are in place and bank-based systems fare well where such is lacking.

On the demand side, one would expect a prevalence of market-based systems in situations where information feedback is especially valued. However, market generated information is not always considered useful for various reasons. For example, the prevalence and severity of moral hazard attenuates the value of information feedback by financial markets. Boot & Thakor (1997), for instance, argue that banks provide a superior resolution of post-lending moral hazard resulting from potential distortions in firms' investment choices while markets provide improvements in real decisions through the information feedback function. However, the greater the moral hazard problem in the economy, the lower the information acquisition in the financial markets, and the smaller the value of market information in affecting real decisions. The value of market information is thereby lower in economies dominated by firms that are prone to moral hazard problems, implying that a bank-based system might be better for such economies.

The real consequences of financial architecture should depend on a host of country-specific factors, including the contractual, legal and institutional environment of the country and the associated degree of agency and

informational problems in the economy. These factors systematically vary across groups of countries. For example, weak legal systems, poor property rights and fragile regulatory institutions characterise less developed countries (La Porta *et. al.,* 1998), leading to financial underdevelopment (La Porta *et. al.,* 1997). This diversity in contractual and informational environment across countries leads one to expect a systematic pattern in the effectiveness of different financial architectures. Given the weak legal and institutional structure in financially underdeveloped countries, it appears more likely for bank-based financial architecture to prevail and be more effective in these economies. Similarly, one is more likely to find effective bank-based architectures in countries that are dominated by small firms which have a greater need for flexible financing. In Bolton & Freixas (2000), for example, the value of financing flexibility is such that, in equilibrium, less mature and riskier firms would prefer bank financing even when costly, while mature and safer firms tap into securities markets. Hence, the distribution of firms across risk class may dictate the dominance of bank versus market financing. There are also substantial fixed costs, partly reflecting the underlying agency and informational problems, in issuing securities, making it a viable financing option mostly to large and stable firms.

The variables of stock market development and bank credit extension that are in employed in this study take us to the very heart of the debate about whether bank-based or market-based financial systems are better for promoting long run economic growth. Thus far, we have examined the arguments that bank-based systems are better at mobilising savings, identifying good investments and exerting sound corporate control, during the early stages of economic development and in weak institutional environments. As well as those arguments that emphasise the advantages of markets in allocating capital, providing risk management tools and mitigating the problems associated with excessively powerful banks.

Empirical research on the comparative merits of bank-based and market-based financial systems has centred on Germany and Japan as bank-based systems and the US and the UK as market based systems (Goldsmith, 1969; Hoshi, Kashyap & Scharsfstein, 1991; Levine, 1997; Mork & Nakkamura, 1999; Weinstein & Yafeh, 1998 and Wenger & Kaserer, 1998). Broadening the analysis to a wider array of national experiences, as this study attempts to do, should provide greater information on the bank-based versus market-based debate.

The bank-based view highlights the positive role of banks in:

- acquiring information about firms and managers and thereby improving capital allocation and corporate governance (Diamond, 1984; Ramakrishnan & Thakor, 1984);
- managing cross-sectional, intertemporal and liquidity risk and thereby enhancing investment efficiency and economic growth (Allen & Gale, 1999a; Bencivenga & Smith, 1991); and
- mobilising capital to exploit economies of scale (Sirri & Tufano, 1995).

The bank-based view also stresses the short-comings of market-based systems. Stiglitz (1985), for instance, argues that well developed markets quickly and publicly reveals information, which reduces the incentives for individual investors to acquire information. Banks, however, mitigate this problem since they form long-run relationships with firms and do not reveal information immediately in public markets (Boot *et. al.,* 1993). Also Boot & Thakor (1997) argue that banks – as coordinated coalitions of investors – are better than uncoordinated markets at monitoring firms and reducing post-lending moral hazard (asset substitution). Proponents of the bank-based view also stress that liquid markets create a myopic investor climate (Bhide, 1993). In liquid markets, investors can inexpensively sell their shares, so they have fewer incentives to exert rigorous corporate control. Thus, according to the bank-based view greater market development may hinder corporate control and economic growth. Gerschenkron (1962) and Rajan & Zingales (1998a) stress that powerful banks can more effectively force firms to repay their debts than atomistic markets, especially in

countries with weak contract enforcement capabilities. Without powerful banks to force repayment, therefore, external investors may be reluctant to finance industrial expansion in countries with underdeveloped institutions. Thus, the bank-based view holds that banks – unhampered by regulatory restrictions on their activities – can exploit scale economies in information processing, ameliorate moral hazard through effective monitoring, form long-run relationships with firms to ease asymmetric information distortions and thereby boost economic growth.

In contrast the market based view highlights the growth enhancing role of well-functioning markets in:

- fostering greater incentives to research firms since it is easier to profit from this information by trading in big, liquid markets (Holmstrom & Tirole, 1993);
- enhancing corporate governance by easing takeovers and making it easier to tie managerial compensation to firm performance (Jensen & Murphy, 1990); and
- facilitating risk management (Levine, 1991; Obstfeld, 1994).

