What Defines Liquidity of the Stock Market? The Case of the Nairobi Stock Exchange

Rose W. Ngugi

Macroeconomics Division
Kenya Institute for Public Policy
Research and Analysis

KIPPRA IN BRIEF

The Kenya Institute for Public Policy Research and Analysis (KIPPRA) is an autonomous institute whose primary mission is to conduct public policy research, leading to policy advice. KIPPRA's mission is to produce consistently high-quality analysis of key issues of public policy and to contribute to the achievement of national long-term development objectives by positively influencing the decision-making process. These goals are met through effective dissemination of recommendations resulting from analysis and by training policy analysts in the public sector. KIPPRA therefore produces a body of well-researched and documented information on public policy, and in the process assists in formulating long-term strategic perspectives. KIPPRA serves as a centralized source from which the government and the private sector may obtain information and advice on public policy issues.

The Discussion Paper Series disseminates results and reflections from ongoing research activities of the institute's programmes. The papers are internally refereed and are disseminated to inform and invoke debate on policy issues. Opinions expressed in the papers are entirely those of the authors and do not necessarily reflect the views of the Institute.

ABSTRACT

Liquidity of the stock market is vital if the market is to play a significant role in the development by facilitating mobilisation of long-term capital. During the revitalisation period, a lot of efforts have been made to enhance market liquidity by instituting institutional and policy reforms. This has seen shifts in trading system to enhance transparency in the price discovery process, and to strengthen investors' protection to boost investors' confidence in committing their resources to the stock market. There has also been tightening of disclosure rules, rationalisation of tax policy to create a level ground for financial assets competition and continued lobby for government to provide a favourable policy environment. A question of interest to policy makers and researchers is whether the implemented reforms have had any significant contribution to the stock market liquidity.

This study analyses the response of trading activity and liquidity of the NSE to the implemented institutional and policy reforms during the revitalisation process. The study covers the period January 1990 to June 2002. We invoke the microstructure theory for empirical analysis testing for market response to the following main changes: shifts in trading system, tightening of the regulatory system, reform of taxation policy, and relaxation of capital controls. Descriptive statistics and simple regression analyses are used to test hypotheses.

The main findings of this study are eight-fold: First, the level of stock returns influence to a large extent the volume of trading activities. However, it takes quality of information and therefore efficiency of the market to achieve market resiliency and depth. Second, enhancing transparency in the price discovery process by shifting to floor trading increases investors' participation, but does not necessarily improve the transactional properties. Shifts in trading system achieve more if coupled with institutional change that reduces information costs. Third, taxation policy plays a major role in facilitating share trading especially if aimed at reducing transaction costs and ensuring competitiveness of shares among the financial assets. However, a tax policy that tilts preferences to dividend income may not be conducive in sustaining market liquidity especially if this is accompanied by concentration of shares among a few individuals. Fourth, our results show that high concentration of shares among a few shareholders in one firm and across the market makes the market less liquid. Fifth, growth of the bonds market may be detrimental to share trading especially

if there are huge differences in yields and investment risk across financial assets. In addition, a high concentration of government bonds may crowd out the private sector in the stock market like it did in the banking sector. Sixth, although foreign investors enhance trading activity, their significant contribution to liquidity is curtailed by their noise trading behaviour and weak regulatory system of the domestic market that transient institutional investors thrive on for trading activity. Enhancing the pull factors for foreign investors in the market is important in order to experience gains in trading activities. Seventh, volatility of the stock market is inversely related to gains in market liquidity. Volatility is partially attributed to information asymmetry and therefore adequacy of the market microstructure infrastructure including the tightness of disclosure rules. Our results show that any efforts made to tighten disclosure rules and protect the investors go a long way in improving liquidity as information costs are reduced. Eighth, economic performance has a direct influence on investors' participation especially because it affects their earnings and therefore their ability to participate in the market. Therefore, in conclusion, we observe that improvement requires not only NSE to invest in improving the market microstructure, but also requires a favourable policy environment.

