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UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

FACULTY OF COMMERCE, LAW AND MANAGEMENT

SCHOOL OF ACCOUNTANCY

STOCK MARKET LIBERALIZATION AND THE COST OF EQUITY CAPITAL: AN EMPIRICAL STUDY OF JSE LISTED FIRMS

BY

DANIEL MAKINA

Submitted in fulfilment of the requirements for the degree

DOCTOR OF PHILOSOPHY

PROMOTER: PROFESSOR MINGA NEGASH

NOVEMBER 2005

STOCK MARKET LIBERALIZATION AND THE COST OF EQUITY CAPITAL: AN EMPIRICAL STUDY OF JSE LISTED FIRMS

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ABSTRACT

The main objective of the study has been to provide new insights into ongoing recent studies examining the impact of stock market liberalization at both macro and micro (firm) levels. The study focused on a single country, South Africa, whose exchange, the Johannesburg Stock Exchange (JSE), liberalized in the 1990s. Consistent with empirical evidence from other studies the study finds support at market, firm and sectoral level for the prediction by international asset pricing models that stock market liberalization reduces the cost of capital. More important, the study makes five major contributions to the literature on the impact of stock market liberalization in emerging markets.

First, it demonstrates that some emerging market specific risks such as political and economic risks can act stronger binding constraints to foreign investment than direct legal barriers which foreign investors are frequently able to circumvent. The second contribution is the observation that there are some firms (in the minority however) that will experience a significant increase in the cost of capital following liberalization, a situation where the local price of risk is higher than the global price of risk, contrary to international asset pricing theory. The third contribution is that it has been empirically proved that the reduction in firms' cost of capital following stock market liberalization is permanent. It is not a transitory phenomenon. The fourth contribution of the study highlights the influence of firm specific characteristics such as size of the firm, book-to-market ratios and leverage ratios on firms' response to impact of stock market liberalization. The preference for large firms by foreign investors is supported, contrary to Merton's (1987) recognition hypothesis, and hence highlights the inconclusiveness of the debate on whether stock market liberalization benefits both large firms and small firms. The fifth contribution is the observation that the effective liberalization date is not the same for all firms but varies from firm to firm.

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DECLARATION

I, Daniel Makina, do hereby certify that this thesis which is submitted to the University of the Witwatersrand, Johannesburg is my own work and all sources that I have used or quoted have been indicated and acknowledged by means of complete references.

Signed……..Date…….

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Chapter 1

Introduction and Background

1.1 Introduction

Since the 1980s one of the key policy decisions of finance relates to financial liberalization in emerging markets. The benefits of such policy decisions have ranged from relaxing domestic capital constraints to the fostering of capital mobility, financial deepening and risk diversification. Stock market liberalization, in particular, can be viewed as the easing of barriers to emerging market investment. Bekaert (1995) has categorized these barriers into three types: legal barriers, indirect barriers (e.g. reporting standards and governance issues) and emerging market specific risks (political, economic, liquidity and currency risks). There is general agreement on the benefits of well-functioning capital markets, namely: the clear correlation between deep capital markets (as measured by bonds and equities volumes) and economic development (as measured by per capita GDP, for instance); better price discovery, and faster and less costly market corrections; and the ability to hedge and benchmark performance on financial systems. Levine (2001) and Ncube and Senbet (1997), among others, provide evidence that market mechanisms (arm's length debt markets beyond bank loans and active equity and derivative markets) reduce agency conflicts and promote efficient resolution of financial distress in the private sector and ultimately total factor productivity.

Despite the optimism that has been generated by financial globalization, Stulz (2005) shows that the positive impact could be limited. He argues that finance is critically affected by "twin agency problems", which he refers to as "the agency problem of corporate insider discretion" and "the agency problem of state discretion". Empirically, net equity flows to less developed countries have been negative from 1996 to 2004 according to data from the World Economic Outlook of the International Monetary Fund (IMF). Even in developed markets, Buch (2001), who focused on European integration, observes that countries benefit from increased capital mobility to different degrees depending on the structure of their financial systems. The author concludes by saying that this could explain the reluctance of some countries to abolish indirect restrictions so as to achieve full financial market integration. Further evidence on the limitations of financial liberalization is provided by Karolyi and Stulz (2003), Obstfeld and Taylor (2003), Prasad et al. (2003), Lewis (1999) and Lucas (1990).

Financial sector development literature has historically emphasized the connection between a country's financial superstructure and its economic development (Goldsmith, 1969; McKinnon, 1973; and Shaw, 1973). The argument is that the services of the financial sector of allocating capital to the highest use without substantial risk of loss through moral hazard, adverse selection or transactions costs are a crucial catalyst for economic growth. Financial sector development has many facets and requires a range of policy reforms across many complementary areas. These include a stable macroeconomic environment, effective regulation and supervision, a supportive legal and institutional framework, and competition. Competitive financial markets require government liberalisation of, for example, interest rates, credit allocation, market entry and other unnecessary restrictions on markets, as well as strengthened regulation and supervision. Privatisation and foreign entry can be drivers that facilitate the removal of other government restrictions within financial markets.

While early financial sector reforms in developing economies initially focused on the banking sector, they have since embraced stock market liberalization. Senbet (2001: 100) maintains that the focus on the banking sector precludes opportunities for building up informational technology unique to risk capital and derivative markets, for instance, disclosure and accounting standards. The debt crisis of the 1980s that afflicted many developing countries (particularly Latin America) was one exogenous factor that promoted the growth and liberalization of emerging equity markets as the crisis brought pessimism about the ability of commercial banks to continue lending to those countries. Emerging stock markets were viewed as a useful vehicle for attracting foreign portfolio investments and hence enhancing savings for economic development. Errunza (1997) has argued that foreign portfolio investment that results from stock market liberalization possesses the essential attributes of efficient risk sharing and cash flow matching for emerging economies. He argues that it complements foreign debt finance in the same way domestic debt does to domestic equity and consequently increase the quality (terms) and quantity of international borrowing at both the national and firm level. In earlier studies, Litzenberger and Sosin (1978), Senbet and Taggart (1984) and others had emphasized the role of debt to complete the market.

Empirical studies on stock market liberalization and integration by Errunza and Miller (2000), Bekaert and Harvey (2000a), Henry (2000a), Kim and Singal (2000), Levine and Zervos (1998b), Bekaert et al. (2001), Vlachos and Waldenstrom (2002) show positive financial effects, particularly on aggregate cost of equity capital, GDP growth and investments. For instance, Bekaert et al. (2001) examine 30 liberalized equity markets and test whether equity market

liberalization spurs growth. Using panel data and endogenous growth theory models they found that liberalization indeed led to a one percent increase in the annual GDP of these countries. They also conclude that in the post liberalization period the ratio of investment to GDP rises, capital flows to recipient countries were not consumed and suggested that the observed increase in the level of investment may be related to the reduction in cost of capital. Fuchs-Schundeln and Funke (2001) further provide empirical evidence that suggests that stock market liberalization leads to a substantial transitory growth effect but also to a smaller permanent growth effect (a permanent growth effect of about 0.4 percent per annum was observed).

Similarly, Laeven (2001) using panel data from 13 countries analysed the effects of financial liberalization on firm level investment and financing constraints and concluded that liberalization reduced imperfections and that firm level investment became less dependent on leverage. Liberalization affected small and large firms differently, and small firms that faced financial constraints in the pre-liberalization period benefited more than their large counterparts.

However, the investigation of financial constraints has been fraught with methodological problems. The basic approach has been to assess whether firms likely to suffer from informational and agency problems show significant departures from standard models. These models are derived under assumptions of perfect capital markets and convex adjustment costs. Schiantarelli (1996) observes that such tests are problematic because adjustment costs are not convex, the absence of perfect capital markets makes modelling the investment behaviour of constrained firms difficult, and correctly partitioning the set of firms into subgroups of constrained and unconstrained firms is not straightforward. These problems become severe when examining international evidence where industrial and institutional structure can differ significantly across countries.

This study examines the effects of financial constraints and the subsequent relaxation thereof on the South African firms listed on the JSE as a consequence of the country's international isolation due to its apartheid policies. In pursuance of this broad objective, the following sub-sections provide the background information regarding the financial sector in South Africa in general, an overview of financial liberalization of the sector, the specific objectives of this study and its intended contribution to new knowledge.

1.2. The Financial Sector in South Africa

South Africa has undergone a number of changes over the past three decades, some of which

have been abrupt and some of a gradual nature. The debt standstill of 1985, economic sanctions during the 1980s, political and financial liberalization in the 1990s all provide avenues for research on how firms have responded to these shocks. In particular, the effect of these shocks on financial sector development is bound to add to some insights on emerging market research.

Despite South Africa having the characteristics of an emerging market, its financial sector is sophisticated and closer to that of developed countries. The formal financial sector is characterised by two levels: the institutional and market levels. At the institutional level are the banking and non-banking financial intermediaries while at the market levels are the stock market, the bond market, the money market and the foreign exchange market. The background history and nature of the banking sector as well as that of the stock market is described below (see Falkena, 1999).

1.2.1 The Banking Sector

A historical description of the evolution of the sector is given to illustrate the gradual nature of financial liberalization that has taken place. At the apex of the banking system is the South African Reserve Bank (SARB), which is the primary monetary authority and custodian of the country's gold and foreign exchange reserves. The primary functions of the Reserve Bank are to protect the value of the rand and to control inflation. While technically it is independent of government control, in practice it works closely with the Treasury and assists in the formulation and implementation of macroeconomic policy. The Reserve Bank regulates the money supply by influencing the interest charged on loans to other institutions. Until 1975 the Reserve Bank enforced fixed interest rates on long-term government securities, but thereafter it allowed transactions at market-related prices. Direct control over deposit interest rates quoted by banking institutions was abolished in 1980. However, it still exercises considerable indirect control through its own bank rate.

The private banking sector was dominated by commercial banks before the 1950s. During those periods, commercial banks avoided services such as personal loans, property leasing, and credit-card facilities. From the 1950s onwards, new institutions such as discount houses, merchant banks, and general banks emerged to meet this demand. Commercial banks increasingly began to enter into medium-term credit arrangements with commerce and industry. They acquired interests in hire-purchase firms and leasing activities and expanded their operations into insurance and even invested in manufacturing and commercial enterprises. During the late 1980s building societies that had listed holding companies on the JSE and had commercial and general

banking arms increasingly challenged the largest five commercial banks in the country: First National Bank, Standard Bank of South Africa, Nedbank, Volskas and Trust Bank. Legislation such as the Deposit Taking Institutions Act of 1991 brought South Africa into line with internationally recognized standards for capital requirements by formalization the overlapping of functions between the banks and the building societies that had existed for more than a decade.

In the 1990s the banking sector underwent further consolidation and re-organization. In February 1991 four financial institutions -Allied Bank, Sage Bank, United Bank and Volkskas- merged to create the Amalgamated Banks of South Africa (ABSA) that became the largest banking group in the country. The banking industry underwent further reorganization in the mid-1990s, one of the reasons being the need to offer banking services in poor communities that were neglected under the previous government.

From the above descriptive account it is apparent that the banking sector has been in the process of continuously undertaking deregulation or liberalization since the 1980s and that the process accelerated in the 1990s following political liberalization.

1.2.2 The Stock Market

At the apex of the market level of the financial sector is the Johannesburg Stock Exchange that is always referred to as the JSE. Founded in 1887 initially to fund the development of mining companies in the wake of the discovery of gold in the Witwatersrand in 1886, the JSE's long history would suggest that it should be appropriately classified as a re-emerging market in accordance with Goetzmann and Jorion's (1996) categorization of markets. Clearly, the development of the stock exchange was demand-driven rather than as a deliberate government policy (supply-leading approach) to set up an exchange, as advocated by the World Bank for many developing countries. Crucially, it was set up by private mining entrepreneurs looking for innovative ways to raise finance. As the economy expanded, the mining companies were joined by an increasing number of industrial and commercial companies so that today most of the listed companies are non-mining companies. It is clear that the development resembles the postulations of the Kuznets hypothesis and the demand approach promulgated by Rajan and Zingales (1998). This is in contrast to the more recent African stock exchanges promoted by governments in the 1990s, for instance, those of Ghana, Malawi, Mozambique, Tanzania, Uganda and Zambia. These exchanges were established following the World Bank economic adjustment policies in order to aid the privatization process of state enterprises. In other words, they developed out of supply-led policies.

The JSE is the second oldest stock market in Africa after Egypt. By the year 2000 it had become by far the largest stock exchange in Africa with a market capitalization of approximately ten times the market capitalization of all other African stock markets and the 17th largest stock exchange in the world. It is currently the third largest emerging market after China and Taiwan. Though considerably developed, the JSE is classified as an emerging market. Emerging markets have been traditionally referred to as less-developed (LDC) markets by academics. Errunza (1997) notes that in 1981 the term "emerging markets" was coined in an effort to increase their appeal to institutional investors.

Three broad categories are suggested, viz.:

- Old established markets often going back several centuries (e.g. Argentina, India and South Africa) that could be considered as advanced emerging markets;
- Those that developed as a result of special situations (e.g. Hong Kong and Singapore); and
- New markets organized to foster growth (e.g. South Korea and new emerging markets in developing countries promoted by the World Bank).

Generally, emerging markets of particular interest to international investors are those tracked by the International Finance Corporation (IFC) and the Morgan Stanley Capital International (MSCI). The IFC definition of an emerging market is in terms of four characteristics: (1) growth; (2) change (economic, financial and political); (3) investability; and (4) size and liquidity. The meeting of these criteria is acknowledged by the country's data being included on the IFC Emerging Market Database.

However, Errunza (1997) argues that the primary indicators of having achieved emerging market status are commitment and credibility of reforms and acceptable market development. The implicit/explicit barriers to free flow of capital that segment emerging markets are the defining characteristic.

According to Goetzmann and Jorion (1999) markets tend to emerge, submerge and re-emerge through time so that many of today's emerging markets are actually re-emerging markets. They were large enough at some point in time to warrant inclusion in previous international databases but for various political, economic and institutional reasons, investors lost interest in these markets that then submerged or disappeared and only re-emerged recently. For instance,

Argentina, China, Malaysia, India, Egypt, Poland, Czechoslovakia, Columbia, Uruguay, Chile, Venezuela, and Mexico had active stock markets in the 1920s as pointed out by Taylor (1998). Furthermore, Taylor and Williamson (1994) and Williamson (1996) provide studies of late 19th century stock market liberalization.

Characteristically the JSE is indeed an emerging market. Barriers to foreign investment in the South African market could be viewed as having been legal barriers and specific emerging market risks such as liquidity, political, economic policy, and currency risk. External factors that temporarily sub-merged the JSE in the mid-1980s until the early 1990s were international sanctions and the government's response of introducing the foreign exchange controls. Table 1.1 below shows some characteristic features of the JSE from 1985 to 2002, that is, from the sanctions period to almost a decade post-political liberalization.

Table 1.1
Characteristics of the JSE

	1985	1990	1995	1998	2002
Number of stocks listed	462	732	640	668	852
Market capitalization (R million)	141 785	350 726	1 022 656	1 001 556	1 584 100
Market capitalization (US$ million)	55 439	137 540	280 526	170 252	181 998
Annual trading value (R million)	6 241	21 130	63 237	323 682	808 662
Annual trading value (US$ million)	2 836	8 158	17 048	58 444	92 949
Market index	1 323	2 720	6 228	5 431	10 288

Source: JSE

International sanctions were an external shock that triggered tightening of foreign exchange controls and some limits in foreign trading on the JSE. The financial rand, which had been abolished in February 1983, was reintroduced in September 1985. The sale of any South African asset by a non-resident resulted in the creation of financial rands, which could only be traded between non-residents, and the exchange rate was determined by supply and demand. At no stage could financial rands leave South Africa. Ownership merely passed from one non-resident seller to a non-resident purchaser who would pay the seller in foreign currency outside South Africa. The strength of the financial rand system in not permitting funds out of South Africa's foreign

reserves was at the same time a major weakness in that new investments by foreigners did not form part of the country's foreign reserves. Dividends and interest earned were remitted to foreign investors in commercial rands (whose rate was overvalued and not entirely determined by demand and supply) and thus effectively guaranteeing a premium on the rate of return.

During the years of economic and political isolation foreign participation was mainly limited to the mining sector, especially the gold and diamond sectors. Table 2 below shows the percentage of foreign holdings of shares on the JSE on 30 June 1993. Evidently, even at the height of the sanctions, foreigners held a significant percentage of the equities of the mines. Accordingly, Brooks, Davidson and Faff (1997) have observed that the JSE could thus be considered as mildly segmented during the years of isolation.

Table 1.2
Percent of Share Holding by Foreigners during Sanctions

Sector	**Percentage**
Gold Mines	24.4
Mining Financials	3.1
Platinum Mines	3.4
Diamond Mines	20.4
Overall Mining	12.5
Industrials	0.1

Source: JSE Report 1994

The liberalization of the JSE has been intricately linked with the political macro-economy of South Africa. The following dates are considered important milestones with regard to political and economic developments:

- 1990: Unbanning of ANC (Political liberalization)
- 1992: Lifting of most economic sanctions
- 1994: First democratic elections
- 1995: Dual exchange rate abolition and official liberalization of the JSE.

A study on structural changes in stock market variables around these dates is bound to provide insights into the liberalization regime in South Africa. Indeed, empirical work on this aspect is one outcome of this thesis.

1.3 Overview of Financial Liberalization in South Africa

As pointed out by early financial economists such as Goldsmith (1969), McKinnon (1973) and Shaw (1973), the major objective for the liberalisation of financial markets and activities was to

increase competition and, thus, efficiency in the allocation of resources. Early emphasis was on reforming the banking sector. As reported by Falkena (1999), financial sector reform in South Africa commenced as far back as the early 1980s when all credit and interest rate ceilings applicable to banks were abolished. In 1983 the Register of Cooperation, which limited competition between the banks, was terminated. Noteworthy is the fact that financial deregulation was usually accompanied by new regulation that strengthened the market mechanism. For instance, the deregulation of the entry requirements of the JSE was accompanied by new stringent prudential requirements for the new members. Financial deregulation entailed the liberalisation of financial prices, markets and the scope of activities.

Generally, most prices in the financial sector have been unregulated as South Africa has been a relatively open market economy. Exceptions were in respect of controls over the prime rate before 1982. The prime rate then was fixed at between 2½ and 3½ percentage points above the Bank rate, but thereafter banks were encouraged to set their own rates. In practice, because of the efficiency of the money market, differentials between the banks' prime rates had been very small, and then only for short periods of time. Before 1984 the Minister of Finance had to approve any change in the mortgage rate. However, in 1984 in line with the erosion of the demarcation of activities of banks and building societies, and the transformation of building societies into banks, the mortgage rate was liberalised.

Financial innovation and international competition have resulted in a significant liberalization of the scope of activities of securities firms and banks. This has seen building societies going into the banking business since 1988 and banks entering the stock market in 1995 with the banks' trading departments being de facto securities firms concentrating on the wholesale business. In 1998 the Bank rate was replaced with a repo-rate, which is more market related.

Before the new democratic order, the South African financial sector, though fairly developed, faced many obstacles, i.e. international sanctions and political isolation, due to the political orientation of the previous minority government. South Africa's investment was affected by sanctions and boycotts, especially during the 1980s and early 1990s. The country experienced a major foreign debt crisis in 1985, when a group of international banks, led by Chase Manhattan, withdrew substantial credit lines. The banks refused to roll over existing loans and called in many of the short-term loans. The value of the rand dropped drastically as a result, and the government reacted by temporarily closing its financial and foreign exchange markets. It declared a standstill on debt repayments of approximately US$14 billion of South Africa's US$24 billion total external debt. Liabilities not included in the standstill were trade credits,

loans from the International Monetary Fund (IMF) and central banks, and credits guaranteed by Paris Club member governments. Publicly quoted issues of South African parastatals (state corporations) were excluded. As a result of sanctions more than 350 foreign corporations, at least 200 of which were United States owned, sold off their South African investments (U.S. Library of Congress, 1998).

Political liberalization that commenced with the unbanning of ANC in February 1990 resulted in both the European Union (EU) and the United States lifting many official sanctions by the end of 1992. However, foreign investors were slow to return to South Africa. The successful transition to democracy culminating in the first democratic elections in April 1994 changed perceptions. South Africa rapidly made itself accessible to the international financial markets. The "stand-still" arrangement with foreign creditor banks was lifted; short-term bank credit (rather solely trade finance) was again available to South African banks, while foreign banks made a powerful re-entry in the market. By the end of 1998 there were 81 foreign banks operating in South Africa – 10 as local subsidiaries, 12 as foreign branches and 59 as representative offices. The JSE Securities Exchange was conferred "emerging markets" status and this saw the re-entry of foreign owned securities firms eager to exploit the opportunities.

1.4 Study Objectives

South Africa is one among many developing economies that has implemented financial liberalization that has included opening up domestic stock markets to foreign investors. However, since the 1980s a number of financial liberalizations in other emerging markets (EMs) have taken place. Generally, such liberalizations have been initiated by an official decree opening the market to foreign portfolio investments or the introductions of country funds and American Depositary Receipts (ADRs) on developed markets. These were major policy initiatives with potentially significant impacts on the domestic market and foreign investors. International asset pricing models predict that the integration of capital markets leads to a reduction in the cost of capital as risk is internationally diversified. [Note that all references to cost of capital refers to cost of equity capital]. Empirical studies using market level analysis by Bekaert and Harvey (2000a), Henry (2000a), Kim and Singal (2000), and others that have examined emerging stock market liberalization and its impact on the cost of capital support these predictions.

Although it is generally accepted that the resulting capital flows should result in the international integration of emerging capital markets, with improved risk sharing a number of issues remain unresolved. The majority of studies have been largely limited to the investigation of aggregate

macroeconomic effects over short periods surrounding liberalization dates (Bekaert and Harvey, 2000a; Henry, 2000a; Kim and Singal, 2000; Levine and Zervos, 1998b; Bekaert et al., 2001; Vlachos and Waldenstrom, 2002; Fuchs-Schundeln and Funke, 2001).

However, from a broad policy perspective, it is equally important to know the microeconomic dimension, that is, whether the benefits only accrue to the few large and well-known firms preferred by foreign investors or whether they trickle down to all firms, large or small, and to all sectors of the economy. From the perspective of the foreign investor, it is also important to know how firms are rated as a consequence of the improved information environment following liberalization (Bae, Bailey and Mao, 2004). Such re-rating would be beneficial to investors, as the right signal for capital allocation would be given. Market level or index-based analysis has been found to produce potential new listing and rebalancing biases (Barber and Lyon, 1997). With index-based analysis, firms are added and dropped complicating temporal comparison. The market level International Finance Corporation (IFC) indices used in these studies may not represent the real portfolio holdings of investors and hence could under or over estimate the impact depending on foreign demand for a security. The use of market-level indices to investigate the impact of market liberalization may also not take into account firm level asymmetries embedded in investment decisions since different firms from a liberalized market may provide different diversification opportunities to the foreign investor.

Therefore, it is important to investigate the impact of stock market liberalization at a more disaggregated level. Examining the same set of firms during both the pre-liberalization and post-liberalization periods could remove biases from the analysis. For instance, unlike market level analysis where there is a need to control for confounding macroeconomic factors as in Bekaert and Harvey (2000a), using firm level data makes these economy-wide control variables less relevant as all firms face the same macroeconomic environment during both the pre- and post-liberalization periods.

There are few recent empirical works, most of which are works-in-progress, that focus on this level. Chari and Henry (2004) have investigated the stock price revaluation effect of liberalizations and show that the firm-specific revaluations are directly proportional to the firm-specific changes in systematic risk. Patro and Wald (2004) have also studied the impact of liberalization on return behaviour of emerging market firms and relate it to firm characteristics. Christoffersen, Chung and Errunza (2004) show a significantly different impact of stock market liberalization across firms. These findings suggest that large firms tend to exhibit large

revaluation effects, insignificant change in performance, large declines in volatility, and insignificant change in correlation from liberalization, while small firms show small revaluation effects, improved performance, smaller decline in volatility and decreases in correlation.

This study complements recent studies that are attempting to examine the impact of stock market liberalization at the micro (firm) level. Unlike other studies that continue to take a cross-country perspective, relying on data from the Standard & Spoor's IFC Emerging Market Data Base (EMDB), this study focuses on a single emerging market, South Africa, for comprehensiveness and uses credible national and private databases as data sources. The main contributions of this study are five-fold. Firstly, the study addresses the problem of dating stock market liberalizations using structural changes in stock market data. Secondly, it investigates the impact of stock market liberalization on firms' cost of capital using a sample of firms that is representative of all sectors of the South African market. Thirdly, the study tests whether the observed reduction in the cost of capital of firms is persistent over a fairly long period. Fourthly, it investigates whether the observed impact is independent of the sector to which a firm belongs. Lastly, the study examines the influence of various firm characteristics on the change in the cost of capital following stock market liberalization.

The JSE provides an ideal laboratory for answering the five research questions for several reasons. The exchange is fairly representative of the South African economy. Prior to the 1990s it possessed the typical barriers to foreign investment observed in emerging markets. Following Bekaert's (1995) classification, these comprise three distinct types. First, there are direct barriers that are legal in nature arising from the different legal status of domestic and foreign investors with regard to foreign restrictions and taxes on foreign investment. In response to economic sanctions and political isolation, South Africa introduced stringent exchange controls that were only lifted in the 1990s when there was a new political dispensation. Second, there are indirect barriers stemming from governance issues such as availability of information, accounting standards, and investor protection legislation. For South Africa, its international isolation meant that it had no obligation to enforce global listing and financial reporting standards. The third type of barrier discouraging foreign investment is the type collectively known as emerging market specific risks (EMSRs) such as liquidity risk, political risk, economic policy risk, and currency risk that may cause de facto segmentation. Indeed, South Africa possessed all of these risks as a result of its past political orientation, international isolation and economic sanctions.

Other reasons that make the JSE an ideal laboratory for studying the impact of liberalization include steadfastness of reforms and a stable macroeconomic environment stretching over a decade, something that enables one to measure long-term effects without many undue confounding factors.

Finally, the adoption of a single country approach enables one to study inter-firm differences within the same macro framework.

1.5 Outline of the Study

The remainder of this thesis is structured in chapters as follows.

Chapter 2 discusses financial development in general. The theory of finance and its links with financial development are critically examined. Issues and experience on matters that relate to financial sector reform in emerging markets are discussed. The chapter's main conclusion is that there is considerable empirical evidence linking financial development to economic growth.

Chapter 3 reviews literature regarding stock market liberalization and integration. The debate on liberalization and the intended benefits are explored. The central question under the spotlight is: has the liberalization of stock markets in emerging economies brought about the expected benefits? Theoretical and empirical issues are discussed and unresolved empirical issues are put into context. The main conclusion of the chapter is that generally the benefits of stock market liberalization far outweigh the negative consequences. However, this evidence has been obtained mainly from analyses at a macro level rather than at a micro (firm) level.

Chapter 4 discusses the research question and develops hypotheses for testing. The research problem is set out as a logical consequence of the debate in chapter 3. It is further developed into measurable hypotheses for econometric and statistical testing. Three hypotheses that empirically measure the impact of stock market liberalization on firms' cost of capital are developed.

Chapter 5 reviews methodological problems in measuring the impact of stock market liberalization on cost of capital. These issues include, inter alia, measuring changes in the cost of capital and methodological approaches used by other researchers. The review process necessarily leads to the selection of a preferred method for testing hypotheses.

Chapter 6 empirically resolves the problem of dating the liberalization of the JSE using time series data related to the cost of equity capital and real aggregate stock price. The date of stock market liberalization is defined as that on which there is a structural change in time series data so that tests for breaks are performed using monthly dividend yield, volume of shares traded and aggregate stock price data from 1970 to 2002.

Chapter 7 lays down the research design for the remainder of the dissertation by describing data sources, choice of firms for investigation, and statistical techniques employed to test hypotheses. The research design and statistical methods utilised follow the discussion on methodological issues as espoused in chapter 5 and econometric techniques in dating the liberalisation of the JSE is developed in chapter 6.

Chapter 8 performs hypothesis testing and presents empirical results. Checks for robustness, validation and transformation of data where necessary are also performed. Furthermore,

Chapter 2

Financial Development: Theory and Empirical Issues

2.1 Introduction

This chapter surveys theoretical and empirical issues on the relationship between financial development and economic growth. In essence, it presents a discussion of the role of finance in economic development. Since the pioneering work of Goldsmith (1969), McKinnon (1973) and Shaw (1973), financial issues that have taken centre stage in developing countries include the desirability of financial liberalization, the role of foreign capital in economic development and the connections between monetary policy, financial markets and financial capital flows.

The chapter is structured as follows. Sub-section 2.2 examines the theory of finance and its relation to economic growth. Sub-section 2.3 discusses the link between financial development and economic development. Sub-section 2.4 discusses financial liberalization in general, especially the early type that focused on the banking sector. Sub-section 2.5 goes on to discuss the debate over the merits of bank-based financial systems versus market-based financial systems. Sub-section 2.6 then narrows the debate to the role of stock markets in emerging economies, which is the main subject of the thesis. Sub-section 2.7 provides the chapter conclusions.

2.2 The Relevance of Finance

The channels through which financial development aids economic growth are best understood through a review of the economic theory of finance. Modigliani and Miller (1958, 1963) and Miller and Modigliani 1961) showed that in fully developed capital markets, under the neoclassical assumptions of perfect competition, no transaction costs, no taxation, and uniformity in expectations by all investors, the market would value a firm's shares entirely on the basis of its earnings prospects independent of its financing or dividend payout decisions. Broadly, the Modigliani and Miller view observes a dichotomy between finance and investment. It argues that corporate growth and investment are dictated by real variables such as productivity, demand for output, technical progress and relative factor prices of capital and labour. Finance, therefore, simply facilitates the investment process. This view is supported by the neo-classical approach in that it sees a limited or modest role of capital in economic growth as is argued by Krugman (1993). Two kinds of evidence suggesting the relative unimportance of capital for economic development are advanced. First is the evident failure of international trade to equalize factor

prices. Second is the evidence of growth accounting in which capital formation generally plays a modest role in explaining growth and in which capital inflows at rates that would widely be regarded as substantial would make only modest differences in GDP growth rates.

The Keynesian perspective on the role of finance in investment and economic growth is similar to the Modigliani and Miller view except that it takes a macroeconomic approach and assumes imperfect capital markets, especially in relation to the costs, the reliability and the availability of relevant information on equal terms to all the participants in the market. According to the Keynesian view, investment is essentially determined by "animal spirits", by businessmen's confidence and expected demand. While in principle, the rate of interest, i.e. the cost of funds, matters, it is in practice regarded as being relatively insignificant compared with the demand factors. By not recognizing the assumption of perfect markets, the Keynesian view finds the Modigliani and Miller's propositions inoperable in the real world. The propositions also run contrary to the traditional view described as the "pecking order" of finance that suggests that firms always prefer internal to external finance (Myers, 1984; Myers and Ajluf, 1984). If they have to use external finance, they would prefer to employ debt whose cost is lowered by the tax advantage and only use equity finance as a last resort. A firm's capital structure and its dividend payout decisions would thus be important variables as they have an independent influence on its share price. Hence, the availability of the appropriate kind of finance could constrain a firm's growth or investment plans.

The view has since been amended and replaced by richer theoretical models and empirical studies that have found a strong relationship between firms' capital structure and investment (Hubbard, 1998). New theoretical developments involving asymmetric information between insiders (managers) and outsiders (creditors or shareholders), problems of adverse selection, moral hazard, agency costs, signalling, transaction costs, have led to different costs of the various forms of finance (see Jensen and Meckling, 1976; Grossman and Stiglitz, 1980, Haugen and Senbet, 1981, for instance). These new developments are broadly compatible with the "pecking order" type theory, and point to the significance of the corporate capital structures for the real economy. The new models of a firm suggest that there are very important interactions between corporate finance and the real economy and that "finance" is not simply a veil. A study by Corbett and Jenkinson (1994) of developed countries, and a similar one by Wu and Negash (2002) for a developing country (South Africa), indicate a pecking order of financial sources.

Thus, contrary to the neo-classical investment models that dominated in the 1960s and 1970s, post-Keynesian economists in the 1980s regarded "cashflow" and corporate retained earnings as being a significant constraint on a firm's investment decisions. Financing constraints are generally attributed to capital market imperfections stemming from such factors as asymmetric information and incentive problems that result in differences between the costs of internal and external financing. Using firm-level data, Love (2003) shows that financing constraints decrease with financial development. Financial frictions cause firms to substitute investment tomorrow for investment today. In other words, the financially constrained firm will postpone investment until the next period. Love (2003) further observes that financial factors have a larger impact on the intertemporal allocation of investment in countries with less developed financial markets.

Schiantarelli (1996) examines empirical evidence on the importance of financial constraints in developing countries and finds that a number of results appear consistently. Firstly, he finds that information asymmetries and agency problems generate significant departures from standard models derived under the assumption of perfect capital markets. Secondly, he finds that internal finance remains the dominant source of financing even though financial structures differ substantially across countries. Thirdly, in many countries, firms create business groups that allow for the formation of an internal capital market that supplements the capital allocation function of the external market and improves their access to external funds. This access affects the relative importance of banks. Banks are particularly important in countries with less developed equity and bond markets. However, there is evidence that they remain important even in countries with very well-developed capital markets, one example being the United States.

2.3 Financial Development and Economic Development

Incidentally, the importance of the financial sector in promoting economic growth was recognized by Schumpeter as early as 1912. However, numerous writers disputed this perspective over decades, notably Lucas (1988).

The theory of finance assumes the existence of well-developed capital markets, a feature absent in developing or emerging markets. For these under-developed markets, the body of thought is associated with that of McKinnon (1973) and Shaw (1973) who broadly advanced three propositions. The first proposition is that financial deepening through growing financial intermediation and monetarisation of the economy facilitates economic development. The second proposition is that financial repression, whereby developing country governments keep the

interest rates artificially low and provide subsidized credits either to favoured sectors or to themselves, is detrimental to long-term growth. The third proposition is that the liberalization of these repressed credit markets will foster development, since raising interest rates to their equilibrium levels leads not only to higher savings but also to more efficient use of investment resources.

Crucially, financial sector development literature has historically emphasized the connection between a country's financial superstructure and its economic development (Goldsmith, 1969, McKinnon, 1973, Shaw, 1973, Kuznets, 1971, Cameron, 1967; Townsend, 1983; Gertler and Hubbard, 1988; and Greenwood and Jovanovic, 1990). The argument is that the services of the financial sector of reallocating capital to the highest efficient use without substantial risk of loss through moral hazard, adverse selection or transactions costs facilitate economic growth.

Theory argues that financial intermediaries or institutions facilitate the efficient allocation of resources across space and time and consequently long-run economic growth through three mechanisms: (1) by reducing information costs; (2) by easing risk sharing and the pooling of resources (and hence lower transactions costs); and (3) by facilitating savings mobilization (Allen and Gale, 1997; Greenwood and Jovanovic, 1990; King and Levine, 1993). A number of empirical studies support the principle that the level of financial intermediary development has a large causal effect on long-run economic performance. These include, among others, firm-level studies by Demirguc-Kunt and Maksimovic (1998), industry-level studies by Rajan Zingales (1998) and country-case studies by Cameron (1967) and Haber (1991).

Growth in per capita income is observed to arise from two sources: accumulation of physical capital and the efficient use of resources. Whilst it is accepted that the efficient use of resources may be driven by superior techniques, financial factors such as the development of the stock market and the deepening of the banking system do exert an influence through both channels.

Among early writers, Goldsmith (1969) emphasised the relationship between the extent of financial development and the efficiency of investment, whereas McKinnon (1973) and Shaw (1973) emphasised the relationship between financial liberalization and increased savings and hence investment. The former writer argued that the process of growth had feedback effects on financial markets that created incentives for further financial development, and both growth and intermediation were seen as endogenous. On the other hand, McKinnon (1973) and Shaw (1973)

focused on the effects of public policy regarding financial markets on savings and investment arguing that policies that lead to financial repression reduced incentives to invest.

In endogenous models that attempt to model the interactions between financial markets and long-run growth, a two-way causal relationship between economic growth and financial growth is observed (Greenwood and Jovanovic, 1990; Greenwood and Smith, 1997). Essentially, in these models, financial institutions are charged with collecting and analysing information to channel investible funds to those activities yielding the highest returns. The process of growth stimulates higher participation in financial markets thereby facilitating the creation and expansion of financial institutions. In turn, through collection and analysis of data about many potential investors, financial institutions are able to allow investment projects to be undertaken efficiently, thus stimulating investment and growth.

Bencivenga and Smith (1991) present a framework whereby the presence of financial intermediation increases economic growth by channelling savings into the activity with high productivity while at the same time allowing individuals to reduce risk associated with their liquidity needs. Individuals face uncertain liquidity needs and in the absence of financial intermediaries they would have to liquidate their savings held in illiquid assets as liquidity needs arise. However, the presence of banks for instance, eliminates unnecessary liquidations as banks, by the law of large numbers, face a predictable demand for liquidity and are therefore able to allocate investment funds more efficiently. Bencivenga and Smith (1991) further show in their model that growth increases even when aggregate savings are reduced as a result of financial development, simply because of the dominant effect financial development has on the efficiency of investment. Furthermore, a model on interaction between financial markets and technological choice developed by Saint-Paul (1992) allows for agents to choose between two technologies: one highly flexible that allows product diversification but with low productivity, and the other one that is rigid but more specialised and productive. Considering that the economy is always exposed to shocks of consumer preference, in the absence of financial markets, risk-averse consumer producers would prefer technological flexibility to high productivity. Financial markets mitigate this behaviour because they enable individuals to hold a diversified portfolio that insures them against negative demand shocks and at the same time allows them to choose the more productive technology.

Bossone (2001) lays out a financial markets approach- what he calls the circuit theory of finance. Central to the circuit process is the complementary function of banks (money market) and non-

banking financial intermediaries (capital markets) in originating money and making it circulate in a manner beneficial to all agents. The credit market represented by banks (acting within short-term horizons) creates liquidity to finance production while capital markets (with longer-term horizons) allocate existing liquidity accumulated by savers to investments. The implication of this circuit theory is that those financial systems where banking and capital markets functions are segmented or absent, tend to be prone to circuit malfunctioning and instability (crisis). This is argued to be the case in developing countries in the early stage of financial development characterized by fragmented markets in which circuit discontinuities do constrain economic growth by limiting the mobility of savings. Development economists, for example Patrick (1966), have argued that correction of such discontinuities would necessarily require policy intervention, that is, government intervention to set up financial institutions where they are currently non-existent.

Well-functioning and competitive financial markets have been observed to be an effective tool in spreading opportunity. Their role in financing new ideas keeps alive the process of "creative destruction" whereby old ideas and organizations are constantly challenged and replaced by new, better ones. Rajan and Zingales (2003) observe that in the United States constant financial innovation creates devices to channel risk capital to people with daring ideas whereas people in developing countries find it difficult to get access to even a few dollars of financing that would give them the freedom to earn an independent life. They then pose two questions. (1) If financial markets bring prosperity, why are they so under-developed around the world? (2) Why were they repressed until recently, even in the United States? Their answer is that throughout history the free market system has been held back not because of its own economic deficiencies, but because of its reliance on political goodwill for its infrastructure. Threats to markets are seen to be coming from two interest groups:

(a) The first group is the privileged comprising incumbents who already have an established position in the market and who would want to keep it exclusive;

(b) The second group comprises opponents of change in distress such as the unemployed, bankrupt investors and firms who would have lost out in the process of creative destruction characteristic of free markets.

During a downturn, instead of viewing destruction as an inevitable counterpart of creation it is difficult for the privileged to extol the virtues of free markets. It is easier to give in to the

incumbent industrialist (whose focus now would be on rising costs of competition from free markets than on the opportunities they create) who ostensibly champions the distressed by demanding that competition and markets suppressed. Incumbents with political power have the power to block the institutions necessary for finance because they are a focused and organized group with plentiful resources.

Rajan and Zingales (2003) put forward a central thesis stating that because financial markets depend on political goodwill for their existence and because they have powerful political enemies among the establishment, their continued survival cannot be taken for granted, even in developed countries. They observe three phases in the historical development of financial markets:

- An initial phase, when a country obtains a more representative government and begins to respect property rights;
- The second phase, when the country opens its borders and liberalizes; and
- The third reactionary phase, when gains of liberalization are reversed by incumbent groups to gain support of the opponents of change.

Demonstrating how incumbents in power could suppress finance, Roubini and Sala-I-Martin's (1992) earlier model that allows the government to use financial repression to broaden the base of inflation tax, shows that financial repression yielded higher seigniorage to finance government expenditures. The classification by Rajan and Zingales (2003) might not be universally applicable as it has been developed from observations of historical developments in industrial countries whose characteristics could be different from those of developing countries. However, the idea that rulers of sovereign states and corporate insiders may pursue their own interests at the expense of outsider investors has also been demonstrated by Stulz (2005)

Greenwood and Jovanovic (1990) suggest that the dynamics of financial development resembles the Kuznets (1971) hypothesis. Financial markets are almost non-existent in the infant stage of development, with a slow growth in the economy. In the intermediate stage of the growth cycle, financial superstructure develops accompanied by an increase in both savings and economic growth while the distribution of income widens. On maturity an extensive financial superstructure would have developed. In the final stage the distribution of income stabilizes while the savings rate falls and economic growth converges to a higher level than that during the infant stage. Replicating the logic of the Kuznets hypothesis for financial markets development,

world markets could be represented as going through four stages as shown in a quadrant in Table 2.1 below.

Table 2.1
Financial Markets mimicking the Kuznets Hypothesis

Stage 3: Maturing Emerging Economies: e.g. East-Asian countries, Australia, New Zealand, South Africa, Brazil, etc. ▪ Fairly developed financial markets, usually those tracked by The Economist	Stage 2: Intermediate Economies: e.g. Emerging economies in Eastern Europe, Latin America, Asia, and some countries in Africa ▪ Developing and liberalizing financial markets
Stage 4: Developed Economies: e.g. North America, Europe and Japan ▪ Well-developed financial markets, but occasionally still go through some reforms	Stage 1: Infant or Underdeveloped Economies: e.g. Mostly African countries ▪ Fragmented and repressed financial markets, usually dominated by a few banks

If we mimic the Kuznets hypothesis, financial development is a demand-driven approach that implies that finance is passive so that financial markets develop out of market needs. Financial intermediation promotes growth because it allows a higher rate of return to be earned on capital, and growth in turn provides the means to implement costly financial structures. Emerging markets could be said to be at the intermediate stage while advanced markets lie between maturity and the developed stages of financial development. The demand-driven argument accords with the reasoning of Rajan and Zingales (1998) that financial development as measured by the level of credit and the size of the stock market may predict economic growth because financial markets anticipate growth. If it is accepted that the stock market capitalizes the present value of growth opportunities and that financial institutions lend more if they think sectors will grow, then financial development may be taken simply as a leading indicator rather than a causal factor. King and Levine (1993) further show that financial development precedes economic growth rather than the other way round. In a sample of eighty countries over the period 1960-1989, they find that different measures of beginning-of-period financial development are associated with higher subsequent rates of growth in the country's growth domestic product, its capital stock, and its productivity over the subsequent decade. They further demonstrate that countries where much of the credit is allocated by the central bank rather than by commercial banks have typically underdeveloped financial systems. Using example of the Democratic Republic of Congo (DRC) (formerly Zaire), they show that if in 1970 that country had had a share of domestic credit allocated by commercial banks equal to the average for developing countries of about 57 percent instead of its mere 26 percent, the country would have grown about 0.9 percent faster each year in the 1970s, and by 1980 per capita GDP would have been 9 percent above its actual level.

Rajan and Zingales (2003) argue as follows. If financial development really causes growth, it should have a different effect on the growth of firms in some industries relative to firms in others. The reason is that in almost every country a significant portion of a firm's investment is financed through the cash it generates from operations - for instance, high-growth firms do not pay dividends in order to plough back cash generated into the business. In line with the pecking order theory, firms prefer to first use their own cash flow (internal finance), for making investment because they feel they have to pay a substantial premium for funds raised from outside, the reason being that outsiders do not know as much as the firm's managers about the firm and its prospects and do not fully trust the managers to act in the interest of outside investors.

However, the process of financial development reduces the cost of external finance by improving disclosure and information dissemination and aligning the incentives of a firm's management with the interests of investors through contracts and speedy enforcement. Rajan and Zingales (2003) therefore argue that the industries that should benefit most from financial development are those that need a lot of external finance. For instance, a typical project in the therapeutic drug industry requires a long period of research and development and substantial investment before a commercially viable drug emerges, whereas the amount of necessary investment and the lag between investment and the generation of cash flows is likely to be small for a firm in an industry like tobacco. In this scenario tobacco firms are less likely to benefit from financial development than drug firms because they need little long-term outside finance. The implication of this argument is that if financial development really causes growth, drug firms should grow relatively faster than tobacco firms in countries with better financial markets. Indeed, in a cross-country study involving Malaysia, South Korea, and Chile, which were all moderate-income, fast-growing countries in the 1980s but differed considerably in the standards of their accounting, Rajan and Zingales (1998) show this to be the case. Using accounting standards as a measure of how much firms disclose and thus how good a country's financial development is, they found that in Malaysia that had the most highly developed financial sector by this metric, the value added by the drug industry grew at a 4 percent higher annual real rate over the 1980s than did tobacco. In contrast, in South Korea, which was moderately financially developed, drugs grew at 3 percent higher than tobacco while in Chile, which was in the lowest quartile of financial development among the countries in the sample, drugs grew at a 2.5 percent lower rate than tobacco. The conclusion arrived is that financial development has differential effects on the growth rates of industries.

Rajan and Zingales (1998) conclude that the link between financial development and growth is one by-product of the theory that financial markets and institutions reduce the cost of external finance for firms. However, they point out that ultimately it is the availability of investment opportunities that drives growth. This re-posits the question: what determines the emergence of financial markets or the degree of their development?

Pagano (1993) observes that historically, bank lending to firms has appeared first, followed by stock and bond markets, and finally credit and insurance markets servicing households. In most models the degree of financial development is assumed to be exogenous. However, Greenwood and Jovanovic (1990) and Saint-Paul (1992) show models in which growth and financial development are endogenous. Taking a cue from the Kuznets hypothesis, they demonstrate that financial intermediation entails real resource costs that are fixed or not exactly proportional to the volume of funds intermediated. Hence, as the economy grows, the individual incentive to participate in financial markets increases as the benefits increase the scale of funds invested while costs increase proportionally less. In other words, financial markets development is seen to be positively correlated with the size of an economy or GDP.

Using macroeconomic aggregates, King and Levine (1993) and Biem and Calomiris (2001) find positive correlation between economic growth and aggregate indicators of financial development such as money supply measures, M2 or M3 to GDP ratio and aggregate stock market capitalization to GDP ratio. Using an endogenous growth model, Pagano (1993) demonstrates that financial development has a positive effect on economic growth: it can raise the proportion of savings channelled to investment; it may increase the social marginal productivity of capital; and it can influence the private saving rate. However, he points out that the problem of using highly aggregated indicators of financial development for evidence is that they tend to neglect the fact that the effects could vary depending on the specific market within which they occurred. For instance, he notes that insurance and household credit markets could well reduce economic growth in the short term through reduced savings in the short term while on other hand the creation of a stock market that provides long term finance would positively promote growth.

Recent studies use time series dimensions to address the causality between finance and growth to study the channels through which finance affects growth. Beck et al. (2000), Neusser and Kugler (1998), Rousseau and Wachtel (1998) and Bekaert et al. (2001) provide evidence in this regard.

2.4 Financial Sector Liberalization

The debate on capital market imperfections would suggest that emerging markets have more imperfections than those in developed markets. This posits the question: How do you bring about perfect markets? Contemporary literature suggests financial development, reduction of information asymmetries, the harmonization of economic rules of different jurisdictions (see for example, Buch, 2001) and efforts to integrate segmented markets to the international market. If financial development does cause growth, deregulation should have a positive effect on the growth rates of per capita income. Jayaratne and Strahan (1996) demonstrate that bank deregulation in the USA was accompanied by an increase of 0.51 to 1.19 percentage points a year in each State.

Early reform efforts in developing countries that focused on the banking sector, on the basis of the McKinnon-Shaw analysis, could be viewed as recognition of the infant stage of financial development in accordance with the Kuznets hypothesis and the endogenous postulations of Greenwood and Jovanovic (1990) and Pagano (1993). The logic of the theory of financial development would imply that stock market liberalization takes place at the intermediate stage when an extensive financial superstructure starts evolving. In fact, the World Bank (1989) views stock market development as part of the natural progression of the development of a country's financial sector as long-term economic growth proceeds, in other words a demand-driven approach.

At a macroeconomic level, Fuchs-Schundeln and Funke (2001) provide new evidence on the three-way beneficial link between stock market liberalization, financial development and economic development. The relationship between financial development and real output could be expressed in the following form:

$$Y = f(BC, SMV, SMDEV) + e \text{ (error term)} \qquad [1]$$

where:

Y = real output
BC = the ratio of bank credit to the private sector to GDP
SMV = an index of stock market volatility
SMDEV = indicator of stock market development.

The equation is bound to have a large error term as only two forms of finance are considered while many other forms are ignored. De Gregorio and Guidotti (1995) finds the ratio of bank credit to the private sector to GDP (BC) as a more accurate representative of the actual volume of funds channelled to the private sector and hence more directly linked to investment and growth. Thus, this indicator is a better measure than monetary aggregates such M1, M2 or M3. Pagano (1993) discusses measures of stock market volatility (SMV) and their limitations. With regard to measuring stock market development (SMDEV), a conglomerate index relating to stock market size, liquidity and integration with world capital markets is a preferred measure (Demirguc-Kunt and Levine, 1996). Measures of the size of the banking sector and the size and liquidity of the stock market are shown to be highly correlated with subsequent growth of GDP per capita (Beck, Demirguc-Kunt and Levine, 2000). Demirguc-Kunt and Maksimovic (1998) show that firms in countries with an active stock market and large banking sector grow faster than predicted by the characteristics of individual firms. This observation is supported by Rajan and Zingales (1998) whose empirical evidence shows that industries that rely more heavily on external finance grow faster in countries with better-developed financial systems.

2.5 Bank-Based vs. Market-Based Financial System

The link between financial development and economic growth has resulted in economists and policymakers debating the merits of bank-based vs. market-based financial systems. Buch (2001) who studied European integration, argues that countries might benefit from increased capital mobility depending on the structure of their financial systems. However, distinguishing financial systems of countries as bank or market based has not been proven by recent research to be the most productive classification. Although economic growth is positively linked with overall financial development, there is no conclusive evidence that either bank-based or the market-based financial systems are more desirable (Levine, 2002).

However, it may be desirable to put into context the characteristics of different financial systems. 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 United States and the United Kingdom as market-based systems.

The bank-based view highlights the three main positive roles of banks. Firstly, Diamond (1984) and Ramakrishnan and Thakor (1984) stress their role in acquiring information about firms and managers and thereby improving capital allocation and corporate governance. Secondly, Allen and Gale (1999) and Bencivenga and Smith (1991) allude to their role in managing cross-

sectional, intertemporal, and liquidity risk and thereby enhancing investment efficiency and economic growth. Thirdly, Sirri and Tufano (1995) stress their role in mobilizing capital to exploit economies of scale. The shortcomings of market-based systems are also highlighted. Stiglitz (1985) argues that well-developed markets cause the 'free rider' problem in that they quickly and publicly reveal information which reduces the incentives for individual investors to acquire information. On the other hand, banks are able to mitigate this problem because they form long-term relationships with firms and do not reveal information immediately in public markets (Boot, Greenbaum, and Thakor, 1993). Boot and Thakor (1997) further argue that since banks are coordinated coalitions of investors, they are better than uncoordinated markets at monitoring firms and reducing post-lending moral hazard, for instance, asset substitution. The bank-based view also stresses that liquid markets, that is stock market-based systems, create a myopic investor climate because investors can inexpensively sell their shares so that they have fewer incentives to exert rigorous corporate control (Bhide 1993). Thus, according to the bank-based view, greater market development may hinder corporate control and economic growth. Gerschenkron (1962) and Rajan and Zingales (1998) further argue that monopolistic banks can more effectively force firms to re-pay their debts than atomistic markets, especially in countries with weak contract enforcement capabilities, whose features are prevalent in many developing countries. In the absence of powerful banks to force repayment, external investors may be reluctant to finance industrial expansion in countries with under-developed institutions.

In summary the bank-based view holds that banks can exploit scale economies in information processing, ameliorate moral hazard through effective monitoring, form long-term relationships with firms to ease asymmetric information distortions, and thereby boost economic growth. However, this is only possible when they are unhampered by regulatory restrictions on their activities; in other words, in a deregulated environment. Furthermore, Senbet (2001) argues that the focus on the banking sector prevents the nurturing of the development of equity and derivative markets.

In contrast, the market-based view highlights three growth-enhancing roles of well-functioning markets. The first is that of fostering greater incentives to research firms since it is easier to profit from this information by trading in big, liquid markets (Holmstrom and Tirole, 1993). The second is that of enhancing corporate governance by easing takeovers and making it easier to tie managerial compensation to firm performance as stressed by Jensen and Murphy (1990). The third role is facilitating risk management (Levine, 1991; Obstfeld, 1994). Rajan (1992), for instance, have argued that monopolistic banks can discourage innovation by extracting

informational rents and protecting established firms with close bank-firm ties from competition. Furthermore, it has been argued that powerful banks with few regulatory restrictions on their activities may collude with firm managers against other creditors and impede efficient corporate governance. In contrast, proponents of competitive capital markets argue that they 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 and Thakor, 1997; Allen and Gale, 1999). In summary the market-based view stresses that markets will reduce the inherent inefficiencies associated with banks and enhance economic growth.

Another view called the financial services view is advanced by Merton and Bodie (1995) and Levine (1997). According to this view, financial arrangements - contracts, markets, and intermediaries - arise to ameliorate market imperfections and provide financial services. In other words, financial arrangements arise to assess potential investment opportunities, exert corporate control, facilitate risk management, enhance liquidity, and ease savings mobilization, and in so doing different financial systems promote economic growth to a greater or lesser degree. The critical issue is creating an environment in which intermediaries and markets provide sound financial services.

It is apparent that conceptually the financial services view is fully consistent with both the bank-based and market-based views. However, the financial services view places the analytical spotlight on how to create better functioning banks and markets. La Porta, Lopez-de-Silanes, Shleifer, and Vishny (LLSV) (2000) present a special case for the financial-services view called the law and finance view. LLSV (2000, p. 19) state, "… bank- versus market-centeredness is not an especially useful way to distinguish financial systems." They highlight the role of the legal system in creating a growth-promoting financial sector. The law and finance view argues that finance is a set of contracts defined - and made more or less effective - by legal rights and enforcement mechanisms. According to this perspective, a well-functioning legal system facilitates the operation of both markets and intermediaries and that in turn improves the efficient allocation of resources and economic growth. The essence of LLSV's (2000) argument is that laws and enforcement mechanisms are a more useful way to distinguish financial systems than focusing on whether countries are bank-based of market-based. This becomes more important in developing countries where legal institutions are weak.