Moreover, the market based view stresses problems with banks. Specifically, powerful banks can hinder innovation by extracting informational rents and protecting established firms with close bank-firm ties from competition (Rajan, 1992). Furthermore, powerful banks with few regulatory restrictions on their activities may collude with firm managers against other creditors and impede efficient corporate governance (Wenger & Kaserer, 1998). In contrast, competitive capital markets play a positive role in aggregating diffuse information signals and effectively transmitting this information to investors, with beneficial implications for firm financing and economic performance (Boot & Thakor, 1997; Allen & Gale, 1999a). Thus proponents of the market-based view stress that markets will reduce the inherent inefficiencies associated with banks and enhance economic growth.[81]

[81] Bhattacharya & Chiesa (1995), Dewatripont & Maskin (1995) and von Thadden (1995) examine the allocative efficiency of bank-based and market-based systems. Boot & Thakor (2000) explore the

5.3 Descriptive Statistics

Figure 5.1 depicts economic growth in South Africa as reflected by per capita GDP on a quarter on quarter basis over the 13 years of the study. The graph is deseasonalised through the introduction of a logarithmic trend line that shows that growth has decreased and in more recent times tended to stabilise. The graph shows a normal mesokurtic distribution (kurtosis of 0,141) suggesting that the distribution is intermediate (neither too peaked nor too flat) while a skewness value of 0,556 suggests that the moments tend to be positively skewed but not significantly so.

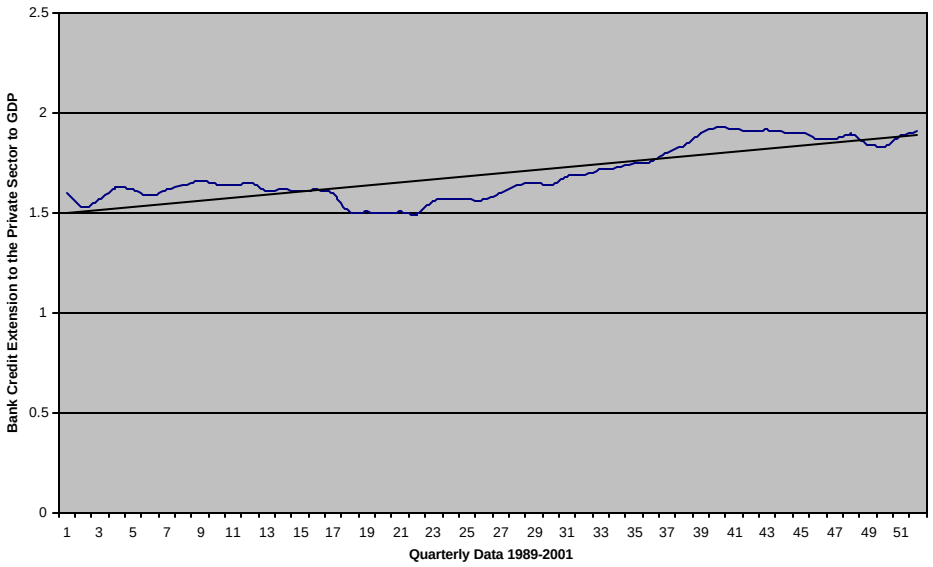
Fig. 5.1: Economic Development in South Africa

Figure 5.2 shows real bank credit extension on a quarterly basis beginning in the first quarter of 1989 and ending at the last quarter of 2001. Due to the effects interest rates have on the demand for bank credit, a linear trend line has been included and indeed, the effect of the interest rate cycle is evident. The

impacts of markets on banks. For additional citations on the role of financial systems in economic growth see Levine (1997)

distribution is slightly platykurtic (kurtosis of -1,244) suggesting that the tails are larger than normal which is a further impact of that interest rate cycle, while it has a skewness value of 0,414 showing the moments tend to approach symmetry, a result of the supply-demand equilibrium relationship found when the marginal efficiency of capital equals the interest rate.