TABLE OF CONTENTS

1.   Introduction

One of the key roles of the stock market is to provide liquidity. Liquidity is imperative because it makes investment less risky and more attractive. Savers are able to acquire assets and sell them quickly and cheaply when they need to access their savings or to alter their portfolios (Demirguc-Kunt and Levine, 1996). Ultimately, by making investment less risky and more profitable, liquidity enhances mobilisation of savings and investment growth and therefore prospects for long-term economic growth. Furthermore, liquidity indicates gained momentum in development of stock market (Kim and Singal, 2000).[1]

To achieve liquidity, the market microstructure must be solid. In this regard, stock markets, both in developed and emerging markets, invest heavily in improving the microstructure infrastructure; for example, in the restructuring/revitalisation process, stock markets have witnessed shifts in their trading system and strengthened regulatory system (Amihud *et al*, 1997). In this respect, the London Stock Exchange (LSE), following the big bang in 1986, adopted an automated order driven trading system. Other European markets converted their trading systems from the traditional call auctions to computer-based continuous trading system. US stock markets also saw introduction of new rules requiring market-makers to incorporate in their public quotes both customer limit orders and orders on electronic communication networks to enhance transparency and quality of execution. For the emerging markets, the

---

1.   Demirguc-Kunt and Levine (1996) observe that liquidity may have adverse effects on economic growth. For example, by increasing return on investment, liquidity may reduce savings rate through the income and substitution effect. Further, by reducing uncertainty, liquidity reduces savings due to the ambiguous effect of uncertainty on savings. For example, while uncertainty makes investment less attractive to risk averse agents, less uncertainty reduces precautionary savings. Furthermore, liquidity may encourage myopia so that investor's commitment is weakened together with the incentive to exert corporate governance.

revitalisation reforms have witnessed shifts in the trading system from the call auction to the continuous trading system and also from manual to automated trading cycles aimed at enhancing efficiency in the price discovery process and improving market liquidity.[2] Ngugi (2002) provides a summary of the various changes adopted by stock markets in Africa. A case in point is the Johannesburg Stock Market (JSE), which adopted the JET trading system commencing dual capacity trading and fully negotiated commissions in March 1996. Later, in 2002, the market adopted electronic trading. The Nairobi Stock Exchange (NSE) saw a shift from the call auction coffeehouse forum to floor trading in the reform process; presently, the market is in the process of automating the trading system and introducing a central depository system (CDS).

With regard to regulatory reforms, most of the emerging markets have introduced statutory regulatory frameworks, a positive move in strengthening the regulatory system and facilitating gains in liquidity with enhanced investors' confidence and reduced information asymmetry. For example, NSE introduced the compensation fund to enhance investors' protection and also issued guidelines on disclosure standards to promote corporate governance. Further, NSE witnessed taxation reforms aimed at reducing transaction costs and relaxed capital controls to allow foreign investors participation.

The question of interest to policy makers and researchers is whether these efforts bear the expected outcome; for example, in the May 2001 NSE monthly editorial, it is indicated that market liquidity measured by the turnover ratio has remained subdued despite efforts made with the mounting of the revitalisation reform process.

---

2.   See, for example, Y. Amihud et al (1997); Lang and Lee (1999) and Ngugi, R.W. (2002)

This study explores the implications of the implemented reforms on trading activities and liquidity of the stock market in order to shed more light on this issue. The rest of the paper is organised as follows. Section 2 discusses various efforts made to enhance liquidity of the NSE. Section 3 provides a brief review of the literature while Section 4 covers the empirical framework. Data and measurement of variables is covered in Section 5 and empirical results in Sections 6 and 7. Section 8 provides conclusions to this study.

2. Enhancing Market Participation and Liquidity for NSE

Performance of the NSE to a large extent reflects on policy and institutional framework and the political environment; for example, while the stock market showed remarkable performance during the colonial period, policy changes implemented in the post-independence period and before the implementation of revitalisation reforms saw the market experience a state of dormancy. In the post-independence period, the new government implemented the Kenyanisation policy as part of its commitment to initiate and implement a process of orderly transfer of assets from the hands of immigrants to those of Kenyan citizens.[3] This saw change in composition of stock market investors and firms as foreign investors' participation in trading activities went down while most of the foreign controlled firms were delisted. Despite government efforts to enhance local participation – either because of little knowledge in share trading among local investors, low savings, or because the private sector was yet to gain its momentum – the participation of local citizens (or investors) failed to match that of foreign investors.