Boyd and Smith (1998) suggest that banks are particularly important at low levels of economic development, a view with accords with the Kuznets hypothesis. Hence, as income rises, countries

benefit from becoming more market-based with positive implications for economic growth. Rajan and Zingales (1998) argue that bank-based systems are better at promoting growth in countries with poor legal systems, while market-based systems have advantages as legal systems improve.

Despite the above compelling arguments, cross-country comparisons by Levine (2002) do not suggest that distinguishing between bank-based and market-based is analytically useful for understanding the process of economic growth. His cross-country evidence is consistent with the financial services view, and observes that better-developed financial systems positively influence economic growth irrespective of whether the overall financial development stems from bank or market development. More specifically, the data is consistent with the view that the legal system plays a leading role in determining the level of growth-promoting financial services since the component of financial development defined by the legal rights of investors and the efficiency of contract enforcement is very strongly associated with growth. Levine's (2002) data supports the LLSV (2000) view that the legal system crucially determines financial development and that financial structure is not a particularly useful way to distinguish financial systems. Thus, results do not support public policies aimed at creating a particular mixture of financial markets and intermediaries but rather highlight the importance of strengthening the rights of investors and improving the efficiency of contract enforcement. In other words, the emphasis should be on the specific laws and enforcement mechanisms that govern both debt and equity transactions.

2.6 The Role of Stock Markets in Emerging Economies

Stock markets are organized markets for dealing in the primary securities (bonds and shares or equities) issued by corporations. These securities are issued in order to finance their expenditure on physical assets, that is, investment goods. Bonds are repayable on maturity whereas shares are not repaid because shareholders assume an ownership stake in the corporation issuing them. Describing them as primary securities relates to the concepts of a financial system and of the flow of funds in that they are issued by deficit units (corporations) and bought directly by surplus units (savers) through the stock market. It is a process of direct finance. Financial intermediaries, such as pension funds and life insurance companies, play a large role in stock markets through a process of indirect finance. They issue their own liabilities to savers becoming surplus units in their own right and finance corporations (deficit units) through ownership of shares.

Stock markets are also secondary markets in which existing (old) securities change ownership. Such purchases and sales of existing shares and bonds that dominate daily transactions on stock

exchanges are not flows of new funds to corporations. Stock markets have the important function of allocating new finance to corporations even though the bulk of their business is concerned with existing securities instead of new issues. This is so because the price of old securities established in stock market dealings determines the price at which new securities can be issued and hence the cost of capital.

According to Singh (1993), in theory a well-functioning stock market promotes economic growth through similar channels as the banking sector, that is, via raising (1) the saving rate, (2) the quantity and (3) the quality of investments. Regarding agency problems, Cho (1986) argues that equity finance does not experience adverse selection and moral hazard problems to the same extent as debt finance does in the presence of asymmetric information. As a result, the existence of equity markets should enhance the allocative efficiency of capital because providers of debt finance should allocate credit efficiently by being afforded knowledge of the riskiness of each individual borrower. Beim and Calomiris (2001: 63) emphasize this role as follows: "The existence of public stock prices focuses the attention of managements and investors alike on value and value creation."

However, Cho's (1986) argument is problematic as regards the informational requirements it imposes on the individual equity investor and its disregard of the agency problem in management controlled corporations (Stiglitz, 1985; Haugen and Senbet, 1981, Jensen and Meckling, 1976). These problems have led to the advocacy that developing economies should prefer bank-dominated financial systems (similar to the German and Japanese ones) to the Anglo-Saxon stock markets-dominated financial systems (see Stiglitz 1985; Akyuz and Kotte, 1991; and Singh, 1993, 1997). One central argument is that the expected rates of return on investments dictated by quarterly or six-monthly earnings per share requirements of stock markets-based financial systems are too high and do not promote long-term growth but rather shot-termism. Singh (1997) further argues that if we acknowledge that the well-functioning U.S. and U.K. stock markets do not perform their disciplinary, allocative and other tasks satisfactorily, emerging stock markets already deficient in infrastructure are likely to perform even worse.

In the past two decades the general trend towards liberalization, deregulation and privatization in developing countries has been accompanied by the growth of stock markets. Both endogenous and exogenous factors have played a role in this development. The World Bank has actively promoted stock market development in these countries through its affiliate, the International Finance Corporation (IFC), which provides technical expertise to further this process. The

Bretton Woods institutions have justified the promotion of stock markets on the grounds that they are part and parcel of the progression of the development of the financial sector as economic development proceeds (World Bank Report, 1989).

The debt crisis of the 1980s that affected many developing countries (particularly in Latin America) was one exogenous factor that promoted the growth and liberalization of emerging equity markets as the crisis brought pessimism about the ability of commercial banks to continue lending to those countries. Emerging stock markets became viewed as a useful vehicle for attracting foreign portfolio investments and hence enhancing savings for economic development. Errunza (1997) argues that foreign portfolio investment that results from stock market liberalization possesses the essential attributes of efficient risk sharing and cash flow matching for emerging economies. He explains that it complements foreign debt finance in the same way domestic debt does to domestic equity and consequently increases the quality (terms) and quantity of international borrowing at both the national and firm level. Fuchs-Schundeln and Funke (2001) further argue that improved risk sharing and more liquid markets and well-developed markets following liberalization promote high return investments and longer duration projects, positive impact on the information-gathering behaviour of private agents, improved corporate control, efficient allocation of resources and positive implications for growth.

The classic theory of the stock markets' role is that portfolio owners' choice of shares is based on information about enterprises, which is fully reflected in the price of their shares. If an enterprise is inefficient, it will be punished by a low share price that makes the cost of capital high for that enterprise and makes it vulnerable to a takeover by more efficient owners.

But what has been the experience of some of the oldest stock markets in some developing countries? An early study by Drake (1986) on exchanges in Asia which were established or reformed in the past three decades as one element of financial liberalization programmes designed to encourage economic development provides some insights. For Hong Kong he noted (pp. 86-87) that the stock exchanges "have not been very effective in raising new capital through the flotation of shares or debentures" and that the "market in existing shares has always been volatile" and "insider trading is still prevalent". In Malaysia and Singapore, he observed a significant flow of new issues to raise new finance over the years. In all three countries (Hong Kong, Malaysia and Singapore) the growth of new issues was due primarily to the local listing of shares in multinational corporations, British companies in particular, rather than that of domestic industrial enterprises. The strong economic growth of Taiwan, Thailand, South Korea and

Indonesia has been attributed to high level of debt finance. Stock markets had been viewed as having a role in enabling savings institutions in Europe, America and Japan to diversify their investments between stock exchanges in different countries instead of being primarily involved in financing domestic development.

Recent evidence indicates a shift in emphasis in economic policy from debt to equity and from banking to securities markets in many countries. New listings, right issues and privatisations have significantly added to the supply of equity. Gill (1993) observes that the development of broad-based equity markets has helped focus attention on the importance of the efficient allocation of capital, particularly access to capital by new entrants to the business community and on income distribution. He further notes that the experiences of the 1970s and 1980s have shown a correlation between those countries that experienced strong and relatively consistent economic growth and countries that have implemented successfully policies to strengthen their equity markets. For instance, Brazil, whose growth rates fell after policies favouring equity markets were reversed, is contrasted with the high growth rates of South Korea which promoted equity markets during the same period.

2.7 Conclusion

There are a number of conclusions that can be drawn from the discussions of this Chapter. From the discussion of the theory of finance, we obtain a fundamental insight into the counter-Modigliani-Miller revolution in corporate finance that it makes a difference whether a firm is financed through debt or equity. There is indeed a difference in their incentive and risk-sharing effects. For instance, equity allows the firm to undertake greater risks. Consequently, this calls for an increased role of equity markets when raising new capital.

Though controversial, the link between financial development and economic growth is not disputed. Empirical evidence, especially that of Levine (2002) and LLSV (2000), suggests that distinguishing between bank-based and market-based financial systems is not analytically useful for understanding the process of growth. There is no support for public policies aimed at creating a particular mix of financial markets and intermediaries. The recommendation given is that emphasis should be on strengthening the rights of investors and improving the efficiency of contract enforcement, that is, the specific laws and enforcement mechanisms that govern both debt and equity transactions.

In the next chapter the discussion focuses on stock market liberalization. A comprehensive review of the literature on the subject matter is given.

Chapter 3

Stock Market Liberalization and Financial Integration: A Literature Review

3.1 Introduction

There has been considerable research on how a country moves from segmented status to integrated status within world markets. Two levels of integration have been studied: economic and financial integration. Economic integration is associated with decreased barriers to trading in goods and services and deregulating labour markets. Financial integration entails free access of foreigners to local capital markets and local investors to foreign capital markets. It is this latter category of evolution that is the subject of this chapter. International asset pricing models predict that the integration of capital markets leads to a reduction of the cost of capital as risk is internationally diversified. This is touted as the major benefit to emerging markets that liberalize their domestic capital markets. In this chapter the central theme is whether the liberalization of stock markets in emerging economies has brought about the expected benefits. The main focus is the impact on the cost of equity capital. Theoretical and empirical issues are discussed and unresolved empirical issues are put into context.

The chapter is structured as follows. Sub-section 3.2 commences with definitions of concepts related to financial liberalization and integration. Sub-section 3.3 proceeds to discuss the theory of liberalization/market integration using international pricing models. Sub-section 3.4 discusses the problems that are encountered when attempting to measure the impact of liberalization. These are seen as arising from the nature of barriers to investment in emerging markets, the problem of dating stock market liberalization, and confounding factors arising from the fact that stock market liberalization often takes place in tandem with other reforms. Sub-section 3.5 presents empirical evidence on benefits of liberalization/integration. Sub-section 3.6 discusses the observed downside of market integration. Finally, sub-section 3.7 concludes with a review of unresolved research issues.

3.2 Definition of Concepts

The central concepts in the liberalization debate are market segmentation and market integration. Market segmentation refers to non-liberalized markets that are closed, whereas market integration refers to the process of liberalizing markets so that there is free flow of capital among global markets.

Financial liberalization and stock market liberalization have tended to have several meanings and at times used interchangeably. For example, few papers distinguish between bank sector liberalization, stock market liberalization and other reforms such as privatizations and foreign exchange reforms. Gelos and Weiner (2001) and Beim and Calomiris (2001) observe that development literature often refers to domestic financial liberalization. Generally, financial liberalization means allowing inward and outward foreign equity investment. However, Biem and Calomiris (2001) define stock market liberalization in a wider sense as a package of reforms towards global market integration and the creation of governance infrastructure such as sound law and regulation governing trading, and reliable systems of accounting information and control. This should invariably include improvements in microstructure. Through its effects on market liquidity and the cost of trading in particular, microstructure can make a market more or less attractive, thereby encouraging market participation (Glen, 2000). A narrow definition views stock market liberalization as a specific type of a more general reform called capital account liberalization, that is, a decision by a country's government to remove restrictions on capital inflows and outflows. Invariably, this process enables foreign investors to purchase or sell domestic securities without restrictions, and similarly domestic investors to purchase or sell foreign securities.

Two distinctions are made between regulatory liberalization and effective liberalization. Regulatory liberalization is policy-induced usually through decree or law, whereas effective liberalization is one that results in market integration. Market integration is the process that results in global assets with similar risks being equally priced if country risk is zero. Regulatory liberalization may not necessarily result in market integration because of two possibilities: (1) the market could have been integrated before the law through foreigners having the ability to access it through other means such as country funds and depository receipts; and (2) regulatory reforms could lack credibility because of other existing market imperfections so that they do not result in market integration. This study, however, uses liberalization and market integration interchangeably.

3.3 The Theory of Liberalization/Market integration

At the heart of the asset pricing theory is the assumption that capital will be allocated in such a way that risk-adjusted returns are equalized across assets. The level of expected stock returns should vary cross-sectionally according to the level of firms' exposure to systematic risks. Whenever there is a change in the level of systematic risk, stock prices should change in such a manner that risk-adjusted returns are equalized once again.

International asset pricing models predict that stock market liberalization reduces the liberalizing country's cost of equity capital (Bekaert and Harvey, 2000a; Errunza and Miller, 2000; Henry, 2000b and Stulz, 1999). At the heart of this theory is market integration. Markets are considered integrated when assets of identical risk command the same expected return and domestic investors are able to invest in foreign assets and foreign investors in domestic assets. In perfectly integrated markets, capital flows across international borders to equate the price of risk. If capital controls or other barriers impede capital movements, then the price of risk should differ internationally. For a fully liberalized stock market, the world CAPM in the absence of exchange risk and other barriers would produce the following pricing relationship:

$$E(R_i) = R_f + \frac{\text{Cov}(R_i, R_g)}{\text{Var}(R_g)} \times (R_g - R_f) \qquad [1]$$

where cov (R_i, R_g) is the covariance of the ith security return, R_i, and the global market portfolio return, R_g, and Var (R_g) is the variance of the global market portfolio. The expected return would now depend on the global price of risk and the global covariance risk. The global price of risk is lower than the local price of risk because the world market portfolio is less volatile than the local market portfolio. Therefore, the expected rate of return of a security in a segmented market should decline when the stock market is liberalized and priced in an integrated market. Underlying the necessary condition for the equity premium to fall following liberalization is the intuition that the local price of risk exceeds the global price of risk. Empirically, Errunza, Senbet and Hogan (1998) and Stulz (1999b) demonstrate that this is the case for emerging markets. In a more recent paper, Stulz (2005: 1595) argues that a country's attributes are still critical to decision making. This is one reason the impact of financial liberalization has been limited. He attributes this to the "twin agency problems" whereby rulers of sovereign states and corporate insiders pursue their own interests at the expense of outside investors.

Since liberalizations alter the set of non-diversifiable risks for the representative investor, stock prices should move in line with the change in systematic risk. Whenever there is a change in the level of systematic risk, stock prices should change in such a way that risk-adjusted returns are equalized once again. Chari and Henry (2004: 595) have observed that when countries open their stock markets to foreign investors, firms that become eligible for purchase by foreigners are repriced according to the difference in the covariance of their returns with the local and world market.

According to the CAPM, the cost of equity capital has two components: the equity premium and the risk-free rate of return. Three reasons are advanced with regard to why stock market liberalization might cause a fall in the cost of equity capital. (1) It might decrease capital constraints by allowing foreign capital flows. The net capital inflows may induce a reduction in the risk-free rate. (2) Allowing foreigners to purchase domestic shares facilitates risk sharing that reduces the equity premium. (3) Increased capital inflows and trading would increase stock market liquidity and thus lowering the liquidity premium which in turn would reduce the equity premium (Errunza, 1997; Henry, 2000a; and Ahimud et al., 2002).

Shareholders demand a liquidity premium in addition to the premium for bearing systematic risk in order to compensate for the frictional costs of trading equity. Hence the equity premium has two components: (1) the premium required for bearing systematic risk, and (2) a liquidity premium. Therefore, a formal equation for cost of equity capital, k, could be expanded to be:

k = risk-free rate + [Risk Premium * Quantity of Systematic Risk] + liquidity premium [2]

Henry (2000b) argues stock market liberalization may not always lead to a fall in the cost of capital. He argues that while it reduces the equity premium it can increase a country's risk-free rate of interest and consequently the cost of equity capital under the following two situations. Firstly, this can happen if the domestic risk-free rate is lower than the world risk-free rate (in which case it rises to equate the world risk-free rate following liberalization). Indeed this is plausible in repressed financial systems. Secondly, this may also happen if we assume that the liberalization of restrictions on capital inflows is accompanied by liberalization of restrictions on capital outflows by domestic residents. Such a scenario could produce ambiguous results. The existence of a lower domestic risk-free rate is possible where the domestic financial system is repressed in the sense that internal interest rates are not market-determined. This would suggest reform of the banking sector, which according to the theory of financial development is the first to evolve and should precede stock market liberalization.

However, Bekaert and Harvey (2003) observe the complexity of the liberalization process in that there is no model that specifies the economic mechanism that moves a country from segmented status to integrated status. Several models have, however, been put forward to explain the phenomenon.

In early literature, Stulz (1981) suggests an approach that models investments in international

markets as being taxed by the host country. A segmented country is considered to be the one that imposes taxes on incoming and outgoing investments whereas an integrated country imposes no taxes. Baccheta and Wincoop (2000) simplify further this model while another model by Errunza and Losq (1985), which is essentially a limiting case of that of Stulz (1981), facilitates an analysis of a continuum of market structures. These approaches contributed to the standard static integration/segmentation model, which has been further refined by Eun and Janakiramanan (1986), Alexander, Eun and Janakiramanan (1987), Errunza, Hogan and Senbet (1998), Baccheta and Wincoop (2000) and Martin and Rey (2000). Bekaert and Harvey (2003) offer further extensions to the standard static integration/segmentation model by augmenting it with probabilities by economic agents attached to government intention to liberalize. In essence, they observe that the change in prices is related to the credibility of the government's intentions.

3.4 Problems in Measuring Impact of Liberalization

Measuring the impact of liberalization is not an easy process for several reasons. These range from the nature of barriers to investment, the problem of dating stock market liberalization, and confounding factors arising from the fact that stock market liberalization often takes place in tandem with other reforms.

3.4.1 Barriers to Investment

Emerging markets face multifaceted barriers to investment. Bekaert (1995) classifies these into three distinct types. The first type relates to direct barriers that are legal in nature arising from the different legal status of domestic and foreign investors with regard to foreign restrictions and taxes on foreign investment. The second type relates to indirect barriers stemming from governance issues such as availability of information, accounting standards, and investor protection legislation. The third type that discourages foreign investment are barriers collectively known as emerging market specific risks (EMSRs) such as liquidity risk, political risk, economic policy risk, and currency risk that may cause de facto segmentation. These are country factors which in recent research are being emphasized (Stulz, 2005).

In a study of nine emerging markets regarding the three types of investment barriers, Bekaert (1995) found direct barriers not to be significantly related to return-based quantitative measure of market integration while indirect barriers were strongly related cross-sectionally. Using country fund data, Nishiotis (2002) also finds indirect barriers and EMSRs as having more important pricing effects than direct barriers. Bekaert, Erb, Harvey and Viskanta (1997) also find political

risk to be priced in emerging market securities while World Bank surveys of institutional investors in developed markets reveal liquidity problems as major impediments to investment.

Another significant barrier to investment is information asymmetry. In the international asset pricing models (IAPMs) of Stulz (1981), and Errunza and Losq (1985) the informational barrier is seen to render cross-border investments costly, or prohibit such investments in the limit. Also, the "home bias" literature emphasizes the importance of information asymmetry to explain the predominance of home assets in international portfolios (French and Poterba, 1991; Cooper and Kaplanis, 1994; and Lewis, 1999). From a survey of market experts and participants, Chuhan (1994) reports limited information as one of the major impediments to investing in emerging markets.

In French and Poterba (1991), Cooper and Kaplanis (1994) and Lewis (1999), firm size has been used in many studies as a proxy for information richness and found to be a good indicator of information availability. Therefore, it is reasonable to assume that foreign investors, who generally have limited information, prefer information-rich, large firms to information-poor, small firms in international investment decisions, especially in emerging markets (see Bailey and Jagtiani, 1994; Kang and Stulz, 1997 and Bailey, Chung and Kang, 1999). It is plausible that the cost of information on small-size firms is too high for foreign investors in relation to the potential diversification benefit. Hence, foreign investors may not invest in small firms. These small firms become non-traded and according to Stulz (1981) there could exist non-traded assets that do not provide sufficient benefits to overcome the cost of existing barriers. Merton (1987) also argues that investors invest only in securities they know about and emphasizes the importance of information asymmetry in investment by noting that (p. 488) *"concern about asymmetric information among investors could be an important reason why some institutional and individual investors do not invest at all in certain securities, such as shares in relatively small firms with few stockholders."* Invariably, this phenomenon will be much more severe in an international investment context.

3.4.2 The Dating Problem

In order to examine the effects of the liberalization we need establish the event date (benchmark date). In other words, we have to date the liberalization. The effective liberalization date is that which results in market integration. Studies that use the event study methodology however crucially depend on a given cut-off date and hence may not be appropriate in situations where the policy reform entails a package of gradual events. The date that may be endogenously

determined by the actions of economic agents, following an economic or political event, not directly linked to the event, may be important.

Invariably, the choice of the event date, that is, the effective liberalization date, is complicated by the fact that unlike corporate announcements that are usually guarded and intended to surprise markets, announcements of liberalization by governments are usually anticipated. There are leakages of information prior to announcement so that market prices adjust in anticipation of liberalization. Discussing the event study methodology, Binder (1998: p.123) sums up the problem as:

"... for regulatory events where the event date is not known, the event study methodology appears to have little statistical power to detect the abnormal returns because the formal announcements in the process are generally anticipated by the market."

Henry (2000a) defines the date of a country's first stock market liberalization as the first month with a verifiable occurrence of any of the following: (1) liberalization by policy decree; (2) establishment of the first country fund; or (3) an increase in the International Finance Corporation's (IFC's) "investability index" of at least 10%. In his empirical studies of twelve emerging economies, he uses the policy decree dates when available in the first instance, and reverts to the other two criteria in the absence of official decree dates. The official liberalization dates used in most empirical studies are invariably the dates when restrictions on foreigners to hold domestic equities are removed for the first time. However, Fuchs-Schundeln and Funke (2001) who have focused on official decree dates, note that some empirical analyses justify the choice of certain dates on the basis of the nature and objective of the study. They observe that studies that explore financial implications using high frequency data favour dates that indicate first signs of liberalization while studies that focus on real economy implications would favour dates when there are significant verifiable real effects.

Bekaert, Harvey and Lundblad (2003) observe that since countries conduct multifaceted reforms (macroeconomic, political, and financial) the dating of financial integration could be a matter of judgment. They raise three critical issues: (1) the possibility that investors can circumvent controls; (2) that regulatory changes that allow foreign investment are often implemented gradually, thus implying that market integration is gradual; and (3) the fact that foreign investors face significant liquidity costs in emerging markets despite liberalization.

Ideally, the starting point in addressing the dating problem is therefore to recognize that the multifaceted barriers to emerging market investment cited by Bekaert (1995) cannot be removed at a single point in time. This should in turn allow a movement from the static segmentation/integration model to the dynamic partial segmentation/partial integration model. Bekaert and Harvey (1995) suggest regime-switching models that allow the degree of market integration to change over time, though they acknowledge the difficulty in specifying such models. However, these models have been extended in Bhattacharya and Daouk (2002), Hardouvelis et al. (2000), Carrieri et al. (2002), Adler and Qi (2002) and Rockinger and Urga (2001). Bekaert (1995) and Edison and Warnock (2001) propose the use of the ratio of market capitalization represented by the International Finance Corporation (IFC) Investable Indices that correct for foreign ownership to the market capitalization represented by the IFC Global Indices. This ratio has the advantage because it captures gradual liberalizations characteristic of many emerging markets. Bae, Chan and Ng (2004) have used this measure to model time-varying volatility and De Jong and De Roon (2002) have also used it to model emerging market expected returns. The dynamic partial segmentation/partial integration model enables the resolution of two issues. Firstly, it accords with the observation that liberalization is a gradual process. Laeven and Perotti (2001) have argued that credibility of liberalizations evolves over time. They further provide empirical evidence on the positive impact of privatisations that occurs during the actual privatisations rather than during the announcement period, an observation consistent with the importance of allowing for gradual integration. Secondly, it allows us to view the dating of liberalization from the perspective of a series of events and hence the likelihood of multiple structural break dates.

Considerable empirical research has largely focused on detection of structural breaks in real macroeconomic time series such as consumption, investment and output rather than stock market financial time series (see Bai, Lumsdaine and Stock, 1998 and Noriega and Soria, 2002). Recent empirical work that has focused on the problem of dating stock market liberalization from the perspective of structural breaks is that of Bekaert, Harvey and Lumsdaine (2002b) and Bekaert, Harvey and Lundblad (2003). They make a distinction between dates of regulatory liberalizations and the dates that are defining events for market integration. Defining the effective liberalization date as that which results in market integration they exploit an econometric technique suggested by Bai, Lumsdaine and Stock (1998) to estimate endogenous break dates for twenty emerging markets. They observe that integration usually occurs later than official decree dates (but exceptions are observed) suggesting a distinction between market liberalization and market integration.

Despite the above two studies providing new insights, the dating of stock market liberalization is still an unresolved issue. Firstly, the studies are based on the static segmented/integrated model rather than explicitly acknowledging the dynamic nature of integration. As a result the focus has been to find a single break point date. Secondly, the time series data used were assumed to be stationary when it is common knowledge that most macroeconomic time series are non-stationary and that emerging market time series, in particular, are not normally distributed (Beim and Calomiris, 2001). Thirdly, due to data (unavailability) problems tests for structural breaks were conducted on only those countries from which data could be obtained from the IFC database or from estimates of U.S. foreign equity portfolio holdings sources, both of which are limited in time frame and breadth. Fourthly, robust or impact tests using different dates are not yet widespread as observed by Bekaert, Harvey and Lundblad (2003).

3.5 Empirical Evidence on Benefits of Liberalization/Integration

In earlier models, Subrahmanyam (1977) advances a theoretical argument in support of the integration of emerging stock markets with those of developed countries. Theoretically, he shows that international capital market integration is Pareto-optimal, meaning that the welfare of individuals in the economies concerned generally improves and never declines.

On why external capital might matter for developing countries, the "Two-Gap" theory of Chenery and Bruno (1962) postulated that a developing country's growth was limited by two constraints: the savings constraint and the foreign exchange constraint, and that the latter was considered to be more binding. Capital inflows from abroad would relax both constraints. The theory fell into disrepute during the late 1960s and 1970s. The basic critique of the theory was that the whole idea of separate constraints on growth made no sense in the context of the market economy. With prices moving to clear markets, the marginal product of each input –be it foreign exchange or domestic capital- should be set equal to its price. In other words, a dollar of capital is a dollar of capital, whether foreign or domestic.

Taking the debate further, Krugman's (1993) survey of theoretical and empirical issues on the role of international financial integration in development demonstrates that integration of financial markets would not promote flow of capital to developing countries, but to the capital-abundant North. His argument is that although the conventional neoclassical view suggests that capital will tend to flow from capital-rich to capital-poor countries, it nevertheless does not give capital per se a very large role and hence it cannot place much weight on the effect of capital

inflows. Furthermore, the new growth theory suggests that international financial integration could promote greater inequality than greater convergence in per capita income. Some of its assumptions suggest that capital will flow from capital-rich to capital-poor countries. However, a discussant, Baldwin (1993), commented that Krugman could have underplayed the role of positive expectations and the fact that the fundamental reforms that are required for development may not occur in the absence of capital flows. Also, the evidence in Kaminsky and Schmulker (2002) suggests that liberalization tends to spur the process of institutional reform and not the other way round.

Empirical literature categorizes economic benefits of stock market liberalization into two broad areas: financial effects and real effects. At same time there are some negative consequences, the most common being contagion.

3.5.1 Financial Effects

Empirical research by Bekaert and Harvey (2000a), Errunza and Miller (2000), Henry (2000a) and Kim and Singal (2000) support the prediction of international asset pricing models (IAPMs) that stock market liberalization leads to a reduction in the aggregate cost of equity capital. Bekaert and Harvey (2003) find surprising robustness across specifications in that dividend yields decline after liberalization though the effect is less than 1% on average. However, the impact becomes stronger if dates of liberalization are determined from structural breaks of time series obtained from Bekaert, Harvey and Lumsdaine (2002). For countries that have experienced more complete liberalization, Edison and Warnock (2003) observe that the decrease in dividend yields is much sharper.

Errunza (2001) shows that there is significant growth in the ratio of market capitalization to GDP, ratio of trading volume to GDP, the turnover ratio and the number of listings after liberalization. Levine and Zervos (1998b) show evidence on the resultant increase in stock market liquidity.

While it is not obvious from finance theory that volatility should increase or decrease when markets are opened, some studies indicate no significant unconditional volatility (see Bekaert and Harvey, 1997, 2003). Generally, on the one hand, markets may be assumed to become informationally more efficient after liberalization, leading to higher volatility as prices quickly adjust to relevant information or hot speculative capital could induce excess volatility. On the other hand, the pre-liberalized market can be assumed to experience large swings from

fundamental values leading to higher volatility. Notwithstanding, in the long run, the gradual development and diversification of the market following liberalization should lead to lower volatility (see Richards, 1996; De Santis and Imrohoroglu, 1997; Aggarwal et al. (1999). Also, estimating panel regressions with a set of variables designed to control for coincidental financial and economic events, Bekaert and Harvey (2000a) find that correlation and beta with the world market increase after equity market liberalizations. They obtain a similar result with an analysis that looked at simple averages before and after liberalization that is unconditional. This analysis does not control for other financial and economic events that may coincide with equity market liberalization as in Bekaert and Harvey (2003). While expected returns decrease correlations and betas increase, they find no particular impact on volatility.

The Efficient Market Hypothesis (EMH) suggests that as markets are made more open to the public, prices should reflect the increased availability of information and become more competitively priced. As domestic and international investors have greater access to the market and the information surrounding it, current prices should reflect all available information. Kim and Singal (2000) examined eleven countries using variance ratio tests and concluded that in general liberalization improves efficiency of equity markets. Using the OLS method, Kawakatsu and Morey (1999) examined 9 countries and found no evidence that markets become efficient by opening to foreign investors. Similarly, Parantap and Morey (2000) examined 12 emerging markets using the traditional technique in testing market efficiency, the serial correlation test, and found weak support for the hypothesis that liberalization makes emerging markets more informationally efficient. Maghyereh and Omet (2002), who believed that the issue could be country specific, used a battery of econometric tests - OLS, GARCH, GMM and unit root tests - found no significant change in the behaviour of stock prices in the Amman Stock Exchange (ASE) after market liberalization. However, more recent empirical studies by Bae, Bailey and Mao (2004) show improvement in the information environment following liberalization.

Studies that have explored firm-level price effects have mainly focused on American Depositary Receipts (ADRs). An ADR is a share of stock of an investment in shares of a non-US corporation. The shares of the non-US corporation trade on a non-US exchange, while the ADRs trade on a US exchange. This mechanism makes it easier for a US investor to invest in a foreign issue. ADRs were first introduced in 1927. Basically, an ADR from a country with investment restrictions could be viewed as investment liberalization. Possibly, when announced in accordance with the international asset pricing model, we would expect positive abnormal returns and presumably ex-post under performance indicating lower expected returns after the

liberalization. Miller (1999) and Foerster and Karolyi (1999) find that these predictions are borne out by data and they find the announcement effect of ADR issuance to be significant, typically larger than 1%. Errunza and Miller (2000) who used a sample of 126 ADRs from 32 countries found significant decline in the cost of capital. They show that firms with the highest diversification potential experience the largest decrease in their cost of capital. Further, their largest firms provide diversification benefit during the period preceding the ADR announcement.

Apart from liberalization, there are, however, other reasons why ADR issues may induce a positive price effect. These include additional liquidity and the relaxation of capital constraints as is argued in Karolyi (1998), and Urias (1994). Researchers also allude to the difficulty in benchmarking ADR firms as the local market may experience significant spillover effects as a result of ADR issuance.

One financial effect of interest is the relationship between foreign portfolio flows and equity returns. Froot et al. (2001) who studied 28 emerging markets and Clark and Berko (1997) who focused on Mexico observe that increased capital flows raise stock market prices. However, studies disagree on whether the effect is temporary or permanent. Warther (1995) and Shleifer (1986) note that if the increase in prices is temporary it may be just a reflection of "price pressure," something that has been observed in developed markets for mutual funds and stock indices. Nevertheless, if the price is permanent, it may reflect a long-lasting decline in the cost of equity capital associated with the risk-sharing benefits of capital market liberalization in emerging markets. Bekaert, Harvey and Lumsdaine (2002) observe that the return effect is not a pure price pressure effect because it is partially permanent (see Bekaert, and Harvey, 2003 for a full discussion).

Notwithstanding to the above, recent research at firm level by Chari and Henry (2004) that has assessed the evidence of price pressure by comparing the behaviour of investible versus non-investible stocks finds little evidence of price pressure driven by index inclusion. If the price pressures were operative, we would expect the larger investible firms to be more affected. Hence, given the mixed evidence, the issue merits further study.

Bailey and Jagitiani (1994) and Bailey, Chung and Kang (1999) explain the revaluation effect on the basis of increased foreign portfolio investor demand for domestic securities. When a country liberalizes, foreigners are allowed to invest in stocks listed on the local exchange and some of these stocks will get included in country and emerging market indices. The mere inclusion of a

stock in an index could well increase the price of that stock due to a jump in demand from index funds and other investors.

With regard to the argument that on liberalization the increase in stock prices from capital flows may be temporary (price pressure) or permanent (lowering of cost of capital), Bohn and Tesar (1996) give evidence of a delayed response of U.S. net portfolio flows to returns. Choe, Kho, and Stulz (1999) confirm this positive feedback effect among foreign investors by examining the case study of South Korea during the Asian crisis period of 1997. Using data on daily international portfolio flows, Froot, O'Connell and Seasholes (2001) report that flows lagging returns account for 80% of the total variation in returns, while contemporaneous flows leading returns capture 4% and 16%, respectively.

Using structural breaks as benchmark dates for analysis, Bekaert et al. (2002a) find that net capital flows to emerging markets increase rapidly after liberalization as investors rebalance their portfolios, but that they level out after 3 years. Bacchetta and Wincoop (2000) present a formal model generating dynamics that is consistent with the empirical observation that if capital market liberalizations induce one-time portfolio rebalancing on the part of global investors, we would expect net flows to increase substantially after liberalization and decrease again.

Some studies by Calvo et al. (1993, 1994), Fernandez-Arias (1996) and the World Bank (1997) suggest that one of the major reasons for increased capital flows in the 1990s was the low U.S. interest rates. On the other hand, Bekaert et al. (2002a) observe no significant effect on capital flows to emerging markets from unexpected reduction in world interest rates. However, they also find that unexpected equity flows are indeed associated with strong short-lived increases, that similarly lead to permanent reductions in dividend yields reflecting a change in the cost of capital. Bekaert and Harvey (2003) conclude that the reduction in the dividend yield suggests that additional flows reduce the cost of capital and that the actual return effect is not a pure price pressure effect because it is partially permanent.

3.5.2 Real Effects

Theoretically, stock market liberalization should lead to economic growth. Foreign capital inflows should drive up local equity prices permanently, thereby reducing the cost of equity capital and in turn increasing real investment. This should be the case because the real variable most sensitive to the cost of capital should be real investment. Cross-country empirical evidence testifies to this. However, most of the studies, among which by King and Levine (1993), Levine (1997), Levine and Zervos (1998), among others, use cross-country aggregate data. At the

industry level, Rajan and Zingales (1998) show that industries that have greater need for external finance grow faster in more financially developed countries. At firm level, Demirguc-Kunt and Maksimovic (1998) observe that firms grow at a faster rate relative to a benchmark growth rate that would hold in the absence of external finance in countries with a more developed financial system.

Liberalization decreases the riskiness of the firm so that everything being equal, the stock price of a firm increases signalling to managers that they can increase shareholder value by investing in physical capital. However, Blanchard, Rhee and Summers (1993) and Morck, Shleifer, and Vishny (1990) point out that if liberalizations are associated with stock price increases that are unrelated to changes in risk, then the optimal investment response is less clear. This is one reason why the dividend yield is considered as a better variable for capturing permanent effects following liberalization by Bekaert and Harvey (2003). Nevertheless, an empirical analysis of whether stock prices move in line with changes in systematic risk also provides the first step toward understanding whether physical investment is efficiently reallocated when barriers to capital movements are removed as is argued by Chari and Henry (2004).

Indeed, Bekaert and Harvey (2000a), Bekaert, Harvey and Lundblad (2002c) find that investment increases post stock market liberalization. The latter authors further show that the ratio of investment to GDP increases while the ratio of consumption to GDP remains the same and that the additional investment appears to be financed by foreign capital as the trade balance significantly decreases. Berkaert, Harvey and Lundblad (2001) have shown that countries that open up their equity market to foreign inflows have experienced an average in GDP growth rate of about 1.1 percent per year.

There is no conclusive evidence that suggests that financial reform increases private savings. Beck et al. (2000) note that while measures of financial development positively and significantly affect measures of total factor productivity growth, they do not have a significant impact on the quantity of investment. The most important channel likely to be the effect of financial reform is the efficiency with which investment is allocated across firms and across sectors as suggested by King and Levine (1993) who also argue that financial liberalization may have also contributed to faster technological progress. However, there is very little micro evidence regarding the effect of financial liberalization on the efficiency of resource allocation.

The demand for better corporate governance by foreign investors in order to protect their investments reduces the gap between the costs of external and internal financial capital thereby

further increasing investment. Generally, empirical evidence shows that the relaxation of financing constraints improves the allocation of capital and promotes growth (Rajan and Zingales, 1998; Love, 2003; Wurgler, 2000). At firm level, Lins et al. (2001) show that firms in emerging markets listing ADRs on U.S. exchanges are able to relax financing constraints as ADRs can be viewed as firm-specific investment liberalizations.

Koo and Shin (2004) observe that because external funds are more costly than internal funds in an imperfect capital market, corporate investments depend on the availability of internal funds. As financial liberalization mitigates constraints on firms, the sensitivity of investments to cash flow can be reduced. Using panel data on South Korean firms, they found that cash-flow effects on investment spending decreased drastically during the liberalization period. In particular, small, non-chaebol (firms receiving preferential treatment) and established firms that were severely constrained gained most from liberalization.

While Athanasoulis and Wincoop (2000) argue that there are large gains in risk-sharing, in practice there is so little risk sharing in the world. One potential reason is moral hazard. It is argued that Japan would not have made its high investment in machinery, equipment, infrastructure and human capital in the post-war period if it had known in advance that it would to transfer to the rest of the world most of the benefits from its unexpected high growth.

3.6 The Downside of Market Integration

The negative effects of financial liberalization have been associated with increased volatility in markets, vulnerability leading to financial crisis and contagion. Aggarwal et al. (1999) observe that emerging markets are characterised by high volatility marked by frequent, sudden changes in variances. However, the periods with high volatility are associated with important events in each country rather than global events. The October 1987 crash is considered to be the only global event that significantly increased volatility in several markets. These observations are consistent with Bekaert and Harvey (1997) who find that on average the proportion of variance attributable to world factors to be quite small for emerging markets. However, others argue that the gradual development and diversification of the market should lead to lower volatility in the long run (Richards, 1996; De Santis and Imrohoroglu, 1997; Aggarwal et al., 1999).

Financial liberalization in general involves replacing one system characterized by heavy government intervention with another that is market oriented but not perfect. The speed at which finance migrates across countries is the issue. Stock market liberalization promotes increased

capital flows mainly in the form of portfolio investments. Portfolio investment by its nature is volatile and unpredictable in the sense that it can easily leave the country as quickly as it has entered. In addition, increased capital inflows need to be intermediated, but then the banking sector in some emerging markets may be not sufficiently developed to cope with large inflows. These problems combine with the "herding" mentality of investors to precipitate financial crises. The World Bank (1997) reported that capital inflows could lead to a vicious circle that increases economic vulnerabilities. It is argued that liberalization dramatically increases financial sector vulnerability in many countries and that a weak banking sector played a large role in both the Mexican and Asian crises. McKinnon and Pill (1997) and Kaminsky and Reinhart (1999) argue that financial liberalization can lead to overborrowing syndromes, increasing the likelihood of crises.

Senbet (2001: 100) argues that globalisation exposes the domestic markets to various classes of risk: (1) volatility of the global financial markets; (2) large unfavourable fluctuations in international exchange rates; and (3) large unfavourable swings in international rates. Beim and Calomiris (2001: 293-294) provide a similar anatomy of a modern financial crisis in emerging markets

Indeed, spectacular currency crises experienced by a number of emerging markets – first in 1994 by Mexico, then Southeast Asia in 1997 and finally Russia in 1998 - highlighted negative effects of integration. The argument is that financial integration leads to increased capital inflows, which in turn, increases asset prices, appreciation of the real exchange rate and improves liquidity, resulting in a rapid expansion of bank credit. The lending boom could potentially lead to a real estate bubble and the combination of a weak and inadequately regulated banking sector may fuel speculative lending as inflated assets are used as collateral to justify further borrowing.

However, empirical evidence for the above argument view is scarce. Bekaert and Harvey (2000b) show that the real exchange rate does not appreciate strongly following liberalization. Furthermore, Bekaert, Harvey and Lundblad (2002d) establish that the volatility of consumption and GDP growth does not significantly increase post-liberalization. In a commentary, Bekaert and Harvey (2003) remark that the assertion that globalization has gone too far for emerging economies is not supported by their empirical analysis, and the fact that crises do occur suggest that financial integration should best be accompanied by vigorous reforms of the domestic financial sector.

Emerging markets economic crises in general have been characterised as contagious. The Asian financial crisis of 1997 and the Russian debt crisis of 1998 affected other emerging markets. Kaminsky and Schmukler (2002) find empirical evidence that emerging markets experience heightened boom-and-bust cycles after liberalization. Krugman (1998) and Stiglitz (1999) argue that some degree of control to cross-border portfolio capital flows can smooth boom-and-bust cycles caused by rapid inflows and outflows of portfolio capital. Bae, Karolyi and Stulz (2003) find that contagion is predictable and depends on regional interest rates, exchange rate changes, and conditional stock return volatility. In a recent study, Bekaert, Harvey and Ng (2005) find no evidence of contagion from the Mexican crisis of 1994 but do find support of contagion from the Asian and Russian crises of 1997 and 1998.

3.7 Conclusion

Empirical evidence suggests that the benefits of stock market liberalization far outweigh the negative effects. The majority of studies, however, have been undertaken at market level or macroeconomic level. Few studies have focused on the microeconomic dimension, save for those that have examined ADRs or cross-listings. Hence, there is research gap in this area. It would be interesting to have insight into the impact of stock market liberalization at firm level.

The theoretical models of the integration process that have been discussed are static models of integrated/segmented economies. There is no economic model thus far that specifies the dynamic process that moves an economy from segmented status to integrated status. Therefore, the empirical models by which we try to characterize the degree of openness of capital may be lacking an appropriate theoretical framework, especially taking into account that policy makers in emerging markets are prone to strategically open their markets to maximize revenues from privatization programmes. As Stulz (2005) points out, country risk is important and there is limit to financial globalization so that full integration may simply be impossible. In addition, the official liberalization dates used for benchmarking analysis may not be appropriate as these dates may simply be reflecting regulatory liberalization and not effective liberalization which is the basis of empirical work. In addition to complementing earlier research work, this study addresses these research gaps. These are discussed in the following chapter.

Chapter 4

The Research Question and Hypothesis Development

4.1 Introduction

The preceding chapters have reviewed and discussed theoretical and empirical issues on financial liberalization in general, and in particular, stock market liberalization. Evident from the discussions is the fact that most empirical works on stock market liberalization in emerging economies are recent and have focused largely on market level analysis where data sources from the IFC have been available. There are few empirical works that have focused on firm level analysis. However, it could be that firm level analysis is the one that might give us better insight into how the benefits of liberalization trickle down in economies. For instance, if liberalization simply favours a small band of large firms whilst disadvantaging a host of small firms then, despite the fact that the overall effect might be positive, it might not be promoting fair competition among all firms. On the other hand, if liberalization favours small firms more than large firms then it could be said to be succeeding in loosening up financial constraints in a beneficial way as the promotion of the growth of small firms is a primary objective of many governments.

The objective of this chapter is to synthesize the research problem at firm level, both theoretically and empirically, and develop testable hypotheses that would guide empirical work. The chapter is structured as follows. Sub-section 4.2 discusses the research problem. Sub-section 4.3 presents an analysis of hypothetical cases demonstrating why firm level analysis is more insightful than market level analysis. Sub-section 4.5 develops the research problem into some testable hypotheses in order to facilitate empirical work. Finally, sub-section 4.5 concludes by summarizing research objectives.

4.2 Research Problem

Theoretical or empirical development literature has paid little attention to what drives financing patterns of the individual firms in emerging economies. One study by Singh (1995) provides one of the most notable empirical studies of corporate finance in developing countries during a period of both internal and external liberalization of stock markets. This study showed that firms rely on equity finance to fund corporate growth and that it becomes a more significant source of finance when the stock market is liberalized. According to Singh (1995) this conclusion is theoretically unexpected because of the myriad of imperfections of emerging stock markets that include

asymmetric information and poor supervision. The more consistent expectation would be for firms to shun the stock market and rely more on retained earnings and debt finance. This would be in line with the traditional view - the "pecking order" theory of finance - that stipulates that firms prefer internal to external finance, and when they do use external finance, they prefer debt finance, and only as a last resort equity finance (Myers, 1984). This argument runs contrary to Modigliani and Miller's (1958) proposition of the irrelevance of capital structure as regards the cost of capital.

Singh and Weisse (1998), surprised by the surge in the use of equity finance following stock market liberalization, argued that emerging market imperfections suggest otherwise. "The observed results for India, the experience of Mexico and evidence from other LDCs as well as the high degree of share price volatility, suggest that despite some beneficial microeconomic results there are grounds to question the position that stock market development will necessarily have positive macroeconomic effects on savings and investment" (Singh and Weisse, 1998: 616). Studies on market efficiency lend weight to these observations. Kawakatsu and Morey (1999), Parantap and Morey (2000) and Maghyereh and Omet (2002) find no evidence to support the hypothesis that liberalization makes emerging markets more informationally efficient. For many emerging markets, the adoption of international accounting standards implies more disclosure and hence more information. However, as to whether this is captured by the researchers is unclear.

Surprisingly, some observations of Singh (1995), for example, stock market becoming a significant source of finance, are consistent with international asset pricing theory that postulates that stock market liberalization reduces the cost of equity capital of firms inducing them to re-evaluate previously rejected projects with negative NPVs leading to higher investment levels. The mere fact that equity finance became a significant source of finance following liberalization suggests its cost would have become cheaper.

4.2.1 The Theoretical Model

Models of international asset pricing under capital market segmentation predict that as capital markets integrate, the cost of capital will decline as risk is globally diversified as chronologically shown in Stulz (1981), Errunza and Losq (1985, 1989), Eun and Janakiramanan (1986) and Stulz (1999c). Building on the analysis of Stulz (1999c), Chari and Henry (2001) devises a model for a small country with a stock market that is completely segmented from world equity markets where investors are risk averse and are only interested in the expected return of their investment

and the variance of that return. Furthermore, the model assumes that all investors have identical risk aversion so that the price of risk in the country becomes constant. This is represented by the use γ. With these assumptions, the capital asset pricing model (CAPM) holds for the country so that the aggregate risk premium before stock market liberalization is $(R_M - r_f) = \sigma^2_M \gamma$, where R_M is the expected return on the market, r_f is the risk-free rate, σ^2_M is the variance of the return on the small country's market portfolio. The risk premium for a given firm i before liberalization is therefore $\beta_{iM}\sigma^2_M\gamma$, where β_{iM} denotes the beta coefficient of firm i before liberalization. The required rate of return $E[R_i]$ on firm i's stock can thus be represented by the following equation:

$$E[R_i] = r_f + \beta_{iM}\sigma^2_M\gamma \qquad [1]$$

When a country opens up its stock market to foreign investors and lets its residents invest abroad, which is symmetric liberalization in the sense that domestic residents can also internationally diversify, domestic residents no longer have to bear all of the risks associated with the economic activities of the country. Adding the country to the world portfolio does not increase the risk premium on the world market portfolio because the liberalizing country is small. With completely open capital markets, the CAPM holds for the global equity market. Hence the risk premium on any risky asset depends on its beta coefficient with respect to the world market portfolio. Letting $E[R_i^*]$ be the required rate of return on firm i in the integrated capital market equilibrium, it is determined as follows:

$$E[R_i^*] = r_f^* + \beta_{iW}(R_W - r_f^*) \qquad [2]$$

where β_{iW} denotes firm i's beta with the world market, R_W denotes the expected real rate of return on the world equity market portfolio and r_f^* the world risk-free rate. Taking the risk premium on the world market portfolio as $E[R_W] - r_f^* = \sigma^2_W\gamma$ where σ^2_W is the variance of the return on the world portfolio, the required rate of return on firm i after liberalization is given by:

$$E[R_i^*] = r_f^* + \beta_{iW}\sigma^2_W\gamma \qquad [3]$$

If we subtract equation [3] from equation [1] we find a link between the liberalization-induced change in the required rate of return on firm i and its diversification properties. Mathematically, this can be represented by the equation:

$$\Delta R_i = E[R_i] - E[R_i^*] = (r_f - r_f^*) + \gamma DIFCOV \qquad [4]$$

where ΔR_i is the change in the required rate of return on impact induced by liberalization and $DIFCOV = [\beta_{iM}\sigma^2_M - \beta_{iW}\sigma^2_W] = [COV(R_i,R_M) - COV(R_i,R_W)]$.

The two channels through which liberalization affects firm-level required rates of return are highlighted by equation [4]. The first channel is through the change in the risk-free rate and is common to all firms. The second channel is one specific or idiosyncratic to firm i that depends on the covariance of firm i's stock return with the local market minus the covariance of firm i's stock return with the world market.

Equation [4] assumes that all firms become eligible for foreign ownership on liberalization; in other words, they become investible securities. The equation therefore predicts that revaluation following liberalization should be an increasing function of DIFCOV for the investible firms. In practice, there will be always some firms that remain off-limits to foreign investors, and these are termed non-investible firms.

Chari and Henry (2001) acknowledge that in the early model, Errunza and Losq (1985) show that the change in the required rate of return for these firms would be given by:

$$\Delta R_i = E[R_i] - E[R_i^*] = (r_f - r_f^*) + \gamma DIFCOV - \gamma E[R_N]COV(R_i,R_N \backslash R_I) \qquad [5]$$

where R_N and R_I are the expected returns on the portfolio of non-investible and investible securities respectively. The equation is similar to their equation [4] except the term, $\gamma E[R_N]COV(R_i,R_N \backslash R_I)$, on the right-hand side which captures what Errunza and Losq (1985) call the super risk premium. The super risk premium compensates domestic investors for bearing all of the risk associated with the non-investible assets that remain off-limits to foreign investors. This is however premised on the assumption that after liberalization domestic residents can hold the entire opportunity set of global securities for diversification purposes. When domestic residents cannot invest abroad, the only source of revaluation for non-investible securities is the common shock, namely, the change in the risk-free rate given by:

$$\Delta R_i = E[R_i] - E[R_i^*] = (r_f - r_f^*) \qquad [6]$$

The revaluation of non-investible firms would depend on whether equation [5] or equation [6] best captures the institutional arrangement with respect to restrictions on capital outflows. Implicit in equation [5] is the assumption that if all non-investible firms reside in countries

without restrictions on capital outflows, we should witness a positive coefficient on DIFCOV. However, equation [6] suggests that the coefficient on DIFCOV should be zero if all non-investible firms are in countries with binding restrictions on capital outflows. Should the truth lie somewhere in between the two cases, we should expect the revaluation of non-investible firms to record a positive coefficient on DIFCOV that is smaller than in the case of investible firms.

Under this theoretical model, the unexpected response of the stock price of firm i to news of the liberalization should mirror the change in the required rate of return (cost of capital) of firm i. The stock price should increase if liberalization lowers the cost of capital (the required rate of return). Conversely, the stock price should decrease if liberalization raises the cost of capital.

4.2.2 Research Objectives

Whilst empirical evidence supports these predictions, most studies have (1) been done at market level, that is, index-based analysis; and (2) examined short-term impact around liberalization dates. There are fewer studies that have examined firm level behaviour, and even these are limited to examining the impact of liberalization around liberalization dates. Foerster and Karolyi (2000) and Errunza and Miller (2000) have examined the impact on the cost of capital for firms which issued Depositary Receipts, but most of the firms in their sample are from developed markets rather than emerging markets. Recent work at firm level by Patro and Wald (2004) and Chari and Henry (2004) support the predictions of theoretical international asset pricing models, but again these studies are premised on impact around liberalization dates. For instance, Patro and Wald (2004) examined a larger sample of emerging market firms, and came to the same conclusion. In addition to not testing long-term effects, these prior studies were not concerned with statistical properties of the variables used as proxies for cost of capital.

Market level or index-based analysis has been found to produce potential new listing and rebalancing biases (Barber and Lyon, 1997). With index-based analysis, firms are added and dropped, complicating temporal comparison. The market level International Finance Corporation (IFC) indices used in these studies may not represent the real portfolio holdings of investors and hence could under or over estimate the impact depending on foreign demand for a security. The use of market-level indices to investigate the impact of market liberalization may also not take into account firm level asymmetries embedded in investment decisions since different firms from a liberalized market may provide different diversification opportunities to the foreign investor. Therefore, examining the same set of firms during both the pre-liberalization and post-liberalization periods removes these biases from the analysis. Also unlike market level analysis

where there is need for controlling for confounding macroeconomic factors (e.g. see Bekaert and Harvey, 2000a), the use of firm level data makes these economy-wide control variables less relevant. This is so because all firms face the same macroeconomic environment during both the pre-liberalization and post-liberalization periods.

This research complements earlier studies that use firm-level data (e.g. Patro and Wald, 2004) and at the same time examines long-term effects with regard to the predictions of theoretical international asset pricing models. Primarily, it tests the prediction regarding the cost of capital using the firm-level data of a single emerging economy and investigates whether the benefits of liberalization are maintained in the long-term. The research adopts a top-down approach. In other words, it starts the analysis at market level, drills down to sector level and finally ends with the firm level analysis, the main focus of the thesis. This approach is borne from a proposition that a market level decline or increase in the cost of capital following stock market liberalization may not necessarily be transmitted to all firms. Hypothetical cases to this proposition will be given.

Whilst earlier studies benchmark their work around official liberalization dates, this study first determines/ and or confirms event dates in the manner suggested by Bekaert, Harvey and Lumsdaine (2002b) and Chaudhuri and Wu (2003). Thus, empirical work first addresses the dating problem. In addition, the effect of liberalization is examined from a long-term perspective. In other words, this research does not merely look at the impact of liberalization on the cost of capital around the event date, but further examines long-term effects post-liberalization to determine whether gains are maintained in the long run.

Another critical element introduced in this study absent from earlier studies, is the possibility of negative re-rating of firms following liberalization that may result in some having an increase in the cost of capital as a result of such re-rating. Almost all empirical studies tend to focus on looking for positive effects in the sense of a decline of a firm's cost of capital following liberalization. They ignore the positive effect emanating from an increase in cost of capital of a firm following its re-rating as a result of the opening up of the market. This is true to firms that enjoyed some kind of protection or preferential treatment prior to liberalization. To investors this is important because it indicates that market segmentation could have been giving incorrect signals with regard to the firm's "correct" cost of capital. Indeed, recent research by Bae, Bailey and Mao (2004) shows that market liberalization generally improves company information disclosure in the country.