Fig. 5.2: Credit Extension Ratio

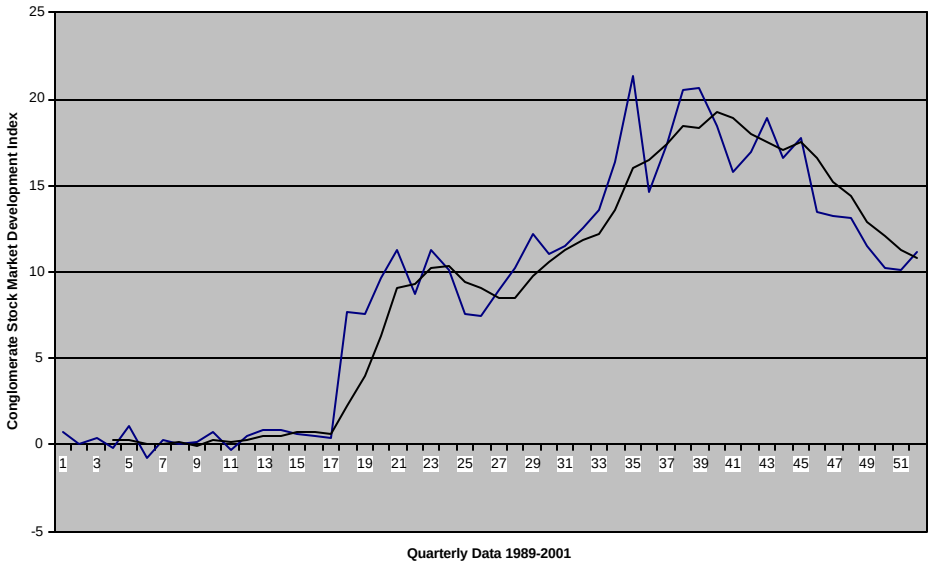


The conglomerate stock market development index over the 13 year period is shown in Fig. 5.3. The distribution may termed platykurtic (having a kurtosis of -1,241) but is marginally so. Indeed when its skewness is examined it is found slightly negatively skewed (-0,023), suggesting its tail stretches to the left but this result is probably insignificant. Still for greater clarity a four-period moving average trend line is included.

When a regression was run on the index using its composite variables of size, liquidity and integration an interesting result appeared. Referring to the standardised coefficients obtained, the beta weights suggested that the size of the stock market when measured by market capitalisation had no importance for the overall conglomerate index and that integration with world capital markets

(beta weight of 0,089) was only slightly important. By far the most important variable was its liquidity (beta weight of 0,971) measured by the mean of the total value of trades to GDP (an activity measure) as well as to market capitalisation (a measure of efficiency).

Fig. 5.3: Stock Market Development



This multivariate regression result is bound to be important when inferential statistics are being discussed. This is particularly in line with Levine's (2002) more recent writing. In that paper he established a dataset to measure the size, activity and efficiency of various components of the financial system, including banks, securities markets and nonbank financial intermediaries for a wide assortment of developed and developing countries. As well as measured financial structure by using new data on regulatory restrictions on bank activities and the ability of banks to own and control firms. A number of indices were calculated both for financial structure as well as overall financial development. In the former:

- structure-activity measured the activity of stock markets relative to that of banks;
- structure-size was a measured of the size of domestic markets relative to that of banks,

- structure-efficiency measured the efficiency of stock markets. [The liquidity of the domestic stock market reflecting market efficiency and overhead costs (which equals the overhead costs of the banking system relative to its assets) standing for banking efficiency];
- structure-aggregate was a conglomerate measure of financial structure based on activity, size and efficiency, it being the first principal component of the previous three measures; and
- structure-regulatory was an aggregate measure of regulatory restrictions on commercial bank activities. Information on the degree to which national regulatory authorities allow commercial banks to engage in securities (underwriting, broking, dealing and all aspects of the unit trust industry), insurance (underwriting or selling) or real estate (investment, development or management) activities and the extent to which banks can own and control non financial firms was considered. For each of these areas the value increased from 1 which is when the activity is unrestricted, 2 if the activity is permitted but some of it must be conducted through subsidiaries, 3 if the activity is restricted, to 4 meaning that the activity is strictly prohibited. A larger gross value would thus be an indication of greater regulation of banking activity.

Table 5.1 shows the values South Africa received under these measures.

Table 5.1: Structure Indices for South Africa

Measure	South Africa	Mean Value
Structure-Activity	-1,90	-2,03
Structure-Size	0,94	-0,65
Structure-Efficiency	-5,91	-6,49
Structure-Aggregate	0,85	0
Structure-Regulatory	8	9

Source: Levine (2002)

The size-measure indicated that South Africa is predominantly market-based even though it does not have a particularly active market. Levine ascribes this to the country having an especially large market capitalisation but with very thin trading.

This assertion was affirmed when the state of its overall financial development was examined. In this respect indicators which proxy for the degree to which national financial systems provide the financial services of assessing and monitoring managers, easing risk management and mobilising resources were chosen:

- finance-activity measured the activity of stock markets and intermediaries. It took the mean of the total value traded ratio as well as the private credit ratio. By excluding credits to the public sector and including credits issued by non-deposit money banks it is a comprehensive measure of financial-intermediary development;
- finance-size measured the size of the stock markets and intermediaries[82];
- finance-efficiency is a measure of financial sector efficiency. To measure the efficiency of stock markets the total value traded ratio was used, while overheads costs relative to system assets measured the efficiency of the banking system; finally
- finance-aggregate is the first principal component of the previous three measures.

Table 5.2 shows the results obtained for South Africa.