Further, the government introduced taxation policy changes that were not favourable in terms of encouraging participation of investors and listing of companies. For example, in 1971, with the aim of controlling

---

3. Kenyanisation of business involved transfer of existing firms to citizens and the creation of new enterprises in the hands of citizens. This saw a change in ownership structure of various businesses. Foreigners were allowed to hold majority interest in companies if sufficient capital was not available from domestic sources or so long as other advantages to the country such as technology and skills, could only be obtained this way. This was achieved through the operations of the Trade Licensing Act under which businesses owned by non-Kenyans were published periodically. Those Kenyans who were able to take over such businesses were provided with financial assistance by the government in terms of loans. Depending on economic performance, the type of economic activities owned by the local citizens and their enthusiasm to use the stock market to raise funds, the Kenyanisation policy would see an increasing number of locally controlled firms listed in the market (Ngugi, 2003)..

the movement of funds outside the country, the government imposed a 12.5 percent tax on dividend and interest paid by corporation to residents and non-residents. In addition, a 20 percent tax on all fees royalties payable to non-residents was imposed. In June 1975, a capital gain tax was introduced, set at 36 percent aimed at generating additional revenue and curbing excessive speculation. Further, tax rate on dividends paid to non-resident was raised from 12.5 percent to 15 per cent and 20 per cent, while the interest rate increased from 12.5 per cent to 20 percent. The adopted tax policy adversely affected the development of equity and debt securities especially with the double taxation of dividend income, which reduced returns on shareholding significantly.[4] Furthermore, corporations were not allowed to deduct expenses of raising share capital or debenture issues from taxable income. As a result, high taxation made it more expensive for corporations to provide adequate after-tax-return on equity while the high expenses of raising finance became a disincentive for raising equity through public issues.

Coupled with the implemented policy changes was the deteriorating macroeconomic condition. Remarkable economic performance was experienced in the 1960s with no alarming policy issue. However, the 1970s saw macroeconomic imbalances characterised by inflation pressure, fiscal deficit and balance of payments problems. Macroeconomic imbalances followed the 1973/74 oil crises that saw escalating inflation and declining GDP growth rate. Companies using a high proportion of imported intermediate inputs were adversely hit by exorbitant oil prices, while the increased cost of production threatened their profitability and therefore the dividend payment rate. In addition,

---

4. Double taxation was experienced because income from which dividend was paid was initially taxed in the hands of the company as dividends were not deductible expenses like the interest on debt. The income was again taxed in the hands of the recipient. As a result, effective tax rate was very high on corporate earning distributed as dividends.

the restrictions imposed on the credit market limited the amount of money that investors were prepared to invest in equity, slackening the demand for quoted securities (Government of Kenya, 1975).

During the revitalisation reform process, various efforts were made with the aim of strengthening the market microstructure. These saw the relaxation of capital controls to allow foreign investors participation, tightening of the legal and regulatory framework to enhance investors' confidence and taxation policy reviews to reduce the explicit costs of transaction. In addition, cross-border listing was permitted and privatisation process through the stock market as well as lobbying for essential economic reforms to enhance the supply side of the market were encouraged. Further, reforms for pension funds and insurance sector and development of the bonds market were viewed as means of enhancing growth on the demand side of the market.

Regulatory changes

During the reform process, the regulatory system saw a shift from self-regulatory to statutory-regulatory framework with the establishment of the Capital Markets Authority (CMA). The establishment of a statutory body is viewed as a step forward towards tightening the regulatory infrastructure; for example, the CMA Act of 1989 spells out enhancement of investors' confidence and reducing information asymmetry as major responsibilities of the statutory body. In this regard, a compensation fund was established in August 1996 aimed at protecting investors from financial loss arising from failure of a licensed stockbroker or dealer to meet contractual obligations. To build up the fund, every licensed stockbroker was required to maintain an irrevocable bank guarantee of Ksh 1.5 million with the stock exchange . This fund is used to settle any third-party claims arising out of day-unsettled trades. In addition, the NSE was required to maintain another level of compensation to be used when the bank guarantee is not adequate. This compensation is to be

paid for by the buyers and sellers of securities at a rate of 0.01 percent of the considerations. Further, the CMA Act (Amendment) 1995 required every buyer and seller of securities to pay 0.01 percent of the consideration to investor compensation fund. This fund is accessed when the first and second compensations are fully utilised and a legal bankruptcy or liquidation proceedings against the licensed stockbrocker are complete and net loses determined.

Further, following the recommendations of "The Assessment of Information Needs for Capital Market" reports, efforts were made to enhance information disclosure and promote public education and awareness about the market operations and the financial assets. Tightening of the disclosure rules for listed companies was aimed at enabling investors to make informed investment decisions. A committee was set up to review the existing disclosure requirements and make recommendations on the formulation of minimum disclosure standards and best practice for all market participants. Audit committees were proposed to all listed companies and guidelines were developed to be effective from January 1999.