Another significant element in this study that is different from earlier studies is its focus on a single country. However, unlike other studies with microeconomic perspective that have taken a cross-country perspective relying on data from the Standard & Spoor's IFC Emerging Market Data Base (EMDB), this study focuses on a single country for comprehensiveness and uses credible national and private databases as data sources. The IFC EMDB may not be comprehensive because IFC uses size, liquidity and industry as criteria in selecting stocks to include in a country index which results in the inclusion of the largest and the most actively traded stocks on the major exchange of each market. Indeed, Kang and Stulz (1997), Choe, Kho and Stulz (1999) and Dahlquist, Pinkowitz, Stulz and Williamson (2003) show that foreign investors are more likely to invest in large firms but that the impact of liberalization may not affect only large firms.

A new element in this study is that it will be able to draw sector level conclusions because of its focus on a single country and the use of national and private databases. With IFC data this is not readily possible. Christoffersen, Chung and Errunza (2004) acknowledge that although the sample sizes obtained from the IFC EMDB at the individual country level are not sufficiently large to allow for sector level conclusions. Therefore, the results of this study can serve as a useful starting point for future investigations.

4.3 Analysis of Hypothetical Cases

Taking a top-bottom approach, I start with following simplified equation:

Cost of capital = Risk-free rate + (Equity Premium x Quantity of Risk) [7]

In the presence of information on internal interest rates, the starting point -acknowledged as ideal by Henry (2000b)- is a review of the risk-free rates of return pre-liberalization and post-liberalization. If there is financial repression, the autarky or domestic risk-free rate could be less than the world risk-free rate so that stock market liberalization, assuming it is accompanied by the liberalization of the money market, would equate to or possibly go above the world rate to reflect emerging market risk. While the equity premium may decrease, it may be counter-balanced, resulting in an increase in the risk free rate. Theoretically, the autarky risk-free rate in segmented markets is higher than the world risk-free rate. Liberalization in turn would lower it as a consequent of an increase in loanable funds induced by foreign capital inflows. However, this is premised on the assumption that there is no financial repression.

Therefore, in determining whether stock market liberalization reduces the cost of equity capital, the ideal starting point is the comparison of pre-liberalization and post-liberalization interest rates. Henry (2000b) points out that the countries in his sample had some form of financial repression during the period under study and that data on internal interest rates was not easily available.

From a microeconomic perspective, it can be argued that it may not matter whether the autarky risk-free rate is initially less than the world risk-free rate or more than it. This point is illustrated with a hypothetical emerging economy composed of, say, three firms A, B and C with weights in the ratio 3: 2: 1. Assuming these weights remain the same after liberalization, the following four cases show possible scenarios regarding changes in the cost of equity capital following capital market liberalization.

Hypothetical Case 1: The stock market is liberalized concurrently with the banking sector but restrictions on residents to invest abroad are still in place.

The existence of financial repression would mean that the autarky risk-free rate of return is lower than the world risk-free rate. The expectation is that the autarky risk-free rate would rise to above the world risk-free rate to reflect emerging market risk. However, the equity premium component may respond positively. Table 4.1 below gives possibilities regarding firm level and aggregate changes in the cost of equity capital before and after liberalization. The cost of equity falls in firms A and B and rises in firm C, but the aggregate cost of equity in the economy falls.

Table 4.1
Analysis of Hypothetical Case 1

Firm	Before Liberalization			After Liberalization		
	Risk-free rate	Equity Premium	Cost of Equity	Risk-free rate	Equity Premium	Cost of Equity
A	4%	10%	14%	6%	7%	13%
B	4%	13%	17%	6%	10%	16%
C	4%	15%	19%	6%	14%	20%
Aggregate Weighted Cost of Equity			15.84%	Aggregate Weighted Cost of Equity		15.18%

This scenario shows a positive effect at market level and for two firms in terms of a decline in the cost capital. There is, however, a negative effect with regard to one firm as result of an increase in the cost of capital. This re-rating is nevertheless positive for investors as they are now receiving the right signals for the firm. In other words, liberalization has improved the information environment in the market.

Hypothetical Case 2: The assumptions as in Case 1 apply. That is, the stock market is liberalized concurrently with the banking sector but restrictions on residents to invest abroad are still in place. However, the changes in the cost of equity as shown in Table 4.2 below differ.

Table 4.2
Analysis of Hypothetical Case 2

Firm	Before Liberalization			After Liberalization		
	Risk-free rate	Equity Premium	Cost of Equity	Risk-free rate	Equity Premium	Cost of Equity
A	4%	10%	14%	6%	9%	15%
B	4%	13%	17%	6%	12%	18%
C	4%	15%	19%	6%	12%	18%
Aggregate Weighted Cost of Equity			15.84%	Aggregate Weighted Cost of Equity		16.50%

The cost of equity rises for firms A and B, but falls for firm C, and the aggregate cost of equity of the economy rises. Positive effects are observed for some firms, negative re-rating for some firms and negative overall market positions are seen as possibilities. The relative weight of firms in the economy becomes a critical matter with regard to the aggregate cost of equity capital. This observation makes market level or index-based analysis not very insightful. Merton's (1987) investor recognition hypothesis states that firms with the largest change in visibility would have the largest change in the cost of capital. Hence we could expect small firms to benefit more from liberalization than large firms as size may proxy for the amount of visibility that a firm receives. Index-based analysis tends to mask this phenomenon.

However, it is important to note that a lowering in the cost of capital is premised on the assumption that emerging market firms will be priced in the global context and the available evidence suggests that the foreigners prefer large firms so that we would expect greater revaluation of larger firms as empirically shown by Christoffersen, Chung and Errunza (2004), Kang and Stulz (1997), Choe, Kho and Stulz (1999) and Dahlquist, Pinkowitz, Stulz and Williamson (2003).

Hypothetical Case 3: The stock market is liberalized after the liberalization of the banking sector.

In this instance, the expectation is that the autarky risk-free rate of return is higher than the world risk-free rate, so that increased capital inflows following stock market liberalization increase

loanable funds and induce a fall of the autarky risk-free rate towards the world rate. All other things being equal, the cost of equity is likely to fall for all firms and in aggregate as illustrated in Table 4.3 below.

Table 4.3
Analysis of Hypothetical Case 3

Firm	Before Liberalization			After Liberalization		
	Risk-free rate	Equity Premium	Cost of Equity	Risk-free rate	Equity Premium	Cost of Equity
A	4%	10%	14%	3%	9%	12%
B	4%	13%	17%	3%	12%	15%
C	4%	15%	19%	3%	14%	17%
Aggregate Weighted Cost of Equity			15.84%	Aggregate Weighted Cost of Equity		13.84%

However, the above scenario could be only idealistic as a re-rating of firms, following liberalization that improves the information environment, may result in an increase in equity premiums of some firms inducing an increase in the cost of capital. The increase in the cost of capital in this instance would be beneficial to investors, as they would be getting the correct signals as a result of better information disclosure brought about by liberalization.

Therefore, hypothetical case 3 could also produce the following results as in Table 4.4 below.

Table 4.4
Further Analysis of Hypothetical Case 3

Firm	Before Liberalization			After Liberalization		
	Risk-free rate	Equity Premium	Cost of Equity	Risk-free rate	Equity Premium	Cost of Equity
A	4%	10%	14%	3%	9%	12%
B	4%	13%	17%	3%	15%	17%
C	4%	15%	19%	3%	17%	20%
Aggregate Weighted Cost of Equity			15.84%	Aggregate Weighted Cost of Equity		15.00%

In the scenario depicted by Table 4.4, there is an overall decline in the cost of capital but firm-level results indicate two firms, B and C, have their equity premiums revised upwards resulting in decline in their cost of capital. Liberalization could have improved the information disclosure on these firms so that they are re-rated negatively.

Hypothetical Case 4: The same assumptions, as in Case 3 apply except that domestic residents are also freely allowed to invest offshore. In other words, stock market liberalization is accompanied by total liberalization of exchange controls. Usually, emerging economies open up

their capital markets to foreign investors but maintain some restrictions with regard to domestic investors investing abroad.

The result of this scenario could be ambiguous as the following Table 4.5 shows.

Table 4.5
Analysis of Hypothetical Case 4

Firm	Before Liberalization			After Liberalization		
	Risk-free rate	Equity Premium	Cost of Equity	Risk-free rate	Equity Premium	Cost of Equity
A	4%	10%	14%	4%	11%	15%
B	4%	13%	17%	4%	12%	16%
C	4%	15%	19%	4%	16%	20%
Aggregate Weighted Cost of Equity			15.84%	Aggregate Weighted Cost of Equity		16.18%

International diversification by domestic residents could precipitate capital flight (outflows in excess of capital inflows) resulting in the risk-free rate and equity premium for some firms rising. The cost of equity for some firms rises, as in A and C while it falls in others as in B and the aggregate level could actually rise. This scenario accords with the reasoning of Krugman (1993) that global capital market integration might lead to increased capital inflows to developed countries rather than to emerging economies. Obstfeld and Taylor (2003: 175) are quoted as saying: "Capital transactions seem to be mostly a rich [country] – rich [country] affair". This is further emphasized by Stulz (2005) who observes that the country factor could be the most crucial element in asset returns.

The lesson from the four simplified hypothetical cases is that investigation of firm level changes in the cost of equity capital following liberalization provides more insight than a market level (macroeconomic) analysis or cross country studies.

4.5 Hypothesis Development

This study contributes to the scarcely researched firm level analysis of the impact of stock market liberalization in emerging markets. It does this by investigating three hypotheses.

Hypothesis 1: *Stock market liberalization reduces the cost of equity capital of firms.*

Essentially, this hypothesis is stipulating that in segmented (non-liberalizing) capital markets, the cost of capital is determined by inherently local risk factors, whereas in liberalizing and

integrated capital markets it is determined by both local and global economic factors. This is consistent with international asset pricing models (IAMs) that surmise that declines in expected returns would be driven by the diversification potential that domestic firms offer foreign investors. Errunza and Miller (2000: p. 579) suggest that the returns could exhibit the following pattern:

(1) High equilibrium expected returns pre-liberalization indicating the high cost of capital.

(2) Large positive returns during the liberalization period, reflecting price increases as the cost of capital falls, that is, the revaluation effect.

(3) Normal equilibrium expected returns post-liberalization, with the difference in the pre- versus the post-period returns (that is, the change in the cost of capital) related to the diversification potential of the firm.

The use of firm level data is a departure from the extensively researched market-level data, which has been found to be consistent with international asset pricing models. This should entail the use of a sample of firms that is relatively homogeneous throughout the study period. This approach complements the following recent studies using firm level data. These recent studies are cross-country studies that excluded South Africa. Chari and Henry (2004) have investigated the stock price revaluation effect of liberalizations and show that the firm-specific revaluations are directly proportional to the firm-specific changes in systematic risk. Patro and Wald (2003) also study the impact of liberalization on return behaviour of emerging market firms and relate it to firm characteristics. An empirical study by Christoffersen, Chung and Errunza (2004) shows a significantly different impact of stock market liberalization across firms. They find that large firms tend to exhibit large revaluation effects, insignificant change in performance, large declines in volatility, and insignificant change in correlation from liberalization, while small firms show small revaluation effects, improved performance, and smaller decline in volatility and decreases in correlation.

Hypothesis 2: *The decline in the firms' cost of capital is permanent or persistent.*

The hypothesis examines whether the reduction in firms' cost of capital post-liberalization is on a persistent basis. In other words, is it maintained or permanent in the long term. So far most studies, whether at market level or firm level, have simply looked at the impact of liberalization

around some selected liberalization dates (see Bekaert and Harvey, 2000a; Henry, 2000a; Kim and Singal, 2000 for market level studies, and Chari and Henry, 2004; Christoffersen, Chung and Errunza, 2004 and Errunza and Miller, 2000 for firm level studies).

As observed in hypothetical cases discussed earlier on, initial stock market liberalization do not constitute a complete opening to foreign investors in most countries. It is acknowledged that stock market liberalization is a gradual process involving several liberalizations subsequent to the first and is part of a broader set of economic reforms geared towards increased openness. Henry (2000a) has hypothesized that news of the first stock market liberalization is also implicit news about the entire future schedule of stock market liberalizations so that the only revaluation effect occurs with the announcement of the first. In other words, when the first stock market liberalization occurs, future liberalizations are anticipated and their probability of occurrence is almost certain. Along this line of reasoning, empirical studies have inferred long-term effects from an event study around some liberalization dates. Though it has been acknowledged that there is a gradual appreciation of prices until the entire liberalization process is complete, given noise in the data, this slope effect is hard to detect (Henry, 2000a). The researcher further refers to an explored possibility whereby the first stock market liberalization occurs and future liberalizations are anticipated but with some positive probability that each of the subsequent liberalization may not occur.

There is another angle to this argument. If we assume that foreign portfolio flows do really materialize, the degree of integration of the domestic market with the World market should rise over time. Indeed, integration is a gradual, complex process and does not increase monotonically. Bekaert and Harvey (1995) and Carrieri, Errunza and Hogan (2002) have reported reversals in the degree of integration. In any case we must also not equate liberalization with integration, though in this study the two are being used interchangeably. Nevertheless, the standard International Asset Pricing Models (IAPMs) and the available evidence suggest that we should expect a decline in the cost of capital and an increase in the stock price upon the liberalization announcement. However, as Stulz (1999), Errunza and Miller (2000), Bekaert and Harvey (2003) and Chari and Henry (2004) observe, the actual price increase would depend on the credibility of the announcement as well as the diversification potential of the market. It is expected that in the months preceding the liberalization date, there will be further price increases due to the resolution of the residual uncertainty and that these increases will be followed by normal equilibrium expected returns post liberalization. In other words, there should be mean reversion in the cost of equity in the post-liberalization period. The idea of the stability of the cost of equity

over time has been uncovered for developed markets. For instance, Goedhart et al. (2002) have empirically shown that the inflation-adjusted cost of equity in the USA has been remarkably stable for 40 years, as it has consistently remained between 6 and 8 percent with an average of 7 percent, implying a current equity risk premium of 3.5 to 4 percent. For the UK it has consistently remained between 4 percent and 7 percent, on average 6 percent, over 35 years.

However, as to whether the normal equilibrium state is sustainable is subject to empirical investigation. Current research has by and large assumed that the reduction in the cost of capital that occurs following liberalization is sustainable.

In testing the hypothesis that the decline in firms' cost of capital is persistent, this study takes the view that if the proxy variable for cost of capital is fairly stable over time and approximates a normal distribution, long-term effects could be evaluated to determine whether the benefits of liberalization are persistent post-liberalization period.

Hypothesis 3: *The impact of stock market liberalization on cost of capital is independent of the sector to which the firm belongs.*

The assumption is that the benefits of stock market liberalization might not be equally spread out throughout the whole economy. This perspective becomes clear if we commence from a framework where it is assumed that a set of firms producing output is governed by some standard production function. Production takes place in a stochastic environment, and each firm is subjected to a variety of shocks, real and nominal: idiosyncratic, industry specific and economy wide. The total shock experienced in period *t* by the firm is given by the following equation:

Total shock = Firm specific shock + industry shock + economy wide shock [8]

The observed change in the cost of capital of any individual firm in period t could be conceived in terms of firm specific responses to shocks:

Change in cost of capital = response to shocks unique to the firm + response to growth of industry + response to the growth of the aggregate economy. [9]

Implicit from equation [9] is the fact that aggregate shocks may have different impacts on different firms and our research task is to investigate this phenomenon bearing in mind possible endogeneity of some shocks and the existence of multicollinearity.

Roll (1992) has suggested that industry factors are primary in explaining international market returns. On the other hand, Heston and Rouwenhorst (1994) and Griffin and Karolyi (1998) suggest that industry factors only explain a small fraction of country index returns. Patro and Wald (2004) have tested whether firms in the manufacturing sector are differentially impacted by liberalization. In their sample, 60.4 percent of the firms were in the manufacturing sector, 15.7 percent were in the finance sector, and the other firms in other sectors. Whilst they find that firms in the manufacturing sector appear to have lower returns during liberalization, the effect is only significant at the 10 percent level when fixed effects are added. In general, they find that sector composition has a small influence on which firms do better on liberalization. However, overall they find that the impact of liberalization, and the subsequent decline in cost of capital, impacts on firms differently and predictably to some extent. These conclusions suggest more research is required in the area and this study seeks to provide further insights in this respect.

Hypothesis 4: *The impact of stock market liberalization on cost of capital is influenced by firm specific characteristics.*

This hypothesis is a natural extension to hypothesis 3 and its importance can be highlighted by re-visiting equation [9] below.

Change in cost of capital = response to shocks unique to the firm + response to growth of industry + response to the growth of the aggregate economy. [9]

Basically, the equation is saying that the change in cost of capital is a function of the firm level shock, industry level shock and the macro level shock. The possibility of endogeneity and collinearity among these shocks is clear, but the dominance of one form of shock over the other is the issue. In the end, firm level characteristics are likely to explain the change in the cost of capital. Empirical work on influence of firm specific characteristics is still in its infancy and has largely focused on the influence of size (Kang and Stulz, 1997; Christoffersen et al., 2004; Patro and Wald, 2004). Other characteristics that have been examined include the local market beta, the foreign exchange beta, book-to-market ratios, cross-listing status, and governance issues. Patro and Wald (2004) hypothesized that high local market beta securities benefited the most

from international diversification but their empirical results provide mixed evidence for this hypothesis. With regard to the influence of the foreign exchange beta, book-to-market ratios and cross-listing status, they find evidence that is consistent with theory. However, with regard to the influence of size of the firm they find evidence contradictory to that of Christoffersen et al. (2004) whose empirical results show that size matters. With regard to governance issues, Bae et al. (2003) find that information measures increase with openness to foreign equity investment. They observe that company information disclosure, information production, and analysis and use of information improve, following stock market liberalization. In addition, adoption of international reporting standards alters the local information environment.

This study will evaluate the influence of a number of firm specific characteristics prior to liberalization to find out if the results are consistent with the theory and other empirical studies.

4.5 Conclusion

This chapter has examined the unresolved issues on how stock market liberalization impacts upon the cost of capital. International asset pricing models predict that the integration of capital markets leads to a reduction in the cost of capital as risk is internationally diversified. Empirical studies using market level analysis by Bekaert and Harvey (2000a), Henry (2000a), Kim and Singal (2000), and others that have examined emerging market stock market liberalization and its impact on the cost of capital support these predictions. However, from a broad policy perspective, it is equally important to know the microeconomic dimension, that is, whether these benefits only accrue to the few large and well-known firms preferred by foreign investors or whether they trickle down to all firms, large or small, and to all sectors of the economy.

Bae, Bailey and Mao (2003) observe improvement in the information environment following liberalization. Therefore, from the perspective of the foreign investor, it is also important to know the re-rating of firms as a consequence of increased information about them. It can be argued that the re-rating of firms may result in some firms having an increase in the cost of capital as information asymmetries are reduced. The negative re-rating of firms that received preferential treatment prior to liberalization had the potential to be beneficial to investors because the “correct” signal regarding efficient capital allocation would be given.

While there have been extensive investigations on the impact of stock market liberalization using market level data, there have been few empirical studies that have used firm level data. Recent work at firm level by Patro and Wald (2004), Chari and Henry (2004), and Christoffersen, Chung

and Errunza (2004) support the predictions of theoretical international asset pricing models but at the same time show significantly different impacts of stock market liberalization across firms. This study complements those studies that use firm level data. However, unlike others that have taken a cross-country perspective relying on data from the IFC database, we focus on a single emerging economy for comprehensiveness (especially with regard to sector and firm level analysis), and use credible national and private databases as data sources. A cross-section of firms listed on the JSE Securities Exchange South Africa that liberalized in the 1990s is investigated, and we use structural break dates of market level financial time series for dating integration and benchmarking the pre-and post-liberalization periods.

In summary, the research objectives are five-fold. Firstly, the study tests for structural breaks in financial time series to date the integration of the JSE and hence utilize break dates to benchmark firm level analysis. Secondly, the study examines whether stock market liberalization resulted in a decline or increase in the cost of equity capital. Thirdly, the study tests the hypothesis that the decline in firms' cost of capital is permanent or persistent over time; in other words whether the cost of capital is mean reverting in the post-liberalization period. Fourthly, it examines whether the impact of liberalization is symmetrical across all sectors. Fifthly, it examines the influence of firm specific characteristics on empirical results.

The next three chapters prepare the ground work for hypothesis testing. Chapter 5 gives a review of methodological issues. Chapter 6 discusses the problem of dating stock market liberalizations and uses utilize structural break analysis to identify the event date for the JSE. Finally, chapter 7 describes the design of the research and the statistical methods used to test hypotheses.

Chapter 5
Methodological Issues Review

5.1 Introduction

Measuring the impact of stock market liberalization is problematic given that the theoretical models we employ are static models of integrated/segmented economies. This complicates the design of research methodologies. Generally the research tools that have been used are suited to testing static models rather than the dynamic models implied by the gradual nature of liberalization. Furthermore, the estimation of the cost of equity capital in emerging markets is controversial as the assumptions of the CAPM are often violated. The CAPM has been found to yield an expected rate of return that is deemed too low to be reasonable in emerging markets. Although there have been numerous ad hoc attempts to modify the CAPM-based cost of capital for these markets, these attempts lack a theoretical framework. This chapter reviews these problems and the associated methodological issues.

The chapter is structured as follows. Sub-section 5.2 discusses theoretical and empirical issues in measuring changes in the cost of capital to account for the impact of stock market liberalization. Sub-section 5.3 examines the pros and cons of proxies for the cost of capital which have been used in empirical studies. Sub-section 5.4 goes on to discuss the methodological approaches that have been adopted to measure the impact of stock market liberalization in empirical studies. Sub-section 5.5 explains the influence of confounding factors resulting from the fact that often stock market liberalization takes places in tandem with other economic reforms. Finally, sub-section 5.6 concludes by suggesting preferred proxies for cost of capital and the methodological approaches adopted in this study.

5.2 Measuring the Changes in Cost of Capital

Theoretical models of the integration process that are currently in use are static models of integrated/segmented economies whilst the true process is actually dynamic. Measuring the cost of equity in a dynamic fashion presents more problems as this would entail use of complex stochastic models. In addition, the problems related to the estimation of the cost of capital in developed markets are different from those that obtain in emerging markets. Though over thirty years of academic debate have not yet resolved as to whether beta is the appropriate measure of risk, the CAPM remains the most widely used measure of the cost of equity in developed

markets (Roll and Ross, 1994). However, the CAPM has been discredited in Fama and French (1992, 1993 and 1995). They show that additional factors such as size and book-to-market ratios may explain stock returns better than beta.

In emerging markets, most assumptions of the CAPM are violated. Beim and Calomiris (2001) have observed that expected returns in emerging markets may not follow normal distributions and hence beta measures may be unreliable. The CAPM implies that assets with the same risk must have the same expected return regardless of where they trade. However, in contrast, in segmented emerging markets Bekaert (1995) has observed that barriers to arbitrage could allow assets with the same risk characteristics but traded in different locations to have different returns. This phenomenon seems to emphasize the importance of country factors as recently observed by Stulz (2005). Harvey (1995) observes that in emerging markets betas and stock returns are largely uncorrelated and that betas are very low so that when used as an input to the CAPM equation, generated required returns are typically low. Bradfield (1993) demonstrates that not all USA industry risks are translatable to the South African context and advocates for the estimation of industry risks locally for cost of capital computation. The problem is that emerging markets have different industrial mixes as compared to developed markets. With regard to the JSE, Bowie and Bradfield (1998) further shows that betas of individual firms are typically exposed to large estimation errors. As a result the variety of beta that is produced with various "corrections" has increased. Furthermore, Van Rensburg and Robertson (2003) present evidence that shows that small size is associated with a higher return and a lower beta on the JSE. In other words, they find beta to be inversely related to returns which is a contradiction of the CAPM.

Several alternative ways of estimating the cost of equity in emerging markets have been advanced. Godfrey and Espinosa (1996) suggest the addition of the spread between the yield of an emerging-market sovereign bond denominated in dollars and the yield of a comparable U.S. bond to the risk-free rate, or alternatively, the adjustment of beta itself. In addition to the problem that not all emerging markets issue dollar-denominated debt, the approach suffers from a lack of theoretical foundation. Given empirical evidence by Erb, Harvey, and Viskanta (1996) and Diamonte, Liew, and Stevens (1996) country credit ratings and political risks are significantly related to stock returns, an approach to estimate the cost of equity based on country rating indices has been proposed. This approach, however, is designed to estimate a country-wide cost of equity and is inapplicable at firm level. In addition, the numerical values of country credit ratings are based on qualitative variables and arbitrary weights.

Stulz (1995) empirically demonstrates that in liberalizing markets the global CAPM approach should be used in preference to the local CAPM, but then global betas of firms are not readily available as most liberalizations only started from the late 1980s, hence the intertemporal comparison of the pre-liberalization period with the post-liberalization period would be difficult.

An innovative approach by Bekaert and Harvey (1995) measures the degree of integration directly from equity return data using a time-varying measure of market integration (a regime-switching model). In such a model, the cost of equity is allowed to change over time depending on the degree of market integration, and required returns are determined by a time-varying weighted average of a global beta and a local standard deviation. In the extreme case of market integration, the model reduces to the world CAPM whereas in the case of market segmentation, the expected rate of return is a proportion of world covariance multiplied by world price of risk, the local volatility and the reward for the local volatility. The model is dynamic because the weighting changes over time and is assumed to be a function of two variables that proxy for the openness of the market: the size of the trade sector and the capitalization of the local equity market. However, this approach is too complex to be widely adopted.

In another approach proposed for emerging markets, Estrada (2000) argues that total risk, idiosyncratic risk, and some measures of downside risk are significantly related to emerging-market stock returns. He proposes an estimation of the cost of equity in emerging markets based on the semi-deviation (a well-known measure of downside risk) with respect to the mean.

5.3 Proxies for Cost of Equity used in Empirical Studies

Owing to difficulties in measuring the cost of equity capital in emerging markets, a number of proxies have been proposed in empirical studies. These include dividend yields, P/E ratios, and book-to-market ratios, among others. In developed markets, Fama and French (1992, 1998) and Ferson and Harvey (1997) have shown that variables like dividend yields, P/E ratios, book-to-market ratios, and past returns have significant explanatory power for the variation in cross-section of expected returns after controlling for market risk. Similar results have been reported for emerging markets (Bekaert et al., 1997; Claessens, Dasgupta and Glen, 1998; Patel, 1998; Rouwenhorst, 1999). The pros and cons of each of these proxies to the estimation of cost of equity capital are discussed below.

5.3.1 Dividend Yield and the Dividend Discount Model

The usefulness of the dividend yield as a proxy for the cost of the equity capital emanates from its input in the Gordon constant dividend growth model. Under the model the required rate of return (k) is given by:

$$k = D/P \text{ (dividend yield)} + g \qquad [1]$$

where:
D = the expected dividend
P = the price of the ordinary share
g = the expected growth rate of the dividend

From the above, the cost of equity capital after stock market liberalization can be given by

$$k_{after} = k_{before} + [(D/P)_{after} - (D/P)_{before}] + [g_{after} - g_{before}] \qquad [2]$$

This equation shows that a fall in a firm's dividend yield following stock market liberalization, may not necessarily indicate a fall in its cost of equity capital as regard has to be given to the change in the expected growth rate of dividends. However, if the expected growth rate (g) remains constant after liberalization, the dividend yield becomes a credible measure for cost of equity capital as Equation [2] reduces to:

$$k_{after} = k_{before} + [(D/P)_{after} - (D/P)_{before}] \qquad [3]$$

Equation [3] shows that if we maintain the assumption of constant dividend growth pre-and post-liberalization, changes in the dividend yield alone is sufficient to explain changes in the cost of equity emanating from liberalization. It is in this respect that the dividend yield has been used as proxy for cost of equity in empirical studies by Bekaert and Harvey (2000a) and Errunza and Miller (2000). Bekaert and Harvey (2003) assert that given high return volatility and considerable uncertainty in timing equity market liberalization, average returns cannot be used to measure changes in the cost of capital. Indeed, most researchers have used dividend yields that are said to capture the permanent price effects of a change in the cost of capital. Furthermore, the dividend yield has some appeal for measuring dynamic changes in the cost of equity because it is readily available for listed companies. Liquidity is also a key factor in emerging markets is better addressed by the dividend yield than by returns which are affected by accrual accounting convention. Nevertheless, Kim and Singal (2000) have used average returns with similar results.

Nevertheless, the use of the dividend yield is not entirely free from problems. From a valuation perspective, it would appear unrealistic to expect the assumption of constant growth of dividends to hold over long periods during both pre-and post-liberalization periods. Whilst the assumption of constant growth would be unreasonable for individual companies, Ward and Stathoulis (1994) report that the assumption fairly holds at sector level.

5.3.2 Price/Earnings Ratio (or Earnings Yield)

The utility of the earnings yield as a proxy for the cost of equity capital can be derived from the constant growth dividend discount model which can be reformulated into an earnings model by assuming that the earnings per ordinary share of a company will forever grow at the same constant growth rate as dividends (g) when a "steady equilibrium" has been achieved.

Using the Modigliani-Miller model we can employ an earnings valuation model to arrive at the cost of equity capital. A simple valuation of an all equity financed firm would be equal to the sum of the present value of the firm's earnings from its current activities and the present value of its future growth opportunities (PVGO) in terms of the following equation (Ohlson, 1995):

$$V(o) = \frac{E(NOI)(1-Tc)}{\rho} + PVGO \qquad [4]$$

where V(o) is the value of the firm, E(NOI) (1-Tc) is expected net operating income after tax, the second term is the present value of the firm's growth opportunities (PVGO) and ρ is the opportunity cost of equity capital.

If PVGO = 0 , then value, V (0) is given by:

$$V(o) = \frac{E(NOI)(1-Tc)}{\rho} \qquad [5]$$

Re-arranging terms, equation [5] becomes:

$$\frac{V(o)}{E(NOI)(1-Tc)} = \frac{1}{\rho} \qquad [6]$$

This equation states that the price earnings ratio (P/E) is equal to the inverse of the earnings yield ratio. Therefore, the earnings yield (E/P) is equal to the cost of equity capital dented by ρ. Thus, for an empirical work, the earnings yield ratio ρ can be used to estimate the cost of equity capital for a non-growing unlevered firm.

As shown in Equation [6] the price/earnings (P/E) multiple is related to the cost of equity capital. A high P/E means the firm gets a high price when selling new stock for a given level of earnings and this means in turn the cost of equity financing is low. Therefore, the earnings yield is a good proxy for the cost of equity capital. However, it is only a reliable approximation when a firm's present value of growth opportunities is zero and accounting policies consistent (Firer, 1993). Fama and French (1995) demonstrate that the earnings yield could be a better proxy for measuring firm risk than even the CAPM. Furthermore, Ward and Stathoulis (1994) demonstrate, with regard to the JSE, that the P/E ratio is a function of the dividend payout ratio, the required return and the expected dividend growth. Practically, the appeal of the P/E ratio as a proxy for measuring dynamic changes in the cost of equity capital is that the market can generate it every trading day.

Morck et al. (2000) provide evidence that stock prices in emerging economies contain relatively little firm-specific information. Chari and Henry (2004) observe that whilst the conclusion may be right in general, emerging market stock prices do actually convey information about firm-specific changes in risk when the economy is opened to foreign portfolio investment.

Evidence further shows some proxies for cost of equity capital may not necessarily move in synch. Singh (1993) observes, for instance, that a high price-earning ratio does not necessarily imply a low dividend yield – two measures showing levels synonymous with a low cost of equity capital. In an analysis of emerging markets tracked by the IFC, Brazil recorded not only a relatively low price-earnings ratio but also one of the lowest dividend yields among the emerging markets in 1989. However, this is more of an exception than the norm. Generally, a low dividend yield is associated with a relatively high P/E ratio, since a lower dividend yield may indicate that dividends are retained for internal use. However, the dividend tends to be more stable than earnings, implying that variance of the dividend yield should be smaller than the variance of the earnings yield (Fama and French, 1988; Tse, 2002). This study uses the dividend yield as a proxy for the cost of equity capital in the first instance and the earnings yield as a check for consistency.

Bearing in mind that although P/E multiples are widely used they have two major flaws. Firstly, they are systematically affected by capital structure. For instance, for companies whose unlevered P/E ratio is greater than one over the cost of debt, P/E ratios rise with leverage. This implies that a company with a relatively high all-equity P/E can artificially increase its P/E ratio by swapping debt for equity. Secondly, the P/E ratio is based on earnings, which include many

non-operating items such as restructuring changes and write-offs, many of which are often one-time events, thus making multiples based on P/E's misleading.

There are other measures that either measure components of the cost of equity or are explanatory variables. These are the buy-sell spread and book-to-market ratio discussed below.

5.3.3 Buy-Sell Spread

Traditionally spread has been used as a measure of liquidity and could represent the liquidity premium in the equation:

Cost of equity = Risk-free rate + Systematic risk premium + Liquidity premium [7]

Using JSE data, Negash (2002) reported that changes in the price to book ratio could be explained by changes in the buy-sell spread and observed its association with certain indicants of intangibles. Levine and Zervos (1998b) observed that firms' securities are thinly traded (with high buy-sell spreads) during the pre-liberalization period but more widely traded (with low buy-sell spreads) in the post-liberalization period. Increased trading induced by liberalization could reduce the liquidity premium and consequently the equity premium so that, all things being equal, the cost of equity capital should fall.

5.3.4 Book to Market (B/M) Ratio

After questioning the validity of the CAPM, finance research has examined other factors that may explain the cross-variation of equity returns. Fama and French (1992, 1993, 1995) have found size and the B/M ratio to be good proxies for risk factors in stock returns. In the case of the JSE research has mainly focused on the role of firm size and evidence has been mixed (De Villiers et al., 1986; Bradfield et al., 1988; Page and Palmer, 1993; Page, 1996). Generally, these researchers find no evidence of a small size effect. However, more recently, Van Rensburg and Robertson (2003) show that small size does actually earn a higher return on the JSE but has a lower beta.

5.4 Methodological Approaches

Several approaches have been adopted to measure the impact of stock market liberalization. These include the event study methodologies, convergence tests, structural break analysis, and panel data test procedures.

5.4.1 Event Study Methodology

In situations where the dating problem has been resolved and there is a clear cut-off date for dividing the pre-liberalization and post-liberalization periods, the event study methodology or a modified version thereof, has been the preferred approach. Binder (1998:111) states that the event study methodology is by far the most widely used research design method in finance and accounting research. It has become the standard method of testing security price reaction to some announcement or event. Examples of these announcements are R&D expenditure level changes, mergers, unbundling, layoffs, dividends, earnings, etc. These announcements are news items that the firm has made a decision that has a long-term effect on its value. However, designing a research method to analyse the long-term effects (value-creation effects) of the news has been filled with methodological controversy as is discussed by Lakonishok, Shleifer and Vishny (1994), Rao and Vermalen (1998), Lyon, Barber and Tsai (1999), and Wimberly and Negash (2004). Thus, unlike what is implied in short term event studies, the long-term effects of many corporate news items remain controversial.

Similar to 'valuation effect', 'value relevance' and market efficiency studies, research in international finance has also used the event study method to examine issues relating to liberalization. The transitory and persistent natures of the gains of liberalization programmes are rarely distinguished. See for example, Henry (2000a), Errunza and Miller (2000) and Bekaert and Harvey (2000a). Kim and Singal (2000) employ an event study method to analyse monthly excess dollar stock returns and/or dividend yields around market openings.

The event study method has at least three limitations in the context of emerging markets. Firstly, since the method deals with short-term issues (short-term reaction to an event), it is debatable whether the long-term effects of liberalization can be inferred. Secondly, because stock market liberalization usually occurs in tandem with other macroeconomic reforms like trade liberalization and general economic liberalization of the economy, the effects of these or other confounding variables may not be fully controlled to isolate the specific effect of each regime. The event study method assumes the dominance of the chosen event, which may not necessarily be the dominant one in effect. Thirdly, emerging market returns are not normally distributed and there is mixed evidence about the predictability of returns in these markets (Biem and Calomiris, 2001: p.28; Bekaert and Harvey, 1997). Analysis of distribution of returns, pre-liberalization and post-liberalization, is premised on their normality and stability.

Additional problem arises when the event dates are not precisely known and may differ from official liberalization dates. Unlike corporate announcements which are usually well guarded, announcements of liberalization by governments are not. There are leakages of information prior to announcements so that market prices adjust in anticipation. Binder (1998: p.123) sums up the problem as follows: "… for regulatory events where the event date is not known, the event study methodology appears to have little statistical power to detect the abnormal returns because the formal announcements in the process are generally anticipated by the market."

From the above, it is apparent that the sequence of events prior to the global opening of the JSE would present problems for the application of the standard event study methodology. Political liberalization that commenced in 1990 must have brought about the expectation that its success could eventually lead to capital market liberalization. The lifting of international economic sanctions in 1993 reinforced this expectation. The successful democratic elections further confirmed the credibility of pending reforms so that the eventual abolition of the dual exchange rate system and the official opening up of the JSE to foreigners in 1995 was a fait accompli. It can be argued that the market had, since 1990, anticipated the formal announcement made in 1995, thus producing a number of possible event dates. This does not allow the straight application of the event study methodology. The presumption of event date known with certainty is not realistic with regard to the liberalization of the JSE. Further, examining all the possible event dates does not make the research manageable. The JSE Report (1994) actually advocated for the correct timing of the liberalization of the exchange. This problem is evident from two studies that use different dates for the liberalization of the JSE: Bekaert, Harvey and Lundblad (2001) use 1992 while Fuchs-Schundeln and Funke (2001) use 1995. Both works used IFC's data.

In sum there are two phases in the research design process. First, identifying the nature of the liberalization and its date. Second, selecting the appropriate research design and statistical test. Three scenarios can arise when considering the liberalization date. The liberalization date may be known or unknown with certainty or in certain cases multiple liberalization dates may also be observed. When the liberalization date is known for certain, the presumption is that the official liberalization date coincides with market reactions. If this were the case, the event study methodology and time series regression of changes in cost of equity capital variables would be a straightforward matter. The main problem would then be how to deal with the event-heteroscedasticity problem in that estimators (1) are often cross-sectionally (in event time) correlated, (2) have different variances across firms, (3) are not independent across time for a

given firm, and/or (4) have greater variance during the event period than in the surrounding periods (Binder, 1998: p.114).

Nevertheless, once the event date is known with a reasonable degree of certainty, the event study method or its modifications is a credible method for testing the hypothesis that stock market liberalization leads to a reduction in cost of capital of firms.

5.4.2 Structural Break Analysis

When we assume that the liberalization date is not known with certainty, we are recognizing the difficulty in dating stock market liberalization and the observation that official liberalizations do not necessarily match with market expectations and reactions. With regard to the JSE there are four possibilities. (1) It could be that the market strongly reacted in 1990 following political liberalization. (2) It could have done so in 1993 when sanctions were lifted. (3) It could have done so in 1994 when democratic elections were successfully held. (4) It could have done so in 1995 when the dual exchange rate was abolished and foreign investors officially allowed participation.

If we treat the liberalization date as the one when a permanent shock to the cost of equity occurs, then time series methods of Bai, Lumsdaine and Stock (1998) could be used to provide an estimate of the break date in proxies used for cost of equity. If several proxies are used, the expectation is that all would break at the same date, and that in turn date would be considered as the liberalization date for purposes of analysis of the pre-liberation and the post-liberalization periods. Bekaert, Harvey and Lumsdaine (2002b) apply this approach and conclude that endogenous structural break dates occur later than exogenous break dates (official liberalization dates). This finding seems to rule out the role of expectations. It suggests that either the market does not anticipate or that it will first establish credibility of the liberalization process before reacting. With regard to the JSE, liberalization was anticipated and it was only a question of when and how. We would argue that credibility is not a stand-alone component from expectations but part and parcel of the whole process of building expectations.

As noted earlier, regarding the JSE, it can be assumed there is no single stock market liberalization date but several, none of which are known with certainty – a case of multiple structural changes occurring at unknown dates. This is recognition that liberalization and market integration are gradual stepwise processes rather than a “big bang”. The econometric method in this instance is one proposed by Bai and Perron (1998). Using selected cost of equity capital

variables one can construct a linear regression model estimated by least squares, one can treat structural break dates as unknown variables to be estimated in addition to the known variables. The behaviour of the cost of capital proxy before and after the dominant break date(s) could be further examined to test whether there is reduction in the post liberalization period.

Structural break analysis can be the precursor to the application of the event study method because once the structural break date has been established, the "before" and "after" liberalization analysis using the methodology can proceed.

5.4.3 Market Integration and Tests of Convergence

Testing for long run changes or trends in cost of equity capital entails employing econometric methods that incorporate dynamic time series regression. Theoretically, as a consequence of market integration, we expect the long run cost of equity capital of a firm to equate to that of a similar global firm as integration implies that global assets of similar risks should be equally priced. There are similarities with the purchasing power parity (PPP) theory of the equilibrium exchange rate that states that, if enough time were allowed for international goods arbitrage to operate efficiently, the law of one price would prevail. Since PPP is a long run relative phenomenon, the co-integration procedure - (Johansen, 1988; Dickey-Fuller, 1979, 1981) and augmented unit root tests - has been applied. Neaime (2002) applies the vector error correction model (VECM) to test the integration of North African and Middle Eastern stock markets amongst themselves and in relationship to the USA, UK and France's stock markets.

It can be argued that the co-integration procedure could similarly be applied to track changes in the cost of equity capital of firms in emerging markets undergoing liberalization. Capital market integration is about the equalization of the price of risk so that identical investments command identical returns globally in the long run. Therefore, the liberalization process could be considered as a process that assists this long run integration. Theoretically, all things being equal, we can expect the cost of equity capital proxy, for example P/E ratios, dividend yields, betas of similar firms or sectors or stock markets in different locations to converge to an equilibrium level as global market integration proceeds. Thus, following Neaime (2002) one can examine the degree of the JSE's integration with major stock markets by using market level cost of equity capital proxies, but micro-level analysis could be difficult. Bekaert (1995) developed a method of measuring financial market integration based on the idea that if markets are perfectly integrated and share one common source of risk, then their expected returns would exhibit perfect correlation.

Historically, studies have looked at increases in correlation as evidence of capital market integration. The different industrial compositions of emerging markets relative to developed markets suggest that the correlations of these market's returns with world returns is lower than the correlation of developed markets' returns with world returns. Evidence in Bekaert and Harvey (2000a) demonstrates that correlations increase after financial liberalizations. However, they note that this evidence does not suggest reduction in the diversification potential because even at the new higher level of correlation there are substantial benefits to international diversification as it is still below the threshold level set by developed markets.

5.4.4 Panel Data Approach

Panel data analysis is a method that allows the undertaking of longitudinal analyses within multiple sites, periodically observed over a defined time frame. Basically, panel data analysis enriches regression analysis by providing both a spatial and temporal dimension. The spatial dimension pertains to a set of cross-sectional units of observation, which could be countries, states, counties, firms, commodities, groups of people, or even individuals. On the other hand, the temporal dimension pertains to periodic observations of a set of variables characterizing these cross-sectional units over a particular time span. For instance, firms could be cross-sectional units of observation while monthly dividend or earnings yields are periodic observations characterizing cross-sectional firms. In this way panel analysis permits the researcher to study the dynamics of change with short time series with repeated observations of sufficient cross-sections. Gujarati (2003) has argued that the combination of time series with cross-sections can enhance the quality and quantity of data in ways that would be impossible using only one of these two dimensions.

Panel data analytic models comprise constant coefficients models, fixed effects models, and random effects models within which are dynamic panel, robust, and covariance structure models. The constant coefficients refer to both intercepts and slopes which might be statistically significant. However, a constant coefficients model with residual homogeneity and normality can be estimated with ordinary least squares estimation (OLS).

On the other hand, the fixed effects model has constant slopes but intercepts that differ according to the cross-sectional unit such as sectors, country or region. While there may be no significant temporal effects, there would be significant differences among, for example, firms, sectors or countries. The intercept is cross-section specific and differs from country to country, for

example, but it may or may not differ over time. Because fixed effects estimators depend only on deviations from their group means, they are sometimes referred to as within-groups estimators (Davidson and MacKinnon, 1993). If the cross-sectional effects are correlated with the regressors, then the cross-sectional effects will be correlated with the group means. Should that be the case ordinary least squares estimation on the pooled sample would be inconsistent, even when the within-groups estimator is consistent. If, however, the fixed effects are uncorrelated with the regressors, the within-groups estimator will not be efficient. Davidson and MacKinnon (1993) further point out that if there is only variation between the group means, then it is permissible to use the between-groups estimator, but this would be inconsistent if the cross-sectional errors are correlated with the group means of the regressors.

Despite the apparent appeal of fixed effects models, they are not without their drawbacks. They frequently have too many cross-sectional units of observations requiring too many dummy variables for their specification. Too many dummy variables may deny the model of a sufficient number of degrees of freedom and reduce the power of statistical tests. Moreover, a model with many such variables may encounter multi-collinearity, increasing the standard errors and thereby denying the model of statistical power to test parameters. If these models contain variables that do not vary within the groups, parameter estimation may be precluded. Although the model residuals are assumed to be normally distributed and homogeneous, there could easily be country-specific heteroscedasticity or autocorrelation over time that would further complicate estimation. Sayrs (1989) notes that as long as there is no groupwise or other heteroscedastic effects on the dependent variable, OLS may be used for fixed effects model estimation as well For OLS to be properly applied, the errors have to be independent and homoscedastic. However, Davidson and MacKinnon (1993) observe that these conditions are so rare that it is often unrealistic to expect that OLS will suffice for such models.

There are also a number of problems that plague panel data models in general. The major advantage of panel data analysis is that it compensates for insufficient time series variation by introducing cross section variation, resulting in an increase in the power of statistical tests. However, new research has questioned the efficacy of panel data analysis. For example, O' Connell (1998) using panel data unit root test to prove the purchasing power parity hypothesis, argues that sample panel studies are inaccurate as they fail to account for cross-sectional dependence in the real exchange rate. The researcher argues that the real exchange rates of two closely linked countries are generally correlated. For instance, a shock to related countries which affects prices or exchange rates will cause them to deviate together so that ignoring such cross sectional dependence significantly reduces the power and size of panel data unit root test.

Notwithstanding the limitations of the approach, with the availability of cross-country data arranged in a time series form, the use of the panel data analytical method to examine issues of liberalization has become popular (Bekaert, Harvey and Lundblad, 2001; Laeven, 2001; Islam, 1995). However, the focus of this study is single country research rather than cross-country research. Considering the fact that the major advantage of the approach is to compensate for insufficient time series variation by introducing cross section variation to increase the power of statistical tests in cross-country studies, such insufficiency may not be present in a single country study. Applying a panel data approach to firms belonging to a single stock exchange is likely to create cross-sectional dependence and multi-collinearity that would affect statistical tests. In this study, nearly a hundred firms will be examined creating many cross-sectional units of observations requiring many dummy variables. These multiple dummy variables would sap the model of a sufficient number of degrees of freedom that permit the conduct of powerful statistical tests. Furthermore, as observed by O'Connell (1998), applying panel data analysis to firms belonging to the same stock exchange fails to account for cross-sectional dependence.

5.5 Confounding Factors and Robustness

Unlike previous works that focus on cross-country comparisons, the sample of firms in this study is from a single economy and hence all the firms face the same macroeconomic environment. Evident in studies that use IFC's database is the fact that the effects of other economic reforms, which could be key variables, are uncontrolled and thus have the potential either to reject the hypothesis when in fact it is correct or make the findings robust. Further, more peculiar to single country studies is the possibility that reform programs may favor or disfavor particular industries or may affect one set of firms more than others. We recognize that firms respond differently to some economic reforms such as trade liberalization and privatizations. There are also firm specific events such as restructurings (mergers, unbundling, foreign listings, leverage, lay offs, technology, etc.) that may impact on the cost of equity capital. One limitation of this study is that it does not control for these firm specific events. However, they will be explained to the extent to which they are thought to have affected results. Furthermore, the robustness of empirical results will be diagnosed using alternative proxies for cost of equity capital.

5.6 Conclusion

The chapter has examined a number of methodological issues surrounding empirical approaches to investigating the impact of stock market liberalization on cost of capital. By so doing, problems in research design for further empirical work are put into context. However, from the

review process it has established that with regard to the proxies for cost of capital, the dividend yield is the most credible choice should data be freely available. The P/E ratio (or its reciprocal, the earnings yield) is considered to be the second credible choice as it is a market ratio closely followed and trusted by market participants. The other proxies discussed such as the buy-sell spread and book-to-market ratio are more of explanatory variables, that is, they contain information that either directly or indirectly affects the cost of capital. From the review it is evident that the use of the CAPM is problematic in the context of emerging markets. Alternative approaches adapting the technique to suit these markets are either in their infancy or lack good theoretical foundation.

Regarding methodological approaches to testing the impact of stock market liberalization, it is clear that the starting point is the resolution of the dating problem. Once a benchmark separating the pre-liberalization period from the post-liberalization period has been established, various econometric or statistical techniques can be applied in the context of the event study methodology or modifications thereof. Panel data test procedures are increasingly becoming popular in emerging market research where data sufficiency problems are severe because these procedures exploit the extra information provided by the pooled cross sectional time series of variables and dramatically increase the power of tests. However, given that the approach is still considered to be in its infancy in the context of single country studies, this study preferred use of other techniques that have tried and tested over long time spans.

Consequently, the approach adopted in this study is first to resolve the dating problem with regards to the JSE, which is done in Chapter 6; after which appropriate statistical techniques for testing hypotheses are selected, and these are discussed in Chapter 7.

Chapter 6

Dating of the Liberalization of the JSE

6.1 Introduction

This chapter examines the problem of dating stock market liberalization using time series of South African stock market data. Defining the date of stock market liberalization as that on which there is a structural change in time series data, a number of tests for structural breaks are conducted on time series of monthly dividend yield, volume of shares traded and aggregate stock price of the JSE. The structural breaks are used for dating of the liberalization of the JSE. This is the event date (benchmark date) upon which we can base our examination of the effects of liberalization.

The chapter is structured as follows. Sub-section 6.2 gives the background to the dating problem citing relevant literature. Sub-section 6.3 describes the approach adopted in dating the liberalization of the JSE. Sub-section 6.4 goes on to describe the data and econometric method employed to date the JSE. Sub-section 6.5 presents the empirical results. Sub-section 6.6 discusses the results. Finally, sub-section 6.7 concludes.

6.2 Background and Relevant Literature

Over the past two decades, financial systems in emerging markets have undergone extensive structural changes as a result of regulatory reform and technological innovation. Prior to the Second World War, emerging markets systems were generally characterised by controls on the prices or quantities of business conducted by the financial sector, restrictions on market access (especially to foreign investors) and controls on the allocation of finance among competing borrowers. Early financial sector reform in developing economies focussed on reforming the banking sector, but since the 1980s, the growing importance of stock markets as vehicles for attracting foreign investment has placed emphasis on their liberalization. Empirical studies on stock market liberalization and integration by Errunza and Miller (2000), Bekaert and Harvey (2000a), Henry (2000a), Kim and Singal (2000), Levine and Zervos (1998b), Bekaert, Harvey and Lundblad (2001) show that it has resulted in structural changes leading to a reduction in the cost of equity capital and growth in investments and the GDP.

If we consider stock market liberalisation as market integration that induces a structural change in the capital markets of an emerging country, then, for any empirical analysis, it is important to know the date of such structural change. However, the dating of liberalization remains a

contentious issue because regulatory liberalizations are not necessarily defining events for market integration, i.e., effective liberalization. As noted earlier, it is possible that the market could well be integrated before the regulatory liberalization by virtue of foreign investors accessing it through country funds or depositary receipts. It is often assumed that country funds can substitute for direct holdings of foreign equity. For example, a U.S. investor can access an otherwise closed market by purchasing the corresponding closed-end funds on the NYSE. While there is evidence that country fund prices respond to information, Bailey and Lim (1992) show that country funds are poor substitutes for direct holdings of foreign equities and that they behave more like domestic U.S. stocks than like foreign equity portfolios.

There are a number of different strategies that have been pursued to date the integration of world capital markets. Broadly, four main approaches have been employed: event association; inference from the behaviour of financial assets; inference from the behaviour of key economic aggregates; and market infrastructure. The event association strategies may involve use of some or all of the following: (1) the regulatory reform date, (2) the date, preferably announcement, of the first country fund, (3) the date (announcement) of the first local equity listing or American depositary Receipt on a foreign exchange, and/or (4) official liberalisation decree date (see Henry 2000a; Miller, 1999, for instance). Strategies that infer from the behaviour of financial assets involve looking for changes in the behaviour of asset returns and linking the change date to market integration. For instance, if dividend yields are associated with expected returns, a sharp drop in dividend yields could be associated with an effective liberalisation reflecting the permanent price increase associated with the liberalisation (see Bekaert, Harvey and Lumsdaine, 2002a). The economic strategies involve analysis of key economic aggregates that might be impacted upon by liberalisation, such as a sharp increase in foreign equity capital flows as has been recorded by Kim and Singal (2000), Bekaert and Harvey (2000a) and Bekaert, Harvey and Lumsdaine (2002a). Lastly, market infrastructure refers to the degree of investor protection and quality of the accounting standards. Some researchers such as Bekaert and Harvey (2000a), Henry (2000a) and Bhattacharya and Daouk (2002) have looked at the date of the enforcement of capital market regulations such as insider trading prosecutions as indicators of market integration.

The approach followed in the study is one that infers the structural break from the behaviour of financial assets to date the liberalisation of the JSE. Recognising that market integration induces structural change, tests for structural breaks are performed on time series of stock market data of

the JSE. The time series of stock market data utilised are the dividend yield, volume of shares traded (representing stock market liquidity) and the stock price.

However, the dating issue in South Africa could be complex because major political and economic liberalizations/transformation policies were enforced simultaneously. Hence, indicating the dominance of one set of reforms over the other(s) brings additional research design challenge(s). Nonetheless, this study limits itself to testing for structural breaks of stock market data in relation to three dates used as benchmarks in prior research that focused on the impact of liberalization on the JSE. The three dates are February 1990, December 1992 and March 1995 (see Brooks, Davidson and Faff, 1997; Bekaert, Harvey and Lundblad, 2001; and Fuchs-Schundeln and Funke, 2001 respectively).

As discussed in chapter 3, two distinctions are made between regulatory liberalization and effective liberalization. Regulatory liberalization is policy-induced usually through decree or law whereas effective liberalization is one that results in market integration. Regulatory liberalization may not necessarily result in market integration for several reasons. Firstly, the emerging market could have been integrated before the regulatory liberalization because foreigners have managed to circumvent capital controls through other means such as country funds and depository receipts. Secondly, regulatory reforms could lack credibility because of other existing market imperfections so that they do not result in market integration.

Empirical research using regulatory liberalisation dates by Bekaert and Harvey (2000a), Errunza and Miller (2000), Henry (2000a) and Kim and Singal (2000) supports the hypothesis that stock market liberalization results in a reduction in the aggregate cost of equity capital, thus indicating market integration. Furthermore, Levine and Zervos (1998b) provide evidence showing a resultant increase in stock market liquidity. These researchers have measured market integration from benchmark dates derived from official regulatory reform dates rather than effective liberalization dates that result in market integration. If we consider market integration to be a structural change then it should result in structural breaks in financial time series. However, official announcements of market liberalization may not necessarily immediately result in structural breaks unless there is a coincidence of market integration and regulatory liberalisation.