Table 5.2: Financial Development Indices for South Africa

Measure	South Africa	Mean Value
Finance-Activity	-2.81	-3.92
Finance-Size	5.35	4.30
Finance-Efficiency	0.75	0.37
Finance-Aggregate	0.79	0

Source: Levine (2002)

Financial development, as Levine (2002) has measured by conglomerate indices of bank activity and stock market activity, is positively and significantly related to economic growth in his international cross section of 47 countries. Indeed, consistent with the Levine & Zervos (1998) result the only financial development indicator not significantly related to growth is Financial-Size. Thus, there is

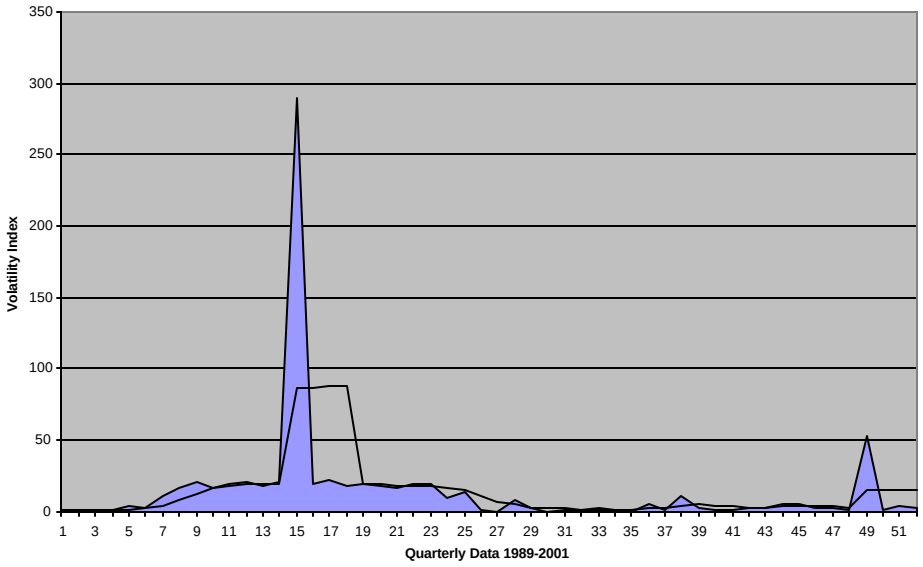
[82] At this point it was acknowledged that market size is not strongly linked with economic growth but that market activity (as measured by a total value traded ratio) is a better predictor of economic growth (*C.f.,* Levine & Zervos, 1998).

repeated confirmation in the literature that market capitalisation is not a robust predictor of economic growth, but that rather stock market liquidity as measured by the value traded ratio and banking sector activity as measured by bank credit to the private sector are robust predictors of growth. While the results indicate that the economic relationship between overall financial sector development and economic growth is relevant, one should keep in mind that:

- the South African financial structure is characterised by a stock market that has a relatively high capitalisation;
- that market is hindered by thin trading and hence poor liquidity; and
- the conglomerate stock market development index used in this study, which although calculated by using equally weighted values for size, liquidity and integration reflected, upon multiple regression, that size was not important at all, integration with world capital markets only slightly significant and that the most important determinant of stock market development was its liquidity.

Finally Fig. 5.4 shows the volatility of the stock market on a quarterly basis over the 13 year study period. There is definitely a positive skew to this distribution (6,562), with scores tending to stretch toward the right. Moreover, a tendency to cluster heavily makes the distribution leptokurtic as well (kurtosis value of 45,462). In order to deal with this, the graph is depicted with a four-period moving average trend line. Volatility reached its peak between the second quarter of 1992 and the fourth quarter of that year, probably related to the high degree of political uncertainty at the time which was in turn associated with a significant amount of capital flight.

Fig. 5.4: Stock Market Volatility



[This was at the time of the Boipatong massacre and the resulting breakdown of the CODESA negotiations as well as a fear that the peace process underway would be damaged either by a right wing threat or the failure of the ANC and Inkatha to find each other during it. That all of this happened during a period of economic contraction did not help matters][83].

5.4 Inferential Statistics

Before getting into the econometric tests that were performed on the assembled data and their analysis, an important caveat is necessary. Beginning in Chapter 1 of this study (under the heading of Data Analysis) and proceeding further in the Chapter on Methodology, a number of econometric procedures were proposed in quite a sequential manner. This may have given the less experienced reader the impression that there exists a particular systematic way the sequence of tests

[83] The manner in which this indicator behaved around this period may show the local market's tendency to (over)react to sudden unexpected events.

needs to be ordered in general. Now, while the particular sequence adopted may be crucial in the determination of the specific form finally adopted, no such particular ordering exits. Rather, while all the tests identified are necessary they need only be executed when they become methodologically appropriate.

Based on equation 4.1 Box-Cox transformations in the use of the log of variables, in keeping with standard econometric practice (especially when per capita growth is the determinant variable in a single equation structural model) resulted in an Ordinary Least Squares (OLS) regression of the following equation between the first quarter of 1989 to the last quarter of 2001:

$$LY = f\,(LBC, LSMV, LMDEV) + å \qquad (5.1)$$

where LY is the log of real GDP per capita, LBC is the ratio of bank credit to the private sector to GDP, LSMV is an index of stock market volatility and LMDEV is an index of stock market development. å is an error term.