Taxation policy

To create an enabling environment for the development of the stock market, taxation policy reforms were implemented aimed at reducing transaction costs and making shares more competitive in the financial asset basket. Such reforms as exemption of listed securities from stamp duty, capital gains tax and value added tax, increased shareholders earnings while creating harmony among the financial assets. Capital gains tax was suspended in June 1985 while stamp duty payable on retail share transfer transaction was abolished during the 1990/91 fiscal year. Further, a withholding tax rate of 15 percent on dividend income paid to residents was made final tax to reduce incidence of double taxation on corporate dividends and other incomes arising from investment in

securities. All dividend and interest income to unit trusts was subjected to final withholding taxes of 15 percent and 10 percent respectively. Withholding tax on dividend income was further reduced during the 1992/93 fiscal year to 5 percent for the local investors and 7.5 percent for non-residents. However, withholding tax on interest income was raised from 10 percent to 15 percent while withholding taxes on bearer instruments and certificates of deposit was raised from 10 percent to 20 percent respectively; in both cases, it was final tax.

To enhance participation of insurance companies, gains that insurance companies were making from share trading and which were previously taxable at the normal corporate tax, were made tax-exempt during the 1997/98 fiscal year. The aim was to release for trading large stockholding in the custody of insurance companies, therefore boosting the supply of securities in the market.

Tax-exempt status was also proposed for licensed dealers whose role in the market was aimed at enhancing liquidity in the market. Finally, during the 2000/2001 fiscal year, to encourage more listings and therefore boost the supply of shares, listed companies were expected to pay 27 percent of the corporate tax for a period of three years down from 30 per cent. Further, in the 2002/2003 fiscal year any newly listed company with an initial listing of at least 30 percent of its share capital was to enjoy a corporate tax rate of 25 percent for a period of five years. Other incentives include tax amnesty, new rules for retirement benefits schemes, and new rules for foreign investors.

Trading system

Efficiency of price discovery process is positively related to liquidity gains in the stock market (Madhvan, 1992; Amihud *et al*, 1997). At inception, NSE adopted call auction coffeehouse forum trading system for its price discovery process. However, following the recommendations

of the International Financial Corporation/Central Bank of Kenya (IFC/CBK) joint study of 1984, open outcry floor trading system was adopted in November 1991 aimed at enhancing transparency in the process. Further, to reduce transaction costs, the March 1995 Report on "Clearing, Settlement and Depository Framework for Kenya's Capital Market" recommended the establishment of a central depository system (CDS); an independent committee was constituted in March 1996 to review and co-ordinate all aspects of the proposed CDS. A major step was achieved towards the implementation of the CDS environment with the introduction of a DvP system in August 2000.

The challenge with the new trading system was to settle all transactions in five days. It is indicated that in a period of one year, the overall market settlement performance stood on average at 4.42 days. Presently, the market is in the process of fully establishing the CDS system and automating the trading cycle (Ngugi, 2003).

Mass education

Creating awareness on the activities of the stock market is viewed as essential in promoting investors participation. In the 1990/91 Capital Markets Authority (CMA) Annual Report it is noted that one of the targets in the development process of the stock market was to intensify investors' awareness through seminars and workshops. Consequently, a workshop on the "Emerging Issues in Capital Market Development" was organised in February 1996 and attended by capital market practitioners and senior personnel of financial institutions. In addition, a special workshop to create awareness on the central depository system was organised in July 1996. The participants included licensees, listed companies and members of the legal and accounting fraternities. Further, a monthly review produced by NSE information desk provides educative materials on various aspects of stock market operations.

Bonds market

Diversity in financial assets traded in the stock market introduces competition and enables diversification of risk by investors. Participation in share trading will therefore reflect on their competitiveness in the financial assets basket. The range of financial assets traded in the market increased with the issuing of the first corporate bond (from the East African Development Bank) in November 1996. This was followed closely by issuing of the Government of Kenya Treasury Bonds in February 1997, commencing its trading in April 1997. The main aim of issuing Treasury bonds was to address the inverse yield curve, by shifting the short-term debt consisting of Treasury bills to long-term debt. The type of Treasury bonds issued show diversity in terms of maturity and targeted goal; for example, the Tax Amnesty Bond issued in June 1998, aimed at encouraging compliance with the Income Tax Act. The government issued the first two-year floating rate Treasury bond in July 1998, aimed at extending the maturity profile of domestic debt, and Special Issue Treasury bonds in 1999 aimed at covering the outstanding payments due to government contractors and suppliers. Shelter Afrique issued a medium term note on the 8 December 2000, through a private placement to institutional investors. Further, the East African Development Bank launched a medium term note and was listed on the NSE Fixed Income securities market segment on 2 May 2001. The first locally controlled firm to offer bond was Safaricom on 26 June 2001.