Fuchs-Schundeln and Funke's (2001:34) summary of the liberalization dates of 27 emerging countries used by different researchers shows that there is a divergence of views on dates of stock market liberalization. Most studies use official policy decree dates. The official

liberalization dates are invariably the dates on which restrictions on foreigners to hold domestic equities were removed for the first time. However, Fuchs-Schundeln and Funke (2001), who have focused on official decree dates, note that some empirical analyses justify the choice of certain dates on the basis of the nature and objective of the study. They observe that studies that explore financial implications using high frequency data favour dates that indicate the first signs of liberalization while studies that focus on real economy implications would favour dates on which there are significant verifiable real effects. For all intents and purposes, these dating approaches are premised on the static segmentation/integration model demonstrated by Bekaert and Harvey (2003) as there is no established equilibrium model that guides us on how a segmented economy moves to integrated status.

As discussed in chapter 3, in addressing the dating problem it is important to recognize that there are multifaceted barriers to emerging market investment that cannot be removed at a single point in time. Bekaert (1995) classifies these multifaceted barriers into three distinct categories. The first category relates to direct barriers that are legal in nature arising from the different legal status of domestic and foreign investors with regard to foreign restrictions and taxes on foreign investment. The second category relates to indirect barriers stemming from governance issues such as availability of information, accounting standards, and investor protection legislation. The third category comprises barriers collectively known as emerging market specific risks (EMSRs) such as liquidity risk, political risk, economic policy risk, and currency risk. Nishiotis (2002), who used country fund data to examine the differential pricing effects of the various types of barriers, found indirect barriers and EMSRs to have more important pricing effects than direct barriers. Also, Bekaert, Erb, Harvey and Viskanta (1997) show that political risk is priced in emerging market securities.

Recognition of these issues allows us to move away from the static segmentation/integration model to the dynamic partial segmentation/partial integration model. In an earlier work, Bekaert and Harvey (1995) advocate the use of regime-switching models that allow the degree of market integration to change over time. They do however acknowledge the difficulty in specifying such models. The dynamic partial segmentation/partial integration model enables the resolution of two issues. Firstly, it accords with the observation that liberalization is a gradual process. Secondly, it allows us to view the dating of liberalization from the perspective of a series of events and hence the likelihood of multiple structural break (milestone) dates.

There has been a substantial empirical research which has focused on the detection of structural breaks in real macroeconomic time series such as consumption, investment and output rather than stock market financial time series (see Bai, Lumsdaine and Stock, 1998 and Noriega and Soria, 2002). Recent empirical work that has focused on the problem of dating stock market liberalization from the perspective of structural breaks is that of Bekaert, Harvey and Lumsdaine (2002b) and Bekaert, Harvey and Lundblad (2001). Defining the effective liberalization date as that on which market integration occurs, they exploit an econometric technique suggested by Bai, Lumsdaine and Stock (1998) to estimate endogenous break dates for 20 emerging markets (excluding South Africa). They observe that integration usually occurs later than the official decree dates (but exceptions are observed) suggesting a distinction between regulatory market liberalization and market integration.

6.3 The Approach in Dating the Liberalization of the JSE

The JSE is characteristically an emerging market possessing some barriers to investment as identified by Bekaert (1995), namely, legal barriers, indirect barriers and specific emerging market risks such as liquidity, political, economic policy, and currency risk.

Prior empirical works on the JSE have suggested three dates to date its liberalization. Firstly, Brooks, Davidson and Faff (1997), using a family of ARCH and GARCH models to study the behaviour of volatility measures, utilized February 2, 1990, the date the then South African President FW de Klerk unbanned the African National Congress (ANC), as the benchmark date for analysis. Crucially, the authors observed a greater integration of the JSE with the international market in the post-1990 period. Their observation is consistent with empirical evidence by Bekaert and Harvey (1995) that records a sharp increase in the market integration parameter in the years 1978 and 1979 with regard to Zimbabwe. These years coincided with the optimism leading to independence officially achieved on April 18, 1980. The same can be inferred for South Africa: political liberalization that started in 1990 and finally led to democratic elections in 1994 could have generated positive expectations that might have induced structural breaks in time series data of stock market variables.

Secondly, in a cross-country study that included South Africa, Bekaert, Harvey and Lundblad (2001) used the end of the year 1992, by which time most economic sanctions were lifted for the country following political liberalization, for dating the liberalization the JSE. This study examined real economic effects, i.e, whether financial liberalization spurs growth.

Thirdly, Fuchs-Schundeln and Funke (2001) whose cross-country study (in which South Africa was included) examined the financial and macroeconomic implications of stock market liberalizations, utilized March 1995, the official date when the JSE was liberalized, for benchmarking analysis.

Defining the date of stock market liberalization as that on which there is a structural change in stock market data, this study tests for structural breaks around the three dates suggested in prior research. The study utilises the Chow (1960) and Perron (1989) tests because the dates for which structural breaks are being tested are for the most part known. This approach accords with the suggestion by Maddala and Kim (1999:398) that where there is prior information on dates the test for breaks should be around those dates.

6.4 Data and Econometric Approach

6.4.1 The Data

Stock market data chosen for analysis are the monthly series of the share price index, the dividend yield and the volume of shares traded dated from 1970 to 2002. The data is sourced from the South Africa Reserve Bank (SARB) database. The data on the monthly average of all shares prices was based on the September 1995 share price index.

The share price index measures the aggregate performance of the stock market in terms of the price level trends. The dividend yield is an approximate measure of the cost of equity capital, and the volume traded measures stock market liquidity, that is, the ease of tradability of shares.

6.4.2 Econometric Approach

A time series is a particular realization of a stochastic process. It is given by Y_t, t = 1, 2, 3, 4….N where in general each Y_t has its own mean, $E[Y_t]$, and its own variance, $var(Y_t)$, and each of these means and variances may differ. Many financial time series, including stock market variables, have trends. The underlying level of the series is either increasing or decreasing over time. If the mean and variance of the series do not vary in any systematic way through time it is said to be stationary or integrated to order of zero, i.e., I (0), meaning that the series has no unit root. Stationarity is also an indication that the time series data is normally distributed. If the series is only stationary after being differenced once, then it is integrated to the order of one, i.e., I (1), meaning that the series has a unit root. Hence tests begin with an examination of unit root properties of our time series data. Firstly, visual inspection is done after graphing the time series. Secondly, unit root tests on time series are carried out using the augmented Dick-Fuller (ADF)

test. Dickey and Fuller (1979, 1981) provide a method of determining the order of integration for individual series. The model is estimated both with and without a time trend so that for a given variable Y, one can estimate the following regressions:

$$\Delta Y_t = \omega_0 + (\rho - 1) Y_{t-1} + \sum_{i=2}^{n} \varpi_i \Delta Y_{t-i+1} + \varepsilon_t \quad [1]$$

$$\Delta Y_t = \omega_0 + \omega_i t + (\rho - 1) Y_{t-1} + \sum_{i=2}^{n} \varpi_i \Delta Y_{t-i+1} + \varepsilon_t \quad [2]$$

Equation [1] tests for the null hypotheses of a random walk against a mean stationary alternative. Equation [2] tests for the same null hypothesis against a trend stationary alternative. For a given sample, if the estimate of ρ is not significantly different from unity, then the null hypothesis of a random walk cannot be rejected. On the other hand, if one finds that $\rho < 1$, the alternative hypothesis of mean reversion is supported. In both cases, the number of lags, *n,* is chosen to purge possible serial correlation in the error term using the optimal sequential procedure suggested by Campbell and Perron (1991), with the maximum lag length set at 12.

The idea is that if one observes the time series as being stationary, that is I (0), one could proceed to perform the Chow (1960) test for structural breaks on the assumed dates using an autoregressive model of the time series given in Equation [3] below.

$$Y_t = \beta_1 + \beta_2 Y_{t-1} + \varepsilon_t \quad [3]$$

In the event of the time series not being stationary, that is I (1), the Broken Trend Stationary (BTS) model with *m* known structural breaks in both level and trend formalised by Perron (1989) to detect breaks is utilized. Noriega and Soria (2002) observe that under this model permanent changes to time series are deterministic as opposed to stochastic so that it is possible to investigate any potential relationship between the estimated break dates and historic events whether economic or political. The BTS model is given by:

$$\Delta Y_t = \beta_1 + \beta_2 T + \beta_3 DUM_t + \beta_4 TDUM_t + \alpha_1 Y_{t-1} + \alpha_2 \Delta Y_{t-1} + \varepsilon_t \quad [4]$$

where ΔY_t = First –difference of the logarithm of time series;

Y_{t-1}. = logarithm of lagged value of time series;

ΔY_{t-1} = logarithm of first-difference of lagged value of time series;

T = the time trend;

DUM_t and $TDUM_t$ = dummy variables allowing changes in the trend's level and slope respectively such that:

DUM_t = 1 if t > assumed policy date t*, 0 otherwise

$TDUM_t$ = t- t* if t > assumed policy date t*, 0 otherwise

ε_t = error term

A BTS regression is performed for each of the assumed policy event dates. The test for structural breaks involves testing whether the coefficients on DUM_t and $TDUM_t$ are significantly different from zero.

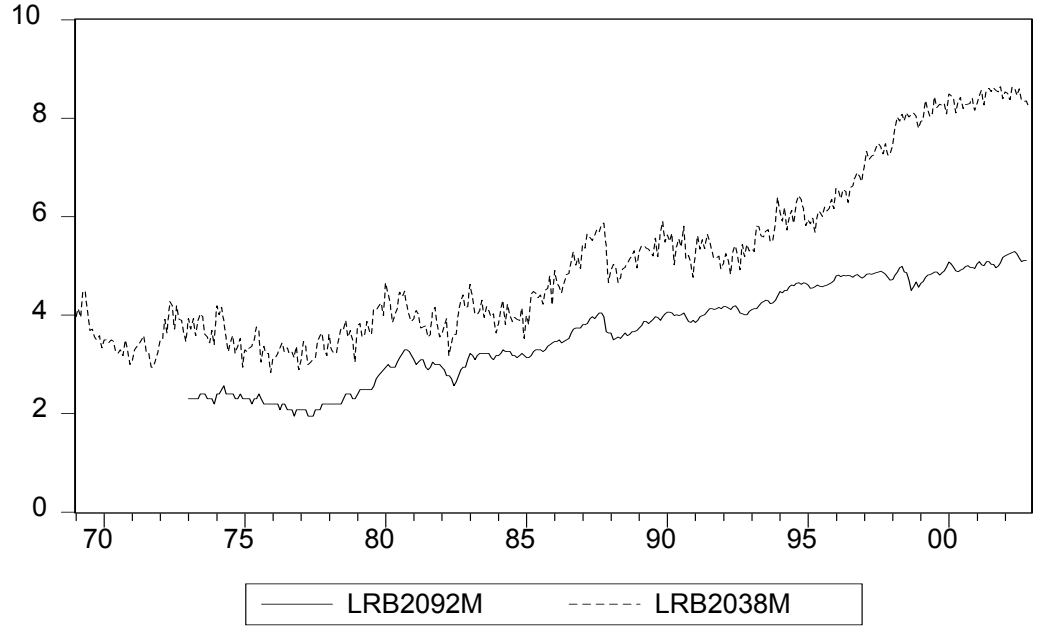
With these econometric techniques the study proceeds to test for structural breaks in stock market data on the three assumed event dates in prior empirical research, viz., February 1990 (Brooks, Davidson and Faff, 1997); December1992 (Bekaert, Harvey and Lundblad, 2001); and March 1995 (Fuchs-Schundeln and Funke, 2001).

6.5 Empirical Results

The analysis is presented at two levels. Firstly, graphical analysis of the time series is shown and explained. Secondly, results of econometric tests are given.

6.5.1 Graphical Analysis

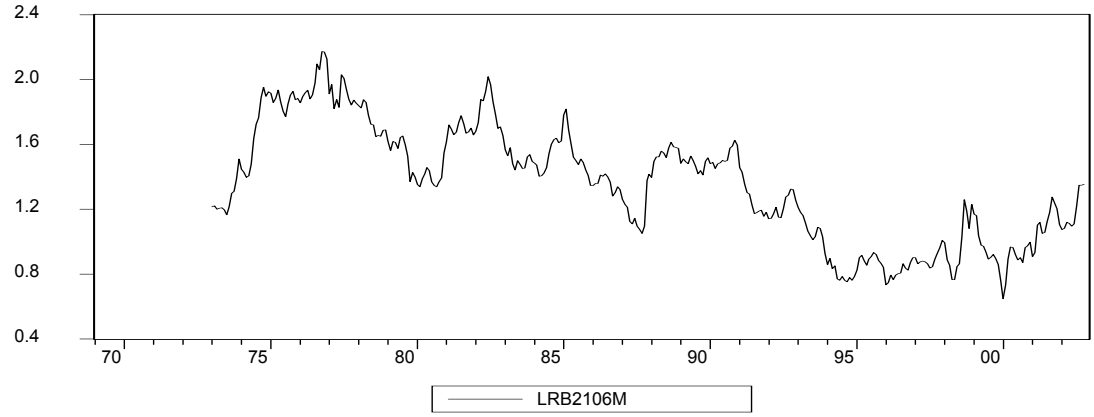
Figure 6.1
Volume Traded and Share Price Index of the JSE



LRB2038M = monthly volume traded.
LRB2092M = monthly real aggregate share price

Figure 6.2

Dividend Yield of the JSE



LRB2106M = monthly dividend yield of the JSE

It is more difficult to visually pinpoint a structural break accurately from graphical analysis because a structural change is a major behavioural change in time series. As can be seen from Figure 6.1, it is not easily apparent, from visual inspection, where the structural break is on the stock price index and the volume traded. Stock market liquidity and the share price index, however, tend to be following an upward trend more sharply after the 1990s, though that of the share price index is not as sharp as that of stock market liquidity. Furthermore, the share price index does not appear to exhibit much volatility. Prior to 1990 the two series show some degree of co-movement, but during the post-1990s and post-1995s, the volume traded and the share price index appear to diverge.

Therefore, from a visual inspection of the graphs, it could be suggested that a probable structural break occurred in the 1990s but this is merely speculative. It is even more difficult from a visual inspection of Figure 6.2 to determine the time of structural breaks in dividend yields. The series shows a periodic downward trend from the late 1970s to the year 2000. Graphical analysis provides a rough sketch of expected results before formal econometric tests are carried out.

6.5.2 Unit Root Tests

The results of unit root tests are presented in Table 6.1 below.

Table 6.1

ADF Tests for Random Walk in Stock Market Data (in levels)

	ADF Tests	
Variable	No Trend	With Trend
Share price index	-0.339360	-3.465288***
Dividend Yield	-1.837772	-3.6124457***
Volume traded	-0.343223	-2.546513
*, **, *** Denote significance at the 10%, 5% and 1% levels respectively		

Both the ADF tests, the one with constant and no trend as well as the one with constant and trend, show that the time series of stock market liquidity (volume traded) have a unit root. Subsequent tests accord with other empirical observations that show stock market liquidity trending upwards over time with a unit root (see Levine, 2001). Similarly, the ADF tests with "a constant" and "no trend" indicate the share price index and the dividend yield have unit roots. However, when the ADF tests are performed with a constant and time trend, the two variables become stationary. This result suggests that the share price index and the dividend yields are trend stationary as opposed to mean reverting, that is, stationary without a time trend.

Theoretically, the dividend yield should be stationary in the absence of excessive volatility. On the basis of this assumption, Bekaert, Harvey and Lumsdaine (2002b) assumed the dividend yield to be stationary when testing for a common break in time series in dating liberalization of world equity markets. More recently, Lewellen (2004) argues that the dividend yield stationarity assumption is reasonable. An earlier study by Roussanov (2001), using generalized rescaled statistics, supports this view.

The trend stationarity in the share price index appears implausible because empirical studies of the JSE all share price index show that it has a unit root even when the ADF test includes a trend component, an observation that is consistent with the theory that share prices follow a random walk that is non-stationary. Several reasons can be given to explain the contradictory findings. Firstly, the SARB share price index on which unit root tests were performed is constructed differently from the JSE all share indexes. The inclusion of all companies listed on the exchange, irrespective of whether they are actively traded or not, is bound to result in the SARB computed index minimizing share price volatility and hence inducing trend stationary. Secondly, this may simply reflect the limited power of the conventional Dickey and Fuller (1979, 1981) and Phillips and Perron (1988) unit root tests. Chaudhuri and Wu (2004), utilizing a panel-based test that exploited cross-sectional information from 17 emerging equity markets (excluding South Africa),

reject the null hypothesis of randomness in favour of mean reversion at the 5 percent significance level. Furthermore, they observe that much of the controversy on the issue of mean reversion arises because the speed of reversion, if it exists, is very slow and that standard unit root tests do not have sufficient power to discriminate a mean reversion process from a random walk process. Thirdly, it is not entirely inconceivable, especially in large samples that stock price indexes can be stationary. Chaudhuri and Wu (2003) have tested for stationarity in emerging market stock prices and found that the null hypothesis of no stationarity can be rejected using the standard unit-root test. They detected stationarity in 10 countries out of their sample of 17 emerging markets. Incidentally, evidence of mean reversion in stock prices was first documented in the U.S. market using firm level data (see DeBondt and Thaler, 1985; Fama and French, 1988; and Porteba and Summers, 1988).

6.5.3 Chow Tests

As a result of the ADF test results which show that dividend yields and stock prices are trend stationary, Chow tests were performed for each of the assumed known break dates: February 1990, December 1992 and March 1995. The null hypothesis is that there is parameter stability in the time series against that of parameter instability (i.e. existence of structural break). The relevant test statistic for the Chow test is the F-statistic and the results are tabulated in Table 6.2.

Table 6.2

Results of Chow Tests

Stock market variable	Dividend Yield		Stock Price	
Breakpoint Date	F-Statistic	Probability	F-Statistic	Probability
1990: 02	2.915047	0.055508*	0.236475	0.789530
1992: 12	2.875204	0.057727*	2.478815	0.085301*
1995: 03	0.567243	0.567603	1.226735	0.294496
*, **, *** Denote significance at the 10%, 5% and 1% levels respectively				

Two structural break points are identified in the dividend yield time series –February 1990 and December 1992 while in the stock price one break is reported in December 1992.

6.5.4 Regressions using the Broken Trend Stationary (BTS) Model

Equation [4] was run separately for each of the assumed break dates: February 1990, December 1992 and March 1995. The results are tabulated in Table 3.

Table 6.3

BTS Model results on Volume of Shares Traded

Variable	Coefficient	Std. Error	t-statistic	Probability
DUMFEB90	-0.459151	0.193202	-2.376532	0.0180**
TIMEDUM90	0.001644	0.000688	2.388361	0.0174**
DUMDEC92	-0.551991	0.254481	-2.169088	0.0307**
TIMEDUM92	0.002140	0.000811	2.637592	0.0087***
DUMMAR95	-0.276998	0.323525	-0.856188	0.3924
TIMEDUM95	0.001343	0.000947	1.419205	0.1566
*, **, *** Denote significance at the 10%, 5% and 1% levels respectively				

The results of the BTS regression indicate that structural breaks occurred in stock market liquidity in February 1990 and December 1992.

6.6 Discussion of Results

Econometric results show two structural breaks in time series of volume traded and dividend yield –February 1990 and December 1992. However, one structural break, December 1992, is identified with regard to the time series of the real aggregate stock price. On the whole, it is noteworthy that the structural breaks occurred before the official liberalization date of the JSE given as March 1995. This supports the use of February 1990 as the benchmark advocated by Brooks, Davidson and Faff (1997) and December 1992 as the benchmark advocated by Bekaert, Harvey and Lundblad (2001) in their empirical analysis of effects of stock market liberalization. Although no structural break in stock market time series data is identified for March 1995, Fuchs-Schundeln and Funke (2001) could be able to justify the use of that date as the benchmark on the basis of their argument that they were examining real effects, that is, real investment growth and GDP per capita growth. Basically, they argue that studies that explore financial implications using high frequency data favour dates that indicate the first signs of liberalization while studies that focus on real economy implications favour dates when there are significant verifiable real effects. If we follow this reasoning Brooks, Davidson and Faff (1997) used the correct benchmark as they looked at financial effects. Bekaert, Harvey and Lundblad (2001) could have used March 1995 as a benchmark instead of December 1992 because they explored real economic growth effects.

With regard to the JSE how do we account for one structural break in the stock price as opposed to two in volume traded and in the dividend yield? In other words, why didn't the stock price experience a structural break in 1990 as volume traded did? Several explanations could be proffered. We surmise that this could be traced to the "greenhouse effect" precipitated by

international sanctions in the 1980s. The "greenhouse effect" and exchange controls trapped capital within South Africa. In the absence of alternative investments, funds were channelled into the equity market where institutional investors tended to hold onto equities precipitating the highly characteristic pyramid, conglomerate and family structures of companies. The result was low liquidity and upward pressure to price. It is possible that following political liberalization there was an oversupply of shares compared to demand so that the price levels did not change significantly. Hence it could be that political liberalization prodded conglomerates to re-balance their holdings without significantly changing price levels, as they were already too high. Alternatively, there could have been a limited number of takers of excess liquidity until the lifting of international economic sanctions in 1992 when big foreign players came on board. There could be other reasons and hence these issues are matters for possible future research.

6.7 Conclusion

This chapter has highlighted the importance of dating stock market liberalizations, distinguishing between dates of regulatory liberalization and dates when markets become significantly integrated. Market integration is taken as a form of structural change. The chapter tested for structural breaks in financial time series of stock market data of the JSE. Evidence suggests that the political liberalization exercise which occurred in the early 1990s with the unbanning of the ANC, the release of ANC's political leadership and the commencement of political negotiation around that time, and the lifting of international political and economic sanctions previously imposed on South Africa, appear to have strongly influenced stock market variables resulting in the identified structural breaks. The identification of structural breaks before the actual lifting of legal barriers shows that the political and economic risks were the more binding barriers in the case of South Africa.

There are several implications that can be drawn from these findings. Firstly, they confirm the dynamic nature of the liberalization process and at the same time showing that some barriers to emerging market investment are more binding than others. Crucially, they highlight the possibility of specific emerging market risks such as political and economic risks being stronger binding barriers than legal barriers. Secondly, the presence of several breaks in some financial time series indicates that when studying the impact(s) of stock market liberalization the selection of event dates should depend upon the structural break date of the variable being studied. For instance, in the case of the JSE empirical testing of stock price behaviour entails use of December 1992 as the benchmark date while the empirical testing of the dividend yield and stock market liquidity behaviour could entail the use of two benchmarks - February 1990 and

December 1992. Thus the impact of liberalization on the latter two stock market variables is ideally tested using a parameterized or regression-switching model. Alternatively, the period February 1990 and December 1992 can be considered a period of instability and hence excluded from empirical analysis that utilizes the event study methodology. Lastly, the findings confirm the observation in other similar work that dating of stock market liberalization is not a clear-cut empirical issue. However, we can conclude that the ideal approach is to first test for structural breaks for the particular variables to be studied. That is, if one is studying financial effects the benchmark dates should be determined from the relevant financial time series, and a similar approach should be applied when studying real economy effects.

Chapter 7

Research Design and Statistical Methods

7.1 Introduction

This chapter lays down the research design for the remainder of the study by describing the data sources, the choice of firms for investigation, and the statistical techniques employed to test hypotheses. The choice of the research design and statistical methods is guided by the discussion on methodological issues contained in chapter 5, and econometric techniques in dating the liberalisation of the JSE developed in chapter 6. The structural breaks identified in chapter 6 are used as benchmarks for the liberalization event for testing the set of hypotheses. In accordance with the empirical results of structural breaks, the pre-liberalization period is taken as the pre-February 1990 period, and the post-liberalization period as the post-December 1992 period. The period February 1990 to December 1992 is considered a liberalization window, especially with regard to political liberalization and the easing of economic sanctions. The dividend yield is the primary proxy used for the cost of equity capital. The reasons for its choice have been discussed in chapter 5. Checks for robustness are done using another proxy -the earnings yield.

The chapter is organized as follows. Sub-section 7.2 describes the choice of firms for examination and the nature of yield data used for analysis. Sub-section 7.3 discusses the statistical techniques used for testing the first hypothesis which states that stock market liberalization reduces the cost of equity capital of firms. Sub-section 7.4 discusses the techniques employed in testing the second hypothesis which states that the decline in firms' cost of equity capital is permanent or persistent over time. Sub-section 7.5 discusses the techniques utilized for testing the third hypothesis which states that the impact of stock market liberalization is independent of the sector to which a firm belongs. Sub-section 7.6 describes the approach used in testing for the influence of firm specific characteristics on the statistical results obtained in testing the first hypothesis. Finally, sub-section 7.7 concludes.

7.2 Choice of Firms and Data

Yield data was obtained from the database of the South African Reserve Bank and McGregor BFA Database, a private database for JSE listed companies. The data comprised monthly dividend and earnings yields of the sampled firms.

The sample of firms chosen for analysis comprised 83 firms continuously listed on the JSE from 1987 or earlier right through to 2002. The objective was to have the same set of firms with a stable dividend policy that survived both the pre-and post-liberalization periods without changing identity and main business line in order to facilitate proper intertemporal comparison. The firms chosen represented the exchange's main seven sectors classified according to the FTSE Global Classification System, viz., Resources, Basic Industries, General Industrials, Cyclical Consumer Goods, Non-Cyclical Consumer Goods, Cyclical Services and Financials. Broad sectors for which sector level yield data were available were Resources, Financials, Commercial and Industrials as per South African Reserve Bank classification. The list of the firms and their respective sectors is shown in Appendix A.

The sample of firms was biased towards survivalist quoted firms and those that did not significantly change identity during the period under investigation in order to minimise the effects of confounding factors such as mergers and restructuring. Only firms with unbroken monthly series of dividend yield and earnings yield within imposed limits of between 0% and 100% were selected for analysis. The imposed limits of between 0% and 100% meant that yield data had neither negative percentages nor percentages that exceeded 100%. What this means is that the sample of firms subjected to testing consisted of only dividend-paying and non-loss making companies. This ensured that the statistical results utilizing the dividend yield as proxy for cost of equity capital could be tested for robustness with statistical results using the earnings yield proxy.

A number of assumptions were made regarding the behaviour of firms selected. Firstly, all firms were assumed to have faced the same business and macroeconomic environments so that liberalization was considered to be the sole aggregate shock that impacted on their cost of equity capital. This meant that confounding factors such as differential responses to reforms, the effect of other micro- and macroeconomic reforms and firm specific events such as restructurings that may impact on the cost of equity capital, were not controlled for. Neither was the fact that some firms already had foreign listing controlled for. Hence, empirical interpretation of results was done taking cognisance of these confounding factors.

Secondly, the level of debt of firms analysed was assumed to have been fairly constant over the period of analysis both pre- and post-liberalization. In other words, firms analysed were assumed to have stable leverage. Since the selection of firms was biased towards dividend-paying and non-loss making firms, the assumption could be considered reasonable. This is indeed supported

by empirical evidence. For instance, using an East Asian and Latin American firm-level panel for the 1980s and 1990s, Schumkler and Vesperoni (2001) studied how leverage ratios, debt maturity structure, and sources of financing change when economies are liberalized and when firms access international capital markets. They found that debt-equity ratios do not increase after financial liberalization and that debt maturity shortens when countries undertake financial liberalization.

Thirdly, firms were assumed to have the following features consistent with the application of the dividend discount model:

- A stable earnings growth rate at or below the nominal growth rate in the economy;
- A well-established dividend payout policy that is likely to continue into the future; and
- A payout ratio consistent with the assumption of stability.

Survivalist firms are more likely to have these features, hence the choice of those continuously listed from the mid-1980s to the year 2002.

Fourthly, a critical assumption that firms' expected future cash flows are unaffected by liberalization is made. This assumption ensures that the present value of growth opportunities (PVGO) is zero, both in the pre-liberalization period and the post-liberalization period. If this assumption holds the unexpected response of a firm's stock price to news of liberalization will mirror the change in the required rate of return on a firm's stock. In other words, the stock price will increase if liberalization lowers the required rate of return, and conversely, the stock price will decrease if liberalization raises the required rate of return.

Finally, consistent with the observations of Bekaert and Harvey (1997) an assumption that there is no significant impact on unconditional volatility is made. This is the assumption of equal variances in returns in the pre-liberalization period and the post-liberalization period. As observed by Bekaert and Harvey (2003), finance theory does not provide a clear guideline on whether volatility should increase or decrease when markets are opened. However, in terms of its time-varying nature, Brooks, Davidson and Faff (1997) find volatility of the JSE to be conforming to that of developed markets in the post-liberalization period. The GARCH specification they identify is more in line with models found in developed countries.

7.3 Statistical Technique for Testing Hypothesis 1

Formally stated hypothesis 1 is given by:

H_1: *Stock market liberalization reduces the cost of equity capital of firms.*

The statistical approaches adopted are in response to the nature of data collected for analysis. The analysis of such data entailed unconditional relationships. Given the observations by Bekaert, Harvey and Lumsdaine (2002b) and Lewellen (2004) that the dividend yield series are stationary**,** a t-test comparison of pre- and post-event date means of the dividend yield (proxy for cost of capital) under assumptions of equal variances is considered adequate to gauge the effects of liberalization [see Levine (2001) for similar treatment]. As the pre-liberalization period and the post-liberalization period are considered two independent periods that differ significantly from one another, they are amenable to a t-test for independent samples for testing the hypothesis that stock market liberalization leads to a reduction in the cost of capital**.** Our choice of the relevant length of periods for analysis of "before" and "after" liberalization is guided by the observation by Bekaert et al (2002a) who find that net capital flows to emerging markets increase rapidly after liberalization as investors rebalance their portfolios, but that they level out after 3 years. Bacchetta and Wincoop (2000) provide further evidence in this regard. Accordingly, therefore monthly dividend yield data 36 months before liberalization are compared with monthly yield data 36 months after liberalization.

The t-test (commonly known as the Student's t-distribution) for independent samples is used to determine whether two samples were drawn from populations with different means. There are two types of tests that determine if the means of two populations are different. One test assumes the variances of the populations are equal; the other assumes that the variances are not equal. The t-test relevant for this research is the one that assumes that variances are equal. This assumption is important as it ties in well with the assumption of risk-neutrality on the part of investors which enables us to examine the behaviour of yields from a common utility function during both the pre-liberalization and post-liberalization periods.

For small and moderate sample sizes, the equal variances version of the test provides an exact test of the equality of the two population means. The validity of the test demands that the samples be drawn from normally distributed populations with equal (population) standard deviations. However, the Central Limit Theorem guarantees the validity of the test even if the populations are non-normal. The Central Limit Theorem states that the arithmetic mean of a random sample of size N from any population with finite variance σ^2, approximately has a N (μ, σ^2/N) distribution, provided N is fairly large. According to Miller (1986), formal analysis and simulations offer the following guidelines describing the extent to which the assumptions of

normality and equal population variances be violated without affecting the validity of t- test for independent samples:

(1) If sample sizes are equal, non-normality is not a problem and the t test can tolerate population standard deviation ratios of 2 without showing any major ill effect. The worst situation occurs when one sample has both a much larger variance and a much smaller sample size than the other. For example, if the variance ratio is 5 and the sample size ratio is 1/5, a nominal p-value of 0.05 is actually 0.22.

(2) Outliers can distort the mean difference and the t statistic. They tend to inflate the variance and depress the value and corresponding statistical significance of the t statistic. However, the effect can be minimised by data transformation or elimination of the outliers.

It is usually not necessary to perform preliminary tests for normality and equality of variances because practice has shown such tests often detect differences too small to affect the t -test. The problem is that the test for normality is dependent on the sample size. With a small sample, a non-significant result does not mean that the data has been drawn from a normal distribution. On the other hand, with a large sample, a significant result does not mean that we could not use the t-test, because the t-test is robust in moderate departures from normality, that is, the p-value obtained can still be validly interpreted.

Another further question that arises is: should one test for equality of the standard deviations before using the usual t-test? The same argument about normality applies here as for in the previous question because the test for equality of variances is dependent on the sample size. According to Armitage and Berry (1994), a rule of thumb is that if the ratio of the larger to smaller standard deviation is greater than two, then the unequal variance test should be used. However, nowadays statistical software packages enable one to easily compute both the equal and unequal variance t-test and see if the answers differ. The unequal variance t-test tends to be less powerful than the usual t-test if the variances are in fact the same, since it uses fewer assumptions.

However, where there are sufficient reasons to believe that the conditions for the validity of the independent t-test are violated, the best approach is to transform the data to a scale in which the conditions are satisfied. This will almost always involve a logarithmic transformation. For

percentages or proportions, arcsin or log transformation might be respectively used. As recommended by Dallal (2000), if no satisfactory transformation can be found, a non-parametric test such as the median test or the Wilcoxon-Mann-Whitney test might be used. The most important assumption is that the data is normally distributed and are free to vary widely about the mean –that is, there are no imposed limits. Clearly this is not true of percentages, which cannot be less than 0% or more than 100%. If the data is close to these limits, then one needs to transform the original data before analysis. One simple way of doing this is to convert the percentages to arcsin values and then analyse these arcsin values according to the suggestion by Dallal (2000). The arcsin transformation moves very low or very high values towards the centre, giving them more theoretical freedom to vary.

Therefore, the testing of the hypothesis that stock market liberalization reduces the cost of equity capital of firms is performed by utilizing an independent sample t-test on two independent time series yield data of each firm –one from the pre-liberalization period and the other from the post-liberalization period. The objective is to establish whether the two means of dividend yields and/or earnings yields from the two periods do differ significantly.

The formula for the t-test is given by:

$$t = \frac{\bar{X}_T - \bar{X}_C}{\sqrt{\frac{\text{var}_T}{n_T} + \frac{\text{var}_C}{n_C}}} \qquad [1]$$

where $\bar{X}_T$, var_T and n_T are respectively the pre-liberalization mean yield, its variance and number of monthly observations, and $\bar{X}_C$, var_C and n_C are respectively the post-liberalization mean yield, its variance and number of monthly observations. The t-value will be positive if the pre-liberalization mean is larger than the post-liberalization mean. Once the t-value is computed, significance tables are used to test whether the ratio is large enough to conclude that the difference between the pre-liberalization mean and the post-liberalization mean is not likely to have been a chance finding.

7.4 Statistical Technique for Testing Hypothesis 2

Formally stated hypothesis 2 is given by:

H_2: *The decline in the firms' cost of capital is persistent over time.*

This hypothesis tests whether the reduction in the cost of capital following liberalization is permanent or persistent over time. If indeed that is the case, we would expect the proxy used for the cost of capital to exhibit mean reversion in the post-liberalization period. The test is conducted for two post-liberalization periods –the medium term defined as a five year period and the long term defined as a ten-year period. Three tests for persistence are performed on post-liberalization dividend yield time series, namely, contingency table analysis, the augmented Dickey-Fuller (ADF) unit root test and the variance ratio test.

7.4.1 Contingency Table Analysis

Dallal (2000) defines a contingency table as a table of counts when information is nominal in nature. In order to use the statistical methods (the Chi-square tests, Spearman rank correlation coefficient analysis, Fisher' exact test, etc) usually applied to such tables, subjects for investigation must fall into row and column categories. Contingency table analysis is popular in testing persistence in the performance of portfolio investment funds (Khan and Rudd, 1995, Von Weilligh and Smit, 2000 and Firer et al., 2001). The approach is robust under conditions of non-normality of data.

In this study a two-dimensional contingency table is formed by classifying subjects into two variables. One variable, the period (the medium term and the long term) will form the columns whilst the associated performance in terms of maintaining a reduced cost of capital will form the rows. Firms with mean dividend yields that are persistently below the pre-liberalization mean for each period are assigned "winners" whilst those showing the opposite are labelled "losers". Finally, persistence is investigated by testing for significance of the "winners" using Chi-Square tests.

7.4.2 ADF Test for Mean Reversion

Mean reversion is tested for by carrying out of unit root tests on time series of dividend yields using the augmented Dick-Fuller (ADF) test. Dickey and Fuller (1979, 1981) provide a method of determining the order of integration for individual series. This determines whether the series mean reverts to an equilibrium level. The model is estimated both without a time trend (for mean reversion) and with a time trend (for trend reversion) so that for a given time series Y, the following two regressions are respectively estimated:

$$\Delta Y_t = \omega_0 + (\rho - 1) Y_{t-1} + \sum_{i=2}^{n} \varpi_i \Delta Y_{t-i+1} + \varepsilon_t \quad [2]$$

$$\Delta Y_t = \omega_0 + \omega_i t + (\rho - 1) Y_{t-1} + \sum_{i=2}^{n} \varpi_i \Delta Y_{t-i+1} + \varepsilon_t \quad [3]$$

Equation [2] tests for the null hypotheses of a random walk in dividend yields against a mean reversion alternative. This equation is used to test the hypothesis that the cost of capital mean reverts to an equilibrium level following liberalization. According to Henry (2000a: 544), this is State 1 which can be explained as follows. When the first stock market liberalization occurs, future liberalizations are anticipated, and because it is known that they will occur with a probability of one, the reduction in cost of capital takes place once and assumes an equilibrium level.

Equation [3] tests for the null hypothesis of a random walk in dividend yields against a trend stationary alternative. This equation is used to test the hypothesis that the cost of capital trend reverts to a lower level following liberalization where there is no tendency for the amplitude of the fluctuations to increase or decrease through time. This, is according to Henry (2000a: 544) is State 2. When the first stock market liberalization occurs, future liberalizations are anticipated, but there is some positive probability that each of the subsequent liberalizations will not occur. This state would imply that in addition to the first reduction in cost of capital there might also be further reductions as each further scheduled liberalization approaches and market participants receive confirmation that it would take place according to schedule.

For both equations [2] and [3], if the estimate of ρ is not significantly different from unity, then the null hypothesis of a random walk cannot be rejected. On the other hand, if one finds that $\rho < 1$, the alternative hypothesis of mean reversion is supported in the case of Equation [2] without a time trend, and trend stationarity is supported in the case of Equation [3] with a time trend. With regard to trend reversion, the appropriate one for the hypothesis being tested is the one where the mean is reverting towards a lower level, which in turn has to be confirmed by comparing the ten-year post-liberalization mean with the pre-liberalization mean of the dividend yield. In performing unit root tests under both equations, the number of lags, *n,* is chosen to purge possible serial correlation in the error term using the optimal sequential procedure suggested by Campbell and Perron (1991), with the maximum lag length set to 12. The Akaike Information Criteria (AIC) is then used to select the appropriate lag length.

7.4.3 Variance Ratio Test for Mean Reversion

Given that the ADF test is not a powerful test in small samples in the sense that it may reject mean reversion when it is present, a more powerful test for mean reversion, the variance ratio test, is performed on the data.

On the assumption that multi-period dividend yields are not overlapping, Cochrane (1988) shows that the variance ratio (VR (q) can be approximated by:

$$VR(q) = \frac{V(\boldsymbol{r}_{t-q,t})}{qV(\boldsymbol{r}_{t-1,t})} \approx 1 + 2\sum_{j=1}^{q}(1-\frac{j}{q})\rho(j) \qquad [4]$$

where V (q) is the variance of the yield (the proxy for return), ρ (j) is the sample autocorrelation of the one-period return at lag j. Under the null hypothesis of serially uncorrelated dividend yields, ρ (j) should be close to zero at all lags. If the data-generating process is a random walk, the variance of the q-period dividend yield should be equal to q times the variance of the one-period dividend. Under the null hypothesis, the expected value of VR (q) should be unity for all q. If VR (q) is significantly lower than unity at long horizons, this indicates that dividend yields tend to revert to a common trend, and thus mean reverting. If VR (q) is significantly higher than unity at long horizons, dividend yields could be said to be mean-averting, meaning increasing over time. However, as shown by Lo and MacKinlay (1989), statistical inference based on the asymptotic distribution could be misleading in small samples.

In order to test whether VR (q) is significantly different from unity, its distribution under the null hypothesis is required. The limiting distribution of the centred variance ratio statistic M_r (q) =VR (q) –1 has been derived by Lo and MacKinlay (1988). Under the null hypothesis of identically independently distributed (i.i.d.) normal returns, they show that:

$$\sqrt{T}\,\boldsymbol{M}_r^t(q) \sim \text{N}(0, 2q)$$

where T is the total number of observations. When returns are overlapping, the ratio becomes:

$$\sqrt{T}\,\boldsymbol{M}_r^t(q) \sim \text{N}(0, \frac{2(2q-1)(q-1)}{3q})$$

under the assumption of homoscedasticity of return series, which has a slightly lower standard error than the earlier equation because it uses more information.

Lo and MacKinlay (1989) note that by choosing the sampling frequency appropriately, the variance ratio test is shown to be as powerful as the Dickey-Fuller tests against the stationary alternative and is more powerful than either of the two tests against the two unit root alternatives. There is evidence showing that financial time series often possess time-varying volatilities and deviate from normality. However, the variance ratio test is robust to many forms of non-normality and heteroscedasticity as is observed by Ajayi and Karamera (1996).

The test for mean-reversion of dividend yields (the proxy for cost of capital) in post-liberalization period is carried out in those firms that experienced a decline in cost of capital following liberalization. The null hypothesis states that dividend yields follow a random walk against the alternative that they are mean reverting. Denoting the dividend yield in time t by X_t, the hypothesis is given by the recursive relation:

$$X_t = \mu + bX_{t-1} + \varepsilon_t \qquad [5]$$

where μ is an arbitrary drift parameter and ε_t is the random disturbance term. It is assumed throughout that for all t, $E[\varepsilon_t] = 0$.

In the spirit of the traditional random walk hypothesis, we begin with the null hypothesis that the disturbances ε_t are independently and identically (i.i.d.) normal random variances with variance δ^2; thus,

H_0: ε_t i.i.d. N $(0, \delta^2)$

One important property of the random walk X_t is that the variance of its increments is linear in the observation interval. This means that the variance of $X_t - X_{t-2}$ is twice the variance of $X_t - X_{t-1}$. Hence, the plausibility of the random walk model may be checked by comparing the variance estimate of $X_t - X_{t-1}$ to, for example, one-half the variance estimate of $X_t - X_{t-2}$. If we calculate variance δ^2 of a series of dividend yields sampled every t periods, the null hypothesis suggests that sampling every (q x t) periods will lead to variance of q x δ^2. Therefore, under the null hypothesis:

$$\frac{\text{var}(X_t + X_{t+1} + ... + X_{t+q})}{q.\text{var}(X_t)} = 1 \qquad [6]$$

The technique used to estimate variance ratios as explained by Ajayi and Karamera (1996) is as follows. One computes the estimates of unbiased single period δ_a^2 and q period δ_c^2 variances using the two equations:

$$\delta_a^2 = \frac{1}{N-1}\sum_{j=1}^{N}(X_j - X_{j-1} - \mu) \qquad [7]$$

$$\delta_c^2 = \frac{1}{M}\sum_{j=q}^{N}(X_j - X_{j-q} - q\mu) \qquad [8]$$

where

X_j = dividend yield at time j,

N = sample size for δ_a^2,

$M = q(N-q+1)(1-\frac{q}{N})$, and

μ = estimate of the mean.

If we let the variance ratio be $VR(q) = \frac{\delta_c^2}{\delta_a^2}$, Lo and MacKinlay (1988) show that

$$J_r(q) = \frac{\sqrt{N}(VR(q)-1)}{\sqrt{\frac{2(2q-1)(q-1)}{3q}}} \overset{a}{\sim} \text{N (0, 1)} \qquad [9]$$

under the assumption of homoscedasticity of returns.

Since it can be shown that

$$VR(q) = 1 + 2\sum_{j=1}^{q-1}(1-\frac{j}{q})\rho(j) \qquad [4]$$

which equation holds asymptotically for estimates of ρ(j). Then, if we let δ_j be the asymptotic variance of the estimate of ρ(j), and θ (q) be the asymptotic variance of VR (q), we can use this equation to determine a heteroscedasticity-consistent version of $J_r(q)$. These are respectively:

$$\delta_j = \frac{N\sum_{k=j+1}^{N}(X_k - X_{k-1} - \mu)^2 (X_k - X_{k-j-1} - \mu)^2}{\sum_{k=1}^{N}(X_k - X_{j-1} - \mu)^2} \quad [10]$$

$$\theta(q) = 4\sum_{j=1}^{q-1}(1 - \frac{j}{q})^2 \delta_j \quad [11]$$

We therefore define a heteroscedasticity-consistent estimator as

$$J_r^*(q) = \frac{\sqrt{N}(VR(q) - 1)}{\sqrt{\theta(q)}} \overset{a}{\sim} \text{N}(0,1) \quad [12]$$

It should be noted that $J_r(q)$ and $J_r^*(q)$ are actually Z scores which are robust under conditions of both homoscedasticity and heteroscedasticity of disturbance terms. Bearing in mind a growing consensus among financial economists that volatilities do change over time, a rejection of the random walk hypothesis because of heteroscedasticity would not be of much interest. Therefore the specification test that is robust to changing variances needs to be considered and compared with the test assuming homoscedasticity. As long as the increments in X over time are uncorrelated, even in the presence of heteroscedasticity the variance ratio must still approach unity under the null hypothesis as the number of observations increase without bound. This should be the case because the variance of the sum of uncorrelated increments must still equal the sum of variances. The random walk null hypothesis requires that VR (q) = 1 for all q. Rejection of VR (q) = 1 for any one q rejects the null hypothesis; in other words, that would be proof of mean reversion.

7.5 Statistical Technique for Testing Hypothesis 3

Formally stated hypothesis is given by:

H_3: *The impact of stock market liberalization on the cost of capital is independent of the sector to which the firm belongs.*

The Chi Square Test for Independence is utilised for testing the null hypothesis that two criteria of classification, when applied to a population of subjects, are independent. If they are not independent then there is an association between them. This test is used to either prove or disprove the hypothesis that the impact of stock market liberalization on the cost of capital is independent of the sector to which the firm belongs.

Being a statistical test, chi-square can be expressed as a formula:

$$\chi^2 = \sum \frac{(O-E)^2}{E} \qquad [13]$$

where O = the frequencies observed, and

E = the frequencies expected

Prior to using the test there are certain requirements that must be met. These are:

1. The data must be in the form of frequencies counted in each of a set of categories.
2. The total numbers observed must exceed 20.
3. The expected frequency under the H_0 hypothesis in any one fraction must not normally be less than 5.
4. All the observations must be independent of each other. In other words, one observation must not have an influence upon another observation.

In terms of the Chi-Square equation, the observed frequencies are the number of firms in each sector registering a decline in the cost of capital following liberalization, and those for which there is either no change or there is actually an increase. The expected frequency is derived from the hypothesis that states that the impact of stock market liberalization on the cost of capital is independent of the sector to which the firm belongs. If that were true, then it would seem reasonable to assume that we should find a roughly even distribution of firms showing a reduction in the cost of capital regardless of the sector to which the firm belongs. To find our expected frequencies we would need to find the number of these firms we would expect to belong in each sector if they were distributed evenly.

7.6 Testing for Firm Specific Characteristics: Hypothesis 4

In the study it has been assumed that the industrial sector can be a major determinant of impact on the cost of capital following liberalization. Hence, a specific hypothesis testing this phenomenon has been incorporated. However, realizing the possible interplay of other firm specific factors, the study has surveyed the impact of selected factors to compliment and augment its major findings.

Mathematically, we could decompose the total liberalization shock by employing the following equation:

Liberalization shock = Firm specific shock + industry shock + economy wide shock [14]

One of the implications of this equation is that whilst the economy wide shock of liberalization is common for all firms, the total liberalization shock impact on each firm may be influenced by either the firm's specific characteristics or the industrial sector to which a firm belongs. The influence of the industrial sector is tested as hypothesis 3 and has been discussed in sub-section 7.5 of this chapter. The contribution of firm specific characteristics could also be analysed should they be identified.

Recognizing that firm characteristics are varied, it was necessary to consider only those that have empirically shown to be related to expected returns. These include dividend yields, P/E ratios, book-to-market ratios, size, and leverage, among others. Fama and French (1992, 1998) and Ferson and Harvey (1997), for instance, have shown that variables like dividend yields, P/E ratios, book-to-market ratios, and past returns have significant explanatory power for the variation in the cross-section of expected returns after controlling for market risk. The dividend yield is used as the main proxy for the cost of equity capital in this study while the earnings yield (the reciprocal of P/E ratio) is used to check for robustness. The influence of firm specific factors such as size, price-to-book ratios and leverage ratios on the main results, is examined using a battery of parametric and non-parametric tests.

Furthermore, acknowledging the gradual nature of liberalization, firms that did not experience a reduction in cost of capital under the benchmark of identified structural break dates were subjected to further tests using the official liberalization date of March 1995 for the JSE.

7.6 Conclusion

The chapter has discussed a range of statistical techniques employed to carry out the study. The rationale for the selection of the preferred techniques for testing hypotheses has been presented. Some techniques require the assumption of normality in data used to hold, or at least to be amenable to the application of the Central Limit Theorem, while the non-parametric tests take into account the nature and limitation of the data in fulfilling a normal distribution representation. Generally, the techniques suggested for the study are non-controversial as they have been tried over time and are largely consistent with the static integrated/segmented models that have been used to test the impact of stock market liberalization by other researchers.

However, it is recognized that there have been some fairly new and advanced techniques, such as panel data analysis, that have been used by other researchers in cross-country studies. This study has, however, a micro-level focus on a single country. In any case the results that have been obtained from such alternative approaches have simply amplified the benefits of liberalization as shown by the non-sophisticated statistical tests.

In summary the techniques that have been proposed for this study are data-friendly and capable of eliciting important conclusions regarding the impact on firms' cost of capital following liberalization. The expected empirical results should be consistent with both theory and findings from similar empirical studies. In the next chapter, chapter 8, hypothesis testing is conducted and the empirical results given. This is continued in chapter 9 where the influence of firm specific characteristics is tested.

Chapter 8

Hypothesis Testing and Empirical Results

8.1 Introduction

This chapter utilizes the statistical techniques discussed in chapter 7 to conduct empirical work. Essentially, three hypotheses are empirically tested. First, the hypothesis that stock market liberalization reduces the cost of equity capital of firms is tested. However, empirical work commences with market level analysis. Second, the hypothesis that the decline in firms' cost of equity capital following liberalization is persistent, is tested. Third, the hypothesis that the impact of stock market liberalization on cost of capital is independent of the sector to which the firm belongs, is tested. Checks for robustness, validation and transformation of data where necessary are also performed.

The rest of the chapter is organized as follows. Sub-section 8.2 presents and discusses empirical results on the hypothesis that stock market liberalization reduces the cost of equity capital of firms. Checks for robustness are performed in sub-section 8.3. Sub-section 8.4 presents and discusses empirical results from testing the hypothesis that the decline in firms' cost of equity capital following liberalization is persistent. Sub-section 8.5 presents empirical evidence from testing the hypothesis that the impact of stock market liberalization on cost of capital is independent of the sector to which the firm belongs. Finally, sub-section 8.6 concludes.

8.2 Testing Hypothesis 1: Stock market liberalization reduces the cost of equity capital of firms.

Given the observations of Bekaert, Harvey and Lumsdaine (2002b) and Lewellen (2004) that the dividend yield series are stationary**,** a t-test comparison of pre- and post-event date means of the dividend yield (proxy for cost of capital) under assumptions of equal variances is considered adequate to gauge the effects of liberalization [see Levine (2001) for similar treatment]. The pre-liberalization period and the post-liberalization are considered two independent periods that differ significantly from one another, hence amenable to a t-test for independent samples for testing the hypothesis that stock market liberalization leads to a reduction in the cost of capital**.** The choice of the relevant length of periods for analysis of "before" and "after" liberalization is guided by the observation of Bekaert et al. (2002a) and Bacchetta and Wincoop (2000), who find that net capital flows to emerging markets increase rapidly after liberalization as investors rebalance their portfolios, but that they level out after 3 years. Accordingly, a comparison of

monthly yield data 36 months before liberalization, with monthly yield data 36 months after liberalization, is made.

Therefore, testing proceeds with analysis of time series of monthly dividend and/or earning yield data under the following assumptions:

1. That the data is quantitative and plausibly normally distributed, or at least amenable to application of the Central Limit Theorem.
2. That the two samples of pre-liberalization yield data and post-liberalization data come from distributions that may differ in their mean value, but have the same variance.
3. That the yield data before liberalization and the yield data post-liberalization are independent of each other.

The third assumption is the most important as it enables us to separate observations of pre-liberalization yield data from those post-liberalization. The t-test for independent samples is therefore used for analysis. The confidence level is set at 95%. Hence the level of significant is 5% for the one-tailed test and 2.5% for the two-tailed test of which the t-test.

The t-test on market level data is first done before proceeding to firm level analysis. The null hypothesis (H_0) and alternative hypothesis (H_1) are set as follows:

Using the dividend yield as proxy for cost of capital: -

H_0: $DY_1 = DY_2$
H_1: $DY_1 > DY_2$ or $DY_1 < DY_2$

where:

DY_1 = pre-liberalization mean dividend yield
DY_2 = post-liberalization mean dividend yield
$DY_1 > DY_2$ indicates a decrease in the cost of capital following liberalization.
$DY_1 < DY_2$ indicates an increase in the cost of capital following liberalization.

Using the earnings yield as proxy for cost of capital: -

H_0: $EY_1 = EY_2$

H_1: $EY_1 > EY_2$ or $EY_1 < EY_2$

where:

EY_1 = pre-liberalization mean earnings yield.

EY_2 = post-liberalization mean earnings yield.

$EY_1 > EY_2$ indicates a decrease in the cost of capital following liberalization.

$EY_1 < EY_2$ indicates an increase in the cost of capital following liberalization.

8.2.1 Market Level Results

Using the dividend yield as proxy for cost of capital, the result of the t-test at the overall market level in Table 8.1 significantly shows that liberalization resulted in a decline in the cost of capital. This is consistent with the predictions of international asset pricing models and market level empirical evidence of Bekaert and Harvey (2000a), Henry (2000a), Kim and Singal (2000), and others. However, as previously on discussed this observation might not be insightful as firm level analysis.

Table 8.1
T-Test at Market Level

Observations of Monthly Dividend Yields before liberalization (DY_1)	Pre-lib Mean DY_1	Std. Deviation	Observations of Monthly Dividend Yields after liberalization (DY_2)	Post-lib Mean DY_2	Std. Deviation	t-statistic	p-value
36	4.1414	0.66716	36	2.5328	0.34463	12.853	0.000***
*, **, *** Denote significance at the 10%, 5% and 1% levels respectively							

8.2.2 Firm Level Results

Firm level results using the dividend model are presented in Appendix B. These results are validated through transformation before interpretation. Bearing in mind the assumption made that the data are normally distributed and are free to vary widely about the mean implies there are no imposed limits. However, this is not true of percentages, the nature in which the yield data is. Since the yield data are within imposed limits of between 0% and 100%, validation entails transforming it into arcsin values before analysis. This is done by converting the yield percentages to arcsin values so that the t-test is conducted on transformed yield data. The arcsin transformation ensures that very low or very high values move towards the centre, giving them more theoretical freedom to vary so that the mean values obtained from t-tests become more meaningful.