The results were as follows:

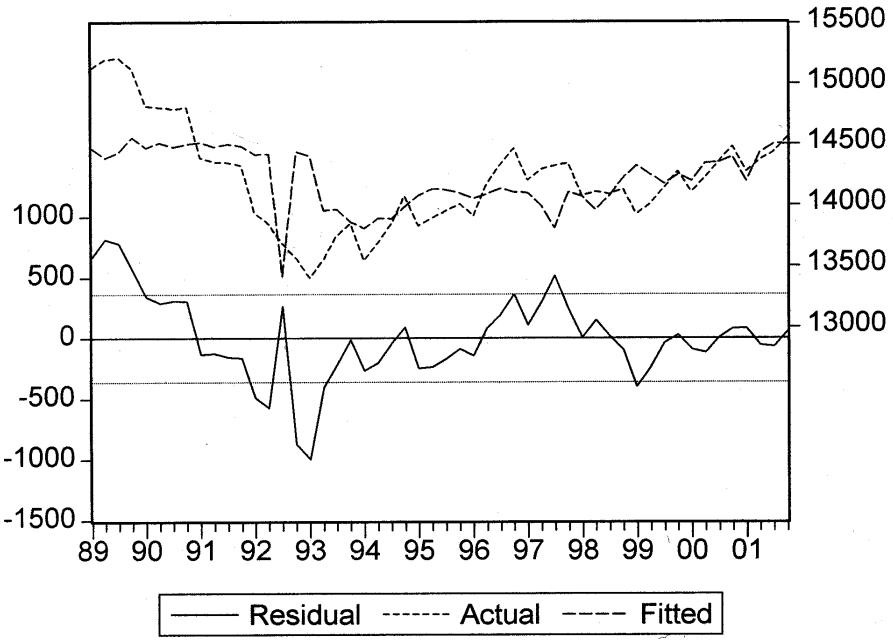
$$LY = 0{,}1328LBC - 0{,}0079LSMV - 0{,}0116LMDEV + 9{,}5177å$$
$$(3{,}1623) \quad (-4{,}4031) \quad (-5{,}5596)$$
$$R^2 = 0{,}5032 \qquad (5.2)$$

The results are all statistically significant at the 1% level. At first, it might appear that with a coefficient of determination just over 50 per cent, the model is unreliable. This might be the case if the regression was interested in the determinants of economic growth of which there are numerous. However, this particular regression is concerned with the financial architecture of the country only, and, the fact that the selected variables are able to explain that much of the resulting variation is to its credit. Of the coefficients the only surprising relation is that between the index of stock market development and economic growth, which is shown as negative. There is a positive relation between bank credit extension to the private sector and, as intuitively expected, a negative relationship between stock market volatility and economic growth.

The next step in our analysis was to test for the order of integration. This test is not executed simply for its own sake, but in this study helps to indicate whether a postulated equality in a long run relationship between variables would result in a stationary error. Cointegration analysis requires that variables be either integrated of the same order or that their linear combination be stationary. Indeed the Engle-Granger (1987) two-step procedure involves estimating a model by OLS and then testing for stationarity of its residuals. If this is not rejected, a short-run model with an ECM can be estimated by replacing the âs by their previously computed OLS estimates, such that the condition of an identical order of integration for the variables in the short-run is met. In the long-run relationship between multiple variables all of them must be integrated of the same order if the error term is to be I(0)[84]. Testing for the stationarity of the residual may be first attempted by inspection of Figure 5.5 below and then the execution of the Augmented Dickey-Fuller Test.

[84] There are economic data series, which although nonstationary, can be combined together (through a linear combination) into a single series, which is itself stationary. Series exhibiting such a property are called cointegrated series.

Fig. 5.5: The Generating Function and its Residual



ADF Test Statistic:	-2,8853
1% Critical Value	-2,6182
5% Critical Value	-1,9488
10% Critical Value	-1,6199

The ADF statistic shows that the residual is stationary at the one per cent level of significance.

Seeing that a vector autoregressive (VAR) model is required to test for the number of cointegrating relationships between the variables in the long-run, a number of tests were executed to determine an appropriate lag length. In the Error Correction Model (ECM) the choice of such an appropriate lag length is especially important. The maximum lag length in relation to the possible existence of autocorrelation in the disturbances needs to be established. An intuitive guide to establishing the best lag length in a VAR model is to choose

such a *k* in the model that would result in the estimated model having residuals without significant autocorrelation.