Appendix C shows the results of t-tests on transformed dividend yields. A comparison of the results of the transformed data and those not transformed shows no difference. They both give the same t-test results. This means that the yield data is not close to imposed limits and has got enough freedom to vary towards the centre. Accordingly, further analysis is carried out on raw yield data without transforming it.

Detailed analyses of t-tests on raw yield data are shown in Appendices D, E and F. The names of the firms are in JSE abbreviations of the full names as given Appendix A. The t-test results indicate three categories of significance, viz., (1) those firms which showed a significant decline in cost of capital (Appendix D); (2) those in which there was no significant change in the cost of capital (Appendix E); and (3) those that showed a significant increase in cost of capital (Appendix F). A total of 48 firms experienced a decline, 16 experienced no change, and 19 experienced an increase. Table 8.2 below gives an analysis of firm level results across sectors.

Table 8.2
Analysis of Firm Level Results across Sectors under the Dividend Model

Significance level	Not significant	Significant decline in cost of capital	Significant increase in cost of capital	Total
No. of firms	16	48	19	83
Sectors	%	%	%	%
Basic Industries	23.1%	61.5%	15.4%	100%
Cyclical Consumer Goods	28.6%	42.9%	28.6%	100%
Cyclical Services	27.8%	38.9%	33.3%	100%
Financials	10.5%	68.4%	21.1%	100%
General Industries	12.5%	75.0%	12.5%	100%
Non-Cyclical Consumer Goods	33.3%	66.7%	-	100%
Resources	11.1%	55.6%	33.3%	100%
Total	20.5%	57.8%	21.7%	100%

A total of 48 firms (57.8 percent) out of the sample of 83 experienced a decline in the cost of capital. That a majority of firms experienced a decline in the cost of capital following

liberalization is consistent with the recent firm level findings of Patro and Wald (2004). Interestingly, the total percentage for which there was no significant change (20.5 percent) was roughly the same as the percentage for which there was a significant increase in the cost of capital (21.7 percent). Two conclusions can be drawn from this observation.

Firstly, although market level analysis (see Table 8.1) indicated significant aggregate reduction in cost of capital, Table 8.2 shows that slightly more than one fifth of sampled firms did not experience any change. In other words, not all firms benefitted from liberalization. Why should this be the case? Several reasons are possible. For a market that was previously very segmented, such firms could be termed non-investible (i.e. not preferred by foreign investors), as suggested by Chari and Henry (2004) and others. According to Stulz (1981), there could exist non-traded assets that do not provide sufficient benefits to overcome the cost of existing barriers. Merton (1987) also argues that investors invest only in securities they know about, and he emphasizes the importance of information asymmetry in investment.

For a market that was mildly segmented like the JSE, where political and economic risks were the main binding constraints to foreign investment rather than direct legal barriers, it could be that firms that experienced no change could well have been globally priced before the assumed liberalization. This phenomenon could be uncovered by examination of individual firm characteristics to determine which firms can be classified as non-investible, and those which could be considered to have been already globally priced before the assumed liberalization, an aspect that is explored in chapter 9.

Secondly, more than one fifth of firms actually experienced a significant increase in the cost of capital, meaning that they were re-rated negatively and that their risk repriced upwards following liberalization. This negative re-rating and upward repricing of risk could be attributed to increased availability of information that accompanies liberalization (Bae, Bailey and Mao, 2004). Assuming the event date used is symmetrical for all firms, one could argue the following. Before liberalization, stocks are subjected to scrutiny by solely domestic analysts whose inherently "home bias" is accentuated by market segmentation. Portfolio holdings are likely to be equally biased towards certain favoured firms because of factors such as agency relations that do not reflect firms' true prospects. As a result of the favoured status, these firms may exhibit an artificially low cost of capital before liberalization. On liberalization, the scrutiny of foreign investors, foreign equity analysts, and higher accounting standards help to resolve agency problems, and thus effectively transmitting higher quality reporting and governance standards to

all firms (see Obstfeld 1998, Stulz 1999). Consequently, those favoured firms with an artificial low cost of capital are likely to be re-rated so that the cost of capital rises to a level that reflects their true competitiveness. This issue is discussed further in chapter 9 where firm specific characteristics are considered.

Sector level analysis (see Table 8.2) shows that the category of firms indicating a significant decline in cost of capital dominates the other two categories across all the seven sectors examined. In five sectors, viz., basic industries, financials, general industrials, non-cyclical consumer goods and resources, firms that experienced a significant decline were more than 50 percent of the total. However, in two sectors, cyclical consumer goods and cyclical services, the combined categories of "not significant" and "significant increase in cost of capital" dominate the category "significant decline in cost of capital" by more than 50 percent. The respective percentages are 57.2 percent and 61.1 percent.

8.3 Checks for Robustness

T-tests are performed using an alternative proxy for cost of capital, the earnings yield, for the same set of firms. The use of the earnings yield as a proxy for the cost of capital as a means of check for robustness can be derived from the constant growth dividend discount model which can be reformulated into an earnings model by assuming that the earnings per ordinary share of a company will forever grow at the same constant growth rate as dividends (g) when a "steady equilibrium" has been achieved.

Appendix G shows the results of the t-test for the entire sample of firms using earnings yields. Before interpreting the results, the yield data are transformed into arcsin values and the t-test re-performed and the results are shown in Appendix H. A comparison of the results of the two t-tests shows no difference. Raw earnings yield data give similar results as transformed yield data. Accordingly, further analysis of empirical results is based on raw data.

Detailed analyses of t-tests on raw yield data are shown in Appendices I, J and K. The results indicate three categories of significance, viz., (1) those firms which showed a significant decline in cost of capital (Appendix I); (2) those in which there was no significant change in the cost of capital (Appendix J); and (3) those that showed a significant increase in cost of capital (Appendix K). A total of 56 firms experienced a decline; 14 experienced no change and 13 experienced an increase. Table 8.3 below shows an analysis of firm level results across sectors.

Table 8.3
Analysis of Firm Level Results across Sectors under the Earnings Model

Significance level	Not significant	Significant decline in cost of capital	Significant increase in cost of capital	Total
No. of firms	14	56	13	83
Sectors	%	%	%	%
Basic Industries	15.4%	69.2%	15.4%	100%
Cyclical Consumer Goods	42.9%	42.9%	14.3%	100%
Cyclical Services	16.7%	72.2%	11.1%	100%
Financials	15.8%	57.9%	26.3%	100%
General Industries	12.5%	75.0%	12.5%	100%
Non-Cyclical Consumer Goods	11.1%	77.8%	11.1%	100%
Resources	11.1%	77.8%	11.1%	100%
Total	16.9%	67.5%	15.7%	100%

Under the earnings model, more firms experienced a reduction in cost of capital; a total of 56 firms (67.5%) as compared with 48 firms (57.8%) under the dividend model. A total of 40 same set of firms had a significant decline under both the earnings and dividend models. Another 5 same set of firms that experienced a significant decline under the dividend model also experienced a decline under the earnings model, albeit not significant. A further 4 firms experienced a significant decline under the earnings model, and an insignificant decline under the dividend model. Therefore, by simply registering a decline in cost of capital, irrespective of whether it is significant or not, there are a total of 49 firms (59%) that corroborate t-test results under both models. Seven firms show directly conflicting results; they show a significant decline under the earnings model but a significant increase under the dividend model. On the other hand, there is one firm that registered a significant decline under the dividend model and a significant increase under the earnings model. These firms are listed in Table 8.4 for possible investigation as to why their t-test results conflict. However, save for these with conflicting results, the results of the t-test that utilizes the principal proxy for cost of capital, the dividend yield, are corroborated by the results using the earnings yield as proxy. This lends support to robustness of the empirical results.

Table 8.4
Firms with Conflicting Results under Dividend and Earnings Models

Firm	Significant decline under dividend model and significant increase under earnings model	Significant decline under earnings model and significant increase under dividend model
CENPROP	√	
ELBGROUP		√
GUBINGS		√
MOBILE		√
REX-TRUE		√
SASOL		√
TRENCOR		√
TRNSHEX		√

Conflicting results shown in Table 8.4 could theoretically be explained by differences in accounting conventions or leverage. The computation of earnings is affected by different accounting practices. Though they are international accounting standards enforced by the profession, firms apply a range of acceptable practices.

The effect of leverage is explained as follows. Holding the firm's operations and total value constant, an increase in leverage will increase or decrease the firm's net income per share and price/earning ratio, depending on the relative sizes of the price/earnings ratio and the reciprocal of the yield on debt borrowing. According to Grinblatt and Titman (2002) the general principle to determine whether leverage increases or decreases the price/earnings ratio is as follows. You first assume the market value of the firm's assets is unaffected by its leverage ratio, and that all debt is risk free. If the ratio of the price to earnings of an all-equity firm is larger than $1/r_D$, where r_D is the interest rate on the firm's assumed risk-free perpetual debt, then an increase in leverage increases the price/earnings ratio. This means that an increase in leverage decreases the earnings yield (the reciprocal of the price/earnings ratio). Also, if the price/earnings ratio of an all-equity firm is less than $1/r_D$, then the increase in leverage lowers the price/earnings ratio of the firm, which is an increase in earnings yield.

This phenomenon is evaluated for the affected firms. Their leverage ratios, defined as the ratio of total debt (short-term plus long-term) to total assets, are analysed in order to find plausible reasons for conflict under the dividend and earnings models identified in Table 8.4. Table 8.5 gives 3-year average leverage ratios both in the pre-liberalization, during-liberalization and post-liberalization periods.

Table 8.5
Leverage Ratios PRE-, DURING and POST-Liberalization

Firm	Average Leverage PRE-Lib. 1987-1989	Average Leverage DURING-Lib. 1990-1992	Average Leverage POST-Lib. 1993-1995
CENPROP	0.07	0.08	0.08
ELBGROUP	0.70	0.71	0.73
GUBINGS	0.61	0.55	0.68
MOBILE	0.43	0.37	0.36
REX-TRUE	0.18	0.25	0.22
SASOL	0.41	0.36	0.28
TRENCOR	0.41	0.41	0.41
TRNSHEX	0.37	0.60	0.44

Average leverage ratios have largely been stable for most of the firms in Table 8.5. This means that leverage may not have played a role in the conflicting t-test results under the dividend and earnings model. Only one firm TRNSHEX could be said to have experienced a significant but still marginal increase in leverage during the liberalization period. The conclusion, therefore, is that conflicting t-test results under the two models originate from other causes, possibly accounting practices or other factors outside the scope of this study. Singh (1993), for instance, observed that a high price-earnings ratio (reciprocal of earnings yield) does not necessarily imply a low dividend yield. He cites the case of Brazil whose stock market recorded a relatively low price-earnings ratio, but at the same time experienced the lowest dividend yields among the emerging markets in 1989.

8.4 Testing Hypothesis 2: The decline in firms' cost of equity capital following stock market liberalization is persistent over time.

There are three angles to this hypothesis. Firstly, if the first stock market liberalization is credible, and there are no uncertainties regarding future liberalizations, the reduction in the cost of equity should be permanent and the cost of capital should mean revert in the long run. Secondly, if the first stock market liberalization is credible but with uncertainties regarding future schedules of liberalization, we would expect the reduction in the cost of equity to be gradual as the credibility of each schedule of liberalization is confirmed by the market. In this case, the cost of equity would trend downwards over time towards an equilibrium mean. Thirdly, if the future liberalization schedule were not considered credible, we would expect the initial reduction in the cost of equity observed over the short-term to reverse over the long term, as the market confirms non-credibility of the reform process. It could also be a reversal of in the "over-reaction" of the market. The correction thereof would result in the cost of equity trending upwards.

In testing the hypothesis that the decline in firms' cost of capital is persistent, there are several methodological problems. The first pertains to the definition of the long run. How long should the post-liberalization period be for it to proxy the long term, especially considering that most emerging markets liberalized only recently, in the 1990s? The second problem relates to confounding factors on firms chosen for investigation over such a long horizon. Some firms might have undergone structural changes such as restructuring, significant change in gearing levels, mergers and acquisitions that may have caused structural breaks in their cost of equity over time. The third problem relates to the measurement of the cost of equity itself, as there are several methods of doing so. Should we use the CAPM, the Gordon Growth Model, or the earnings model? It is the view of this study that if the proxy variable chosen for the cost of equity capital is fairly stable over time and approximates a normal distribution, long-term effects could be evaluated to determine whether the benefits of liberalization are persistent in the post-liberalization period.

In an endeavour to address the first question, a medium-term horizon of five years and a long run horizon of ten years are used for testing the hypothesis. The post-liberalization period considered for testing run from January 1993 to December 2002 in which the sample of firms examined comprised 48 firms that experienced a reduction in cost of equity capital. These are firms shown in Appendix D. Once again the proxy used for the cost of equity capital is the dividend yield of each firm. The usefulness of the dividend yield as a proxy for the cost of the equity capital emanates from its ability to address liquidity problems which are usually severe in emerging markets. Nonetheless, the use of the dividend yield is not entirely free of problems. From a valuation perspective it would appear unrealistic to expect the assumption of constant growth of dividends to hold over a long horizon of 10 years. However, while there could be variable growth cycles, the long run mean dividend growth rate of a firm could reasonably be assumed to be constant under stable conditions. Notwithstanding, this confounding factor is taken into account when interpreting results.

8.4.1 Contingency Table Analysis

A total of 48 firms that experienced a reduction in the cost of capital are subjected to analysis. These are the firms in which the objective is to establish whether the decline in cost of capital experienced over a 36-month post-liberalization period was maintained over the medium term, taken as five years post-liberalization, and over the long term post-liberalization period of 10 years. Firms whose average dividend yields (proxy for cost of capital) persist below the pre-

liberalization mean over the 5-year post-liberalization period and 10-year post-liberalization period respectively are taken as "winners". Those whose average dividend yields do not maintain a downward trend are termed "losers". A firm can be a "winner" in one period and a "loser" in another period, or vice versa. Alternatively, it can be a "winner" or a "loser" in all periods.

Therefore, the first stage of empirical work is to compute mean dividend yields of firms over (1) a 5-year period and over (2) a 10-year period, all within the post-liberalization period. The computed mean dividend yield of each firm is then compared with the benchmark mean dividend yield of the firm in the 3-year pre-liberalization period. The objective is to determine whether the reduction in dividend yield observed from a comparison of 36-month pre-liberalization period with a 36-month post-liberalization period is maintained over the medium-term and the long-term.

The computed mean dividend yields of the firms, including the mean dividend yield of the overall index (all shares) over the medium to long-term year post-liberalization period, are presented in Appendix L. It is observed that over the medium-term of five years, the decline in the mean dividend yield persisted in 45 firms, 94% of the total sample. There were only three firms (6%) that had means higher than the pre-liberalization mean. The decline in the mean dividend yield at market level also persisted over the medium term. Over the long term of ten years, a total of 36 firms, constituting 75% of the sample, maintained a reduced mean in dividend yield when compared with the pre-liberalization mean. Eleven firms, 23 percent of the total, experienced increases in mean dividend yield over the ten-year horizon. The reduction in dividend yield was also maintained at market level; the ten-year mean was still lower than the pre-liberalization mean.

The significance of the observations on firms is ascertained using a contingency table analysis shown in Table 8.6 below.

Table 8.6

Analysis of Winners and Losers

Period		Lower Mean Persistent?		Control Totals
		Winners	Losers	
Medium Term:	Firm Count	45	3	48
	Expected Count	41.0	7.0	48.0
	% Within Period	93.8%	6.3%	100.0%
	% Within Lower Mean	54.9%	21.4%	50.0%
Long Term:	Firm Count	37	11	48
	Expected Count	41.0	7.0	48.0
	% Within Period	77.1%	22.9%	100.0%
	% Within Lower Mean	45.1%	78.6%	50.0%
Combined Periods:	Firm Count	82	14	96
	Expected Count	82.0	14.0	96.0
	% Within Periods	85.4%	14.6%	100.0%
	% Within Lower Mean	100.0%	100.0%	100.0%
Pearson test statistic $\chi^2 = 0.021$				

The analysis in Table 8.6 shows that a majority of firms had persistently lower mean dividend yields both over the medium term and the long term. However, the persistence is more pronounced over the medium than in the long-term. The Pearson statistic shows that there is association between the periods and the mean persistence.

The support for persistence should be interpreted in the context of the limitations of contingency table analysis. Contingency table analysis is essentially a non-parametric approach that is appropriate where there is doubt as to the distributional assumptions of the sample. The approach is popular in evaluating investment funds, and is used simply to identify the frequency with which funds are defined as winners and losers over successive time periods. The non-parametric contingency tables are, nonetheless, robust under non-normality of fund return distribution. However, in this study persistence is being viewed from the perspective of the dividend yield (the proxy used for cost of equity) assuming an equilibrium mean level in the post-liberalization period, a phenomenon known as mean reversion. Therefore, the study proceeds to employ the appropriate econometric tests that test for this phenomenon to complement the results from

contingency table analysis. The two tests for mean reversion under which the data is subjected to are the ADF test and the variance ratio test.

8.4.2 ADF Tests for Mean Reversion

The second stage of empirical work carries out formal econometric testing for mean reversion. This is done by carrying out of unit root tests on time series of dividend yields, using the augmented Dick-Fuller (ADF) test over both the medium and long-term period. Unit root tests are performed on firms' monthly dividend yields over both five and ten year post-liberalization periods. As explained earlier on, non-existence of unit roots in the series would indicate either mean stationarity (reversion) or trend stationarity. The results of the ADF test 'with trend' for trend reversion and 'without trend' for mean reversion are presented in Appendix M. Analysis of the ADF tests is made in Table 8.7.

Table 8.7
Analysis of ADF Tests

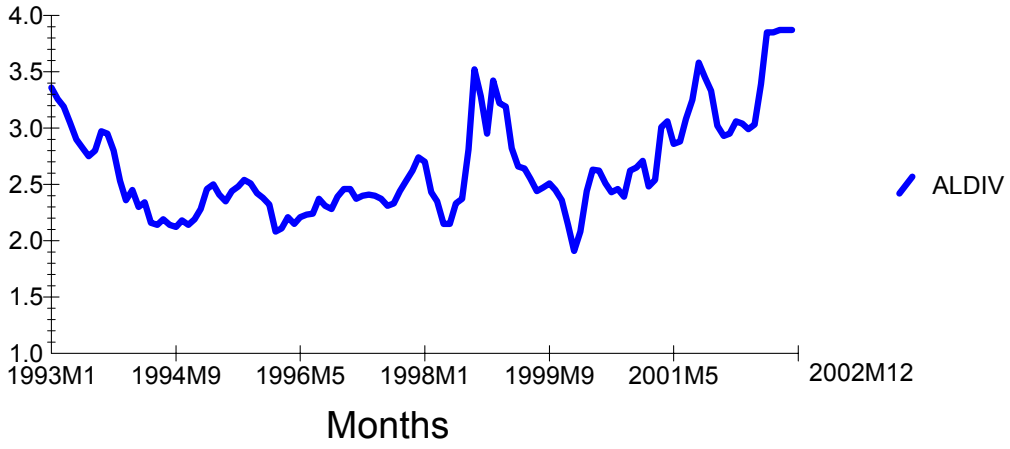
Categories of significance	Medium Term 5 years post-liberalization	Long Term 10 years post-liberalization
No. of mean reverting firms	21 (44%)	18 (37%)
No. of trend reverting firms	6 (12%)	9 (19%)
No. of random walk firms	21 (44%)	21 (44%)
Total	48 (100%)	48 (100%)

Evident from Table 8.7 is that there is more mean reversion in dividend yield over the medium term (21 firms) than over the long term (18 firms). Considering that ADF tests are large sample tests, one would have expected the reverse to occur. A plausible explanation for this result is that beyond the medium term structural breaks in dividend yield time series occurred in a number of firms. There is significant trend reversion in 6 firms over the medium term and in 9 firms over the long term. Trend reversion implies that the dividend yield series are integrated to the order of zero [I (0)] with a time trend. Appendix M also shows significant trend reversion at market level over the long term. In order to determine the overall direction of the trend, the dividend yield series of the overall market, and those firms where significant trend reversion has been detected are graphed.

Figures 8.1 to 8.13 are graphs of post-liberalization dividend yield series of the overall JSE index and firms that have exhibited trend reversion in ADF tests. The statistical properties of these are

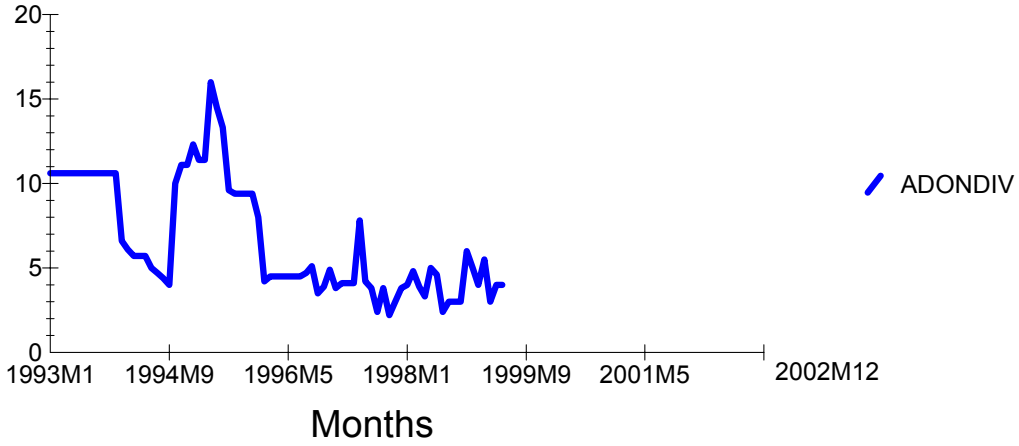
already known; they are integrated to the order of zero [I (0)] with a deterministic trend. Therefore, the sole purpose of the graphs is to determine the direction of the trend, that is, whether it is downward or upwards. If it is downward this would support the hypothesis that the cost of capital trend reverts to a lower mean level following liberalization (Henry, 2000a: 544).

Figure 8.1
All Shares Dividend Yield Series Post-Liberalization



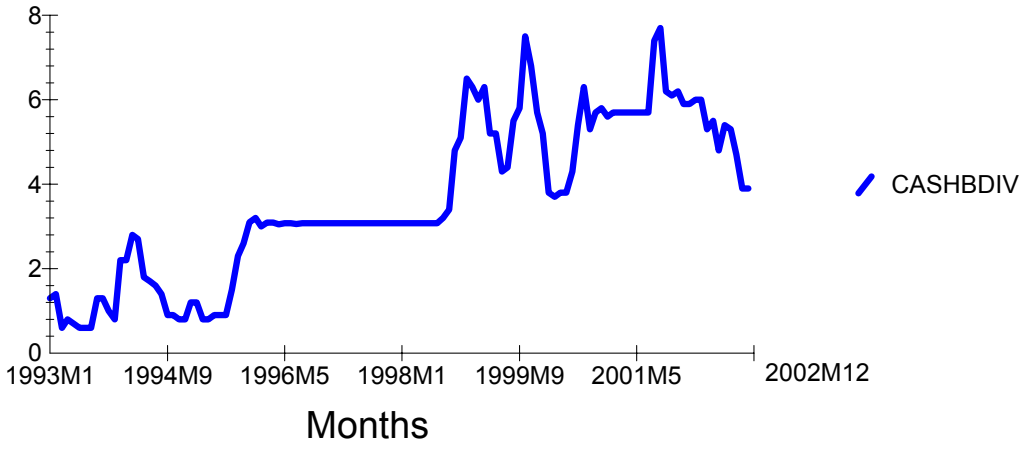
The pre-liberalization dividend yield of the overall index (all shares) averaged 4.14. The post-liberalization mean over ten years is 2.65. Whilst it is still lower than the pre-liberalization, the Figure 8.1 does suggest an upward trend. Therefore, it could be said that the overall index is not trending towards a lower mean dividend yield, the proxy used for cost of equity capital.

Figure 8.2
Adonis Dividend Yield Series



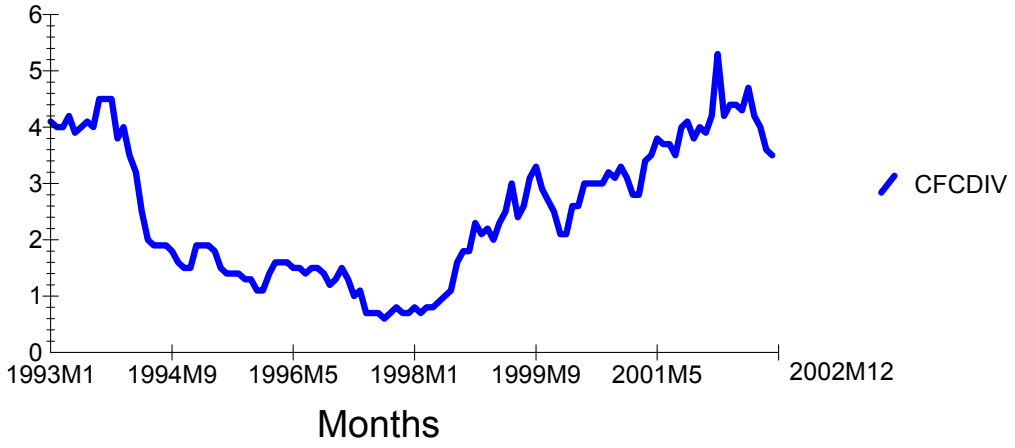
The pre-liberalization dividend yield of the firm ADONIS averaged 13.35. The graph in Figure 8.2 whose series are limited to 1999 clearly shows that the firm is experiencing a downward trend in the average dividend yield.

Figure 8.3
Cashbuild Dividend Yield Series



The pre-liberalization dividend yield of the firm CASHBUILD averaged 4.35. In the first five years post-liberalization the dividend yield exhibited mean reversion at a lower level averaging 2.06 over that period. However, from the beginning of 1998 the trend has been upward, so that over the entire ten year post-liberalization period significant upward trend reversion of the dividend yield is evidenced.

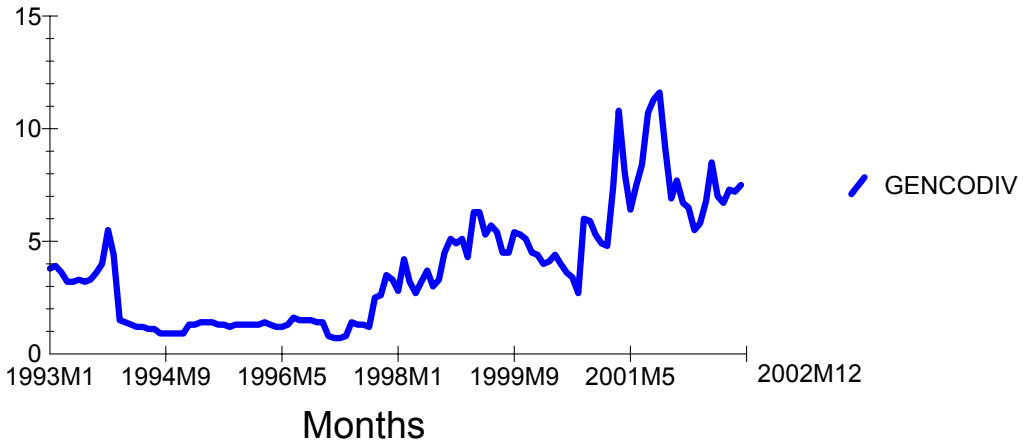
Figure 8.4
CFC Dividend Yield Series



The pre-liberalization dividend yield of the firm CFC averaged 4.20. In the first five years post-liberalization the dividend yield exhibited mean reversion averaging 2.05 over the period.

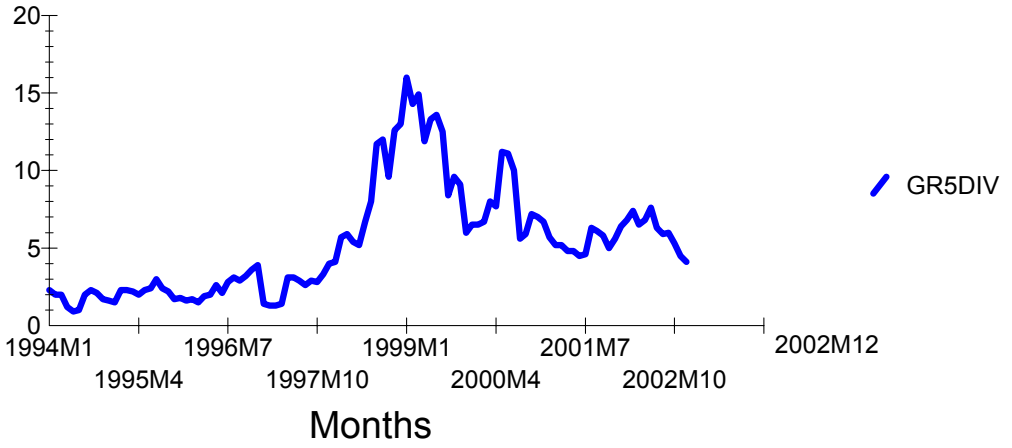
However, from1998 onwards the dividend yield exhibited an upward trend. It can therefore be concluded that the firm's dividend yield first exhibited mean reversion in the first five years post-liberalization and then significantly trended upwards as evidenced in Figure 8.4.

Figure 8.5
Gencor Dividend Yield Series



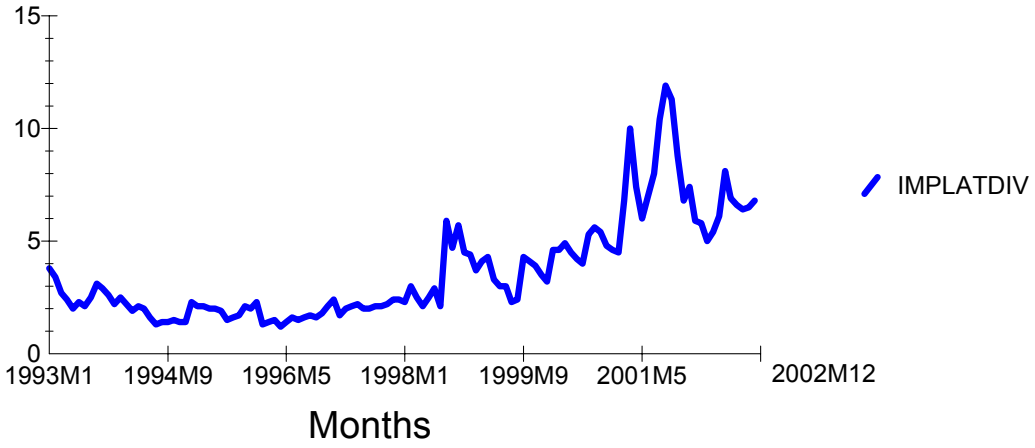
The pre-liberalization mean dividend yield of GENCOR averaged 3.06. From 1993 to 1997 the dividend yield trended downwards averaging 1.85 over the period as evidenced in Figure 8.5. From late 1997 onwards it exhibited an upward movement, which overall in a ten year period statistically reflected a random walk. Therefore, the firm GENCOR could be said to have experienced a downward trend stationary reversion in dividend yield in the medium term (five post-liberalization), which process was reversed in the next five years post-liberalization period.

Figure 8.6
Group-5 Dividend Yield Series



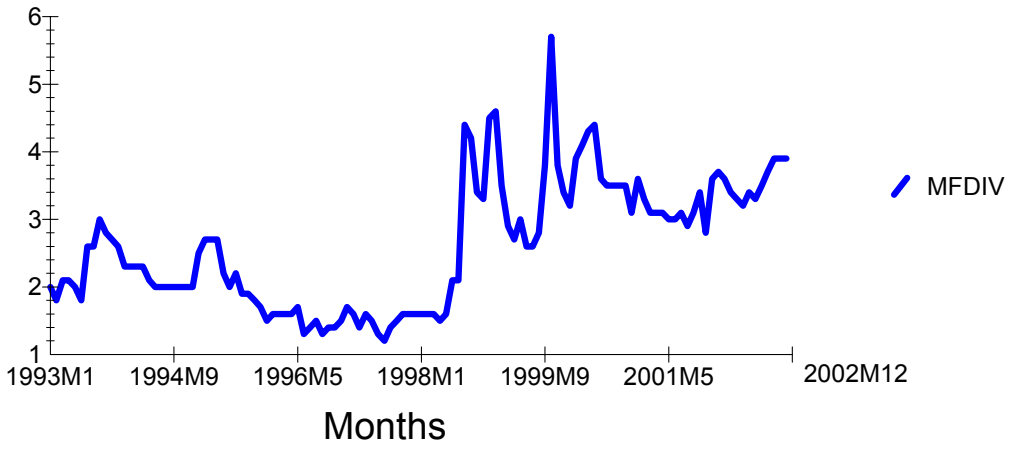
The pre-liberalization dividend yield of GRINDROD averaged 4.45. In the medium term from 1993 to 1997 it significantly trended downward averaging 3.78 lower than the pre-liberalization average. From 1998 onwards it randomly moved upwards above the pre-liberalization average as is evident in Figure 8.6. Therefore, the benefits of liberalization for this firm could be said to have persisted in the medium term, that is, five years post-liberalization, rather than the long term defined as the ten-year period post-liberalization. The graph shows evidence of reversal of gains.

Figure 8.7
Implats Dividend Yield Series



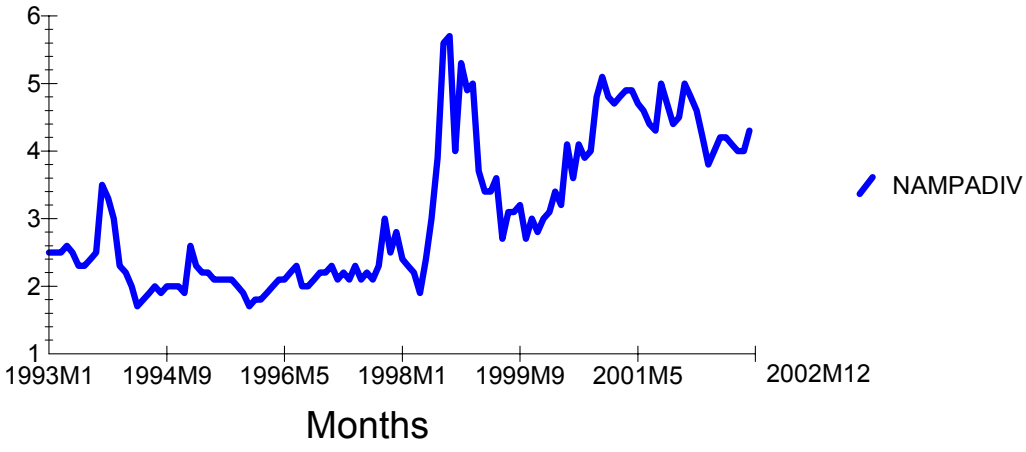
The pre-liberalization dividend yield of the firm IMPLATS averaged 5.40. In the first five years post-liberalization the dividend yield exhibited mean reversion averaging 2.01 over the period. However, from1998 onwards the dividend yield exhibited an upward trend that is evident from Figure 8.7. It can therefore be concluded that the firm's dividend yield first exhibited mean reversion in the first five years post-liberalization and then significantly trended upwards.

Figure 8.9
M & F Dividend Yield Series



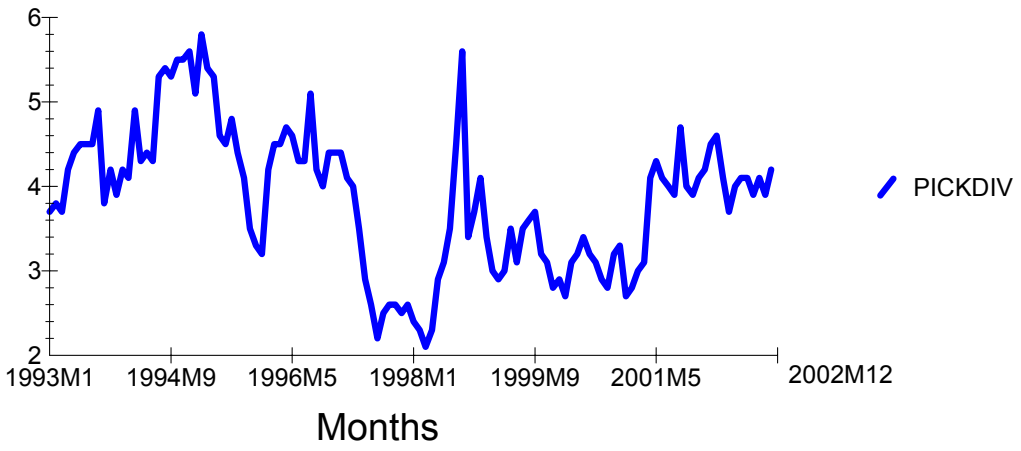
The pre-liberalization dividend of M & F averaged 3.38. In the first five years post-liberalization it moved in a random walk fashion averaging 1.92 over the period. However, from1998 onwards the dividend yield exhibited an upward trend that is evident from Figure 8.9. It can therefore be concluded that the firm's dividend yield first exhibited a lower mean in the first five years post-liberalization and then significantly trended upwards.

Figure 8.10
Nampak Dividend Yield Series



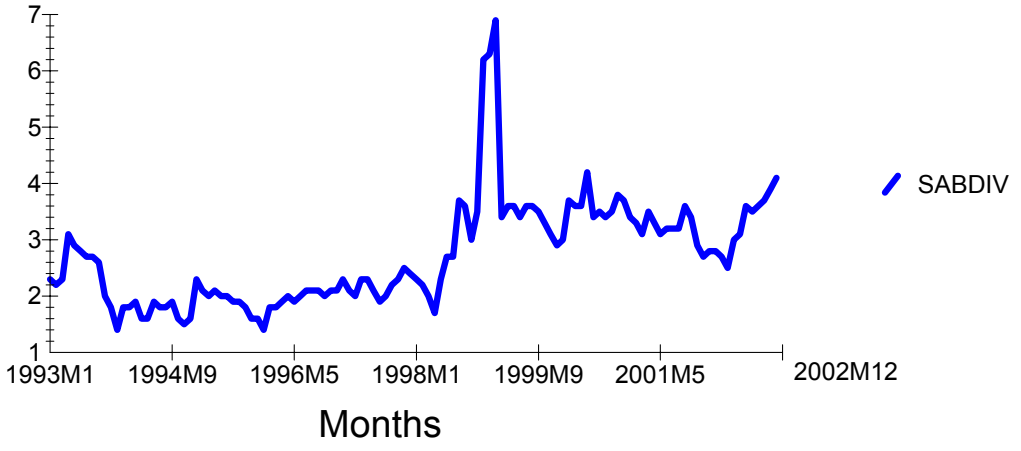
The pre-liberalization dividend of NAMPAK averaged 4.50. In the first five years post-liberalization it exhibited mean reversion averaging 2.22 over the period. However, from 1998 onwards the dividend yield exhibited an upward trend that is evident from Figure 8.10. It can therefore be concluded that the firm's dividend yield first exhibited mean reversion in the first five years post-liberalization but thereafter significantly trended upwards.

Figure 8.11
PicknPay Dividend Yield Series



The pre-liberalization dividend yield of PICKNPAY averaged 5.14. Over the medium term it trended downwards. However, from 1998 it showed upward volatility, which receded from 1999 onwards as is evident in Figure 8.11. Generally, the average dividend yield remained below the pre-liberalization average.

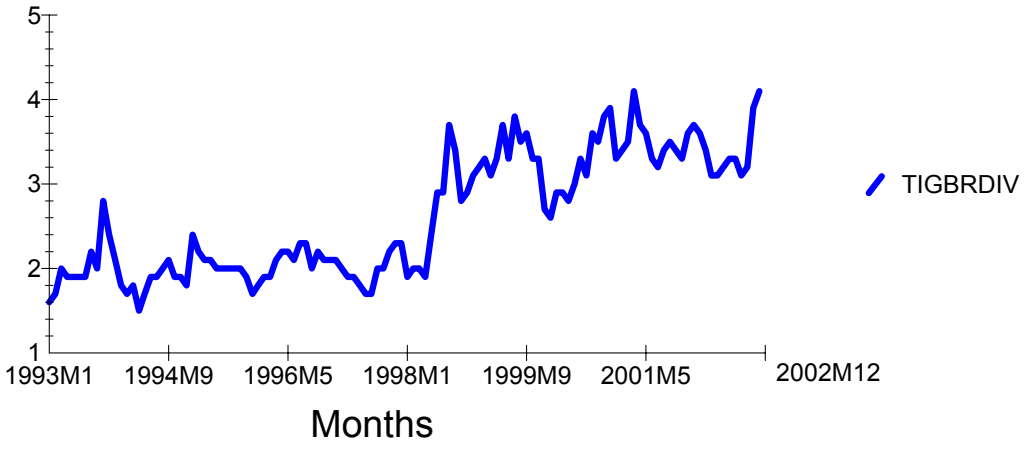
Figure 8.12
SAB Dividend Yield Series



The pre-liberalization dividend of SAB averaged 3.35. In the first five years post-liberalization it exhibited downward trend reversion averaging 2.04 over the period. However, from1998 onwards the dividend yield exhibited an upward trend that is evident from Figure 8.12. It can

therefore be concluded that the firm's dividend yield first exhibited downward trend reversion in the first five years post-liberalization and then significantly trended upwards.

Figure 8.13
Tigerbrands Dividend Yield Series



The pre-liberalization dividend of TIGERBRANDS averaged 3.15. In the first five years post-liberalization it exhibited mean reversion averaging 1.99 over the period. However, from 1998 onwards the dividend yield exhibited an upward trend that is evident from Figure 8.13. It can therefore be concluded that the firm's dividend yield first exhibited mean reversion in the first five years post-liberalization but thereafter significantly trended upwards.

Graphic analysis of those firms that showed trend reversion with ADF tests provides three conclusions. First, all trend reversion in the years 1993 to 1997 (medium term) was downward. Second, all trend reversion over the long-term was upward except for the firm ADONIS. Third, all upward trending started from the beginning of 1998, the year that coincides with the East Asian financial crisis. This shows that crisis could have had some impact on some JSE listed firms in the sense of reversing some gains derived from liberalization. This is, however, an aspect for future research outside the scope of this study.

In testing the hypothesis that the decline in the cost of equity capital is permanent or persistent over time, both mean reversion and downward trend reversion could lend support to this prediction. All trend reversion in the medium term was downward, whereas for the long term only one case was downward and the rest (8 firms) upwards. To summarise results, there is a need to combine downward trend reversion with mean reversion. This is done in Table 8.8.

Table 8.8
Analysis of Mean/Trend Reversion in Dividend Yields

Classification of firms	Medium Term 5 years post-liberalization	Long Term 10 years post-liberalization
No. of mean reverting and downward trend reverting firms	27 (56%)	19 (39%)
No. of upward trend reverting firms	0	8 (17%)
No. of random walk firms	21 (44%)	21 (44%)
Total	48 (100%)	48 (100%)

In summary, the prediction that the decline in the cost of equity capital is permanent is supported by 56% of firms sampled over the medium term and 39% of firms sampled over the long term. In the long-term, a ten-year period post-liberalization, 17% of firms sampled exhibited significant upward trend reversion which from graphical analysis commenced from 1998 - a period coinciding with the East Asian financial crisis. Dividend yield series in 21 firms, 44 percent of the sample total exhibited a random walk. However, from an examination of the summary descriptive statistics, 16 of these firms, a significant 33 percent of the total, had reductions in the dividend yield that persisted in the 10-year post-liberalization period, albeit in a random fashion. There is therefore a possibility that failure of these firms' dividend yields to mean revert could be attributed to the low power of ADF unit root tests to detect mean reversion. Therefore, it is necessary to consider more powerful tests for mean reversion. In this regard the variance ratio test is performed on the data.

8.4.4 Variance Ratio Tests for Mean Reversion

Variance ratios (VRq) of dividend yield series of each firm are computed at horizon (nq) of 24 months, 48 months, 60 months and 108 months. Z-score statistics under the assumption of homoscedasticity denoted as Zq, and those under the assumption of heteroscedasticity denoted as Zq* are calculated for each sample interval. Appendix N shows the results of variance ratio tests performed for the overall market and the 48 firms under investigation.

The interpretation of the results is guided by that of Porteba and Summers (1988) who reported variance ratio tests for a group of 18 countries over the period 1957 to 1986. They found 15 countries having variance ratios of less than one. The sample period was not long enough for them to detect statistical significance, but nevertheless interpreted their results as supporting mean reversion. The variance ratios were interpreted from the basic premise that those lower than one in all sample intervals indicate mean reversion. In the same vein variance ratios greater

than one indicate mean aversion, and those equal to one at all sample intervals indicate a random walk.

Similarly the post-liberalization period of ten years examined in this study could not be considered long enough to detect statistical significance from calculated Z-scores as is indeed the case. Hence, mean reversion is interpreted from the basic premise of variance ratios of less than one at all sample intervals. The analysis of variance ratios in Appendix N shows that a total of 33 firms, representing 69% of the total sampled, had variance ratios of less than one at all horizons (sample intervals). These are interpreted as supporting mean reversion as in Porteba and Summers (1988) after taking into account the short time span. Mean reversion is not uncovered at market level over the long horizon - a result similar to that obtained from ADF tests.

8.4.5 Comparison of Results and Conclusion

Contingency table analysis shows that the majority of firms had persistently lower mean dividend yields both over the medium term and the long term. However, the persistence is more pronounced over the medium than in the long-term. This result is supported by ADF tests, except that in long term the majority did not exhibit sustained decline in cost of capital. Of the 48 firms that had a decline in cost of capital, 56% of the firms had a sustained decline over 5 years, while 39% of the firms sustained decline over 10 years. Variance ratio tests found 69% of the sampled firms to have sustained a decline at all sample intervals. According to both the ADF test and the variance ratio test, the decline in cost of capital was not sustained at market level over the long term.

In conclusion, empirical results of this study substantially support the hypothesis that the decline in firms' cost of equity capital, proxied by the dividend yield following stock market liberalization, is persistent. This persistence is more marked in the medium term period of five years than in the longer horizon of ten years. While firm level analysis supports the hypothesis, market level results do not. Therefore, it can be argued that the gains of liberalization at macro level were reversed. However, micro (firm) level analysis still identifies winners and hence is more insightful.

8.5 Testing Hypothesis 3: The impact of stock market liberalization on cost of capital is independent of the sector to which the firm belongs.

The Chi-square Test for Independence reinforced with the contingency coefficient was performed using the dividend yield model and the earnings yield model for corroboration under the null hypothesis (H_0) that impact is independent of the sector to which a firm belongs.

Observed and expected frequencies in two broad categories of significance are considered, viz. (1) firms with significant decline in cost of capital, and (2) firms with either no change or with significant increase in cost of capital. Tables 8.9 and 8.10 respectively show the results the Chi-Square test under the dividend model and the earnings model.

Table 8.9
Chi-Square Test for Independence using the Dividend Model

Sector	Significant Decline in Cost of Capital	Not Significant plus Significant Increase in Cost of Capital	Total
Basic Industries:			
Firm Count	8	4	13
Expected Count	7.5	5.5	13.0
% Within Sector	61.5%	38.5%	100.0%
Cyclical Consumer Goods:			
Firm Count	3	4	7
Expected Count	4.0	3.0	7.0
% Within Sector	42.9%	57.1%	100.0%
Cyclical Services:			
Firm Count	7	11	18
Expected Count	10.4	7.6	18.0
% Within Sector	38.9%	61.1%	100.0%
Financials:			
Firm Count	13	6	19
Expected Count	11.0	8.0	19.0
% Within Sector	68.4%	31.6%	100.0%
General Industrials:			
Firm Count	6	2	8
Expected Count	4.6	3.4	8.0
% Within Sector	75.0%	25.0%	100.0%
Non-Cyclical Consumer Goods:			
Firm Count	7	3	10
Expected Count	5.8	4.2	10.0
% Within Sector	70.0%	30.0%	100.0%
Resources:			
Firm Count	4	4	8
Expected Count	4.6	3.4	8.0
% Within Sector	50.0%	50.0%	100.0%
Total:			
Firm Count	48	35	83
Expected Count	48.0	35.0	83.0
% Within Sector	57.8%	42.2%	100.0%
Pearson Chi-Square Value = 6.014 and p-value = 0.422 Likelihood Ratio Value = 6.073 and p-value = 0.415 Contingency coefficient = 0.260 and p-value =0.422			

Table 8.10
Chi-Square Test for Independence using the Earnings Model

Sector	Significant Decline in Cost of Capital	Not Significant plus Significant Increase in Cost of Capital	Total
Basic Industries:			
Firm Count	9	4	13
Expected Count	8.8	4.2	13.0
% Within Sector	69.2%	30.8%	100.0%
Cyclical Consumer Goods:			
Firm Count	3	4	7
Expected Count	4.7	2.3	7.0
% Within Sector	42.9%	57.1%	100.0%
Cyclical Services:			
Firm Count	13	5	18
Expected Count	12.1	5.9	18.0
% Within Sector	72.2%	27.8%	100.0%
Financials:			
Firm Count	11	8	19
Expected Count	12.8	6.2	19.0
% Within Sector	57.9%	42.1%	100.0%
General Industrials:			
Firm Count	6	2	8
Expected Count	5.4	2.6	8.0
% Within Sector	75.0%	25.0%	100.0%
Non-Cyclical Consumer Goods:			
Firm Count	8	2	10
Expected Count	6.7	3.3	10.0
% Within Sector	80.0%	20.0%	100.0%
Resources:			
Firm Count	6	2	8
Expected Count	5.4	2.6	8.0
% Within Sector	75.0%	25.0%	100.0%
Total:			
Firm Count	56	27	83
Expected Count	56.0	27.0	83.0
% Within Sector	67.5%	32.5%	100.0%
Pearson Chi-Square Value = 4.058 and p-value = 0.669 Likelihood Ratio Value = 3.967 and p-value = 0.681 Contingency coefficient =0.216 and p-value = 0.669			

In all cases the Pearson Chi-square, the likelihood ratio values and the contingency coefficient support the null hypothesis of independence under both the dividend model and the earnings model.

A further check for robustness is carried out by performing t-tests on dividend yields of four broad sectors of the JSE: resources, financials, commercials and industrials, the broad classification of the South African Reserve Bank. Table 8.11 summarises the results.

Table 8.11
Independent Sample T-Test of Dividend Yields at Sector Level

Sector	Pre-lib Mean DY_1	Std. Deviation	Post-lib Mean DY_2	Std. Deviation	t-statistic	p-value
Commercials	5.0075	1.56695	3.9083	1.16200	3.381	0.001***
Financials	4.1120	1.0906	3.3740	0.9669	3.037	0.003**
Industrials	5.9039	1.72984	4.4583	1.20719	4.112	0.000***
Resources	9.1275	2.09015	7.0711	1.92024	4.347	0.000***
*, **, *** Denote significance at the 10%, 5% and 1% levels respectively						

All the four broad sectors experienced a decline in cost of capital thus confirming the Chi-Square result that the impact of liberalization was independent of the sector to which a firm belonged. This finding is consistent with cross-country findings of Patro and Wald (2004), who found sector composition to have a small influence on which firms do better during liberalization, and to have no significant impact in the post-liberalization. This is also consistent with the observation of Heston and Rouwenhorst (1994) and Griffin and Karolyi (1998), who have suggested that industry factors only explain a small fraction of country index returns.

Whilst sector composition may have insignificant statistical influence, it is apparent that the level of impact was not different from sector to sector. The rankings in terms the percentages of firms that experienced a decline in cost of capital are tabulated in Table 8.12.

Table 8.12
Rankings of Declines in Cost of Capital within Sectors

Sector	Ranking under Dividend Model	Ranking under Earnings Model
Basic Industries	61.5% (4)	69.2% (4)
Cyclical Consumer Goods	42.9% (6)	42.9% (6)
Cyclical Services	38.9% (7)	72.2% (3)
Financials	68.4% (3)	57.9% (5)
General Industrials	75.0% (1)	75.0% (2)
Non-Cyclical Consumer Goods	70.0% (2)	80.0% (1)
Resources	50.0% (5)	75.0% (2)

According to the dividend model, the majority of firms within a sector that experienced a decline in cost of capital belonged to the 'General Industrials Sector', whereas according to the earnings model, the majority belonged to the 'Non-Cyclical Consumer Goods Sector'. There were two sectors - Cyclical Consumer Goods and Cyclical Services - which in terms of the dividend model

the majority of firms within the sectors did not experience a decline in cost of capital. Interestingly, the 'Cyclical Services Sector' had a significant majority of firms experiencing a decline in terms of the earnings model.

Notwithstanding, statistically the impact of stock market liberalization is independent of the sector to which a firm belongs, and hence these seemingly observed differences must be due to other firm specific characteristics other than sectoral composition. The significance of these other firm specific characteristics is explored in chapter 9.

8.6.1 Conclusion

Firm level analysis of the impact of stock market liberalization on the JSE gives results consistent with models of international asset pricing. The main conclusions are five-fold. First, the majority of firms show a decline in the cost of capital following liberalization. Second, the decline in the cost of capital is sustained over the medium and long term for some firms, but it is not sustained at market level.. Third, the impact of liberalization is transmitted to all sectors and is independent of the sector to which a firm belongs. This observation tallies with recent empirical findings of Patro and Wald (2004) at cross-country level. Fourth, we find a sizeable number of firms that experience an increase in the cost of capital following liberalization. Fifth, there is also a sizeable number of firms that experience no change in cost of capital following liberalization.

The empirical results regarding firms experiencing no change in cost of capital and those experiencing an increase in cost of capital necessitated further empirical examination of firm specific characteristics. This is the subject of the following chapter 9 that tests hypothesis 4: The impact of stock market liberalization on cost of capital is influenced by firm specific characteristics.

Chapter 9

Firm Characteristics and the Cost of Capital

9.1 Introduction

In chapter 8 the sector to which a firm belongs was found to be an insignificant explanatory variable regarding the impact on the cost of capital following stock market liberalization. Indeed, other empirical studies by Heston and Rouwenhorst (1994), Griffin and Karolyi (1998) and Patro and Wald (2004) corroborate this observation. Nevertheless, whilst sector composition may have insignificant statistical influence, it was apparent that the impact on our sample was not uniform across firms. Also, as Table 8.12 clearly shows, the effect was not equal across sectors. Therefore, the conclusion that can be drawn is that these seemingly observed differences must be due to other firm specific characteristics independent of sectors. This chapter tests hypothesis 4 that states: The impact of stock market liberalization on cost of capital is influenced by firm specific characteristics. The influence of three firm specific characteristics, viz., the size of the firm, the book-to-market ratio and the leverage ratio are tested. It is acknowledged that this list of firm specific characteristics is not exhaustive, as there are many other characteristics such as the liquidity of a firm's shares, asset structure, corporate governance issues et cetera, that are equally important. In addition, the chapter examines the effect of using the official liberalization date of the JSE as a benchmark for analysis.