Table 5.3 shows the various Information Criterion (IC) tests that were executed. Among them are, for example, the Akaike IC test that aims to select the model which has the minimal loss of information. As well as the Final Prediction Error (FPE) criterion which aims at selecting a model with the smallest *ex post* prediction error. That is, FPE is based on forecasts made using actual rather than estimated values of explanatory variables for forecast periods and using parameter estimates for the entire sample, inclusive of the forecast period. Generally all the IC tests are based on the principle of minimising the residual sum of squares as a guide for selecting the best model. The mean value of the four tests VAR(6) was subsequently used in order to test for cointegration between the variables.

Table 5.3: Selection of the Order of the VAR: Economic Growth

Test executed	Order of the VAR selected	Test statistic
Sequential modified LR (each test at 5%)	5	29,7372
Final prediction error	6	85483,15
Akaike IC	7	22,1283
Hannan-Quinn IC	6	23,6377

In order to test for cointegration between the variables, the Johansen (1988) likelihood ratio test for the number of cointegrating relationships (denoted by *r*) was employed. The long run relationship was estimated with no intercept or trend and the figures normalised on the dependent variable. Johansen cointegration involves finding the roots or eigenvalues of the polynomial equation advanced from the determinant equation. This is a non-standard form of the eigenvalue problem. The solution yields the eigenvalues (ordered from the largest to the smallest) and associated eigenvectors which are then arranged into a matrix.

Table 5.4: The Johansen Test for the Number of Cointegrating Relationships: Economic Growth

Possible number of cointegrating equations	Eigenvalue	Statistic	5 Percent Critical Value	1 Percent Critical Value
Cointegration LR test based on trace of stochastic matrix				
r = 0	0,4605	48,6662	39,89	45,58
r 1	0,2124	20,8991	24,31	29,75
r 2	0,1946	10,1536	12,53	16,31
r 3	0,0092	0,4173	3,84	6,51
Cointegration LT test based on the maximal eigenvalue of the stochastic matrix				
r = 0	0,4605	27,7670	23,80	28,82
r 1	0,2124	10,7455	17,89	22,99
r 2	0,1946	9,7363	11,44	15,69
r 3	0,0092	0,4173	3,84	6,51

Testing an analysing cointegration in a VAR model is often regarded as superior to the Engle-Granger single equation model. The statistical properties of the Johansen procedure are generally better and the power of the cointegration test is higher. However, it should be stressed that the Engle-Granger and Johansen procedures are grounded within different macroeconomic methodologies. Most notable in the Engle-Granger approach the endo-exogenous division of variables is assumed (and therefore there might only be one cointegrating relationship) while in the Johansen approach, based on VAR modelling, there are no exogenous variables. The trace test indicates 1 cointegrating equation at both five per cent and one per cent levels, while the max-eigenvalue test indicates 1 cointegrating equation at the five per cent and no cointegration at the one percent level. The existence of one cointegrating relationship was therefore accepted.

To arrive at the results of the Johansen test just employed and the Granger causality tests to follow, it is necessary to make use of an Error Correction Model that represents the short-run dynamic adjustment process. In order to lend validity to the results from these tests therefore, it is just as necessary to examine the resulting equation to ensure that there are no violations of the Gaussian assumptions. The tests employed for this purpose are listed in Table 5.5.

Table 5.5: Tests applied to the ECM equation

Purpose of Test	Test	Probability
Serial Correlation	Breusch-Godfrey	0,8108
Persistence	ARCH	0,3352
Heteroskedasticity	White	0,9950
Stability	Ramsey RESET	0,1924

The probabilities shown in the table indicate the chances of falsely rejecting the null hypotheses of zero restrictions on the coefficient or diagnostic. Since they are all higher than 0,05 all the tests results are in order for a five per cent level of significance.

In a cointegrating relationship it is not known which variables are 'described' by the long-run process or, in other words, which is on the left hand side of the cointegrating relationship and which on the right. This is especially so for studies such as the current one where the cointegrating vector is not known *a priori*. Thus general to specific modelling (reducing a model through the testing of restrictions) which will be applied in the Granger causality testing to follow requires that, in the first place we be always open to the fact that a dynamic feedback process is likely, since every cointegrating relationship is stationary[85]. The restriction applied here will be of a level of significance (α) of 0,2 (lower limit) and 0,8 (upper limit).

Table 5.6: Granger Causality Test Probabilities

Variable	Causes Growth	Is caused by Growth
Stock market volatility	0,89	0,18
Market development	0,76	0,05
Credit extension	0,56	0,99