The chapter is organized as follows. Sub-section 9.2 re-visits the theory of liberalization and re-examines the empirical evidence as it specifically relates to firms. Sub-section 9.3 examines the effect of the size of the firm vis-à-vis its change in cost of capital following liberalization. Sub-section 9.4 examines the effect of book-to-market ratios. Sub-section 9.5 examines the effect of leverage ratios. Sub-section 9.6 discusses firm-specific event dates as an explanatory variable as to when a firm would respond to the liberalization shock. Sub-section 9.7 examines the effect of using the official liberalization date on firms that lost out when analysis was benchmarked with an effective liberalization date determined from structural breaks on stock market data. Finally, sub-section 9.8 concludes.

9.2 Theory and Evidence

Following stock market liberalization, the capital asset pricing model (CAPM) predicts that two effects will drive the stock price revaluation of each publicly traded firm within a given country (Stulz, 1999a, b, c). As also observed by Lucas (1990) the first effect common to all firms is a

fall in the risk-free rate of return as a country moves from financial autarky to financial integration with the rest of the world. The second effect is specific to any given firm; the greater the covariance of a firm's stock return with the local market, relative to the covariance of its returns with the world market, the larger the firm-specific component of that firm's stock price revaluation. Chari and Henry (2004) observe that when countries liberalize their stock markets some publicly listed firms become eligible for foreign ownership and these are termed investible firms, while others remain off limits to foreign investors and are termed non-investible firms. This generates two testable implications of the CAPM theory. In the first case, if we take two firms that are identical except that one is investible and the other is non-investible, the theory predicts that the revaluation effect on the investible firm would be more strongly related to its covariance structure of returns than that of the non-investible firm. Secondly, the fall in the risk-free rate effect is a common shock to all firms in the economy so that it should be the same across investible and non-investible firms.

Chari and Henry (2004) show that the firm-specific revaluations of investible securities are significantly related to the difference in the covariance of their returns with the local and world markets. Their findings show that an investible firm whose historical covariance with the local market exceeds that of the world market by 0.01 experiences a firm-specific revaluation of 3.4 percent when the stock market is liberalized. In contrast, they find that there is no firm-specific revaluation for non-investible firms. That the common shock is the same for both investible and non-investible firms as predicted by theory is also confirmed. Henry (2000b) observes that the impact of this common shock may be ambiguous. If a country is capital scarce in autarky, the average cost of capital may fall if the liberalization results in a net capital inflow. On the other hand, if a country has followed policies of financial repression and interest rates were kept artificially low, the average cost of capital may increase if the stock market liberalization is accompanied by domestic financial deregulation.

In theory it has been established that permitting foreign investors to enter the local stock market directly or by allowing local assets to trade in overseas stock markets, developing economy firms are able to draw from the global pool of capital to undertake useful investments that generate profits and employment. Furthermore, Obstfeld (1998) and Stulz (1999b) have shown that the scrutiny of foreign investors, foreign equity analysts, and foreign stock listing standards can help resolve agency problems and effectively transmit higher quality reporting and governance standards to developing country firms. Bae, Bailey and Mao (2004) find that information measures typically increase with openness to foreign equity investment, thereby illustrating

another beneficial effect of liberalizing capital barriers. From a detailed sample of Korean firms, they find these effects to differ for firms that rate poorly on governance. In a related study, Bekaert (1995) shows that indirect barriers to foreign investment such as poor credit ratings and the lack of a high quality regulatory and accounting framework are strongly related cross-sectionally with the integration measure.

The international version of the classical capital asset pricing model predicts that to maximise risk-adjusted returns investors should hold the world market portfolio of risky assets. However, in practice domestic assets are heavily weighted in investors' portfolios - a phenomenon called home bias - suggesting that investors are irrational when they eschew the potential gains of diversification. On the other hand, the under-weighting of foreign assets may well be due to rational reasons such as direct and indirect barriers to international investment. The phenomenon of home asset preference have led to researchers believing that even developed markets are not well integrated, and that the concept of international risk sharing is very much dependent on model assumptions (Lewis, 1999; Van Wincoop, 1999). Recently, Stulz (2005) finds that country risk does limit the benefits of financial globalization.

Direct barriers may be of second-order importance; more important are information asymmetries due to poor quality and low credibility of financial information in many countries. The model of Merton (1987) suggests that an indirect barrier, information costs, may affect investor behaviour as they tend to hold stocks that they know and trust. The perceived riskiness of stocks they do not know is high. Portes and Rey (2002) show that information flows are an important determinant of cross-border equity transactions. Asymmetric information between local and non-local investors may be an important factor for investment decisions. In this regard, cross-listing by emerging market firms in the U.S. reduces barriers to U.S. investors. Firms may opt for the U.S. environment because of its investor protection regulations, its accounting standards, disclosure requirements, and its regulatory environment, which in turn compel the cross-listed firms to produce "higher quality" financial information thus reducing information costs (Ahearne et al., 2004; Bae et al., 2004). However, the recent scandals in Enron, WorldCom and Anderson have to some extent discredited US GAAP, hence the introduction of the Sarbanes-Oxley Act in 2002 whose objective was to protect investors by improving the accuracy and reliability of corporate disclosures made pursuant to the securities laws.

9.3 Size of the Firm

The theory does not provide a conclusive firm guidance with regard to the expected post-liberalization performance, though we know that big firms typically have preferred access to resources in developing economies. However, considering that financial liberalization is generally part of a broader reform policy that also liberates the goods and labour markets, provides a more competitive environment for import of technology and raw materials, reduces the cronyism/government role in allocation of projects and resources, the expectation is that such an environment could put smaller firms in a position to realize their growth potential. This would mean that the process of integration and investibility would also extend to smaller firms through spill-over and growth over time. Indeed, from Merton's (1987) investor recognition hypothesis which states that firms with the largest change in visibility would have the largest change in cost of capital, we would expect small firms to benefit more from liberalization than large firms. This should be so if size is taken as proxy for the argument that the smaller the firm the more the amount of visibility the firm receives.

Patro and Wald (2004) find evidence to support Merton's investor recognition hypothesis. In their emerging market sample they observe that small firms have significant higher returns during and after liberalization. They attribute this to a more sustained impact for visibility where smaller emerging market firms gain more international visibility over a period of years starting at liberalization.

However, there is also strong counter empirical evidence to the view that small firms benefit more from liberalization. Given the foreign investor preference for large firms, liberalization would be expected to favour them, as more investors are attracted to them. Christoffersen, Chung and Errunza (2004) show significantly different impact of stock market liberalization across firms. They find that large firms tend to exhibit large revaluation effects, insignificant change in performance, large declines in volatility, and insignificant change in correlation from liberalization, while small firms show small revaluation effects, improved performance, and smaller decline in volatility and decreases in correlation. Their conclusion is that size matters. Also, Kang and Stulz (1997) show that foreign equity portfolios are skewed towards the equities of large firms.

Representing size by market capitalization of each firm in our sample, this study examines whether the each firm's capitalization in the year preceding liberalization benchmark date had an influence on the results of the t-tests on dividend yields as shown in Appendix B. The null hypothesis is set as follows:

H_0: The majority of firms that experienced a decline in the cost of capital following stock market liberalization were small firms.

The hypothesis is tested by comparing the market capitalization prior liberalization of the 83 firms in the sample under two broad categories of significance: (1) firms that experienced decline in cost of capital and (2) firms that did not experience decline -a category combining no significant change and significant increase. Appendix O shows the market capitalization of the firms before liberalization and the associated t-test results. Table 9.1 analyses the firms under three groups: group 1 comprises firms with market capitalization of less than 100 million rands classified as small caps; group 2 comprises firms with market capitalization of between 100 million and 999 million rands classified as mid caps; and group 3 comprises firms with market capitalization of 1 billion rands and above classified as large caps.

Table 9.1
Analysis of the Significance of Market Capitalization

Market capitalization	**Firms that experienced decline in cost of capital**	**Firms that did not experience decline**	**Total**
Small caps: Firm count	12	20	32
% Within market cap	37.5%	62.5%	100.0%
% Within significance	25.0%	57.1%	38.6%
Mid caps: Firm count	14	6	20
% Within market cap	70.0%	30.0%	100.0%
% Within significance	29.2%	17.1%	24.1%
Large caps: Firm count	22	9	31
% Within market cap	71.0%	29.0%	100.0%
% Within significance	45.8%	25.7%	37.3%
Total: Firm count	48	35	83
% Within market cap	57.8%	42.2%	100.0%
% Within significance	100.0%	100.0%	100.0%

Table 9.1 analysis shows that the size of the firm (as measured by market capitalization) prior liberalization had an influence on the results. Merton's recognition hypothesis as represented by the null hypothesis that the majority of firms likely to benefit from liberalization are small firms is rejected in favour of the alternative hypothesis. The size of the firm does matter; an increasing number of firms experienced a reduction in the cost of capital in tandem with increased associated market capitalization. The small cap category is the only one in which the percentage of firms that did not experience a reduction was more than the percentage that registered a reduction in the cost of capital.

The significance of the influence of size of the firm is further confirmed by the Chi-Square test whose results are shown in Table 9.2. The null hypothesis is that impact is independent of the size of the firm. All the test statistics are significant at the 5% level indicating that there is an association between the size of the firm and the benefits it derives from liberalization.

Table 9.2
Market Cap Chi-Square Test Results

Test Statistic	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.832	2	0.012**
Likelihood Ratio	8.892	2	0.012**
Linear-by-Linear Association	7.197	1	0.007***
*, **, *** Denote significance at the 10%, 5% and 1% levels respectively			

The observation that large firms gain more from liberalization is consistent with empirical evidence of Christoffersen, Chung and Errunza (2004) and Kang and Stulz (1997) and others.

9.4 Book-to-Market Ratios

Following Fama and French's (1993) stipulation that firm returns are significantly related to book-to-market ratios, the study tests whether the level of these ratios prior liberalization have significant impact on changes in cost of capital following liberalization.

The book-to-market ratio is derived from taking the value of shareholders' equity less the book value of preferred stock, plus deferred taxes and investment tax credits on the balance sheet, and dividing this total amount by the market price multiplied by outstanding shares. In essence, this ratio attempts to identify undervalued securities by taking the book equity value and dividing it by market value. If the ratio is above 1 then the stock is undervalued, and if it is less than 1 then the stock is overvalued. Thus a stock with a high ratio is often interpreted as a value stock (the market is valuing equity relatively cheaply compared to book value). This is the same as a low price-to-book value ratio. A stock with a price-to-book ratio of less than 1 is interpreted as undervalued whereas one with a price-to-book ratio of over 1 is overvalued. Value managers often form portfolios of securities with low price-to-book values or high book-to-market values.

In emerging markets, it can be argued that most stocks are generally undervalued, that is, having high book-to-market ratios or low price-to-book ratios that would be a product of thin trading characteristic of these markets. This phenomenon is supported by large revaluations effects from empirical evidence of Kim and Singal (2000) and Henry (2000a) at market level; and

Christoffersen et al. (2004) at firm level, among others. Therefore, an analysis of book-to-market ratios of firms before liberalization could provide insightful information that would explain the possible responses following liberalization. A testable null hypothesis in the context of emerging markets would be:

H_0: The majority of firms that experience a reduction in cost of capital following stock market liberalization have high book-to-market ratios (or low price-to-book ratio).

In this study the hypothesis is tested by comparing price-to-book ratios prior liberalization of the 83 firms in the sample under two broad categories of significance: (1) firms that experienced decline in cost of capital and (2) firms that did not experience decline - a category combining no significant change and significant increase. Appendix P shows the price-to-book ratios of the firms prior to liberalization and the associated t-test results. The firms are grouped into two: the first group being that with low price-to-book ratio under 1.2 and the second group being that with high price-to-book ratio of above 1.2. The group division is a subjective one based on a rule of thumb that firms with price-to-book ratios of over 1.2 are significantly over-valued. Table 9.3 analyses the two groups according to levels of significance of t-test results.

Table 9.3
Analysis of the Significance of Price-to-Book Ratio

Price-to-book (P/B) ratio	**Firms that experienced decline in cost of capital**	**Firms that did not experience decline**	**Total**
1.2 and under:			
Firm count	20	23	43
% Within P/B category	46.5%	53.5%	100.0%
% Within significance	41.7%	65.7%	51.8%
Over 1.20:			
Firm count	28	12	40
% Within P/B category	70.0%	30.0%	100.0%
% Within significance	58.3%	34.3%	48.2%
Total:			
Firm count	48	35	83
% Within P/B category	57.8%	42.2%	100.0%
% Within significance	100.0%	100.0%	100.0%

The analysis in Table 9.3 rejects the null hypothesis that the majority of firms that should do well following liberalization are those with lower price-to-book ratios. Firms with high price-to-book ratios (alternatively low book-to-market price ratios) outperform those with low price-to-book

ratios. In other words, over priced firms before liberalization tend to be favoured on liberalization. Why should this be the case?

Before answering the question statistical significance of the influence of price-to-book ratio is tested. The Fisher's Exact test together with the Chi-square test is utilised for examining association between a firm's price-to-book ratio and its performance regarding the cost of capital following liberalization. Fisher's Exact test is a procedure that can be used for data in a two by two contingency table as is the classification of the price-to-book ratios into two categories within two categories of significance, namely, firms that experienced decline in cost of capital and firms that did not experience decline. The test is based on exact probabilities from a specific distribution, the hyper-geometric distribution. Whereas the Chi-square test relies on a large sample approximation, the Fisher's Exact test can be used in situations where a large sample approximation is inappropriate. More over, there is really no lower bound on the amount of data that is needed for the test. One simply has to have at least one data value in each row and one data value in each column. The test is also very useful for highly unbalanced tables. The results of the Fisher's Exact test complemented with those of the Chi-square test are shown in Table 9.4. Both test statistics are significant at the 5% level, indicating that the price-to-book ratio of a firm prior liberalization is an explanatory variable on impact on cost of capital following liberalization.

Table 9.4
Fisher's Exact Test and Chi-Square Test on P/B Ratios

Test Statistic	Value	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.688	0.030		
Likelihood Ratio	4.748	0.029		
Fisher's Exact Test			0.045	0.026
Linear-by-Linear Association	4.632	0.031		
No. of Valid Cases	83			

The observation that firms with high price-to-book ratios (low book-to-market ratios) prior liberalization perform better is counter to intuition and other empirical evidence. The characteristics of emerging markets such as low liquidity, thin trading and poor informational efficiency would suggest under-valuation of securities prior liberalization. Such securities would be expected to gain the most impact following liberalization. Hence the expectation is to obtain

more firms with high book-to-market ratios experiencing profound revaluation and hence reduction in the cost of capital. Indeed, Patro and Wald (2004) found evidence that firms with high book-to-market ratios have higher returns in the post-liberalization period, hence showing the inherent under-valuation. However, their results were not significant after controlling for country-specific effects.

Why a contradictory result is obtained in this study could possibly be explained through establishing a relationship between market capitalization and book-to-market ratios. A visual inspection of Appendix Q that juxtaposes market capitalization of firms and their price-to-market ratios in ascending order shows a possible positive correlation. When the data is first transformed into logarithms and a correlation test performed, the results tabulated in Table 9.5 indicate significant positive correlation.

Table 9.5
Correlation between Market Cap (MC) and Price-to-Book Ratios (P/B)

MC	Pearson Correlation	1	0.609(**)
	Sig. (2-tailed)		0.000
	No. of cases	83	83
P/B	Pearson Correlation	0.609(**)	1
	Sig. (2-tailed)	0.000	
	No. of cases	83	83

** Correlation is significant at the 0.01 level (2-tailed)

Therefore, the positive correlation between market capitalization of firms and the price-to-book ratios explains why the null hypothesis has been rejected. High price-to-book ratios are associated with firms with large market capitalization, which were found to be in the majority in experiencing a reduction in cost of capital following liberalization. Again, the phenomenon that size matters is being confirmed by the data. On the other hand, according to Lev and Sougiannis (1999) the book-to-market ratio could be simply be a "black box" explaining many variables such as size, cost of capital, information asymmetry, growth and many others. The correlation results of this study show that the ratio is associated with the size of the firm.

9.5 Leverage Ratios

The assumption made in the use of the dividend yield model (as adapted from the constant dividend discount model) is that of stable leverage. In other words, the usefulness of the model is tied to stable leverage during both the pre-liberalization and post-liberalization periods. It would therefore be interesting to find out the effect of leverage upon the firm's response to stock market liberalization.

Finance theory postulates that the cost of equity of a firm increases as leverage increases. This proposition was well understood before Modigliani and Miller's (1958) capital structure irrelevance theorem. Though subsequent literature, including that of Modigliani and Miller (1963), has focused on market imperfections that disputes the theorem, Miller (1977) has shown that a limited Modigliani-Miller theorem can still obtain under taxation (assumed to be absent under the theorem) as long as firms costlessly adjust their supply of debt. Furthermore, Senbet and Taggart (1984) demonstrate that Miller's irrelevance proposition can be generalized in any kind of capital market imperfection or incompleteness. Their argument is that if firms have a comparative advantage in dealing with these imperfections, they will have an incentive to act as financial intermediaries. Notwithstanding the argument, the authors acknowledge that capital structure is indeterminate at the individual level, though there is a positive theory of corporate finance at the aggregate level.

The traditional view is that the value of a firm increases as gearing increases, but only at low levels of gearing. However, the value tends to fall off at higher levels of gearing as the risk of debt makes itself felt. In this vein the expected value of the yield on equity can be presented by the equation:

$$E[\text{yield on equity}] = E[\pi] + g(E[\pi] - r) \qquad [1]$$

where $E[\pi]$ is the expected rate of profit on physical capital, g the gearing ratio and r the interest rate on debt. What this equation shows is that the yield on equity is a positive function of the gearing ratio, but only if the interest rate on debt is less than the average rate of profit per unit of physical capital. Thus the random character of π, the profitability of physical capital, introduces risk into the equation. It increases the spread or dispersion of the distribution of the yield on equity. In other words, the risk on the equity yield is increased by high leverage. However, at the heart of the argument is the point that an increase in a firm's gearing increases both the potential profitability of the owners' net assets (their equity) and the risk.

In the context of the liberalization debate the expectation is that, given constant expected cash flows, firms initially saddled with high leverage ratios (debt to assets ratios) are likely to experience lower reduction in cost of equity than those with moderate leverage levels. This should be so on account of the risk-return trade-off. A highly leveraged firm is riskier than a lowly leveraged firm, so that we could expect foreign investors to be attracted to low to medium

leveraged firms, given expected constant cash flows. On the other hand, it is possible for leverage to affect growth in a non-linear fashion. Over a range, the effect may be ambiguous. Leverage can be growth enhancing for a firm at higher levels, but as it rises beyond a certain threshold, the impact may become unambiguously negative.

Under assumptions of constant expected cash flows following liberalization, a null hypothesis that can be tested could be phrased thus:

H_0: The majority of firms that experience a reduction in the cost of capital following liberalization have low to medium leverage ratios.

The hypothesis is tested by comparing leverage ratios prior liberalization of the 83 firms in the sample under two broad categories of significance: (1) firms that experienced decline in cost of capital and (2) firms that did not experience decline - a category combining a "no significant change" and a "significant increase". The leverage ratio used in this study is total debt (both short term and long term) to total assets. Short term debt is included because JSE listed firms usually roll it over more often over time so that it assumes a long term nature. Appendix R shows the leverage ratios of the firms just before liberalization and the associated t-test results. The firms are divided into two groups: the first group being those firms with low to medium leverage ratios, a level subjectively set as under 50%, and the second group being those with leverage ratios above 50%. Table 9.6 analyses the two groups according to levels of significance of t-test results.

Table 9.6
Analysis of the Significance of Leverage Ratios

Leverage ratio	**Firms that experienced decline in cost of capital**	**Firms that did not experience decline**	**Total**
Under 50%:			
Firm count	26	27	53
% Within category	49.1%	50.9%	100.0%
% Within significance	54.2%	77.1%	63.9%
Over 50%:			
Firm count	22	8	30
% Within category	73.3%	26.7%	100.0%
% Within significance	45.8%	22.9%	36.1%
Total:			
Firm count	48	35	83
% Within category	57.8%	42.2%	100.0%
% Within significance	100.0%	100.0%	100.0%

Overall the majority of firms, 54.2% of 48 firms, which experienced a decline in the cost of capital, had leverage ratios under 50%. This supports the null hypothesis that the majority of firms that experience a reduction in the cost of capital following liberalization have low to medium leverage ratios. However, within categories, a different story is evident; a larger percentage of firms with leverage ratio of over 50% experienced a decline than did those within the category of leverage ratio under 50%. This observation lends support to the postulation that leverage can be growth enhancing for a firm at higher levels as long as the interest rate on debt is less than the average rate of profit per unit of physical capital. This conclusion is arrived at from interpreting equation [1] that shows that the yield on equity is a positive function of the gearing ratio, but only if the interest rate on debt is less than the average rate of profit per unit of physical capital.

The Fisher's Exact test complimented with the Chi-square test is then performed to determine the statistical significance of leverage. As utilized in the earlier sub-section 9.4, the Fisher's Exact test is a statistical test used to determine if there are non-random associations between two categorical variables. The results in Table 9.7 show leverage ratio prior liberalization to have a significant statistical effect on firms' cost of capital response following liberalization.

Table 9.7
Fisher's Exact Test and Chi-Square Test on Leverage Ratios

Test Statistic	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.630	1	0.031		
Likelihood Ratio	4.768	1	0.029		
Fisher's Exact Test				0.039	0.026
Linear-by-Linear Association	4.574	1	0.032		
N of Valid Cases	83				

9.6 Event Date as an Explanatory Variable

So far it has been established that the size of the firm, book-to-market ratio and leverage ratio prior liberalization have significant effect on firms' cost of capital responses following liberalization. However, the results should be interpreted bearing in mind that the three variables may be simply explaining one central variable that is not yet identified. For instance, the book-to-market ratio is known to be a function of size, cost of capital, leverage, et cetera, whilst size is a function of leverage, cost of capital, et cetera (Lev and Sougiannis, 1999). Hence, in testing the influence of the three characteristics endogeneity may complicate analysis.

There are still unanswered questions pertaining to why some firms experience no significant change, or experience significant increase in cost of capital. Theoretically, this is explained by the degree of covariance of local returns relative to the covariance of global returns. However, one plausible reason stemming from the problem of dating liberalization is that the benchmark date used to separate the pre-liberalization period from the post-liberalization period may not be appropriate for the particular firm. The study has used an omnibus effective liberalization date determined from structural breaks in stock market time series data for all the firms. It can be argued that firms that positively responded on the basis of analysis from the effective liberalization date reacted to the first signs of liberalization. Indeed, a majority of firms, 57.8% of the total, did positively respond to first indications of financial liberalization. However, it is possible that a particular firm could have its own unique effective liberalization date (structural break date), say, in dividend yield, from which relevant statistical tests should be ideally carried out. In other words, not all firms might be sensitive to the identified effective liberalization date at market level. Resolving the problem would ideally entail identifying an appropriate benchmark date for each firm in question. This is, however, a time consuming exercise whose value is very limited when analysing many firms. An approximate approach is to assume that the firms that experienced either no significant change or some significant increase in the cost of capital on the effective liberalization of the exchange may actually have responded to the liberalization shock when the JSE was official liberalized in March 1995.

Therefore, a testable hypothesis would be that the unique characteristics of those firms that did not respond to the first signs of liberalization could have been that they wanted confirmation of credibility of the liberalization process conferred by official decree. In any case using official liberalization dates has been the most widely used method for benchmarking analysis of impact of stock market liberalization (Henry, 2000a; Kim and Singal, 2000; Bekaert and Harvey, 2000a; Errunza and Miller, 2000; Patro and Wald, 2004; and Christoffersen et al, 2004). Stated more formally, a testable hypothesis is that there are variable effective liberalization dates for different sets of firms. Therefore, if liberalization is not a symmetrical process, differential impact upon individual firms can take place at different dates during the process. In other words, each firm can have its unique liberalization date. Indeed this has been found to be the case for firms that cross list or register ADRs whereby the dates when they do so are defining benchmarks in measuring impact on price or return behaviour. A similar argument can be put forward that firms that experienced either no significant change or a significant change in cost of capital simply did so because the benchmark date utilized, though appropriate for the majority of firms, was not

unique for them. Since the effective liberalization date at market level used as the benchmark for the analysis occurred prior the official liberalization date of the JSE, given as March 1995, it can be argued that firms that responded were the most sensitive to the first early indications of liberalization. The rest of the firms could have been expected to respond positively to the official liberalization date. To determine this necessitates an enquiry into impact of stock market liberalization on these firms having regard to the official liberalization date.

9.7 Event Study using Official Liberalization Date on Losers

The tests for firms that experienced either no significant change or significant increase in cost of capital listed in Appendices G and H are accordingly designed as follows. Taking March 1995 as the official liberalization date, three periods are defined: the three year period from -43 to -7 months of liberalization is referred to as PRE, one year from -6 to +15 months of liberalization is referred as DURING and the three year period from +6 to +41 months of liberalization is referred to as POST. This approach is in accordance with the empirical design in Christoffersen et al (2004) and others. However, in this study the interest is in the pre-liberalization and post-liberalization periods. Hence, an independent sample t-test is performed in respect of the dividend yield of each firm for the PRE and POST period.

Some 35 firms out of a total of 83 did not experience a decline in cost of capital based on analysis from the effective liberalization date determined from structural breaks; 16 of them experienced no significant change and 19 experienced significant increase in cost of capital, and these firms are respectively shown in Appendices E and F. An independent sample t-test is performed on these firms with confidence level set at 95%. Therefore, the level of significance is 5% for the one-tailed test and 2.5% for the two-tailed test. The null hypothesis (H_0) and alternative hypothesis (H_1) are set as follows:

Using the dividend yield as proxy for cost of capital:

H_0: $DY_1 = DY_2$

H_1: $DY_1 > DY_2$ or $DY_1 < DY_2$

where:

DY_1 = pre-liberalization mean dividend yield

DY_2 = post-liberalization mean dividend yield

$DY_1 > DY_2$ indicates a decrease in the cost of capital following liberalization.

$DY_1 < DY_2$ indicates an increase in the cost of capital following liberalization.

The overall results of the independent sample t-test of the firms are shown in Appendix S. However, the three categories are tabulated below as Table 9.8 to 9.10.

Table 9.8

Firms that experienced a significant decline in cost of capital using official liberalization date as benchmark

Firm	Sector	Pre-lib Mean DY_1	Std. Deviation	Post-lib Mean DY_2	Std. Deviation	t-statistic	p-value
CONCOR	Basic Industries	7.8361	2.65611	3.0972	1.31941	9.5870	0.000
SAPPI	Basic Industries	4.7028	2.00777	2.4722	0.661	6.3310	0.000
PALS	Cyclical Cons. Goods	11.1500	3.4709	8.675	1.87683	3.7630	0.000
SEARDEL	Cyclical Cons. Goods	5.8472	2.12932	4.45	1.16974	3.4510	0.001
AF-&-OVE	Cyclical Services	9.2972	2.50764	4.3194	0.91615	11.1870	0.000
BEARMAN	Cyclical Services	10.3111	5.17951	4.0694	1.67908	6.8780	0.000
DON	Cyclical Services	3.4278	1.07693	2.2722	1.32958	4.0520	0.000
GUBINGS	Cyclical Services	10.9583	8.01086	2.2028	0.3982	6.5500	0.000
OCEANA	Cyclical Services	6.8278	0.8457	4.4528	0.55265	14.1050	0.000
PUTCO	Cyclical Services	12.1111	2.684	7.4667	2.98434	6.9430	0.000
REX-TRUE	Cyclical Services	7.1472	1.6382	3.3639	0.85127	12.2960	0.000
BOLTONS	Financials	0.8550	5.1346	6.3917	1.62698	2.4040	0.019
CONFED	Financials	4.6056	1.05963	2.4500	0.3916	11.4430	0.000
EUREKA	Financials	27.9111	16.82311	1.8972	0.69302	9.2700	0.000
BARWORLD	General Industries	6.0167	2.48648	2.5139	0.71839	8.1200	0.000
BICAF	General Industries	29.0250	19.76786	8.3361	1.7258	6.2560	0.000
NAMSEA	Non-Cyclical Cons. Goods	16.8583	12.43064	10.8444	0.60825	2.8990	0.005
SASOL	Resources	4.1861	1.47302	2.9889	0.82385	4.2560	0.000

Table 9.8 show that eighteen firms out of a total of 35 firms that they did not positively respond to the initial liberalization shock did so when the JSE was officially liberalized. The figure indicates that 51 percent of the firms which had not responded to the first liberalization shock did so when the exchange was officially liberalized. This confirms the hypothesis that some firms

have their unique liberalization dates depending on their sensitivity to integration factors. On a combined basis, the total number of firms that positively responded to liberalization both during the first shock (as indicated by structural breaks in financial time series) and during the period of the official decree are 66 firms (48 in the first wave and 18 on official decree) out of a sample of 83 firms. This brings to 79.5 percent of firms that experienced a reduction in cost of capital following liberalization.

However, there are still a number of firms that experience no significant change or experience a significant increase in cost of capital. Table 9.9 shows those firms that continue to experience no significant change using the official liberalization date as a benchmark.

There could be several reasons why some firms may not have been affected by the liberalization shock. One reason could be that such firms might have been internationally integrated well before the liberalization date upon which other firms are being assessed. It is possible that particular firms could well be integrated before the regulatory liberalization by virtue of foreign investors accessing it through country funds, depositary receipts or other means, such as greater involvement in international trade. The other reason could be that the firms concerned were non-investible or off limits to foreign investors because of government policy or any other local conditions.

Table 9.9
Firms that experienced no significant change in cost of capital using official liberalization date as benchmark

Firm	Sector	Pre-lib Mean DY_1	Std. Deviation	Post-lib Mean DY_2	Std. Deviation	t-statistic	p-value
CHEMSERVE	Basic Industries	3.5889	0.6628	4.9667	7.90425	-1.0420	0.301
DORBYL	Basic Industries	4.2500	2.20058	4.2167	2.43973	0.0610	0.952
CMH	Cyclical Cons. Goods	4.2500	2.20058	4.2167	2.43973	0.0610	0.952
METAIR	Cyclical Cons. Goods	6.2889	3.4550	5.4694	1.34692	1.3260	0.189
IPROP	Financials	10.5889	3.6926	9.1333	7.69553	1.0230	0.310
LIBERTY	Financials	2.5722	0.32215	2.7833	2.7833	-1.7660	0.082
CONAFEX	Non-Cyclical Cons. Goods	3.2389	0.88553	3.9222	6.60013	-6.1600	0.540
CROOKES	Non-Cyclical Cons. Goods	4.1139	1.11462	3.5667	1.23866	1.9700	0.053

A scrutiny of Table 9.9 shows five firms - DORBYL, CMH, METAIR, IPROP and CROOKES - actually experienced a reduction in the cost of capital but it was not statistically significant. Two firms - CONAFEX and LIBERTY - are international firms that already had greater involvement in international trade prior liberalization. One firm CHEMSERVE is a local retailing firm whose appeal to foreign investors could have been limited.

Could the same reasons be attributed to those firms that experienced a significant increase in cost of capital shown in Table 9.10?

This is a harder question to answer. Theoretically, this could be the case where the local price of risk of a firm is higher than the global price of risk for some reasons related to domestic protection of certain firms. Empirically**,** this can be attributed to negative re-rating and upward repricing of risk due to increased availability of information that accompanies liberalization (Bae, Bailey and Mao, 2004). Before liberalization, stocks are subjected to scrutiny by solely domestic analysts whose inherently "home bias" is accentuated by market segmentation. Portfolio holdings are likely to be equally biased towards certain favoured firms because of factors such as agency relations that do not reflect firms' true prospects. Because of the favoured status, these firms may exhibit an artificial low cost of capital before liberalization. On liberalization, the scrutiny of foreign investors, foreign equity analysts, and higher accounting standards help to resolve agency problems, thus effectively transmitting higher quality reporting and governance standards to all firms (see Obstfeld 1998, Stulz 1999). Consequently, those favoured firms with an artificial low cost of capital are likely to be re-rated so that the cost of capital rises to a level that reflects their true competitiveness.

On the other hand, it is possible that these firms experienced their liberalization at some date so different from either the structural break dates or the official liberalization date considered in this Study so that the tests performed are not appropriate for them. Furthermore, tests have been performed on the assumption that dividend yield is a good proxy for the cost of equity capital. There are possibilities that this proxy might not be appropriate for some firms. Notwithstanding, when the research problem for the Study was formulated in Chapter 4 theoretical arguments were presented to the effect that there are bound to be winners and losers when the stock market is liberalized [Errunza and Losq (1985)]. In practice, there will be always some firms that remain off-limits to foreign investors, and these are termed non-investible firms.

Table 9.10
Firms that experienced significant increase in cost of capital using the official liberalization date as benchmark

Firm	Sector	Pre-lib Mean DY_1	Std. Deviation	Post-lib Mean DY_2	Std. Deviation	t-statistic	p-value
ELBGROUP	Basic Industries	3.3278	1.43877	4.4833	1.93767	-2.8730	0.005
KERSAF	Cyclical Services	4.2972	1.2070	5.4139	1.88333	-2.9950	0.004
MOBILE	Cyclical Services	1.4806	0.26384	2.1944	0.33205	-10.1000	0.000
SUN INTERN	Cyclical Services	4.5833	1.4958	8.7444	4.7933	-4.9720	0.000
TRENCOR	Cyclical Services	1.4444	0.2443	2.0972	0.28534	-10.4270	0.000
SYCOM	Financials	10.9500	2.11491	15.0778	2.87711	-6.9360	0.000
ANGOLD	Resources	5.1083	1.90644	6.4111	1.52966	-3.1980	0.002
TRNSHEX	Resources	3.1667	0.87112	3.9889	1.41356	-2.9710	0.004
VILLAGE	Resources	19.4278	7.22771	86.5917	16.74957	-22.0900	0.000

9.8 Conclusion

There are several fascinating conclusions from the tests on the effect of firm characteristics vis-à-vis impact on cost of capital following stock market liberalization. First, the size of the firm prior liberalization has got a significant influence on its response to liberalization. The observation that foreign investors prefer large firms is supported in that the majority of firms that experience a reduction in cost of capital are those with large capitalization, the big firms. Second, firms with low book-to-market ratios prior liberalization are preferred contrary to intuition that firms in emerging markets are undervalued as a result of inherent market imperfections. Interestingly, there is a positive correlation between firms with low book-to-market ratio with market capitalization meaning large firms are the ones with low book-to-market ratios. Third, overall firms with low leverage ratios prior liberalization are favoured as suggested by finance theory. However, within categories of low and high leverage ratios, a larger proportion of firms within the higher leverage category experience a reduction in cost of capital than those with low leverage. Fourth, different sets of firms may have their unique event date or liberalization date. This increases the proportion of firms that gained from liberalization. Finally, there are always some firms that fail to derive the cost of capital reduction benefit from liberalization.

Chapter 10

Summary, Conclusions and Directions for Future Research

10.1 Introduction

The major prediction of international pricing models is that under the assumption that firms' expected future cash flows are unaffected by the stock market liberalization, the unexpected response of the stock price of a firm to news of the liberalization should mirror the change in the required rate of return (cost of capital) of the firm. The stock price should increase if liberalization lowers the cost of capital. As this study has shown there is extensive empirical evidence at market level in support of this prediction. However, firm level empirical evidence is still sparse and has been largely limited to examining impact on cross-listings, country funds and American Depositary Receipts (ADRs). More recently, Patro and Wald (2004) and Chari and Henry (2004) find support at firm level for the predictions of theoretical international asset pricing models.

The objectives of this study are broadly two-fold. Firstly, it contributes new evidence to current firm-level analysis on the impact of stock market liberalization in emerging economies. Primarily, the proposition that stock market liberalization reduces the cost of capital of firms is empirically tested on JSE listed firms. The study focuses on a single country for comprehensiveness and uses national and private databases as data sources, unlike cross-country studies that have relied on data from the Standard & Spoor's IFC Emerging Market Data Base (EMDB). Very often the IFC EMDB are not comprehensive because the IFC uses size, liquidity and industry as criteria in selecting stocks to include in a country index, which results in the inclusion of the largest and the most actively traded stocks on the major exchange of each market. Yet it is equally important to know whether the benefits of liberalization also trickle down to small firms.

Secondly, the objective of the study is to investigate whether the benefits of liberalization are simply transitory or permanent, and to discern any firm specific characteristics that influence firms' responses to stock market liberalization. A top-down approach, starting with the analysis at market level, then at sector and firm level, and finally analyzing firm specific characteristics, is adopted. Furthermore, rather than benchmarking empirical work around official liberalization dates, this study first determines the effective liberalization date by testing for structural breaks in stock market data as suggested by Bekaert, Harvey and Lumsdaine (2002b) and Chaudhuri and Wu (2003).

In summary, the research objectives are five-fold. Firstly, the study tests for structural breaks in financial time series to date the integration of the JSE and utilizes break dates representing effective liberalization dates to benchmark firm level analysis. Secondly, the study examines whether stock market liberalization resulted in a significant decline or increase in the cost of equity capital. Thirdly, the study tests the hypothesis that the decline in firms' cost of equity capital is permanent or persistent; in other words whether the cost of capital exhibits mean reversion in the post-liberalization period. Fourthly, it examines whether the impact of liberalization was symmetrical across all sectors. Fifthly, it examines the influence of firm specific characteristics on empirical results.

The chapter is structured as follows. Sub-section 10.2 provides a summary of empirical results. Sub-section 10.3 provides a synthesis of the contribution of this study to new knowledge. Sub-section 10.4 concludes by providing directions for future research.

10.2 Summary of Results

10.2.1 Important Insights from Theory

Emanating from the discussions on the relevance is the prominence of the counter-Modigliani-Miller revolution in corporate finance that it makes a difference whether a firm is financed through debt or equity. Indeed there is a difference in their incentive and risk-sharing effects. Equity enables the firm to undertake greater risks. This has led to calls for an increased role of equity markets for raising new capital. It is one reason why the promotion of the development of equity markets and their liberalization in developing countries has taken a central role in development finance.

International asset pricing models predict that as capital markets integrate, the cost of capital will decline as risk is globally diversified (Stulz, 1981; Errunza and Losq, 1985, 1989; Eun and Janakiramanan, 1986; and Stulz, 1999c). However, recent observations by Stulz (2005) show that the "twin agency problems" that arise because rulers of sovereign states and corporate insiders pursue their own interests at the expense of the outside investors determine how well investors can share risks across countries, and separate savings decisions from investment decisions. These problems may limit the impact of financial globalization. Furthermore, the theoretical models of the integration process discussed are static models of integrated/segmented economies because there is no economic model as yet that specifies the true dynamic process that moves an economy from a segmented status to an integrated status. Hence, the empirical models by which we

characterize the degree of openness of capital markets may be lacking an appropriate theoretical framework, especially taking into account that policy makers in emerging markets are prone to strategically open their markets to maximize revenues from privatization programmes.

10.2.2 Extant Evidence on Financial Liberalization

Though controversial, the link between financial development and economic growth is not disputed in the literature (Schumpeter, 1912; Goldsmith, 1969, McKinnon, 1973, Shaw, 1973, Kuznets, 1971, Cameron, 1967; Townsend, 1983; and Greenwood and Jovanovic, 1990). So is the desirability of financial liberalization, with its timing and sequencing appropriately designed. Empirical evidence, especially that of Levine (2002) and LLSV (2000) suggests that distinguishing between bank-based and market-based financial systems is not analytically useful for understanding the process of growth. They find no support for public policies aimed at creating a particular mix of financial markets and intermediaries. It is suggested that emphasis should be placed on strengthening the rights of investors and improving the efficiency of contract enforcement, that is, the specific laws and enforcement mechanisms that govern both debt and equity transactions. Ncube and Senbet (1997) find evidence for this contention in the context of financial liberalization in Africa. More recently, Morck, Yeung and Yu (2000) observe that in emerging markets weak property rights discourage informed trading and therefore prevent firm-specific information from being incorporated into stock prices.

The prediction of international asset pricing models that stock market liberalization in emerging markets reduces the cost of capital is overwhelmingly supported at market level (Bekaert and Harvey, 2000a; Henry, 2000a; Kim and Singal, 2000). Few studies have focused on the micro dimension, that is, firm level analysis. This research gap is addressed in this study.

10.2.3 Methodological Approaches

Empirically, methodological problems in investigating the impact of stock market liberalization have revolved around measuring the cost of capital in emerging markets in the presence of liquidity constraints, and in designing appropriate statistical or econometric techniques for measuring the impact. As regards measuring the cost of capital, researchers have resorted to the use of proxies rather than attempting to compute it. The dividend yield has emerged as the most widely used choice as proxy for cost of capital. The P/E ratio (or its reciprocal, the earnings yield) is considered to be the second credible choice as it is a market ratio closely followed and trusted by market participants. However, stock returns have also been utilized in studies and have produced results consistent with those from dividend yields. Empirical evidence shows that the

use of the CAPM is problematic both in the context of modern and emerging markets. With regard to the JSE there is evidence that the two factor APT model provides a better account of the relationship between macroeconomic forces, and the model addresses key deficiencies of the single factor CAPM in the South African financial environment (Vans Rensburg, 2002; Van Rensburg and Slaney, 1997). More so, the beta estimation of JSE firms has been fraught with problems (Bowie and Bradfield, 1994; Bradfield, 1989; and Bradfield et al., 1988).

With regard to designing research strategies for testing impact of stock market liberalization, the starting point is the resolution of the dating problem. Once a benchmark separating the pre-liberalization period from the post-liberalization period has been established, various econometric or statistical techniques can be applied in the context of the event study methodology or modifications thereof. Panel data test procedures are increasingly becoming popular in emerging market research where data sufficiency problems are severe because these procedures exploit the extra information provided by the pooled cross sectional time series of variables, and dramatically increase the power of tests. This study has used a battery of statistical and econometric techniques ranging from parametric to non-parametric techniques. The selection of a technique has depended on its appropriateness for the hypothesis being tested.

10.2.4 The Effective Liberalization Date of the JSE

The problem of dating stock market liberalization using time series of South African stock market data has been examined. Defining the effective date of stock market liberalization as that on which there is a structural change in time series data, tests for structural breaks are performed. The tests are performed on time series of aggregate monthly dividend yield, volume of shares traded and aggregate stock price of the JSE. From the time series of the aggregate dividend yield and stock market liquidity, two structural breaks are reported, the first of which occurred in February 1990, and the second in December 1992. From the time series of the real aggregate stock price one structural break that occurred in December 1992 is reported. Noteworthy is that the structural breaks occurred earlier than the JSE's official liberalization date of March 1995, thus suggesting that for South Africa political and economic risks were the more binding constraints to foreign investment than were legal barriers.

Accordingly, the identified structural break dates have been used to benchmark empirical analysis in this study. The pre-liberalization period has been defined as the pre-February 1990 period while post-liberalization period has been taken as the post-December 1992 period. The

intervening period between February 1990 and December 1992 is taken as the liberalization window.

10.2.5 Empirical Analysis at Market and Firm Level

Both market and firm level analyses of the impact of stock market liberalization on the JSE give results consistent with the prediction of international asset pricing models that stock market liberalization reduces the cost of equity capital. The results are also consistent with the findings of other researchers. The main firm level conclusions are six-fold. First, the majority of firms (58% of the sampled 83 firms) experience a decline in the cost of capital following liberalization. Second, the decline in firms' cost of capital is persistent. A majority of firms exhibited mean reversion of the post-liberalization dividend yield, the proxy used for the cost of capital, both in the medium and long term, but not to the same degree. Third, the impact of liberalization is found to be transmitted to all sectors and is independent of the sector to which a firm belongs. This observation tallies with recent empirical findings of Patro and Wald (2004) at cross-country level, and with earlier studies by Heston and Rouwenhorst (1994) and Griffin and Karolyi (1998). Fourth, the study finds a sizeable number of firms (22% of the sampled 83 firms) that experience an increase in the cost of capital following liberalization. It is hypothesized that this could be attributed to the reduction in information asymmetries resulting in re-rating of firms. Improved accounting and governance and increased information about firms often accompany stock market liberalization (Bae, Bailey and Mao, 2004). With increased information and increased analyst coverage by both domestic and foreign analysts repricing of risk, a revision of the cost of capital of firms either downward or upward should possibly take place. The number of analysts covering domestic firms should increase as an emerging market becomes more open to foreign portfolio investment. Fifth, a sizeable number of firms (20% of the sampled 83 firms) experienced no change in the cost of capital following liberalization, showing that there are some firms that remain off limits to foreign investors. Finally, the study supports the hypothesis that liberalization is gradual and that some firms may have their unique effective liberalization date. Whilst a majority of firms have the same effective liberalization date derived from market level structural changes of stock market financial time series, there are some firms whose response took place at a different date for one reason or another. In this study there were a number of firms (51%) that registered a positive response to liberalization only after the official liberalization date (March 1995) when direct legal barriers were removed. These firms had earlier experienced either no change or an increase in cost of capital when examined on the basis of the effective liberalization date derived from structural breaks of stock market financial time series.

10.2.6 The Effect of Firm Specific Characteristics

Firm specific characteristics prior to liberalization have had an influence on the change in firms' cost of capital following stock market liberalization. First, the size of the firm prior to liberalization has a significant influence on its response to liberalization. The majority of firms that experience a reduction in cost of capital are those with large capitalization. This result is consistent with the recent work of Christoffersen, Chung and Errunza (2004). Second, firms with low book-to-market ratios prior to liberalization are preferred, contrary to intuition that firms in emerging markets are undervalued as a result of inherent market imperfections. However, this observation is reconciled in that there is a positive correlation between firms with low book-to-market ratio with high market capitalization, meaning that large firms are the ones with low book-to-market ratios. Third, the majority of firms that experience a reduction in cost of capital are those with low leverage ratios prior to liberalization, an observation consistent with theory. Within categories of firms with low and high leverage ratios, a larger proportion of firms within the higher leverage category experience a reduction in cost of capital than those with low leverage - an observation consistent with the growth enhancing characteristic of leverage.

10.3 Contribution of the Study

The empirical results of the study provide new insights into emerging markets finance research, which is still in its infancy due to the fairly short histories available in standard databases like the International Finance Corporation's Emerging Market Database and the Morgan Stanley Capital International. This study used national and private databases which are comprehensive in their coverage of firm level data. New evidence on the impact of stock market liberalization in the context of a single country that is consistent with other cross-country studies does emerge.

First, the study shows that some country specific risks such as political and economic risks can be more binding constraints to foreign investment than direct legal barriers which foreign investors always find ways to circumvent. In the case of South Africa, a country that had instituted complex legal barriers to limit the participation of foreign investors on the JSE following the imposition of international economic sanctions and subsequent large scale disinvestments by foreign companies, the dawn of political liberalization in 1990 and the lifting of sanctions in 1992 paved the way for the return of foreign investors well before the scrapping of legal barriers in March 1995.

Indeed, structural breaks in stock market data identified in February 1990 and December 1992 respectively, following the unbanning of ANC and the lifting of international economic sanctions, show that political and economic risks proved to the more effective barriers to foreign investment in South Africa than did legal barriers. Structural breaks defined the effective liberalization dates which are linked to important political and economic events. It should however be noted that most research on impact of stock market liberalization has been benchmarked from official liberalization dates – the dates when legal barriers are officially removed. This study departed from this practice by benchmarking analysis from dates when actual binding constraints on foreign investment were broken and produced results consistent with the predictions of international asset pricing models.

The second contribution of this study relates to the observation that there are some firms that will experience a significant increase in the cost of capital following liberalization. Whilst this phenomenon is theoretically feasible, it has not been emphasized or investigated empirically. The theoretical model of Eun and Janakiramanan (1986) and Stulz (1999c) highlight two channels through which liberalization affects firm-level required rate of return. The first channel is through the change in the risk-free rate and is common to all firms. The second channel is one specific or idiosyncratic to a particular firm that depends on the covariance of the firm's stock return with the local market, minus the covariance of the firm stock return with the world market. Henry (2000b) has demonstrated the adverse effect of the first channel, in that the cost of capital may increase if stock market liberalization is accompanied by domestic financial deregulation if a country had previously followed policies of financial repression. However, the adverse effect of the second channel has not been emphasized in the literature. What has been emphasized is that the global price of risk is lower than the local price of risk because the world market portfolio is less volatile than the local market portfolio. Under such conditions, the expected rate of return of a firm from a segmented market should decline when the stock market is liberalized and priced in an integrated market. There have been also observations of certain firms being off limits to foreign investors and hence experiencing no change in cost of capital.

The findings by this study of a substantial number of firms experiencing a significant increase in the cost of capital show that there is a possibility of some firms having a higher global price of risk than local risk following liberalization. This can arise from state protection of certain firms and from information asymmetries that are only resolved through liberalization. Such firms are re-rated negatively and their risk repriced upwards following liberalization. This negative re-rating and upward repricing of risk could be the result of increased availability of information

that accompanies liberalization. It is hypothesized that before liberalization stocks are subjected to scrutiny by solely domestic analysts whose inherently "home bias" is accentuated by market segmentation. Portfolio holdings are likely to be equally biased towards certain favoured firms because of factors such as agency relations that do not reflect firms' true prospects. As a result of the favoured status, these firms may exhibit an artificial low cost of capital before liberalization. On liberalization, the scrutiny of foreign investors, foreign equity analysts, and requirements of higher accounting standards help to resolve agency problems, thus effectively transmitting higher quality reporting and governance standards to all firms. Consequently, those favoured firms with an artificial low cost of capital are likely to be re-rated so that the cost of capital rises to a level that reflects their true competitiveness. As to whether the increase would reverse over time may depend on the individual firm's attractiveness to foreign investors.

The third contribution of this study is that it has empirically proved that the reduction in firms' cost of capital following stock market liberalization is permanent and persistent. It is not a transitory phenomenon. Extant empirical studies on impact of stock market liberalization have largely interpolated long-term effects from event studies around market openings. This study has shown that the majority of firms exhibit mean reversion in the cost of equity capital in the post-liberalization period. However, mean reversion is shown to be more marked in the medium term period of five years than in the longer horizon of ten years. Nevertheless, the uncovering of substantial mean reversion could be indicative of the proposition that the benefits of liberalization are not reversed in the long term for some firms. Market level analysis did not exhibit mean reversion and thus, firm level analysis was more insightful.

The fourth contribution of the study is highlighting the influence of firm specific characteristics such as size of the firm, book-to-market ratios and leverage on firms' response to impact of stock market liberalization. The preference for large firms by foreign investors is supported, contrary to Merton's (1987) recognition hypothesis, hence highlighting the inconclusiveness of the debate on whether stock market liberalization benefits large firms or small firms. Furthermore, firms with low book-to-market ratios prior to liberalization are preferred contrary to intuition that firms in emerging markets are undervalued as a result of inherent market imperfections. However, this observation was reconciled with the finding of a positive correlation between firms with low book-to-market ratio with high market capitalization, meaning that large firms were the ones with low book-to-market ratios.

The fifth contribution of the study is the observation that the effective liberalization date is not the same for all firms but varies among firms. This supports the proposition that liberalization is a gradual and dynamic process. Therefore, the static segmented/integrated models we use for measuring its impact might be inadequate. In this study, the variability of the effective liberalization date has been simply captured by performing equivalent tests on two dates – structural break dates and the official liberalization date, but still using the same static segmented/integrated model. The use of the official liberalization date (1995) as event date has highlighted the gradual nature of the liberalization process.

Finally, this is the first South African study that analysed comprehensively the effects of stock market liberalization. This has been done at both macro and micro (firm) level.

10.3 Directions for Future Research

Given the foreign investor preference for large firms, the opening of stock markets should have a differential impact across firms. This study together with other studies by Christoffersen, Chung and Errunza (2004) and Kang and Stulz (1997) has shown the majority of firms that have benefitted from liberalization to be large firms. However, it is also important for foreign investors to learn about the behaviour of smaller firms that may constitute future diversification opportunities. This has not been investigated in this study, though such firms were identified to have experienced reductions in cost of capital. Future research could track the performance of such firms in the post-liberalization period with a view to establishing whether it improves over time. It is still debatable as to whether the benefits of stock market liberalization trickle down to the smaller firms.

This study found more firms with low book-to-market ratios prior liberalization experiencing a reduction in cost of capital, something that is counter to intuition, having regard to the characteristics of emerging markets. The characteristics of emerging markets such as low liquidity, thin trading and poor informational efficiency would suggest such firms having high book-to-market prior liberalization to reflect under-valuation. Recent empirical evidence by Patro and Wald (2004) found evidence that firms with high book-to-market ratios have higher returns post-liberalization, hence showing the inherent under-valuation. However, their observation was not significant after controlling for country-specific fixed effects. Therefore, in the light of the contradictory finding in this study and inconclusive current empirical evidence, further research is warranted in this area.

Generally, the debate on the influence of firm specific characteristics on the impact of stock market liberalization is still in its infancy and empirical evidence is still inconclusive. Morck, Yeung and Yu (2000) document evidence that stock prices contain relatively little firm-specific information. On the other hand, Chari and Henry (2001) suggest that emerging market stock prices do convey information about firm-specific changes in systematic risk when the economy is opened to foreign portfolio investment. However, contrary to the conventional wisdom that security analysts specialize in the production of firm-specific information, a recent study by Chan and Hameed (2005) finds that securities that are covered by more analysts incorporate greater market-wide information and lesser firm-specific information in emerging markets, and that more analyst coverage leads to an increase in stock price synchronicity. Furthermore, after controlling for the influence of firm size on the lead-lag relation, they find that the returns on a high analyst-following portfolio lead returns as compared to a low analyst-following portfolio. Empirical questions for future research that arise are whether these observations explain the little support for Merton's (1987) recognition hypothesis in favour of the preference for large firms by foreign investors. Other firm-specific characteristics such as asset structure and corporate governance issues are also subjects for future research.

Another important issue for further study pending the availability of reliable data is liquidity. Illiquidity is considered to be a critical impediment to investing in emerging markets (Nishiotis, 2002). Therefore, liquidity measures can be used as conditioning factors to investigate the impact of stock market liberalization since it is predicted that equity market liberalization significantly improves the level of liquidity. Bekaert, Harvey and Lundblad (2003) are doing some pioneering work in this regard. They find their measure of liquidity (proportion of zero daily firm returns averaged over the month) to significantly predict future returns while alternative measures such as turnover do not. Also, consistent with liquidity being a priced factor, they find that unexpected liquidity shocks to be positively correlated with return shocks and negatively correlated with shocks to the dividend yield. In this study the importance of liquidity as a priced factor has only been emphasized by the identification of structural breaks in volume traded that coincided with those of the dividend yield and the stock price at market level. This, in a different way, lends support to the Bekaert et al. (2003) observation that there is some correlation between liquidity, stock returns and dividend yield. Notwithstanding the above, research on liquidity is still in its infancy, hence needing further research.

Finally, this study has examined the impact of stock market liberalization on firms of a single emerging economy, South Africa. It would be of interest to know how the impact on these South

African firms compares with similarly classified firms in other emerging markets. The liberalization years for emerging markets whose firms could be compared to those of South Africa are Argentina 1991, Brazil 1990, Mexico 1993, Indonesia 1992, South Korea 1993, and Thailand 1990. Considering that effective liberalization date of the JSE Securities Exchange was also found to lie between the years 1990 and 1992, a comparative study with the named countries could shed new light on impact of stock market liberalization on firms' cost of capital. This is a natural domain for future research following this study.