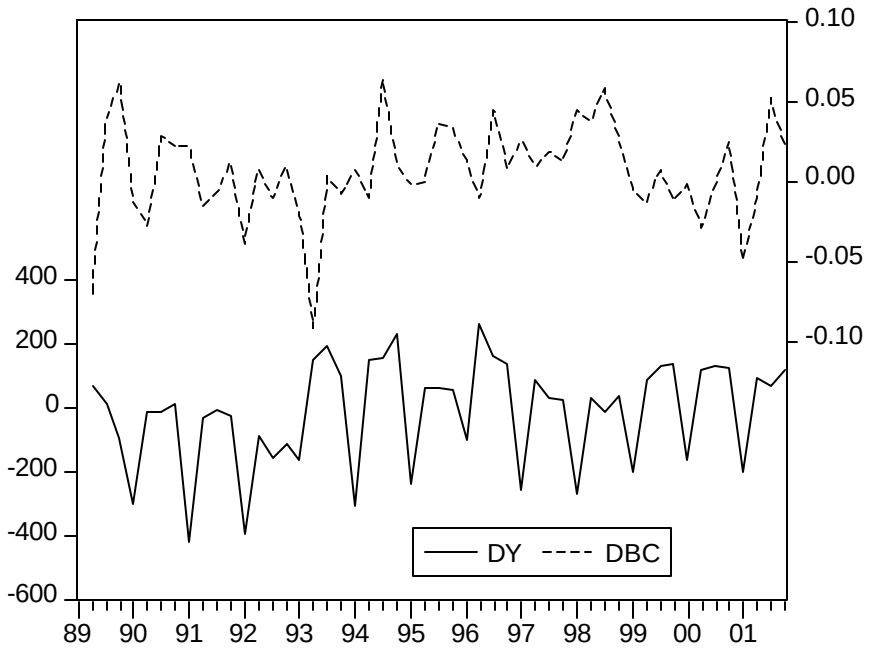
The probabilities that stock market volatility and market development are caused by growth may immediately be rejected, their coefficients being insignificant. Interestingly, while the OLS regression showed a negative relation between stock

[85] In econometrics, causality has a meaning more on the lines of predicting rather than producing. The notion that x causes y and simultaneously y causes x is nothing but a simplification – due to a discontinuity of observations, we are unable to define the cause and outcome.

market volatility and growth, Granger causality posits that there is a 89 per cent chance that volatility does cause growth. This result is not necessarily conflicting when it is considered that OLS results speak about long run relations only, and, Granger causality, flowing from the ECM, represents an incorporation of both the economic theory relating to the long run relationship between variables and short run disequilibrium behaviour. As was stated in the previous chapter greater volatility as far as revelation of information necessitates it, may actually be an indicator of development. In that, if the market is to be efficient, then speculative assets that trade on it should quickly react to new information about economic effects. This is perhaps the reason there is still much disagreement in the literature about the resulting impact of market volatility.

The ability of credit extension and market development to cause growth is far more perplexing. There is admittedly, an inconclusive range between the critical factor limits due to the fact that empirical (simulated) percentiles are being used as critical values rather than analytical ones. Since the true critical value is unknown, if a calculated statistic falls within this range then one is unable to categorically reject the probability. However, since there is only one cointegrating vector and the most parsimonious one must be accepted, taken together greater weighting should be given to the relationship between bank credit extension and growth than to stock market development and growth.

Fig. 5.6: Growth and Credit Extension



The ability of growth to cause bank credit expansion is well within acceptable demand-side economic theory and there should be no wonder therefore, that the probability is as high as posited. After all, in a growing economy there will undoubtedly be a greater demand for bank credit (which is simply a sub-component of real money supply). As was stated earlier since every cointegrating relationship is stationary, even though the ability of bank credit extension to Granger cause growth is inconclusive, South Africa may be better off encouraging bank credit extension than stock market development. Despite the limitations arrived at through the study, it would be true, based on an assessment of all the tests conducted to contend that:

- the null hypothesis, that as far as the financial architecture in South Africa is concerned, the development of the JSE Securities Exchange has stimulated the country's economic growth has to be rejected.

5.5 Discussion

Levine & Zervos (1998) use a phrase that sums up the South African situation quite aptly: “Importantly, a large stock market is not necessarily a liquid market”. All of the positive correlations - with current and future rates of economic growth, capital accumulation and productivity growth – come about due to stock market liquidity. Indeed in their paper they find that stock market liquidity is a robust predictor of real per capita GDP growth, physical capital growth and productivity growth even after controlling for initial income, initial investment in education, political stability, fiscal policy, openness to trade, macroeconomic stability and the forward looking nature of stock prices. Moreover, the relationship between stock market size and the growth indicators vanishes when liquidity is controlled for. Thus, it is not just listing securities on an exchange but rather the ability to trade those securities that is closely linked to economic performance.

In this study the conglomerate stock market index that was built used the three equally weighted measures of size, integration with world capital markets and liquidity as components, yet when a multiple regression was run on that index by far the most influential component (beta weight 0,971) was liquidity expressed as the mean of market activity and efficiency. Given the rather thin trading of the JSE Securities Exchange then, this may be the reason that a significant causal relationship between stock market development and growth could not be found.

Cochrane (1988) suggested a non-parametric method of calculating the variance of long-differences, where these are given by $M_{t+k} - M_t$ and where k increases indefinitely. This he offered could be calculated as a variance ratio, V^k, defined as:

$$V^k = [1/k \text{ Var } (M_{t+k} - M_t)] / [\text{Var } (\Delta M_t)] \qquad (5.3)$$

At the start of this study this measure was thought to be useful as in the case of a random walk, the variance grows with the time interval k. Dividing by k thus results in the variance of the one-period shock. For a time series process $V^k \rightarrow 0$

while for a random walk $V^k \rightarrow 1$. For k = 12 and k = 20 the variance ratio for stock market development in South Africa is respectively 2,72 and 43,73. This indicates extreme persistence of shocks to stock market development. In South Africa a 1 per cent increase in stock market development now, theoretically should lead to a 43,73 percent increase after 5 years. However, given the inconclusive nature of the Granger causality tests and the statistically negative relation the OLS regression holds, the result of this test of variance of long-differences is at best ineffectual and at worst may require that stock market expansion be seen warily within our context.

This brings us conveniently to the next question to be asked of the data. Supposing that low liquidity could explain the inconclusive result from the Granger test for causality, it does not help explain the OLS regression result of a significantly negative relation between market development and economic growth. To attend to this it was thought useful to make use of correlation analysis.

The first two variables considered were stock market development and the volatility index, the reason being that they both showed in the OLS regression, a negative relationship to growth. Perhaps it is by exposing the economy to asset price volatility, that the stock market and economic growth are negatively related. However, correlation analysis revealed a small though statistically significant (at the five per cent level) inverse relationship between the two indices (correlation coefficient of -0,25). Seen from a broader view this result is quite logical since in the presence of risk-averse investors, the greater the volatility of the stock market the less likely it is that that market will develop. Or, in the reverse, greater stock market development brings with it a higher degree of risk diversification which should be reflected by a lower level of volatility.

The next variables studied were stock market development and bank credit extension and the result of the correlation analysis here was more surprising. Although these two variables showed an opposing relation to growth in the OLS

regression, correlation analysis posited (at a one per cent level of significance) a very high correlation between the two with a coefficient of 0,66. This indicates that stock market development in South Africa may have been fuelled by bank borrowings and in fact while the market is a large one it may be a highly leveraged one at that. This could account for the relative predominance of institutional players in our market seeing the relative ease at which they are able to trade on margin. On a microeconomic level this could also help explain why, during periods of rising interest rates there is a high degree of consolidation in the fund management industry.

5.6 Summary

This chapter has been concerned with testing the hypothesis that as far as the financial architecture in South Africa is concerned, the development of the JSE Securities Exchange has stimulated the country's economic growth, the preceding chapters having pointed to the essential elements of financial infrastructure needed to facilitate economic performance in emerging and transition economies. After all, an important function of that infrastructure is to promote growth through the effective mobilisation of savings into productive capital and to channel that capital to its most productive uses.

Since a model that incorporated indicators for economic growth as well as banking sector and stock market development, as well as volatility of that market was to be examined, it was necessary for this chapter to begin with a discussion of the relative merits of market-based versus bank-based economies. To do this, use was made of the information feedback function of markets. A central attribute of financial markets is that equilibrium prices formed in markets provide valuable information (about the prospect of investment opportunities) to real decisions of firms. The relative importance of a given financial architecture (market vs. bank based) depends therefore on how effectively markets perform this information feedback function (supply side argument) and the value of market information to decision making in the firm (demand side argument).

When the descriptive statistics were being examined it was discovered that while South Africa may have a relatively large stock market as measured by market capitalisation, it is a thinly traded one. Thus, although all three variables of size, integration with world capital markets and liquidity were incorporated into the conglomerate stock market development index, multiple regression revealed that liquidity had the greatest influence on that variable. Then, of the model as a whole, an ordinary least squares regression showed a statistically significant though negative relation between stock market development and growth. This is in sharp contrast with the positive relation the regression held for the relationship of bank credit extension to the private sector and economic growth. Cointegration analysis was able to detect only one significant vector normalised on economic growth. Granger causality subsequently showed that it was growth that caused bank credit extension. The causality tests executed on the ability of stock market development to cause growth was inconclusive. Taken together the results from all the tests undertaken required that the hypothesis be rejected.

Now, while Granger causality was also inconclusive for the role of bank credit extension in causing growth, the fact that the OLS regression held a positive relation between the two and that being part of a cointegrating relation implies that they are stationary, the role it could play in stimulating growth should not too hastily be relegated. After all, many emerging economies may be trapped in an underdevelopment equilibrium out of which it would take the coordinated investment efforts of many firms across several industries to ignite an economic takeoff. Under *laissez faire* many of these countries would end up in the wrong equilibrium. Certainly there have been, in Belgium, Germany, Italy and Japan, key phases of development where banks have played just that coordinating role in engineering such a take off. This suggests that their ability to play the part of catalyst to economic development not be completely written off. This may be particularly true in the South African context where there is a predominance of only four large banking groups offering universal banking services. The importance of those bank's market power and the limited competition they face

may enable them to play just such a catalytic role. Further discussion of this point is made in the recommendations of the concluding chapter.