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APPENDICES

APPENDIX A
SAMPLE OF FIRMS

Date Listed	Company Name	Name Abbreviation	Sector
1986	ABSA Group Ltd	ABSA	Financial
1969	Adonis Knitwear Holdings Ltd	ADONIS	Cyclical Consumer Goods
1966	AECI Ltd	AECI	Basic Industries
1948	African & Overseas Enterprises Ltd	AF-&-OVE	Cyclical Services
1964	African Oxygen Ltd	AFROX	Basic Industries
1986	Afrox Healthcare Ltd	AHEALTH	Non-Cyclical Consumer Goods
1946	Allied Technologies Ltd	ALTECH	General Industrials
1958	Allied Electronics Corp. Ltd	ALTRON	General Industrials
1987	Anbeeco Investment Holdings Ltd	ANBEECO	Cyclical Consumer Goods
1917	Anglo American PLC	ANGLO	Resources
1933	Anglovaal Industries Ltd	ANGLOVAAL	Non-Cyclical Consumer Goods
1944	AngloGold Ltd	ANGOLD	Resources
1933	Anglovaal Mining Ltd	AVMIN	Resources
1941	Barloworld Ltd	BARWORLD	General Industrials
1984	Bearing Man Ltd	BEARMAN	Cyclical Services
1946	BICC CAFCA Ltd	BICAF	General Industrials
1947	Bolton Industrial Holdings Ltd	BOLTONS	Financials
1946	Burlington Industries Ltd	BURLINGTON	Cyclical Consumer Goods
1986	Cashbuild Ltd	CASHBIL	Basic Industries
1962	Caxton Publishers & Printers	CAXTON	Cyclical Services
1980	Centrecity Property Fund	CENPROP	Financials
1984	Commercial Finance Co. Ltd	CFC	Financials
1967	Chemical Services Ltd	CHEMSER	Basic Industries
1987	Combined Motor Holdings Ltd	CMH	Cyclical Consumer Goods
1985	Conafex Societe Anonyme	CONAFEX	Non-Cyclical Consumer Goods
1981	Concor Ltd	CONCOR	Basic Industries
1947	Congella Federation Ltd	CONFED	Financials
1900	Canadian Overseas Packaging Industries Ltd	COPI	Basic Industries
1909	Coronation Holdings Ltd	COROHLD	Financials
1948	Crookes Brothers Ltd	CROOKES	Non-Cyclical Consumer Goods
1947	Don Group Ltd	DON	Cyclical Services
1948	Dorbyl Ltd	DORBYL	Basic Industries
1951	Edward L Bateman -ELB Group 08.02.02	ELBGROUP	Basic Industries
1969	Ellerine Holdings Ltd	ELLERINE	Cyclical Services
1945	Eureka Industrial Ltd	EUREKA	Financials
1941	Foschini Ltd	FOSCHINI	Cyclical Services
1902	GENCOR Ltd	GENCOR	Financials
1986	Grindrod Unicorn Group Ltd - Grindrod Ltd 04.06.01	GRIDROD	Cyclical Services
1974	Group Five Ltd	GROUP-5	Basic Industries
1964	Gubb & Inggs Ltd	GUBINGS	Cyclical Services
1969	Highveld Steel & Vandium Corp. Ltd	HIVELD	Basic Industries

1985	Hudaco Industries Ltd	HUDACO	General Industrials
1973	Impala Platinum Holdings Ltd	IMPLATS	Resources
1986	INVESTEC Holdings-INVESTEC 29.07.02	INHOLD	Financials
1968	Iprop Holdings Ltd	IPROP	Financials
1981	JD Group Ltd	JDGROUP	Cyclical Services
1984	Kersaf Investments Ltd (Sun International Ltd)	KERSAF	Cyclical Services
1962	Liberty Group Ltd	LIBERTY	Financials
1968	Liberty Holdings Ltd	LIB-HOLD	Financials
1970	Mutual & Federal insurance Co. Ltd	M-&-F	Financials
1949	Metair Investments Ltd	METAIR	Cyclical Consumer Goods
1949	Metje & Ziegler Ltd	METJE-&-Z	General Industrials
1986	Metropolitan Life Ltd	METLIFE	Financials
1969	Mobile Industries Ltd	MOBILE	Cyclical Services
1969	Nampak Ltd	NAMPAK	Cyclical Services
1948	Namibian Sea Products Ltd	NAMSEA	Non-Cyclical Consumer Goods
1969	NEDCOR Ltd	NEDCOR	Financials
1947	Oceana Group Ltd	OCEANA	Cyclical Services
1957	Omina Holdings Ltd	OMNIA	Basic Industries
1984	Ozz Ltd	OZZ	General Industrials
1963	Palabora Mining Co Ltd	PALAMIN	Resources
1987	Pals Holdings Ltd	PALS	Cyclical Consumer Goods
1981	Pick N Pay Holdings Ltd	PICKNPAY	Non-Cyclical Consumer Goods
1969	Pick N Pay Stores Ltd	PIKWIK	Non-Cyclical Consumer Goods
1910	Pretoria Portland Cement Co Ltd	PPC	Basic Industries
1929	The Premier Group Ltd	PREM-GR	Financials
1955	Putco Ltd	PUTCO	Cyclical Services
1948	Reunert Ltd	REUNERT	General Industrials
1945	Rex Trueform Clothing Co Ltd	REX-TRUE	Cyclical Services
1897	SABMiller PLC (formerly SA Breweries)	SABMILLER	Non-Cyclical Consumer Goods
1969	SA Eagle Insurance Co Ltd	SA-EAGLE	Financials
1964	Santam Ltd	SANTAM	Financials
1937	SAPPI Ltd	SAPPI	Basic Industries
1979	Sasol Ltd	SASOL	Resources
1995	Seardel Investment Co Ltd	SEARDEL	Cyclical Consumer Goods
1985	Sun International (South Africa) Ltd	SUN INTERN	Cyclical Services
1986	Sycom Property Fund	SYCOM	Financials
1944	Tiger Brands Ltd	TIGBRANDS	Non-Cyclical Consumer Goods
1952	Tongaat-Hulett Group Ltd	TONGAAT	Non-Cyclical Consumer Goods
1955	Trencor Ltd	TRENCOR	Cyclical Services
1981	Trans Hex Group	TRNSHEX	Resources
1934	Village Main Reef Gold Mining Co Ltd	VILLAGE	Resources
1968	Wesco Investments Ltd	WESCO	Cyclical Services

APPENDIX B
RESULTS OF T-TEST ON FIRMS' DIVIDEND YIELDS

Firm	Mean DY_1	Std. Deviation	Mean DY_2	Std. Deviation	t-statistic	p-value	Accept H_0 or H_1: $DY_1 > DY_2$ or $DY_1 < DY_2$
ABSA	6.168	1.1393	5.216	0.88726	3.29624	0.002	$DY_1 > DY_2$
ADONIS	13.3519	1.62702	8.4222	3.47511	6.676	0.000	$DY_1 > DY_2$
AECI	5.78	1.1843	3.984	1.7606	4.23216	0.000	$DY_1 > DY_2$
AF-&-OVE	6.536	2.0293	7.772	2.9245	-1.73612	0.090	$DY_1 = DY_2$
AFROX	4.172	0.38245	2.324	0.39294	16.8511	0.000	$DY_1 > DY_2$
AHEALTH	3.5308	0.74429	1.2692	0.20569	10.5597	0.000	$DY_1 > DY_2$
ALTECH	3.1231	0.35155	2.6923	0.4663	2.388	0.025	$DY_1 > DY_2$
ALTRON	4.912	1.1278	3.932	0.49136	4.01381	0.000	$DY_1 > DY_2$
ANBEECO	10.188	2.24357	6.528	2.43713	5.524	0.000	$DY_1 > DY_2$
ANGLO	3.404	0.91172	2.34	0.73655	4.539	0.000	$DY_1 > DY_2$
ANGLOVAAL	2.36	0.77028	1.136	0.16042	7.77826	0.000	$DY_1 > DY_2$
ANGOLD	4.24	0.92826	3.916	1.5478	0.898	0.374	$DY_1 = DY_2$
AVMIN	1.904	0.35294	1.124	0.23144	9.24043	0.000	$DY_1 > DY_2$
BARWORLD	7.6308	2.3514	7.5462	1.8532	0.1019	0.920	$DY_1 = DY_2$
BEARMAN	6.9615	1.7086	8.1385	8.1385	-1.74748	0.093	$DY_1 = DY_2$
BICAF	20.804	8.7267	40.464	14.2849	-5.8723	0.000	$DY_1 < DY_2$
BOLTONS	4.556	1.1748	7.908	6.5099	-2.53361	0.018	$DY_1 < DY_2$
BURLINGTON	3.712	0.85114	3.268	0.43753	2.31973	0.026	$DY_1 > DY_2$
CASHBIL	4.356	0.82466	1.28	0.64807	14.6638	0.000	$DY_1 > DY_2$
CAXTON	4.6462	0.57099	2.1846	0.17246	14.8797	0.000	$DY_1 > DY_2$
CENPROP	9.808	1.1053	9.212	0.61733	2.35391	0.024	$DY_1 > DY_2$
CFC	4.2	0.68191	3.152	1.1322	3.96473	0.000	$DY_1 > DY_2$
CHEMSERVE	4.816	0.71396	4.488	5.7186	0.28457	0.778	$DY_1 = DY_2$
CMH	7.024	1.36665	8.428	3.56564	-1.838	0.072	$DY_1 = DY_2$
CONAFEX	3.088	1.0584	2.896	1.2654	0.58193	0.563	$DY_1 = DY_2$
CONCOR	4.9	2.8122	10.0077	1.0688	-3.81348	0.001	$DY_1 < DY_2$
CONFED	5.36	0.58878	5.352	0.49254	0.05211	0.959	$DY_1 = DY_2$
COPI	1.964	0.39463	1.152	0.35487	7.65	0.000	$DY_1 > DY_2$
COROHLD	15.056	5.2689	2.000	1.6768	12.0725	0.000	$DY_1 > DY_2$
CROOKES	4.088	1.008	4.18	1.413	-0.33381	0.740	$DY_1 = DY_2$
DON	1.6615	0.67273	3.0538	1.3697	-3.28973	0.004	$DY_1 < DY_2$
DORBYL	4.9077	0.83911	4.0923	1.1835	2.02638	0.055	$DY_1 = DY_2$
ELBGROUP	0.6415	0.087706	3.5692	0.6033	-17.2876	0.000	$DY_1 < DY_2$
ELLERINE	13.3538	2.0695	3.2154	0.57423	17.0207	0.000	$DY_1 > DY_2$
EUREKA	17.568	6.1247	41.6792	17.5426	-6.37088	0.000	$DY_1 < DY_2$
FOSCHINI	4.148	0.58745	3.0667	1.3037	3.71715	0.001	$DY_1 > DY_2$
GENCOR	3.064	0.34385	2.384	1.4221	2.24997	0.033	$DY_1 > DY_2$
GRINDROD	4.448	0.46289	2.888	0.63726	9.90308	0.000	$DY_1 > DY_2$
GROUP-5	12.0923	1.4648	1.7615	0.49081	24.1106	0.000	$DY_1 > DY_2$

GUBINGS	4.132	0.58003	12.592	9.1898	-3.01168	0.004	$DY_1 < DY_2$
HIVELD	8.556	2.3712	3.132	1.1856	10.7113	0.000	$DY_1 > DY_2$
HUDACO	6.712	0.9645	3.96	0.8124	11.41	0.000	$DY_1 > DY_2$
IMPLATS	5.4	1.5097	2.2	0.65701	9.71781	0.000	$DY_1 > DY_2$
INHOLD	10.38	4.3947	2.036	0.55218	9.41921	0.000	$DY_1 > DY_2$
IPROP	6.6462	0.86083	10.3	1.8704	-6.39841	0.000	$DY_1 < DY_2$
JDGROUP	5.932	0.90587	3.884	1.0742	7.28738	0.000	$DY_1 > DY_2$
KERSAF	5.3538	0.99383	5.5	1.2537	-0.32939	0.745	$DY_1 = DY_2$
LIBERTY	0.57692	1.0289	2.4462	0.16132	-6.47138	0.000	$DY_1 < DY_2$
LIB-HOLD	3.6	0.36742	2.5308	0.19742	9.24274	0.000	$DY_1 > DY_2$
M-&-F	3.384	0.78829	2.236	0.32517	7.39592	0.000	$DY_1 > DY_2$
METAIR	4.796	0.47913	7.912	2.94665	-5.219	0.000	$DY_1 < DY_2$
METJE-&-Z	6.056	1.3562	3.2833	0.79819	8.76291	0.000	$DY_1 > DY_2$
METLIFE	5.6385	1.5935	3.2615	0.57087	5.06308	0.000	$DY_1 > DY_2$
MOBILE	0.16923	0.075107	1.5846	0.32621	-15.2454	0.000	$DY_1 < DY_2$
NAMPAK	4.508	1.0851	2.328	0.44956	9.28027	0.000	$DY_1 > DY_2$
NAMSEA	18.5	5.2265	22.116	11.5366	-1.42753	0.163	$DY_1 = DY_2$
NEDCOR	5.724	1.1666	3.112	0.43428	10.4912	0.000	$DY_1 > DY_2$
OCEANA	5.8077	1.1258	6.3231	0.70137	-1.40096	0.176	$DY_1 = DY_2$
OMNIA	9.116	1.842	6.332	1.8634	5.31262	0.000	$DY_1 > DY_2$
OZZ	62.5538	21.9925	3.8077	0.65506	9.62683	0.000	$DY_1 > DY_2$
PALAMIN	15.872	2.49675	5.668	5.68607	8.216	0.000	$DY_1 > DY_2$
PALS	10.1	1.24633	9.7846	3.84598	0.282	0.780	$DY_1 = DY_2$
PICKNPAY	5.1385	0.3453	4.1769	0.37673	6.78445	0.000	$DY_1 > DY_2$
PIKWIK	3.4615	0.26938	2.88	0.17889	5.926	0.000	$DY_1 > DY_2$
PPC	5.944	1.403	3.1941	0.81813	5.57723	0.000	$DY_1 > DY_2$
PREM-GR	3.656	1.1691	2.176	1.4443	3.98241	0.000	$DY_1 > DY_2$
PUTCO	21.5308	57.6231	11.06	0.67676	0.57479	0.576	$DY_1 = DY_2$
REUNERT	4.088	1.1256	2.408	0.56341	6.67347	0.000	$DY_1 > DY_2$
REX-TRUE	5.5615	1.8963	7.6538	1.9475	-2.77534	0.011	$DY_1 < DY_2$
SAB	3.348	0.50176	2.076	0.48501	9.11368	0.000	$DY_1 > DY_2$
SA-EAGLE	8.0385	0.93678	4.0308	0.30382	14.6727	0.000	$DY_1 > DY_2$
SANTAM	8.8462	2.6098	5.1462	0.43323	5.04271	0.000	$DY_1 > DY_2$
SAPPI	4.5077	0.55296	5.5846	1.9304	-4.72994	0.000	$DY_1 < DY_2$
SASOL	4.5	0.57155	5.6154	1.1901	-3.04606	0.000	$DY_1 < DY_2$
SEARDEL	6.5462	0.87141	7.8462	1.56717	-2.614	0.015	$DY_1 < DY_2$
SUN INTERN	6.1385	1.8976	6	1.5067	0.20604	0.839	$DY_1 = DY_2$
SYCOM	9.3231	0.64699	11.9923	3.0349	-3.1014	0.000	$DY_1 < DY_2$
TIGBRANDS	3.152	0.75173	1.952	0.27707	7.48909	0.000	$DY_1 > DY_2$
TONGAAT	3.568	0.5513	2.432	0.8915	5.41887	0.000	$DY_1 > DY_2$
TRENCOR	2.7615	0.66023	3.8462	0.97521	-3.32088	0.000	$DY_1 < DY_2$
TRNSHEX	2.7615	0.66023	3.8462	0.97521	-6.18064	0.000	$DY_1 < DY_2$
VILLAGE	13.0385	2.5705	19.4077	7.0594	-2.75858	0.015	$DY_1 < DY_2$
WESCO	2.5811	0.74901	2.2541	0.35245	2.40305	0.020	$DY_1 > DY_2$

APPENDIX C
RESULTS OF T-TESTS ON FIRMS' TRANSFORMED DIVIDEND YIELDS

Firm	Mean DY_1	Std. Deviation	Mean DY_2	Std. Deviation	t-statistic	Sig. (two-tailed): p-value	Accept H_0 or H_1: $DY_1 > DY_2$ or $DY_1 < DY_2$
ABSA	14.32314	1.364687	13.15819	1.139348321	3.276418	0.002	$DY_1 > DY_2$
ADONIS	21.512	1.33096	16.8854	3.51536	6.154	0.000	$DY_1 > DY_2$
AECI	13.84511	1.441356	11.28432	2.410449369	4.559	0.000	$DY_1 > DY_2$
AF-&-OVE	14.61009	2.588373	15.95383	2.985250021	-1.70045	0.096	$DY_1 = DY_2$
AFROX	11.77431	0.548564	8.741829	0.713108941	16.85289	0.000	$DY_1 > DY_2$
AHEALTH	10.7739	1.178032	6.44951	0.522549312	12.09862	0.000	$DY_1 > DY_2$
ALTECH	10.16403	0.584712	9.411981	0.823233766	2.685367	0.013	$DY_1 > DY_2$
ALTRON	12.72748	1.485934	11.51865	0.557463853	3.739461	0.001	$DY_1 > DY_2$
ANBEECO	18.5107	2.15369	14.4874	2.79478	5.701	0.000	$DY_1 > DY_2$
ANGLO	10.54063	1.452604	8.698834	1.374626987	4.60469	0.000	$DY_1 > DY_2$
ANGLOVAAL	8.707308	1.560885	6.103342	0.441023281	8.027052	0.000	$DY_1 > DY_2$
ANGOLD	11.8182	1.3034	11.2492	2.04037	1.175	0.246	$DY_1 = DY_2$
AVMIN	7.899062	0.738617	6.056291	0.616528003	9.576687	0.000	$DY_1 > DY_2$
BARWORLD	15.84504	2.696771	15.77106	2.523472423	0.072229	0.943	$DY_1 = DY_2$
BEARMAN	15.20348	1.870978	16.49135	1.841174756	-1.76897	0.090	$DY_1 = DY_2$
BICAF	26.62387	6.388604	39.47798	9.04767996	-5.80276	0.000	$DY_1 < DY_2$
BOLTONS	12.22446	1.649406	14.78481	7.450307855	-1.67766	0.100	$DY_1 < DY_2$
BURLINGTON	11.03916	1.296597	10.39298	0.70620305	2.188308	0.034	$DY_1 > DY_2$
CASHBIL	12.0036	1.078312	6.314468	1.57226171	14.9203	0.000	$DY_1 > DY_2$
CAXTON	12.42719	0.769968	8.493816	0.334534213	16.89333	0.000	$DY_1 > DY_2$
CENPROF	18.22472	1.071957	17.65988	0.61123566	2.288673	0.027	$DY_1 > DY_2$
CFC	11.78975	0.971928	10.05207	1.95715212	3.976015	0.000	$DY_1 > DY_2$
CHEMSERVE	12.64372	0.967969	11.46284	4.846483968	1.194696	0.238	$DY_1 = DY_2$
CMH	15.2935	1.62082	16.5379	3.66183	-1.554	0.127	$DY_1 = DY_2$
CONAFEX	9.98962	1.697393	9.556953	2.246112801	0.768408	0.446	$DY_1 = DY_2$
CONCOR	14.30636	4.777947	18.19243	0.980078383	-2.87367	0.008	$DY_1 < DY_2$
CONFED	13.36829	0.738843	13.36344	0.620072929	0.025104	0.980	$DY_1 = DY_2$
COPI	8.020958	0.778651	6.075399	1.05427302	7.422149	0.000	$DY_1 > DY_2$
COROHLD	22.53014	4.266386	7.460769	3.136102525	14.41255	0.000	$DY_1 > DY_2$
CROOKES	11.55934	1.368689	11.64512	1.987938011	-0.1801	0.858	$DY_1 = DY_2$
DON	7.267199	1.502816	9.823363	2.325103279	-3.32902	0.003	$DY_1 < DY_2$
DORBYL	12.75632	1.12599	11.51846	1.999707414	1.944784	0.064	$DY_1 = DY_2$
ELBGROUP	4.601061	0.310242	10.85536	0.926447245	-23.0808	0.000	$DY_1 < DY_2$
ELLERINE	21.38213	1.731393	10.29042	0.95867513	20.20719	0.000	$DY_1 > DY_2$
EUREKA	24.45086	4.747675	38.15258	13.30896711	-4.8483	0.000	$DY_1 < DY_2$
FOSCHINI	11.7253	0.824521	9.46629	2.926141491	3.715368	0.001	$DY_1 > DY_2$
GENCOR	10.02818	0.556844	8.492932	2.697156229	2.894012	0.006	$DY_1 > DY_2$
GRINDROD	12.15985	0.644962	9.726689	1.10428999	9.513156	0.000	$DY_1 > DY_2$

GROUP-5	20.32003	1.254763	3.926286	3.932507951	14.5654	0.000	$DY_1 > DY_2$
GUBINGS	11.70109	0.84066	19.65287	7.737505714	-5.1084	0.000	$DY_1 < DY_2$
HIVELD	16.867	2.386156	9.940907	1.917793882	11.57768	0.000	$DY_1 > DY_2$
HUDACO	14.97928	1.111776	11.39247	1.143466539	11.4527	0.000	$DY_1 > DY_2$
IMPLATS	13.31392	1.925544	8.441564	1.268511962	10.56531	0.000	$DY_1 > DY_2$
INHOLD	18.38609	4.283377	8.132408	1.115058594	11.58311	0.000	$DY_1 > DY_2$
IPROP	14.91104	1.00759	18.65765	1.722189931	-6.77025	0.000	$DY_1 < DY_2$
JDGROUP	14.05791	1.110349	11.26057	1.619826963	7.122056	0.000	$DY_1 > DY_2$
KERSAF	13.32878	1.24837	13.48519	1.574688854	-0.28063	0.781	$DY_1 = DY_2$
LIBERTY	3.741373	2.347697	8.993555	0.30283065	-7.99993	0.000	$DY_1 < DY_2$
LIB-HOLD	10.92402	0.576965	9.147225	0.365195349	9.382034	0.000	$DY_1 > DY_2$
M-&-F	10.53746	1.206537	8.714334	0.770664694	6.367177	0.000	$DY_1 > DY_2$
METAIR	12.6361	0.62985	16.0739	3.15645	-5.34	0.000	$DY_1 < DY_2$
METJE-&-Z	14.159	1.67408	10.8434	1.59241	7.175	0.000	$DY_1 > DY_2$
METLIFE	13.58549	2.183428	10.37196	0.878262495	4.923222	0.000	$DY_1 > DY_2$
MOBILE	2.305269	0.515143	7.197413	0.739838457	-19.5658	0.000	$DY_1 < DY_2$
NAMPAK	12.15816	1.639157	8.740038	0.827950189	9.306611	0.000	$DY_1 > DY_2$
NAMSEA	25.15803	4.558621	27.31304	8.078031581	-1.16167	0.251	$DY_1 = DY_2$
NEDCOR	13.7712	1.485137	10.13634	0.731810426	10.97716	0.000	$DY_1 > DY_2$
OCEANA	13.88291	1.423378	14.54497	0.807781981	-1.45856	0.158	$DY_1 = DY_2$
OMNIA	17.49248	1.840958	14.42793	2.200770602	5.340344	0.000	$DY_1 > DY_2$
OZZ	53.67806	15.01974	11.2133	1.001952857	10.17124	0.000	$DY_1 > DY_2$
PALAMIN	23.41875	1.948973	10.23078	9.559799088	6.758593	0.000	$DY_1 > DY_2$
PALS	18.5005	1.18122	17.7116	3.82099	0.711	0.484	$DY_1 = DY_2$
PICKNPAY	13.09521	0.448275	11.78225	0.537906333	6.760755	0.000	$DY_1 > DY_2$
PIKWIK	10.71508	0.424513	9.744418	0.414474138	5.898864	0.000	$DY_1 > DY_2$
PPC	14.01043	1.785148	11.21525	1.817118819	5.486583	0.000	$DY_1 > DY_2$
PREM-GR	10.86662	1.930999	8.260277	2.031191038	4.649894	0.000	$DY_1 > DY_2$
PUTCO	13.60388	0.844406	20.50714	1.776468121	-12.2318	0.000	$DY_1 < DY_2$
REUNERT	11.56702	1.586974	8.868743	1.057137679	7.075279	0.000	$DY_1 > DY_2$
REX-TRUE	13.4554	2.42178	15.9568	2.01983	-2.86	0.009	$DY_1 < DY_2$
SAB	10.514	0.8172	8.2328	0.95466	9.076	0.000	$DY_1 > DY_2$
SA-EAGLE	16.44756	0.963838	11.57478	0.433957166	16.62121	0.000	$DY_1 > DY_2$
SANTAM	17.10003	2.901025	13.10167	0.555918736	4.880574	0.000	$DY_1 > DY_2$
SAPPI	12.23728	0.764509	13.10635	4.095005897	-0.75219	0.459	$DY_1 = DY_2$
SASOL	12.22655	0.767677	13.63977	1.477015097	-3.06104	0.005	$DY_1 < DY_2$
SEARDEL	14.7957	1.00408	16.1946	1.68663	-2.57	0.017	$DY_1 < DY_2$
SUN INTERN	14.20148	2.208295	14.07512	1.856881028	0.157904	0.876	$DY_1 = DY_2$
SYCOM	17.7693	0.63698	20.1415	2.54957	-3.255	0.003	$DY_1 < DY_2$
TIGBRANDS	10.15675	1.242861	8.013316	0.556051322	7.871116	0.000	$DY_1 > DY_2$
TONGAAT	10.85761	0.852052	8.831196	1.642722669	5.475166	0.000	$DY_1 > DY_2$
TRENCOR	4.325565	1.667882	7.134081	0.64941012	-5.6576	0.000	$DY_1 < DY_2$
TRNSHEX	4.325565	1.667882	7.134081	0.64941012	-5.6576	0.000	$DY_1 < DY_2$
VILLAGE	21.07859	2.224719	25.1032	4.47593784	-2.88258	0.008	$DY_1 < DY_2$

WESCO	8.844702	1.477496	8.320532	0.744036125	2.454391	0.016	$DY_1 > DY_2$

APPENDIX D
FIRMS THAT EXPERIENCED A DECLINE IN COST OF CAPITAL ACCORDING TO THE DIVIDEND MODEL

Firm	Sector	Pre-lib Mean DY_1	Std. Deviation	Post-lib Mean DY_2	Std. Deviation	t-statistic	p-value
ABSA	Financial	6.1680	1.1393	5.2160	0.8873	3.296	0.002
ADONIS	Cyclical Cons. Goods	13.3519	1.6270	8.4222	3.4751	6.676	0.000
AECI	Basic Industries	5.7800	1.1843	3.9840	1.7606	4.232	0.000
AFROX	Basic Industries	4.1720	0.3825	2.3240	0.3929	16.851	0.000
AHEALTH	Non-Cyclical Cons. Goods	3.5308	0.7443	1.2692	0.2057	10.560	0.000
ALTECH	General Industrials	3.1231	0.3516	2.6923	0.4663	2.388	0.025
ALTRON	General Industrials	4.9120	1.1278	3.9320	0.4914	4.014	0.000
ANBEECO	Cyclical Cons. Goods	10.1880	2.2436	6.5280	2.4371	5.524	0.000
ANGLO	Resources	3.4040	0.9117	2.3400	0.7366	4.539	0.000
ANGLOVAAL	Resources	2.3600	0.7703	1.1360	0.1604	7.778	0.000
AVMIN	Resources	1.9040	0.3529	1.1240	0.2314	9.240	0.000
BURLINGTON	Cyclical Cons. Goods	3.7120	0.8511	3.2680	0.4375	2.320	0.026
CASHBIL	Basic Industries	4.3560	0.8247	1.2800	0.6481	14.664	0.000
CAXTON	Cyclical Services	4.6462	0.5710	2.1846	0.1725	14.880	0.000
CENPROF	Financials	9.8080	1.1053	9.2120	0.6173	2.354	0.024
CFC	Financials	4.2000	0.6819	3.1520	1.1322	3.965	0.000
COPI	Basic Industries	1.9640	0.3946	1.1520	0.3549	7.650	0.000
COROHLD	Financials	15.0560	5.2689	2.0000	1.6768	12.072	0.000
ELLERINE	Cyclical Services	13.3538	2.0695	3.2154	0.5742	17.021	0.000
FOSCHINI	Cyclical Services	4.1480	0.5875	3.0667	1.3037	3.717	0.001
GENCOR	Financials	3.0640	0.3439	2.3840	1.4221	2.250	0.033
GRINDROD	Cyclical Services	4.4480	0.4629	2.8880	0.6373	9.903	0.000
GROUP-5	Basic Industries	12.0923	1.4648	1.7615	0.4908	24.111	0.000
HIVELD	Basic Industries	8.5560	2.3712	3.1320	1.1856	10.711	0.000
HUDACO	General Industrials	6.7120	0.9645	3.9600	0.8124	11.410	0.000
IMPLATS	Resources	5.4000	1.5097	2.2000	0.6570	9.718	0.000
INHOLD	Financials	10.3800	4.3947	2.0360	0.5522	9.419	0.000
JDGROUP	Cyclical Services	5.9320	0.9059	3.8840	1.0742	7.287	0.000
LIB-HOLD	Financials	3.6000	0.3674	2.5308	0.1974	9.243	0.000
M-&-F	Financials	3.3840	0.7883	2.2360	0.3252	7.396	0.000
METJE-&-Z	General Industrials	6.0560	1.3562	3.2833	0.7982	8.763	0.000
METLIFE	Financials	5.6385	1.5935	3.2615	0.5709	5.063	0.000
NAMPAK	Cyclical Services	4.5080	1.0851	2.3280	0.4496	9.280	0.000
NEDCOR	Financials	5.7240	1.1666	3.1120	0.4343	10.491	0.000
OMNIA	Basic Industries	9.1160	1.8420	6.3320	1.8634	5.313	0.000
OZZ	General Industrials	62.5538	21.9925	3.8077	0.6551	9.627	0.000
PALAMIN	Resources	15.8720	2.4968	5.6680	5.6861	8.216	0.000
PICKNPAY	Non-Cyclical Cons. Goods	5.1385	0.3453	4.1769	0.3767	6.784	0.000
PIKWIK	Non-Cyclical Cons. Goods	3.4615	0.2694	2.8800	0.1789	5.926	0.000
PPC	Basic Industries	5.9440	1.4030	3.1941	0.8181	5.577	0.000
PREM-GR	Financials	3.6560	1.1691	2.1760	1.4443	3.982	0.000
REUNERT	General Industrials	4.0880	1.1256	2.4080	0.5634	6.673	0.000
SAB	Non-Cyclical Cons. Goods	3.3480	0.5018	2.0760	0.4850	9.114	0.000
SA-EAGLE	Financials	8.0385	0.9368	4.0308	0.3038	14.673	0.000
SANTAM	Financials	8.8462	2.6098	5.1462	0.4332	5.043	0.000
TIGBRANDS	Non-Cyclical Cons. Goods	3.1520	0.7517	1.9520	0.2771	7.489	0.000

TONGAAT	Non-Cyclical Cons. Goods	3.5680	0.5513	2.4320	0.8915	5.419	0.000
WESCO	Cyclical Services	2.5811	0.7490	2.2541	0.3525	2.403	0.020

APPENDIX E
FIRMS THAT EXPERIENCED NO CHANGE IN COST OF CAPITAL ACCORDING TO THE DIVIDEND MODEL

Firm	Sector	Pre-lib Mean DY_1	Std. Deviation	Post-lib Mean DY_2	Std. Deviation	t-statistic	p-value
AF-&-OVE	Cyclical Services	6.5360	2.0293	7.7720	2.9245	-1.736	0.090
ANGOLD	Resources	4.2400	0.9283	3.9160	1.5478	0.898	0.374
BARWORLD	General Industrials	7.6308	2.3514	7.5462	1.8532	0.102	0.920
BEARMAN	Cyclical Services	6.9615	1.7086	8.1385	8.1385	-1.747	0.093
CHEMSERVE	Basic Industries	4.8160	0.7140	4.4880	5.7186	0.285	0.778
CMH	Cyclical Cons. Goods	7.0240	1.3667	8.4280	3.5656	-1.838	0.072
CONAFEX	Non-Cyclical Cons. Goods	3.0880	1.0584	2.8960	1.2654	0.582	0.563
CONFED	Financials	5.3600	0.5888	5.3520	0.4925	0.052	0.959
CROOKES	Non-Cyclical Cons. Goods	4.0880	1.0080	4.1800	1.4130	-0.334	0.740
DORBYL	Basic Industries	4.9077	0.8391	4.0923	1.1835	2.026	0.055
KERSAF	Cyclical Services	5.3538	0.9938	5.5000	1.2537	-0.329	0.745
NAMSEA	Non-Cyclical Cons. Goods	18.5000	5.2265	22.1160	11.5366	-1.428	0.163
OCEANA	Cyclical Services	5.8077	1.1258	6.3231	0.7014	-1.401	0.176
PALS	Cyclical Cons. Goods	10.1000	1.2463	9.7846	3.8460	0.282	0.780
PUTCO	Cyclical Services	21.5308	57.6231	11.0600	0.6768	0.575	0.576
SUN INTERN	Cyclical Services	6.1385	1.8976	6.0000	1.5067	0.206	0.839

APPENDIX F
FIRMS THAT EXPERIENCED AN INCREASE IN COST OF CAPITAL ACCORDING TO THE DIVIDEND MODEL

Firm	Sector	Pre-lib Mean DY_1	Std. Deviation	Post-lib Mean DY_2	Std. Deviation	t-statistic	p-value
BICAF	General Industrials	20.8040	8.7267	40.4640	14.2849	-5.872	0.000
BOLTONS	Financials	4.5560	1.1748	7.9080	6.5099	-2.534	0.018
CONCOR	Basic Industries	4.9000	2.8122	10.0077	1.0688	-3.813	0.001
DON	Cyclical Services	1.6615	0.6727	3.0538	1.3697	-3.290	0.004
ELBGROUP	Basic Industries	0.6415	0.0877	3.5692	0.6033	-17.288	0.000
EUREKA	Financials	17.5680	6.1247	41.6792	17.5426	-6.371	0.000
GUBINGS	Cyclical Services	4.1320	0.5800	12.5920	9.1898	-3.012	0.004
IPROP	Financials	6.6462	0.8608	10.3000	1.8704	-6.398	0.000
LIBERTY	Financials	0.5769	1.0289	2.4462	0.1613	-6.471	0.000
METAIR	Cyclical Cons. Goods	4.7960	0.4791	7.9120	2.9467	-5.219	0.000
MOBILE	Cyclical Services	0.1692	0.0751	1.5846	0.3262	-15.245	0.000
REX-TRUE	Cyclical Services	5.5615	1.8963	7.6538	1.9475	-2.775	0.011
SAPPI	Basic Industries	4.5077	0.5530	5.5846	1.9304	-4.730	0.000
SASOL	Resources	4.5000	0.5716	5.6154	1.1901	-3.046	0.000
SEARDEL	Cyclical Cons. Goods	6.5462	0.8714	7.8462	1.5672	-2.614	0.015
SYCOM	Financials	9.3231	0.6470	11.9923	3.0349	-3.101	0.000
TRENCOR	Cyclical Services	2.7615	0.6602	3.8462	0.9752	-3.321	0.000
TRNSHEX	Resources	2.7615	0.6602	3.8462	0.9752	-6.181	0.000
VILLAGE	Resources	13.0385	2.5705	19.4077	7.0594	-2.759	0.015

APPENDIX G
RESULTS OF T-TESTS OF FIRMS' EARNINGS YIELDS

Firm	Mean EY_1	Std. Deviation	Mean EY_2	Std. Deviation	t-statistic	Sig.(two-tailed): p-value	Accept H_0 or H_1: $EY_1 > EY_2$ or $EY_1 < EY_2$
ABSA	12.6514	2.7179	12.1459	2.2318	0.87416376	0.385	$EY_1 = EY_2$
ADONIS	29.1758	9.4697	19.9303	15.60362	3.539000	0.001	$EY_1 > EY_2$
AECI	10.8981	2.8537	10.1887	2.6325	1.33027851	0.186	$EY_1 = EY_2$
AF-&-OVE	28.7091	7.3441	18.4758	5.6383	6.34916413	0.000	$EY_1 > EY_2$
AFROX	7.0434	1.2661	4.3283	0.41062	14.8509044	0.000	$EY_1 > EY_2$
AHEALTH	13.1649	4.5237	7.8541	2.1957	6.42444902	0.000	$EY_1 > EY_2$
ALTECH	7.6019	2.2647	8.1073	2.1362	-1.2848776	0.202	$EY_1 = EY_2$
ALTRON	13.8317	4.2529	10.1814	3.0528	4.7819703	0.000	$EY_1 > EY_2$
ANBEECO	30.3	15.76842	19.5343	8.81626	3.526	0.001	$EY_1 > EY_2$
ANGLO	11.5736	2.8098	7.3547	1.3546	9.84645439	0.000	$EY_1 > EY_2$
ANGLOVAAL	14.5629	2.321	6.6857	0.83601	18.8901832	0.000	$EY_1 > EY_2$
ANGOLD	6.6119	2.2212	5.2288	2.1116	9.846516	0.000	$EY_1 > EY_2$
AVMIN	11.0849	1.8222	6.5958	3.7743	7.72445374	0.000	$EY_1 > EY_2$
BARWORLD	30.7034	6.4421	8.4136	3.8518	22.8106892	0.000	$EY_1 > EY_2$
BEARMAN	198.2576	248.6833	14.7697	7.6928	4.23652674	0.000	$EY_1 > EY_2$
BICAF	75.1424	43.6617	59.5818	33.7278	0.2971124	0.767	$EY_1 = EY_2$
BOLTONS	18.6727	6.4993	24.8212	12.1897	-2.95783424	0.005	$EY_1 < EY_2$
BURLINGTON	28.3455	7.2712	14.7848	6.09739	8.20900	0.000	$EY_1 > EY_2$
CASHBIL	7.7683	4.1073	3.922	2.1522	5.3113587	0.000	$EY_1 > EY_2$
CAXTON	28.0679	7.4826	10.9547	5.7368	13.2134515	0.000	$EY_1 > EY_2$
CENPROF	8.8649	1.3126	9.8378	1.0372	-3.53775252	0.001	$EY_1 < EY_2$
CFC	5.7679	1.8706	5.9893	1.1615	3.55155066	0.001	$EY_1 > EY_2$
CHEMSEF	13.7515	2.9627	29.3774	38.1396	-2.79054594	0.009	$EY_1 < EY_2$
CMH	21.496	4.26844	21.5	8.37631	-0.002	0.998	$EY_1 = EY_2$
CONAFEX	29.9086	15.4298	14.597	9.0997	4.94581767	0.000	$EY_1 > EY_2$
CONCOR	10.6622	6.4868	20.9405	10.234	-5.15992859	0.000	$EY_1 < EY_2$
CONFED	14.6121	1.7302	12.8909	2.7479	3.04494452	0.004	$EY_1 > EY_2$
COPI	4.1818	1.4819	3.7273	0.64579	1.615	0.111	$EY_1 = EY_2$
COROHLD	14.2628	8.8542	6.0163	2.0892	5.94414401	0.000	$EY_1 > EY_2$
CROOKES	7.1107	1.3977	10.9286	1.9063	-3.67893012	0.001	$EY_1 < EY_2$
DON	7.103	1.8509	7.5677	2.4935	-1.01363225	0.315	$EY_1 < EY_2$
DORBYL	16.6017	5.2287	9.5034	4.1566	8.16269513	0.000	$EY_1 > EY_2$
ELBGROUP	15.3377	4.8113	6.6774	4.8139	11.6309298	0.000	$EY_1 > EY_2$
ELLERINE	25.4453	10.7722	7.9358	2.0183	11.63095	0.000	$EY_1 > EY_2$
EUREKA	27.1723	23.0329	39.8234	28.5766	-2.36303512	0.020	$EY_1 < EY_2$
FOSCHINI	9.3434	1.8181	3.8442	0.88416	18.9350849	0.000	$EY_1 > EY_2$
GENCOR	10.3424	2.012	6.2949	3.2804	7.54927616	0.000	$EY_1 > EY_2$
GRIDROD	8.7914	3.8744	7.8	1.913	1.35744034	0.181	$EY_1 = EY_2$

GROUP-5	35.596	4.5961	23.708	16.205	3.52881156	0.001	$EY_1 > EY_2$
GUBINGS	31.052	8.7786	22.0533	8.3567	4.157	0.000	$EY_1 > EY_2$
HIVELD	19.966	8.8999	5.3746	1.7843	11.6080377	0.000	$EY_1 > EY_2$
HUDACO	10.4745	5.5313	8.0255	1.2938	8.90061282	0.000	$EY_1 > EY_2$
IMPLATS	13.1814	4.6882	5.0203	1.3498	12.8491593	0.000	$EY_1 > EY_2$
INHOLD	22.8057	8.6757	4.7486	0.9778	12.2359115	0.000	$EY_1 > EY_2$
IPROP	8.4868	2.4927	9.9458	3.3063	-2.37542277	0.020	$EY_1 < EY_2$
JDGROUP	24.849	21.8984	11.902	5.7806	4.00153019	0.000	$EY_1 > EY_2$
KERSAF	6.8085	1.8637	8.4847	5.226	-0.5235097	0.602	$EY_1 = EY_2$
LIBERTY	4.6939	0.9737	4.751	2.2444	-0.16349511	0.871	$EY_1 = EY_2$
LIB-HOLD	5.8429	1.2302	5.4776	2.4826	0.92292311	0.359	$EY_1 = EY_2$
M-&-F	13.9082	10.6547	6.0531	1.4113	4.82151859	0.000	$EY_1 > EY_2$
METAIR	14.5925	5.45851	24.8623	5.8345	-6.278	0.000	$EY_1 < EY_2$
METJE-&-Z	28.5914	7.2404	14.7833	4.4506	9.399417	0.000	$EY_1 > EY_2$
METLIFE	8.3	1.7783	4.066	0.70102	14.5454268	0.000	$EY_1 > EY_2$
MOBILE	15.0172	3.898	6.4552	1.1547	11.341557	0.000	$EY_1 > EY_2$
NAMPAK	10.9566	2.3895	5.7508	0.66783	15.5180633	0.000	$EY_1 > EY_2$
NAMSEA	19.1606	4.5601	21.097	8.2229	-1.18302542	0.242	$EY_1 = EY_2$
NEDCOR	14.4143	3.1946	9.3449	1.4943	10.061715	0.000	$EY_1 > EY_2$
OCEANA	13.9264	3.0325	10.8288	1.6649	6.99347922	0.000	$EY_1 > EY_2$
OMNIA	24.5485	5.8289	11.7545	3.7512	10.6029835	0.000	$EY_1 > EY_2$
OZZ	61.0021	45.0685	7.8468	1.8415	8.07905266	0.000	$EY_1 > EY_2$
PALAMIN	15.558	3.494	15.522	6.5093	0.037	0.971	$EY_1 = EY_2$
PALS	26.356	3.66084	35.712	25.38604	-1.824	0.074	$EY_1 = EY_2$
PICKNPAY	8.9	2.0661	6.9814	1.7908	5.389935	0.000	$EY_1 > EY_2$
PIKWIK	26.3303	14.9089	3.1273	0.47649	8.93581929	0.000	$EY_1 > EY_2$
PPC	11.6377	2.9252	5.7017	1.2766	13.6217434	0.000	$EY_1 > EY_2$
PREM-GR	7.9585	2.1405	5.4339	1.0453	8.03856971	0.000	$EY_1 > EY_2$
PUTCO	3.5647	2.4599	21.712	3.9233	-19.9481336	0.000	$EY_1 > EY_2$
REUNERT	10.4459	3.5636	6.5135	1.5762	6.13864552	0.000	$EY_1 > EY_2$
REX-TRUE	24.3377	5.9516	13.3831	5.5715	9.30434282	0.000	$EY_1 > EY_2$
SABMILLER	7.5542	1.9643	4.4864	0.54503	11.55952	0.000	$EY_1 > EY_2$
SA-EAGLE	18.1245	5.5804	7.9327	1.914	11.9564373	0.000	$EY_1 > EY_2$
SANTAM	27.9979	7.4094	12.417	3.4225	13.0876219	0.000	$EY_1 > EY_2$
SAPPI	10.9898	4.1678	7.3489	4.8351	4.03573159	0.000	$EY_1 > EY_2$
SASOL	11.7186	3.1554	10.2136	10.2136	2.91320318	0.004	$EY_1 > EY_2$
SEARDEL	27.9106	10.23409	27.5702	10.23731	0.161	0.872	$EY_1 = EY_2$
SUN INTERN	8.6571	2.0817	8.4184	2.7066	0.4895044	0.626	$EY_1 = EY_2$
SYCOM	8.4088	1.4398	10.3265	1.0145	-6.34867	0.000	$EY_1 < EY_2$
TIGBRANDS	9.1	1.6337	5.7255	0.5769	13.3522071	0.000	$EY_1 > EY_2$
TONGAAT	8.7143	3.2763	7.525	1.8889	10.6273502	0.000	$EY_1 > EY_2$
TRENCOR	15.73	3.4184	6.25	2.5893	12.108	0.000	$EY_1 > EY_2$
TRNSHEX	9.2051	2.8726	12.0915	7.4039	12.3232057	0.000	$EY_1 > EY_2$
VILLAGE	8.678	3.9553	57.3881	36.5306	-10.0901928	0.000	$EY_1 < EY_2$

WESCO	25.6776	10.7107	15.4776	4.3225	6.18180341	0.000	$EY_1 > EY_2$

APPENDIX H
RESULTS OF T-TESTS OF FIRMS' TRANSFORMED EARNINGS YIELDS

Firm	Mean EY_1	Std. Deviation	Mean EY_2	Std. Deviation	t-statistic	Sig. (two-tailed): p-value	Accept H_0 or H_1: $EY_1 > EY_2$ or $EY_1 < EY_2$
ABSA	20.72565	2.386763	20.31379	2.028719	0.799769	0.426	$EY_1 = EY_2$
ADONIS	32.4437	5.9018	22.6241	12.62047	4.049	0.000	$EY_1 > EY_2$
AECI	19.13545	2.568341	18.48543	2.407757	1.344195	0.182	$EY_1 = EY_2$
AF-&-OVE	32.21395	4.73855	25.25405	3.965501	6.470638	0.000	$EY_1 > EY_2$
AFROX	15.33338	1.407868	11.9954	0.569631	16.00069	0.000	$EY_1 > EY_2$
AHEALTH	21.01063	3.783594	16.11787	2.416018	6.629604	0.000	$EY_1 > EY_2$
ALTECH	15.82766	2.525665	16.47207	2.140846	-1.41694	0.159	$EY_1 = EY_2$
ALTRON	21.63111	3.535012	18.30663	2.987593	4.677587	0.000	$EY_1 > EY_2$
ANBEECO	32.5612	10.34496	25.6442	6.2547	3.385	0.001	$EY_1 > EY_2$
ANGLO	19.75852	2.516388	15.67418	1.479379	10.18637	0.000	$EY_1 > EY_2$
ANGLOVAAL	22.37561	1.855567	14.95809	0.957741	21.01499	0.000	$EY_1 > EY_2$
ANGOLD	14.6994	2.57882	12.9838	2.60685	3.594	0.000	$EY_1 > EY_2$
AVMIN	19.38503	1.703502	13.384	5.241673	7.920003	0.000	$EY_1 > EY_2$
BARWORLD	33.53189	4.029724	16.53968	3.58857	24.18835	0.000	$EY_1 > EY_2$
BEARMAN	28.13755	5.556222	21.97609	6.114079	3.737472	0.000	$EY_1 > EY_2$
BICAF	41.35324	11.19629	54.88122	15.92108	-3.13241	0.003	$EY_1 < EY_2$
BOLTONS	25.26406	4.934184	30.38824	8.460588	-2.91091	0.005	$EY_1 < EY_2$
BURLINGTON	31.93271	4.995846	22.99169	3.872695	7.413507	0.000	$EY_1 > EY_2$
CASHBIL	15.56898	4.702413	11.03487	3.076509	5.166474	0.000	$EY_1 > EY_2$
CAXTON	31.77121	4.956732	18.55082	5.860647	12.53903	0.000	$EY_1 > EY_2$
CENPROF	17.27877	1.323437	18.25698	0.9931	-3.59612	0.001	$EY_1 < EY_2$
CFC	15.19214	1.873299	13.15499	2.431312	3.512085	0.001	$EY_1 > EY_2$
CHEMSEF	21.6483	2.552473	31.00858	25.26968	-2.11749	0.038	$EY_1 < EY_2$
CMH	27.5032	3.11327	27.2309	5.85307	0.205	0.838	$EY_1 = EY_2$
CONAFEX	32.1716	10.81744	20.26509	8.842952	5.041529	0.000	$EY_1 > EY_2$
CONCOR	18.22164	6.141939	26.59946	7.231212	-5.37127	0.000	$EY_1 < EY_2$
CONFED	22.43966	1.412229	20.92015	2.500414	3.039675	0.003	$EY_1 > EY_2$
COPI	10.82241	1.78701	10.65687	0.669127	0.433762	0.666	$EY_1 = EY_2$
COROHLD	21.54872	6.41731	14.01048	2.441528	7.199392	0.000	$EY_1 > EY_2$
CROOKES	15.69465	1.653757	17.85048	2.805184	-3.50316	0.001	$EY_1 < EY_2$
DON	15.32311	2.161003	15.87871	2.516416	-0.96222	0.340	$EY_1 = EY_2$
DORBYL	23.77371	4.145587	17.506	4.293243	8.0668	0.000	$EY_1 > EY_2$
ELBGROUP	22.81799	3.807541	13.44012	6.879934	8.682399	0.000	$EY_1 > EY_2$
ELLERINE	29.85617	6.991965	16.24402	2.106421	13.57066	0.000	$EY_1 > EY_2$
EUREKA	28.21514	17.27756	36.07503	16.87441	-2.20621	0.030	$EY_1 < EY_2$
FOSCHINI	17.71639	1.84191	11.33301	1.422633	19.96773	0.000	$EY_1 > EY_2$
GENCOR	18.62754	1.852806	13.76612	4.829775	7.324743	0.000	$EY_1 > EY_2$

GRIDROD	16.73502	4.451103	16.11031	2.006633	0.756952	0.452	$EY_1 = EY_2$
GROUP-5	36.59409	2.733645	27.98163	10.89273	3.834403	0.000	$EY_1 > EY_2$
GUBINGS	33.60888	5.749959	27.66613	5.653967	4.129666	0.000	$EY_1 > EY_2$
HIVELD	26.07025	6.19964	13.32961	2.402541	13.95019	0.000	$EY_1 > EY_2$
HUDACO	20.87619	2.831518	16.85835	1.48192	8.97818	0.000	$EY_1 > EY_2$
IMPLATS	20.99694	3.949808	12.83573	1.775705	14.47546	0.000	$EY_1 > EY_2$
INHOLD	28.13663	5.955016	12.52176	1.335964	15.13654	0.000	$EY_1 > EY_2$
IPROP	16.76154	2.610063	18.08799	3.17761	-2.34834	0.021	$EY_1 = EY_2$
JDGROUP	26.10197	17.48193	19.64585	5.130847	2.480489	0.015	$EY_1 > EY_2$
KERSAF	14.99358	2.11252	16.47327	4.348567	-2.35095	0.020	$EY_1 < EY_2$
LIBERTY	12.45311	1.275877	12.42206	2.219184	0.084891	0.933	$EY_1 = EY_2$
LIB-HOLD	13.91821	1.474375	13.3688	2.318119	1.399892	0.165	$EY_1 = EY_2$
M-&-F	19.18596	11.37579	14.14654	1.699006	3.06695	0.003	$EY_1 > EY_2$
METAIR	22.0797	4.61988	29.5007	6.78986	-6.578	0.000	$EY_1 < EY_2$
METJE-&-Z	32.1414	4.68621	21.9243	3.46365	10.373	0.000	$EY_1 > EY_2$
METLIFE	16.65211	1.880083	11.63416	0.989613	16.1917	0.000	$EY_1 > EY_2$
MOBILE	22.651	3.038525	14.66859	1.297251	13.01103	0.000	$EY_1 > EY_2$
NAMPAK	19.2287	2.17618	13.78386	0.769436	17.17312	0.000	$EY_1 > EY_2$
NAMSEA	25.79381	3.460138	26.97383	5.660053	-1.02183	0.311	$EY_1 = EY_2$
NEDCOR	22.1957	2.599751	17.74936	1.456867	10.44396	0.000	$EY_1 > EY_2$
OCEANA	21.78738	2.610906	18.99829	1.452157	6.796439	0.000	$EY_1 > EY_2$
OMNIA	29.55293	3.868765	19.83171	3.30184	10.97954	0.000	$EY_1 > EY_2$
OZZ	43.33923	15.91998	16.1665	1.941849	11.61249	0.000	$EY_1 > EY_2$
PALAMIN	23.0963	2.840623	22.73738	5.275893	0.460096	0.646	$EY_1 = EY_2$
PALS	30.839	2.3759	35.0929	17.07811	-1.234	0.223	$EY_1 = EY_2$
PICKNPAY	17.24738	2.100017	15.16988	2.14644	5.314099	0.000	$EY_1 > EY_2$
PIKWIK	29.06338	12.19123	10.19233	0.752897	8.738126	0.000	$EY_1 > EY_2$
PPC	19.81455	2.550628	13.64815	1.645832	14.78886	0.000	$EY_1 > EY_2$
PREM-GR	16.25251	2.240309	13.30986	1.225277	8.38965	0.000	$EY_1 > EY_2$
PUTCO	10.89132	2.817027	27.69525	2.653657	-21.71	0.000	$EY_1 = EY_2$
REUNERT	18.61014	3.342994	14.68764	1.815186	6.27223	0.000	$EY_1 > EY_2$
REX-TRUE	29.3921	4.01855	21.4464	4.68499	9.372	0.000	$EY_1 > EY_2$
SAB	15.8286	2.12251	12.2062	0.76917	12.325	0.000	$EY_1 > EY_2$
SA-EAGLE	24.96531	4.084577	16.24198	2.083348	13.31746	0.000	$EY_1 > EY_2$
SANTAM	31.74915	4.802736	20.46547	2.937683	13.74028	0.000	$EY_1 > EY_2$
SAPPI	18.96744	4.194117	14.87627	5.442402	4.331008	0.000	$EY_1 > EY_2$
SASOL	19.86163	2.777189	18.52048	2.27917	2.867359	0.005	$EY_1 > EY_2$
SEARDEL	31.4813	6.776	31.3758	6.37996	0.078	0.938	$EY_1 = EY_2$
SUN INTERN	16.99783	2.122381	16.68284	2.690253	0.643464	0.521	$EY_1 = EY_2$
SYCOM	16.797	1.52692	18.7242	0.95699	-6.236	0.000	$EY_1 < EY_2$
TIGBRANDS	17.49502	1.605718	13.82727	0.718119	14.29508	0.000	$EY_1 > EY_2$
TONGAAT	19.14458	1.726714	14.12699	1.894083	10.35909	0.000	$EY_1 > EY_2$
TRENCOR	23.25425	2.666297	14.12242	3.451294	11.4685	0.000	$EY_1 > EY_2$
TRNSHEX	23.25425	2.666297	15.39303	2.854089	12.55241	0.000	$EY_1 > EY_2$

VILLAGE	16.66635	4.244384	41.22592	14.84622	-12.1238	0.000	$EY_1 < EY_2$
WESCO	30.72928	6.088412	20.98031	4.95785	9.617707	0.000	$EY_1 > EY_2$

APPENDIX I
FIRMS THAT EXPERIENCED A DECLINE IN COST OF CAPITAL ACCORDING TO THE EARNINGS MODEL

Firm	Sector	Pre-lib Mean EY_1	Std. Deviation	Post-lib Mean EY_2	Std. Deviation	t-statistic	p-value
ADONIS	Cyclical Cons. Goods	29.1758	9.4697	19.9303	15.6036	3.539	0.001
AF-&-OVE	Cyclical Services	28.7091	7.3441	18.4758	5.6383	6.349	0.000
AFROX	Basic Industries	7.0434	1.2661	4.3283	0.4106	14.851	0.000
AHEALTH	Non-Cyclical Cons. Goods	13.1649	4.5237	7.8541	2.1957	6.424	0.000
ALTRON	General Industrials	13.8317	4.2529	10.1814	3.0528	4.782	0.000
ANBEECO	Cyclical Cons. Goods	30.3000	15.7684	19.5343	8.8163	3.526	0.001
ANGLO	Resources	11.5736	2.8098	7.3547	1.3546	9.846	0.000
ANGLOVAAL	Resources	14.5629	2.3210	6.6857	0.8360	18.890	0.000
ANGOLD	Resources	6.6119	2.2212	5.2288	2.1116	9.847	0.000
AVMIN	Resources	11.0849	1.8222	6.5958	3.7743	7.724	0.000
BARWORLD	General Industrials	30.7034	6.4421	8.4136	3.8518	22.811	0.000
BEARMAN	Cyclical Services	198.2576	248.6833	14.7697	7.6928	4.237	0.000
BURLINGTON	Cyclical Cons. Goods	28.3455	7.2712	14.7848	6.0974	8.209	0.000
CASHBIL	Basic Industries	7.7683	4.1073	3.9220	2.1522	5.311	0.000
CAXTON	Cyclical Services	28.0679	7.4826	10.9547	5.7368	13.213	0.000
CFC	Financials	5.7679	1.8706	5.9893	1.1615	3.552	0.001
CONAFEX	Non-Cyclical Cons. Goods	29.9086	15.4298	14.5970	9.0997	4.946	0.000
CONFED	Financials	14.6121	1.7302	12.8909	2.7479	3.045	0.004
COROHLD	Financials	14.2628	8.8542	6.0163	2.0892	5.944	0.000
DORBYL	Basic Industries	16.6017	5.2287	9.5034	4.1566	8.163	0.000
ELBGROUP	Basic Industries	15.3377	4.8113	6.6774	4.8139	11.631	0.000
ELLERINE	Cyclical Services	25.4453	10.7722	7.9358	2.0183	11.631	0.000
FOSCHINI	Cyclical Services	9.3434	1.8181	3.8442	0.8842	18.935	0.000
GENCOR	Financials	10.3424	2.0120	6.2949	3.2804	7.549	0.000
GROUP-5	Basic Industries	35.5960	4.5961	23.7080	16.2050	3.529	0.001
GUBINGS	Cyclical Services	31.0520	8.7786	22.0533	8.3567	4.157	0.000
HIVELD	Basic Industries	19.9660	8.8999	5.3746	1.7843	11.608	0.000
HUDACO	General Industrials	10.4745	5.5313	8.0255	1.2938	8.901	0.000
IMPLATS	Resources	13.1814	4.6882	5.0203	1.3498	12.849	0.000
INHOLD	Financials	22.8057	8.6757	4.7486	0.9778	12.236	0.000
JDGROUP	Cyclical Services	24.8490	21.8984	11.9020	5.7806	4.002	0.000
M-&-F	Financials	13.9082	10.6547			97OCEANA(.000)22.8(0)-0.6TD0.01TJ	

REUNERT	General Industrials	10.4459	3.5636	6.5135	1.5762	6.139	0.000
REX-TRUE	Cyclical Services	24.3377	5.9516	13.3831	5.5715	9.304	0.000
SABMILLER	Non-Cyclical Cons. Goods	7.5542	1.9643	4.4864	0.5450	11.560	0.000
SA-EAGLE	Financials	18.1245	5.5804	7.9327	1.9140	11.956	0.000
SANTAM	Financials	27.9979	7.4094	12.4170	3.4225	13.088	0.000
SAPPI	Basic Industries	10.9898	4.1678	7.3489	4.8351	4.036	0.000
SASOL	Resources	11.7186	3.1554	10.2136	10.2136	2.913	0.004
TIGBRANDS	Non-Cyclical Cons. Goods	9.1000	1.6337	5.7255	0.5769	13.352	0.000
TONGAAT	Non-Cyclical Cons. Goods	8.7143	3.2763	7.5250	1.8889	10.627	0.000
TRENCOR	Cyclical Services	15.7300	3.4184	6.2500	2.5893	12.108	0.000
TRNSHEX	Resources	9.2051	2.8726	12.0915	7.4039	12.323	0.000
WESCO	Cyclical Services	25.6776	10.7107	15.4776	4.3225	6.182	0.000

APPENDIX J
FIRMS THAT EXPERIENCED NO CHANGE IN COST OF CAPITAL ACCORDING TO THE EARNINGS MODEL

Firm	Sector	Pre-lib Mean EY_1	Std. Deviation	Post-lib Mean EY_2	Std. Deviation	t-statistic	p-value
ABSA	Financial	12.6514	2.7179	12.1459	2.2318	0.874	0.385
AECI	Basic Industries	10.8981	2.8537	10.1887	2.6325	1.330	0.186
ALTECH	General Industrials	7.6019	2.2647	8.1073	2.1362	-1.285	0.202
BICAF	General Industrials	75.1424	43.6617	59.5818	33.7278	0.297	0.767
CMH	Cyclical Cons. Goods	21.4960	4.2684	21.5000	8.3763	-0.002	0.998
COPI	Basic Industries	4.1818	1.4819	3.7273	0.6458	1.615	0.111
DON	Cyclical Services	7.1030	1.8509	7.5677	2.4935	-1.014	0.315
GRIDROD	Cyclical Services	8.7914	3.8744	7.8000	1.9130	1.357	0.181
KERSAF	Cyclical Services	6.8085	1.8637	8.4847	5.2260	-0.524	0.602
LIBERTY	Financials	4.6939	0.9737	4.7510	2.2444	-0.163	0.871
LIB-HOLD	Financials	5.8429	1.2302	5.4776	2.4826	0.923	0.359
NAMSEA	Non-Cyclical Cons. Goods	19.1606	4.5601	21.0970	8.2229	-1.183	0.242
PALAMIN	Resources	15.5580	3.4940	15.5220	6.5093	0.037	0.971
PALS	Cyclical Cons. Goods	26.3560	3.6608	35.7120	25.3860	-1.824	0.074
SEARDEL	Cyclical Cons. Goods	27.9106	10.2341	27.5702	10.2373	0.161	0.872
SUN INTERN	Cyclical Services	8.6571	2.0817	8.4184	2.7066	0.490	0.626

APPENDIX K
FIRMS THAT EXPERIENCED AN INCREASE IN COST OF CAPITAL ACCORDING TO THE EARNINGS MODEL

Firm	Sector	Pre-lib Mean EY_1	Std. Deviation	Post-lib Mean EY_2	Std. Deviation	t-statistic	p-value
BOLTONS	Financials	18.6727	6.4993	24.8212	12.1897	-2.958	0.005
CENPROF	Financials	8.8649	1.3126	9.8378	1.0372	-3.538	0.001
CHEMSEF	Basic Industries	13.7515	2.9627	29.3774	38.1396	-2.791	0.009
CONCOR	Basic Industries	10.6622	6.4868	20.9405	10.2340	-5.160	0.000
CROOKES	Non-Cyclical Cons. Goods	7.1107	1.3977	10.9286	1.9063	-3.679	0.001
EUREKA	Financials	27.1723	23.0329	39.8234	28.5766	-2.363	0.020
IPROP	Financials	8.4868	2.4927	9.9458	3.3063	-2.375	0.020
METAIR	Cyclical Cons. Goods	14.5925	5.4585	24.8623	5.8345	-6.278	0.000
PUTCO	Cyclical Services	3.5647	2.4599	21.7120	3.9233	-19.948	0.000
SYCOM	Financials	8.4088	1.4398	10.3265	1.0145	-6.349	0.000
VILLAGE	Resources	8.6780	3.9553	57.3881	36.5306	-10.090	0.000

APPENDIX L
SUMMARY DESCRIPTIVE STATISTICS OF FIRMS OVER THE SHORT, MEDIUM AND LONG TERM PERIOD POST-LIBERALIZATION

	Pre-lib. 36 months	Post-lib. 36 months	Post-lib. 60 months	Comments: medium term	Post-lib. 120 months	Comments: Long term
Firm	Mean Div. [Std Dev.]	Mean Div. [Std Dev.]	Mean Div. [Std Dev.]	Lower mean persistent?	Mean Div. [Std Dev.]	Lower mean persistent?
ABSA	6.19 [1.14]	5.22 [0.89]	3.85 [1.37]	yes	3.64 [1.09]	yes
ADONIS	13.35 [1.63]	8.42 [3.48]	7.36 [3.47]	yes	6.63 [3.39]	yes
AECI	5.78 [1.18]	3.98 [1.76]	3.77 [1.23]	yes	4.49 [1.69]	yes
AFROX	4.17 [0.38]	2.32 [0.39]	2.27 [0.32]	yes	2.98 [1.03]	yes
AHEALTH	3.53 [0.74]	1.27 [0.21]	1.72 [0.56]	yes	3.01 [1.64]	yes
ALTECH	3.12 [0.35]	2.69 [0.47]	3.69 [1.31]	no	3.66 [1.02]	no
ALTRON	4.91 [1.13]	3.93 [0.49]	3.73 [1.29]	yes	3.94 [1.09]	yes
ANBEECO	10.19 [2.24]	6.53 [2.44]	6.78 [2.45]	yes	7.27 [2.67]	yes
ANGLO	3.40 [0.91]	2.34 [0.74]	2.39 [0.57]	yes	2.71 [0.81]	yes
ANGLOVAAL	2.36 [0.77]	1.14 [0.16]	1.33 [0.50]	yes	2.58 [1.44]	no
AVMIN	1.90 [0.35]	1.12 [0.23]	2.22 [2.33]	no	2.36 [2.29]	no
BURLINGTON	3.71 [0.85]	3.27 [0.44]	3.18 [0.65]	yes	2.93 [1.07]	yes
CASHBIL	4.36 [0.82]	1.28 [0.65]	2.06 [1.01]	yes	3.60 [1.90]	yes
CAXTON	4.65 [0.57]	2.18 [0.17]	1.31 [0.63]	yes	1.76 [0.99]	yes
CENPROP	9.81 [1.11]	9.21 [0.62]	11.92 [2.92]	no	14.06 [3.67]	no
CFC	4.20 [0.68]	3.15 [1.13]	2.05 [1.22]	yes	2.48 [1.23]	yes
COPI	1.96 [0.39]	1.15 [0.35]	1.74 [1.13]	yes	3.71 [2.34]	no
COROHLD	15.06 [5.27]	2.00 [1.68]	1.14 [1.31]	yes	1.49 [1.49]	yes
ELLERINE	13.35 [2.07]	3.22 [0.57]	2.52 [0.59]	yes	3.01 [1.05]	yes
FOSCHINI	4.15 [0.59]	3.07 [1.30]	2.70 [0.87]	yes	2.81 [1.01]	yes
GENCOR	3.06 [0.34]	2.38 [1.42]	1.85 [1.12]	yes	3.82 [2.60]	no
GRINDROD	4.45 [0.46]	2.89 [0.64]	3.78 [1.81]	yes	5.23 [3.35]	yes
GROUP-5	12.09 [1.46]	1.76 [0.49]	2.25 [0.74]	yes	5.32 [3.62]	yes
HIVELD	8.56 [2.37]	3.13 [1.19]	2.65 [1.02]	yes	2.93 [1.27]	yes
HUDACO	6.71 [0.96]	3.96 [0.81]	3.98 [0.74]	yes	5.42 [3.61]	yes

IMPLATS	5.40 [1.51]	2.20 [0.66]	2.01 [0.51]	yes	3.64 [2.30]	yes
INHOLD	10.38 [4.39]	2.04 [0.55]	1.84 [0.45]	yes	2.33 [1.18]	yes
JDGROUP	5.93 [0.91]	3.88 [1.07]	2.65 [1.29]	yes	2.50 [1.24]	yes
LIB-HOLD	3.60 [0.37]	2.53 [0.20]	2.54 [0.29]	yes	5.68 [6.55]	no
M-&-F	3.38 [0.79]	2.24 [0.33]	1.92 [0.45]	yes	2.61 [0.94]	yes
METJE-&-Z	6.06 [1.36]	3.28 [0.80]	3.11 [0.52]	yes	3.15 [0.47]	yes
METLIFE	5.64 [1.59]	3.26 [0.57]	2.32 [0.89]	yes	2.42 [0.86]	yes
NAMPAK	4.51 [1.09]	2.33 [0.45]	2.23 [0.35]	yes	3.09 [1.11]	yes
NEDCOR	5.72 [1.17]	3.11 [0.43]	2.69 [0.55]	yes	2.68 [0.84]	yes
OMNIA	9.12 [1.84]	6.33 [1.86]	5.50 [1.54]	yes	5.88 [1.74]	yes
OZZ	62.55 [21.99]	3.81 [0.66]	2.83 [0.78]	yes	5.39 [3.01]	yes
PALAMIN	15.87 [2.50]	5.67 [5.69]	8.14 [8.64]	yes	6.96 [7.16]	yes
PICKNPAY	5.14 [0.35]	4.18 [0.38]	4.21 [0.87]	yes	3.86 [0.85]	yes
PIKWIK	3.46 [0.27]	2.88 [0.18]	3.07 [0.81]	yes	3.66 [0.97]	no
PPC	5.94 [1.40]	3.19 [0.82]	3.18 [1.43]	yes	4.73 [2.06]	yes
PREM-GR	3.66 [1.17]	2.18 [1.44]	3.28 [2.52]	yes	4.32 [4.74]	no
REUNERT	4.09 [1.13]	2.41 [0.56]	2.33 [0.64]	yes	3.91 [1.77]	yes
SAB	3.35 [0.50]	2.08 [0.49]	2.04 [0.35]	yes	2.72 [0.95]	yes
SA-EAGLE	8.04 [0.94]	4.03 [0.30]	3.80 [0.71]	yes	4.89 [1.65]	yes
SANTAM	8.85 [2.61]	5.15 [0.43]	4.13 [1.23]	yes	4.28 [1.15]	yes
TIGBRANDS	3.15 [0.75]	1.95 [0.28]	2.00 [0.22]	yes	2.61 [0.72]	yes
TONGAAT	3.57 [0.55]	2.43 [0.89]	2.40 [0.62]	yes	3.82 [1.77]	no
WESCO	2.58 [0.75	2.25 [0.35]	2.31 [0.38]	yes	3.23 [1.80]	no
ALL SHARES	4.14 [2.53]	2.53 [0.34]	2.46 [0.30]	yes	2.65 [0.45]	yes

APPENDIX M
AUGMENTED DICKEY-FULLER TESTS FOR MEAN REVERSION

Firm	Medium-term 5 years post-lib			Long-term 10 years post-lib		
	ADF-No Trend	ADF- with Trend	Comments	ADF-No Trend	ADF- with Trend	Comments
ABSA	-1.15	-2.93	Random walk	-1.56	-1.44	Random walk
ADONIS	-2.11	-3.75**	Trend reverting	-2.31	-3.97***	Trend reverting
AECI	-4.47***	-2.93	Mean reverting	-5.02***	-5.27***	Mean reverting
AFROX	-3.13**	-3.11	Mean reverting	-1.47	-2.59	Random walk
AHEALTH	-1.23	-1.62	Random walk	-1.97	-2.29	Random walk
ALL SHARES	-1.31	-1.82	Random walk	-1.75	-3.24*	Trend reverting
ALTECH	-2.4	-2.54	Random walk	-3.18**	-3.24**	Mean reverting
ALTRON	-3.22**	-3.29*	Mean reverting	-4.19***	-4.22***	Mean reverting
ANBEECO	-4.41***	-3.19*	Mean reverting	-4.46***	-4.16***	Mean reverting
ANGLO	-3.51***	-2.39	Mean reverting	-2.81*	-3.23**	Mean reverting
ANGLOVAAL	3.44**	2.58	Mean reverting	-1.76	-2.47	Random walk
AVMIN	-1.75	-2.40	Random walk	-2.26	-2.43	Random walk
BURLINGTON	-3.10**	-2.93	Mean reverting	-2.69*	-3.93***	Mean reverting
CASHBUILD	-2.81*	-5.32***	Mean reverting	-2.06	-5.03***	Trend reverting
CAXTON	-2.23	-2.44	Random walk	-0.97	-2.10	Random walk
CENPROP	-0.48	-1.99	Random walk	-2.55	-2.42	Random walk
CFC	-4.67***	-5.25***	Mean reverting	-2.26	-3.93***	Trend reverting
COPI	-0.37	--1.15	Random walk	-1.68	-2.24	Random walk
COROHLD	-3.33**	-4.11***	Mean reverting	-0.31	-0.98	Random walk
ELLERINE	-2.77*	-2.80	Mean reverting	-3.33**	-4.70***	Mean reverting
FOSCHINI	-3.43**	-4.83***	Mean reverting	-3.83***	-3.84**	Mean reverting
GENCOR	-0.3	0.27	Random walk	-1.67	-4.05***	Trend reverting
GRINDROD	2.1	0.73	Random walk	-2.66*	-2.69*	Mean reverting
GROUP-5	-1.26	-3.55**	Trend reverting	-1.99	-1.88	Random walk
HIVELD	-3.59***	-3.35*	Mean reverting	-3.15**	-3.20**	Mean reverting
HUDACO	0.27	-0.62	Random walk	-2.48	-2.40	Random walk
IMPLATS	-2.78*	-3.11	Mean reverting	-1.84	-4.03***	Trend reverting
INHOLD	-3.13**	-3.11	Mean	-1.68	-1.19	Random

			reverting			walk
JDGROUP	-1.95	-3.51**	Trend reverting	-3.04**	-3.31*	Mean reverting
LIB-HOLD	-3.64***	-3.73**	Mean reverting	-2.57*	-3.96***	Mean reverting
M & F	-1.69	-2.36	Random walk	-2.24	-3.46**	Trend reverting
MEITJE-&-Z	-4.05***	-4.02**	Mean reverting	-4.27***	-4.31***	Mean reverting
METLIFE	-1.82	-3.01	Random walk	-2.26	-2.50	Random walk
NAMPAK	-2.59*	-3.12	Mean reverting	-1.73	-3.73***	Trend reverting
NEDCOR	-2.63*	-4.15***	Trend reverting	-1.82	-2.27	Random walk
OMNIA	-2.23	-2.40	Random walk	-3.21**	-3.17*	Mean reverting
OZZ	-1.94	-1.09	Random walk	-1.60	-3.01	Random walk
PALAMIN	-2.21	-2.23	Random walk	-3.02**	-3.14*	Mean reverting
PICKNPAY	-1.82	-3.40*	Trend reverting	-2.04	-2.26	Random walk
PIKWIK	-3.29**	-3.26*	Mean reverting	-3.07**	-3.73**	Mean reverting
PPC	-2.45	-1.84	Random walk	-2.11	-2.70	Random walk
PREM-GR	-2.51	-2.45	Random walk	-3.78***	-4.09***	Mean reverting
REUNERT	0.37	-0.54	Random walk	-1.43	-2.52	Random walk
SAB	-2.25	-3.65**	Trend reverting	-2.46	-3.68**	Trend reverting
SANTAM	-1.47	-2.85	Random walk	-2.94**	-2.92	Mean reverting
SEA-EAGLE	-2.66*	-3.43*	Mean reverting	-1.17	-2.56	Random walk
TIGBRANDS	-3.40**	-4.50***	Mean reverting	-1.25	-3.36**	Trend reverting
TONGAAT	-2.03	-3.29	Random walk	-1.75	-3.00	Random walk
WESCO	-2.68	-2.86	Random walk	-2.38	-2.44	Random walk
*, **, *** Denote significance at the 10%, 5% and 1% levels respectively						

APPENDIX N
VARIANCE RATIOS OF POST-LIBERALIZATION DIVIDEND YIELDS

Firm	Horizon q	VRq	test stat Zq	test stat Zq*	Comments
ABSA	24	0.4038	-1.1870	-1.1789	
	48	0.5235	-0.6600	-0.7435	Mean reverting
	72	0.3327	-0.7507	-0.9001	
	108	0.6390	-0.3305	-0.4131	
ADONIS	24	0.3195	-1.0826	-1.1493	
	48	0.2542	-0.8256	-0.9143	Mean reverting
	72	0.0764	-0.8304	-0.9674	
ANBEECO	24	0.3514	-1.0386	-1.1590	
	48	0.4900	-0.5683	-0.6482	Mean reverting
	72	0.0318	-0.8762	-1.0379	
AECI	24	0.5896	-0.8171	-0.5502	
	48	0.9755	-0.0339	-0.0269	Not mean reverting
	72	1.3213	0.3615	0.3235	
	108	2.5651	1.4327	1.4541	
AFROX	24	0.4687	-1.0577	-0.7536	
	48	0.3491	-0.9017	-0.7399	Mean reverting
	72	0.1312	-0.9775	-0.8860	
	108	0.2174	-0.7164	-0.7233	
AHEALTH	24	0.7574	-0.4829	-0.3973	
	48	0.3540	-0.8948	-0.8471	Mean reverting
	72	0.2949	-0.7933	-0.7941	
	108	0.1990	-0.7332	-0.7888	
ALL SHARES	24	0.5896	-0.8171	-0.6966	
	48	0.3261	-0.9336	-0.8784	Not mean reverting
	72	0.4555	-0.6127	-0.6090	
	108	1.1786	0.1635	0.1754	
ALTECH	24	0.6816	-0.6338	-0.5529	
	48	0.6478	-0.4879	-0.4398	Mean reverting
	72	0.3841	-0.6929	-0.6542	
	108	0.1635	-0.7657	-0.7831	
ALTRON	24	0.4607	-1.0735	-0.9479	
	48	0.2999	-0.9698	-0.8990	Mean reverting
	72	0.1812	-0.9212	-0.9016	
	108	0.1487	-0.7793	-0.8335	
ANGLO	24	0.4387	-1.1175	-1.0460	
	48	0.2650	-1.0181	-1.0133	Not mean reverting
	72	0.1911	-0.9101	-0.9501	

	108	1.2553	0.2337	0.2605	
ANGLOVAAL	24	0.5056	-0.9843	-0.7254	
	48	0.5199	-0.6650	-0.5439	Mean reverting
	72	0.2800	-0.8101	-0.7319	
	108	0.0948	-0.8286	-0.8498	
AVMIN	24	0.9458	-0.0974	-0.0563	
	48	0.6704	-0.4123	-0.2962	Mean reverting
	72	0.4654	-0.5430	-0.4542	
BURLINGTON	24	0.6225	-0.5681	-0.5294	Not mean reverting
	48	1.1071	0.1122	0.1157	
CASHBUILD	24	0.3591	-1.2758	-1.0995	
	48	0.5208	-0.6638	-0.6157	Not mean reverting
	72	0.8524	-0.1660	-0.1661	
	108	1.6045	0.5534	0.6044	
CAXTON	24	1.2775	0.5524	0.5534	
	48	2.1688	1.6191	1.7049	Not mean reverting
	72	1.9052	1.0185	1.1259	
	108	0.9822	-0.0163	-0.0192	
CENPROP	24	0.4763	-1.0426	-0.8154	
	48	0.5875	-0.5714	-0.4856	Mean reverting
	72	0.1622	-0.9426	-0.8623	
	108	0.2343	-0.7010	-0.7069	
CFC	24	1.4721	0.9399	0.8664	
	48	2.5257	2.1135	2.1890	Not mean reverting
	72	2.1071	1.2456	1.3769	
	108	0.8665	-0.1222	-0.1452	
COPI	24	0.3795	-1.2353	-0.7509	
	48	0.4498	-0.7622	-0.5805	Mean reverting
	72	0.3047	-0.7823	-0.6885	
	108	0.0533	-0.8666	-0.8927	
COROHLD	24	1.8079	1.6082	1.3043	
	48	2.2354	1.7114	1.7044	Not mean reverting
	72	3.3848	2.6831	3.0387	
	108	8.2818	6.6659	8.5046	
ELLERINE	24	0.2914	-1.4107	-1.3021	
	48	0.3232	-0.9375	-0.9291	Mean reverting
	72	0.2411	-0.8539	-0.8815	
	108	0.5274	-0.4326	-0.4790	
FOSCHINI	24	0.3159	-1.3618	-1.1976	
	48	0.2692	-1.0124	-1.0317	Mean reverting
	72	0.5070	-0.5547	-0.6419	
	108	0.6338	-0.3352	-0.4372	

GENCOR	24	0.3175	-1.3586	-1.0011	
	48	0.4273	-0.7933	-0.6712	Mean reverting
	72	0.4629	-0.6043	-0.5657	
	108	0.0917	-0.8315	-0.8744	
GRINDROD	24	1.2413	0.4803	0.3220	
	48	0.9824	-0.0244	-0.0183	Not mean reverting
	72	0.2258	-0.8710	-0.7240	
	108	0.0391	-0.8796	-0.8305	
GROUP_5	24	1.0908	0.1807	0.1439	
	48	1.5039	0.6981	0.5903	Not mean reverting
	72	0.6792	-0.3610	-0.3264	
	108	0.0246	-0.8929	-0.8909	
HIVELD	24	0.4396	-1.1155	-1.1189	
	48	0.3821	-0.8560	-0.9198	Mean reverting
	72	0.3129	-0.7730	-0.8493	
	108	0.7050	-0.2701	-0.3111	
HUDACO	24	0.4443	-1.1063	-0.6324	
	48	0.4979	-0.6955	-0.5167	Mean reverting
	72	0.2046	-0.8949	-0.7838	
	108	0.0123	-0.9042	-0.9407	
IMPLATS	24	0.2794	-1.4345	-1.0690	
	48	0.3332	-0.9237	-0.7786	Mean reverting
	72	0.4344	-0.6363	-0.5786	
	108	0.2403	-0.6954	-0.7014	
INHOLD	24	0.7713	-0.4437	-0.4296	
	48	1.0359	0.0484	0.0526	Not mean reverting
	72	1.0296	0.0325	0.0379	
	108	1.1657	0.1478	0.1846	
JDGROUP	24	0.5297	-0.9363	-0.9253	
	48	0.6598	-0.4713	-0.5228	
	72	1.0618	0.0696	0.0828	Not mean reverting
	108	4.7830	3.4630	4.4151	
LIB_HOLD	24	0.4319	-1.1309	-0.9980	
	48	0.4380	-0.7785	-0.7035	Mean reverting
	72	0.6052	-0.4442	-0.4470	
	108	0.9325	-0.0618	-0.0716	
METJIE_ZE	24	0.2371	-1.4198	-1.0966	
	48	0.3538	-0.8368	-0.7305	Mean reverting
	72	0.8569	-0.1505	-0.1500	
METLIFE	24	0.6285	-0.6880	-0.7373	
	48	0.7332	-0.3439	-0.3892	Mean reverting
	72	0.1597	-0.8795	-1.0125	
M & F	24	0.4070	-1.1804	-0.8374	

	48	0.2854	-0.9898	-0.7872	Mean reverting
	72	0.0977	-1.0152	-0.8962	
	108	0.1821	-0.7487	-0.7471	
NAMPAK	24	0.3396	-1.3147	-0.9285	
	48	0.3769	-0.8632	-0.7108	Mean reverting
	72	0.2956	-0.7925	-0.7210	
	108	0.1893	-0.7421	-0.7523	
NEDCOR	24	0.5060	-0.9834	-0.9679	
	48	0.6644	-0.4649	-0.4931	Mean reverting
	72	0.5216	-0.5382	-0.5901	
	108	0.6368	-0.3324	-0.3822	
OMNIA	24	0.3728	-1.2487	-1.1858	
	48	0.2525	-1.0355	-1.0054	Mean reverting
	72	0.1241	-0.9855	-0.9996	
	108	0.3224	-0.6203	-0.6760	
OZZ	24	0.4921	-1.0111	-0.9286	
	48	0.4441	-0.7700	-0.8226	Not mean reverting
	72	0.3667	-0.7125	-0.8228	
	108	1.2615	0.2394	0.3023	
PALAMIN	24	0.9131	-0.1685	-0.2340	
	48	0.4190	-0.7843	-0.8743	Mean reverting
	72	0.5621	-0.4801	-0.5375	
	108	0.0000	-0.8920	-1.0748	
PICKNPAY	24	0.3453	-1.3033	-1.2558	
	48	0.4447	-0.7692	-0.7987	Mean reverting
	72	0.4163	-0.6567	-0.7026	
	108	0.2882	-0.6516	-0.7333	
PIKWIK	24	0.1758	-1.6407	-1.5376	
	48	0.1648	-1.1570	-1.1255	Mean reverting
	72	0.1265	-0.9828	-0.9848	
	108	0.0811	-0.8411	-0.9000	
PPC	24	1.3028	0.6029	0.5325	
	48	1.1005	0.1392	0.1290	Not mean reverting
	72	1.1257	0.1414	0.1375	
	108	0.6043	-0.3622	-0.3799	
PREM_GR	24	0.2556	-1.1365	-1.0091	Mean reverting
	48	0.3195	-0.7229	-0.8376	
REUNERT	24	0.7260	-0.5455	-0.3950	
	48	0.7315	-0.3719	-0.3039	Mean reverting
	72	0.4609	-0.6065	-0.5435	
	108	0.1753	-0.7550	-0.7567	
SAB	24	0.2981	-1.3974	-0.9486	
	48	0.1819	-1.1333	-0.9467	Mean reverting

	72	0.1050	-1.0070	-0.9581	
	108	0.5496	-0.4123	-0.4475	
SANTAM	24	0.5834	-0.8293	-0.8295	
	48	0.3974	-0.8348	-0.8956	
	72	0.1879	-0.9136	-1.0241	Mean reverting
	108	0.1553	-0.7732	-0.9209	
SEA_EAGLE	24	0.4468	-1.1013	-1.0458	
	48	0.6156	-0.5324	-0.5530	Mean reverting
	72	0.2961	-0.7919	-0.8644	
	108	0.3755	-0.5717	-0.6578	
TIGERBRANDS	24	0.2821	-1.4292	-1.4031	
	48	0.2283	-1.0690	-1.1040	Not mean reverting
	72	0.0793	-1.0358	-1.1202	
	108	1.4628	0.4236	0.4850	
TONGAAT	24	0.2446	-1.5039	-0.9035	
	48	0.2270	-1.0708	-0.7834	Mean reverting
	72	0.1632	-0.9414	-0.7894	
	108	0.1805	-0.7502	-0.7279	
WESCO	24	1.4024	0.8011	0.5337	
	48	1.1380	0.1912	0.1463	Not mean reverting
	72	0.5841	-0.4680	-0.3990	
	108	0.2241	-0.7103	-0.6878	

APPENDIX O
MARKET CAP IN ASCENDING ORDER AND T-TEST RESULTS

Firm	Pre-lib. Market Cap. (in rands)	Accept H_0 or H_1: $DY_1 > DY_2$ or $DY_1 < DY_2$
BURLINGTON	1,980,000	$DY_1 > DY_2$
ADONIS	2,481,500	$DY_1 > DY_2$
PALS	2,600,000	$DY_1 = DY_2$
VILLAGE	3,641,067	$DY_1 < DY_2$
METJE-&-Z	6,067,188	$DY_1 > DY_2$
AF-&-OVE	7,500,000	$DY_1 = DY_2$
ANBEECO	7,788,580	$DY_1 > DY_2$
BOLTONS	10,347,500	$DY_1 < DY_2$
CONAFEX	11,108,241	$DY_1 = DY_2$
CMH	11,400,000	$DY_1 = DY_2$
REX-TRUE	12,967,500	$DY_1 < DY_2$
SANTAM	12,967,500	$DY_1 > DY_2$
COROHLD	15,600,000	$DY_1 > DY_2$

GUBINGS	16,248,240	$DY_1 < DY_2$
DON	17,937,500	$DY_1 < DY_2$
EUREKA	18,000,000	$DY_1 < DY_2$
CONFED	19,480,678	$DY_1 = DY_2$
BICAF	19,890,000	$DY_1 < DY_2$
CONCOR	34,224,600	$DY_1 < DY_2$
BEARMAN	37,652,464	$DY_1 = DY_2$
GROUP-5	39,721,816	$DY_1 > DY_2$
SEARDEL	46,846,496	$DY_1 < DY_2$
CROOKES	54,000,000	$DY_1 = DY_2$
CFC	60,514,440	$DY_1 > DY_2$
NAMSEA	60,524,496	$DY_1 = DY_2$
METAIR	66,184,225	$DY_1 < DY_2$
PUTCO	68,705,000	$DY_1 = DY_2$
CASHBIL	71,690,000	$DY_1 > DY_2$
IPROP	79,381,356	$DY_1 < DY_2$
ANGLOVAAL INDUSTRIES	79,530,671	$DY_1 > DY_2$
OZZ	79,664,076	$DY_1 > DY_2$
AHEALTH	92,160,000	$DY_1 > DY_2$
JDGROUP	124,827,500	$DY_1 > DY_2$
GRINDROD	132,280,994	$DY_1 > DY_2$
CAXTON	173,070,480	$DY_1 > DY_2$
OCEANA	184,627,755	$DY_1 = DY_2$
CHEMSERVE	186,632,700	$DY_1 = DY_2$
OMNIA	197,701,372	$DY_1 > DY_2$
ELBGROUP	232,927,370	$DY_1 < DY_2$
TRNSHEX	248,613,750	$DY_1 < DY_2$
WESCO	319,268,400	$DY_1 > DY_2$
INHOLD	365,000,000	$DY_1 > DY_2$
HUDACO	392,292,835	$DY_1 > DY_2$
ELLERINE	400,188,400	$DY_1 > DY_2$
SYCOM	437,762,232	$DY_1 < DY_2$
DORBYL	451,625,244	$DY_1 = DY_2$
CENPROP	465,948,514	$DY_1 > DY_2$
SA-EAGLE	491,897,500	$DY_1 > DY_2$
COPI	632,812,500	$DY_1 > DY_2$
HIVELD	782,610,854	$DY_1 > DY_2$
AECI	881,600,834	$DY_1 > DY_2$
PICKNPAY	970,356,008	$DY_1 > DY_2$
SAB	1,078,565,986	$DY_1 > DY_2$
REUNERT	1,078,565,986	$DY_1 > DY_2$
METLIFE	1,336,406,480	$DY_1 > DY_2$
TONGAAT	1,347,191,622	$DY_1 > DY_2$
MOBILE	1,354,338,025	$DY_1 < DY_2$

ALTRON	1,427,466,225	$DY_1 > DY_2$
ALTECH	1,471,884,540	$DY_1 > DY_2$
PPC	1,568,385,280	$DY_1 > DY_2$
M-&-F	1,760,812,500	$DY_1 > DY_2$
PIKWIK	1,878,298,656	$DY_1 > DY_2$
PALAMIN	1,882,980,750	$DY_1 > DY_2$
AVMIN	2,219,328,054	$DY_1 > DY_2$
FOSCHINI	2,303,161,534	$DY_1 > DY_2$
IMPLATS	2,446,473,800	$DY_1 > DY_2$
ANGGOLD	2,633,042,073	$DY_1 = DY_2$
TRENCOR	2,731,542,616	$DY_1 < DY_2$
KERSAF	2,936,239,125	$DY_1 = DY_2$
AFROX	3,055,565,958	$DY_1 > DY_2$
SUN INTERN	3,161,516,276	$DY_1 = DY_2$
NEDCOR	3,230,838,523	$DY_1 > DY_2$
PREM-GR	4,003,407,447	$DY_1 > DY_2$
NAMPAK	4,244,724,176	$DY_1 > DY_2$
ABSA	4,670,171,030	$DY_1 > DY_2$
SAPPI	4,915,908,129	$DY_1 < DY_2$
TIGBRANDS	6,829,240,054	$DY_1 > DY_2$
LIB-HOLD	7,186,976,754	$DY_1 > DY_2$
BARWORLD	8,796,130,065	$DY_1 = DY_2$
SASOL	9,114,005,530	$DY_1 < DY_2$
LIBERTY	13,729,461,240	$DY_1 < DY_2$
GENCOR	13,761,258,730	$DY_1 > DY_2$
ANGLO	20,134,517,375	$DY_1 > DY_2$

APPENDIX P
PRICE-TO-BOOK RATIO IN ASCENDING ORDER AND T-TEST RESULTS

Firm	Pre-lib. Price to Book (P/B) Ratio	Accept H_0 or H_1: $DY_1 > DY_2$ or $DY_1 < DY_2$
VILLAGE	0.29	$DY_1 < DY_2$
GUBINGS	0.29	$DY_1 < DY_2$
BOLTONS	0.33	$DY_1 < DY_2$
METAIR	0.35	$DY_1 < DY_2$
REX-TRUE	0.36	$DY_1 < DY_2$
AF-&-OVE	0.36	$DY_1 = DY_2$
METJE-&-Z	0.38	$DY_1 > DY_2$
EUREKA	0.39	$DY_1 < DY_2$
CONAFEX	0.39	$DY_1 = DY_2$
SEARDEL	0.40	$DY_1 < DY_2$
BURLINGTON	0.40	$DY_1 > DY_2$
AECI	0.42	$DY_1 > DY_2$

CMH	0.43	$DY_1 = DY_2$
PUTCO	0.45	$DY_1 = DY_2$
ADONIS	0.45	$DY_1 > DY_2$
PALS	0.46	$DY_1 = DY_2$
JDGROUP	0.47	$DY_1 > DY_2$
WESCO	0.49	$DY_1 > DY_2$
HIVELD	0.50	$DY_1 > DY_2$
BICAF	0.56	$DY_1 < DY_2$
DORBYL	0.65	$DY_1 = DY_2$
SA-EAGLE	0.66	$DY_1 > DY_2$
CONCOR	0.68	$DY_1 < DY_2$
IPROP	0.70	$DY_1 < DY_2$
GROUP-5	0.71	$DY_1 > DY_2$
DON	0.72	$DY_1 < DY_2$
GRINDROD	0.72	$DY_1 > DY_2$
OZZ	0.73	$DY_1 > DY_2$
CROOKES	0.75	$DY_1 = DY_2$
SANTAM	0.75	$DY_1 > DY_2$
ANGGOLD	0.78	$DY_1 = DY_2$
NAMSEA	0.88	$DY_1 = DY_2$
TONGAAT	0.9	$DY_1 > DY_2$
ELLERINE	0.96	$DY_1 > DY_2$
BEARMAN	0.98	$DY_1 = DY_2$
ANBEECO	1.02	$DY_1 > DY_2$
NEDCOR	1.02	$DY_1 > DY_2$
M-&-F	1.04	$DY_1 > DY_2$
CAXTON	1.08	$DY_1 > DY_2$
COPI	1.09	$DY_1 > DY_2$
SAPPI	1.17	$DY_1 < DY_2$
CFC	1.17	$DY_1 > DY_2$
SYCOM	1.20	$DY_1 < DY_2$
LIB-HOLD	1.26	$DY_1 > DY_2$
OCEANA	1.33	$DY_1 = DY_2$
GENCOR	1.36	$DY_1 > DY_2$
ANGLOVAAL INDUSTRIES	1.40	$DY_1 > DY_2$
ABSA	1.41	$DY_1 > DY_2$
CHEMSERVE	1.57	$DY_1 = DY_2$
ELBGROUP	1.73	$DY_1 < DY_2$
LIBERTY	1.73	$DY_1 < DY_2$
CONFED	1.78	$DY_1 = DY_2$
OMNIA	1.78	$DY_1 > DY_2$
ANGLO	1.81	$DY_1 > DY_2$
CENPROP	1.83	$DY_1 > DY_2$
SASOL	1.87	$DY_1 < DY_2$

COROHLD	2.17	$DY_1 > DY_2$
PPC	2.20	$DY_1 > DY_2$
INHOLD	2.27	$DY_1 > DY_2$
REUNERT	2.47	$DY_1 > DY_2$
ALTECH	2.57	$DY_1 > DY_2$
BARWORLD	2.65	$DY_1 = DY_2$
ALTRON	2.73	$DY_1 > DY_2$
HUDACO	2.80	$DY_1 > DY_2$
PREM-GR	2.87	$DY_1 > DY_2$
NAMPAK	2.87	$DY_1 > DY_2$
CASHBIL	2.99	$DY_1 > DY_2$
TIGBRANDS	3.35	$DY_1 > DY_2$
KERSAF	3.38	$DY_1 = DY_2$
METLIFE	3.54	$DY_1 > DY_2$
AFROX	3.67	$DY_1 > DY_2$
SAB	3.69	$DY_1 > DY_2$
SUN INTERN	4.23	$DY_1 = DY_2$
TRENCOR	4.30	$DY_1 < DY_2$
FOSCHINI	4.55	$DY_1 > DY_2$
PICKNPAY	4.75	$DY_1 > DY_2$
AHEALTH	5.03	$DY_1 > DY_2$
MOBILE	5.52	$DY_1 < DY_2$
TRNSHEX	6.62	$DY_1 < DY_2$
AVMIN	6.73	$DY_1 > DY_2$
IMPLATS	8.56	$DY_1 > DY_2$
PIKWIK	35.59	$DY_1 > DY_2$
PALAMIN	37.93	$DY_1 > DY_2$

APPENDIX Q
CORRELATION BETWEEN MARKET CAP AND P/B RATIOS

Firm	Pre-lib Market Cap. (in rands)	Pre-lib. Price to Book (P/B) Ratio
BURLINGTON	1,980,000	0.4
ADONIS	2,481,500	0.45
PALS	2,600,000	0.46
VILLAGE	3,641,067	0.29
METJE-&-Z	6,067,188	0.38
AF-&-OVE	7,500,000	0.36
ANBEECO	7,788,580	1.02
BOLTONS	10,347,500	0.33
CONAFEX	11,108,241	0.39
CMH	11,400,000	0.43
REX-TRUE	12,967,500	0.36
SANTAM	12,967,500	0.75
COROHLD	15,600,000	2.17
GUBINGS	16,248,240	0.29
DON	17,937,500	0.72
EUREKA	18,000,000	0.39

CONFED	19,480,678	1.78
BICAF	19,890,000	0.56
CONCOR	34,224,600	0.68
BEARMAN	37,652,464	0.98
GROUP-5	39,721,816	0.71
SEARDEL	46,846,496	0.4
CROOKES	54,000,000	0.75
CFC	60,514,440	1.17
NAMSEA	60,524,496	0.88
METAIR	66,184,225	0.35
PUTCO	68,705,000	0.45
CASHBIL	71,690,000	2.99
IPROP	79,381,356	0.7
ANGLOVAAL INDUSTRIES	79,530,671	1.4
OZZ	79,664,076	0.73
AHEALTH	92,160,000	5.03
JDGROUP	124,827,500	0.47
GRINDROD	132,280,994	0.72
CAXTON	173,070,480	1.08
OCEANA	184,627,755	1.33
CHEMSERVE	186,632,700	1.57
OMNIA	197,701,372	1.78
ELBGROUP	232,927,370	1.73
TRNSHEX	248,613,750	6.62
WESCO	319,268,400	0.49
INHOLD	365,000,000	2.27
HUDACO	392,292,835	2.8
ELLERINE	400,188,400	0.96
SYCOM	437,762,232	1.2
DORBYL	451,625,244	0.65
CENPROP	465,948,514	1.83
SA-EAGLE	491,897,500	0.66
COPI	632,812,500	1.09
HIVELD	782,610,854	0.5
AECI	881,600,834	0.42
PICKNPAY	970,356,008	4.75
REUNERT	1,078,565,986	2.47
SAB	1,078,565,986	3.69
METLIFE	1,336,406,480	3.54
TONGAAT	1,347,191,622	0.9
MOBILE	1,354,338,025	5.52
ALTRON	1,427,466,225	2.73
ALTECH	1,471,884,540	2.57
PPC	1,568,385,280	2.2
M-&-F	1,760,812,500	1.04
PIKWIK	1,878,298,656	35.59*
PALAMIN	1,882,980,750	37.93*
AVMIN	2,219,328,054	6.73
FOSCHINI	2,303,161,534	4.55
IMPLATS	2,446,473,800	8.56
ANGGOLD	2,633,042,073	0.78
TRENCOR	2,731,542,616	4.3
KERSAF	2,936,239,125	3.38
AFROX	3,055,565,958	3.67

SUN INTERN	3,161,516,276	4.23
NEDCOR	3,230,838,523	1.02
PREM-GR	4,003,407,447	2.87
NAMPAK	4,244,724,176	2.87
ABSA	4,670,171,030	1.41
SAPPI	4,915,908,129	1.17
TIGBRANDS	6,829,240,054	3.35
LIB-HOLD	7,186,976,754	1.26
BARWORLD	8,796,130,065	2.65
SASOL	9,114,005,530	1.87
LIBERTY	13,729,461,240	1.73
GENCOR	13,761,258,730	1.36
ANGLO	20,134,517,375	1.81

* Outliers among sample

APPENDIX R
LEVERAGE RATIOS AND T-TEST RESULTS

Firm	Pre-lib. Leverage ratio	Accept H_0 or H_1: $DY_1 > DY_2$ or $DY_1 < DY_2$
AVMIN	0.06	$DY_1 > DY_2$
SYCOM	0.07	$DY_1 < DY_2$
CROOKES	0.07	$DY_1 = DY_2$
COROHLD	0.07	$DY_1 > DY_2$
CENPROP	0.07	$DY_1 > DY_2$
DON	0.08	$DY_1 < DY_2$
ADONIS	0.11	$DY_1 > DY_2$
ANGGOLD	0.12	$DY_1 = DY_2$
CONFED	0.15	$DY_1 = DY_2$
COPI	0.15	$DY_1 > DY_2$
VILLAGE	0.16	$DY_1 < DY_2$
ANGLO	0.16	$DY_1 > DY_2$
CFC	0.17	$DY_1 > DY_2$
AF-&-OVE	0.22	$DY_1 = DY_2$
PPC	0.22	$DY_1 > DY_2$
REX-TRUE	0.23	$DY_1 < DY_2$
BICAF	0.24	$DY_1 < DY_2$
HIVELD	0.25	$DY_1 > DY_2$
IPROP	0.26	$DY_1 < DY_2$
GENCOR	0.27	$DY_1 > DY_2$
SAPPI	0.28	$DY_1 < DY_2$
SUN INTERN	0.29	$DY_1 = DY_2$
ELLERINE	0.29	$DY_1 > DY_2$
OZZ	0.3	$DY_1 > DY_2$
TONGAAT	0.3	$DY_1 > DY_2$
CONAFEX	0.31	$DY_1 = DY_2$
METAIR	0.33	$DY_1 < DY_2$
KERSAF	0.33	$DY_1 = DY_2$

NAMSEA	0.35	$DY_1 = DY_2$
PUTCO	0.35	$DY_1 = DY_2$
ALTECH	0.35	$DY_1 > DY_2$
M-&-F	0.36	$DY_1 > DY_2$
OCEANA	0.4	$DY_1 = DY_2$
AFROX	0.4	$DY_1 > DY_2$
SA-EAGLE	0.42	$DY_1 > DY_2$
PIKWIK	0.42	$DY_1 > DY_2$
WESCO	0.43	$DY_1 > DY_2$
ALTRON	0.43	$DY_1 > DY_2$
BOLTONS	0.44	$DY_1 < DY_2$
METJE-&-Z	0.44	$DY_1 > DY_2$
DORBYL	0.45	$DY_1 = DY_2$
ANGLOVAAL INDUSTRIES	0.45	$DY_1 > DY_2$
AECI	0.45	$DY_1 > DY_2$
SASOL	0.46	$DY_1 < DY_2$
PALS	0.46	$DY_1 = DY_2$
JDGROUP	0.46	$DY_1 > DY_2$
CAXTON	0.46	$DY_1 > DY_2$
NAMPAK	0.46	$DY_1 > DY_2$
EUREKA	0.47	$DY_1 < DY_2$
TRENCOR	0.47	$DY_1 < DY_2$
TRNSHEX	0.48	$DY_1 < DY_2$
MOBILE	0.49	$DY_1 < DY_2$
CHEMSERVE	0.49	$DY_1 = DY_2$
GUBINGS	0.51	$DY_1 < DY_2$
ANBEECO	0.51	$DY_1 > DY_2$
TIGBRANDS	0.51	$DY_1 > DY_2$
BURLINGTON	0.52	$DY_1 > DY_2$
SANTAM	0.52	$DY_1 > DY_2$
SAB	0.53	$DY_1 > DY_2$
HUDACO	0.54	$DY_1 > DY_2$
FOSCHINI	0.54	$DY_1 > DY_2$
BARWORLD	0.56	$DY_1 = DY_2$
GRINDROD	0.56	$DY_1 > DY_2$
BEARMAN	0.57	$DY_1 = DY_2$
REUNERT	0.57	$DY_1 > DY_2$
PREM-GR	0.57	$DY_1 > DY_2$
GROUP-5	0.59	$DY_1 > DY_2$
CMH	0.63	$DY_1 = DY_2$
SEARDEL	0.66	$DY_1 < DY_2$
OMNIA	0.67	$DY_1 > DY_2$
LIB-HOLD	0.67	$DY_1 > DY_2$
ELBGROUP	0.69	$DY_1 < DY_2$

LIBERTY	0.69	$DY_1 < DY_2$
CASHBIL	0.7	$DY_1 > DY_2$
PICKNPAY	0.7	$DY_1 > DY_2$
CONCOR	0.72	$DY_1 < DY_2$
IMPLATS	0.74	$DY_1 > DY_2$
AHEALTH	0.8	$DY_1 > DY_2$
INHOLD	0.88	$DY_1 > DY_2$
PALAMIN	0.89	$DY_1 > DY_2$
METLIFE	0.94	$DY_1 > DY_2$
NEDCOR	0.94	$DY_1 > DY_2$
ABSA	0.94	$DY_1 > DY_2$

APPENDIX S
T-TEST RESULTS USING OFFICIAL LIBERALIZATION DATE

Firm	Sector	Pre-lib Mean DY1	Std. Deviation	Post-lib Mean DY2	Std. Deviation	t-statistic	p-value
CHEMSERVE	Basic Industries	3.5889	0.6628	4.9667	7.90425	-1.0420	0.301
CONCOR	Basic Industries	7.8361	2.65611	3.0972	1.31941	9.5870	0.000
DORBYL	Basic Industries	4.2500	2.20058	4.2167	2.43973	0.0610	0.952
ELBGROUP	Basic Industries	3.3278	1.43877	4.4833	1.93767	-2.8730	0.005
SAPPI	Basic Industries	4.7028	2.00777	2.4722	0.661	6.3310	0.000
CMH	Cyclical Cons. Goods	4.2500	2.20058	4.2167	2.43973	0.0610	0.952
METAIR	Cyclical Cons. Goods	6.2889	3.4550	5.4694	1.34692	1.3260	0.189
PALS	Cyclical Cons. Goods	11.1500	3.4709	8.675	1.87683	3.7630	0.000
SEARDEL	Cyclical Cons. Goods	5.8472	2.12932	4.45	1.16974	3.4510	0.001
AF-&-OVE	Cyclical Services	9.2972	2.50764	4.3194	0.91615	11.1870	0.000
BEARMAN	Cyclical Services	10.3111	5.17951	4.0694	1.67908	6.8780	0.000
DON	Cyclical Services	3.4278	1.07693	2.2722	1.32958	4.0520	0.000
GUBINGS	Cyclical Services	10.9583	8.01086	2.2028	0.3982	6.5500	0.000
KERSAF	Cyclical Services	4.2972	1.2070	5.4139	1.88333	-2.9950	0.004
MOBILE	Cyclical Services	1.4806	0.26384	2.1944	0.33205	-10.1000	0.000
OCEANA	Cyclical Services	6.8278	0.8457	4.4528	0.55265	14.1050	0.000
PUTCO	Cyclical Services	12.1111	2.684	7.4667	2.98434	6.9430	0.000
REX-TRUE	Cyclical Services	7.1472	1.6382	3.3639	0.85127	12.2960	0.000
SUN INTERN	Cyclical Services	4.5833	1.4958	8.7444	4.7933	-4.9720	0.000
TRENCOR	Cyclical Services	1.4444	0.2443	2.0972	0.28534	-10.4270	0.000
BOLTONS	Financials	0.8550	5.1346	6.3917	1.62698	2.4040	0.019
CONFED	Financials	4.6056	1.05963	2.4500	0.3916	11.4430	0.000
EUREKA	Financials	27.9111	16.82311	1.8972	0.69302	9.2700	0.000
IPROP	Financials	10.5889	3.6926	9.1333	7.69553	1.0230	0.310
LIBERTY	Financials	2.5722	0.32215	2.7833	2.7833	-1.7660	0.082
SYCOM	Financials	10.9500	2.11491	15.0778	2.87711	-6.9360	0.000
BARWORLD	General Industries	6.0167	2.48648	2.5139	0.71839	8.1200	0.000

BICAF	General Industries	29.0250	19.76786	8.3361	1.7258	6.2560	0.000
CONAFEX	Non-Cyclical Cons. Goods	3.2389	0.88553	3.9222	6.60013	-6.1600	0.540
CROOKES	Non-Cyclical Cons. Goods	4.1139	1.11462	3.5667	1.23866	1.9700	0.053
NAMSEA	Non-Cyclical Cons. Goods	16.8583	12.43064	10.8444	0.60825	2.8990	0.005
ANGOLD	Resources	5.1083	1.90644	6.4111	1.52966	-3.1980	0.002
SASOL	Resources	4.1861	1.47302	2.9889	0.82385	4.2560	0.000
TRNSHEX	Resources	3.1667	0.87112	3.9889	1.41356	-2.9710	0.004
VILLAGE	Resources	19.4278	7.22771	86.5917	16.74957	-22.0900	0.000

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