Regional factors

One other major factor that has had implications on the NSE trading activities is political change among the countries of the East African Community (EAC). Initially, NSE had a large market scope serving the three EAC members. However, in the era of political independence and policy changes adopted by the new governments, NSE was left to serve only the Kenyan market.

Political changes demanded formalisation of trading relations among members. A first attempt was made in 1964 with the Kampala Agreement, but little was achieved. Eventually, it was achieved with the signing of the East Africa Community Treaty on 1st December 1967; the Treaty covered such areas as the trading arrangements not implemented with the Kampala Agreement of 1964. This was, however, short-lived as Tanzania adopted a nationalisation policy on the one hand, while on the other hand both Uganda and Tanzania took a unilateral decision to be excluded from the scheduled territories for exchange control. These devlopments complicated the trading activities as transactions between Kenya and the other two member countries were now subjected to the normal exchange control regulations therefore curtailing free movement of capital and squeezing the market scope of the NSE.[5] This meant, for example, that companies originating from Uganda and Tanzania had to be delisted on the NSE .

In the liberalisation process, efforts have been made to enhance cross-border listing; for example, the East African Member State Securities Regulatory Authorities (EASRA) was formed in March 1997 under the memorandum of understanding between securities' regulators of Kenya, Uganda and Tanzania. The main aim was to promote cross-border listing, harmonise legal and regulatory framework governing capital markets in the region and the capital market policies, and to promote cooperation between the stock exchanges. As a result, East African Breweries Ltd

---

5. For example, the Economic Survey of 1968 indicates that, for a short period, the Tanzanian government imposed exchange controls restrictions against Kenya and Uganda which meant evolving new procedures for making and receiving payments. To restrict capital flight, the Bank of Tanzania suspended the arrangement where Tanzanian notes could be redeemed in Kenya and Uganda. With this nationalisation, Kenyan banks found themselves without correspondent in Tanzania and therefore with no channel of remitting funds or sending cheques and bills for collection in Tanzania.

(EABL) pioneered the move with its listing on the Uganda Securities Exchange, commencing trading on 27 March 2001. Kenya Airways followed suit on 25 March 2002.

3.   A Brief Literature Review

Kyle (1985) describes market liquidity as a slippery and elusive concept especially because it encompasses a number of transactional properties including tightness, depth and resiliency. For example, liquidity is defined narrowly as the ability to buy and sell a particular security with minimal market impact (Glen, 1994). In this respect, Amihud *et al* (1990) observe that illiquidity reflects on the difficulties of converting cash into assets and assets into cash, or the cost of trading assets in the market. Liquidity is also defined broadly as the willingness of stock market participants to engage in trades.

In analysing transactional properties, Kyle (1985) defines tightness (the cost of turning around position over a short period of time) as a measure of the ability to transact quickly, while market depth (the size of an order flow innovation required to change prices by a given amount) is the ability to transact at the current market prices or the sensitivity of prices to order flow. It is observed that market depth is inversely related to the amount of private information no yet incorporated in stock prices, such that the higher the information asymmetry, the lower the market depth. Resiliency or elasticity measures the speed with which prices recover from a random uninformative shock. Therefore, it is directly related to the information capital of investors in the market; the more informed the investors, the more resilient is the market. Black (1976) maintains that market liquidity holds when:

(a)   there are bid and ask prices for investors who want to buy or sell small amounts of stock immediately;

(b)   the difference between the bid and ask price is always small;

(c)   an investor who is buying or selling a large amount of stock in the absence of special information can expect to do so over a long period of time at a price not very different on average

from the current market prices; and

(d)   an investor can buy or sell a large block of stock immediately but at premium or discount that depends on the size of the block.

Market liquidity is a microstructure element, reflecting institutional infrastructure of the stock market. For example, Amihud *et al* (1990) attribute illiquidity to such costs as the market maker spread, market impact costs, delay and search costs, and brokerage commissions and fees. Madhavan (1992), focusing on the transactional properties of the market, argues that the quality of information possessed by the market makers and traders significantly influence market depth. This argument corroborates the information asymmetry paradigm of Kyle (1985) and Admati and Pfleiderer (1988), suggesting that adequacy of the institutional infrastructure, including the tightness of disclosure rules and the accounting standards, matter in gaining market liquidity. For example, Ahna and Cheung (1999) observe that low liquidity is implied by a negative relationship between the spread and market depth.[6] In addition, Pagano and Roell (1996) attribute liquidity to the adopted trading system, observing that greater transparency[7] in the trading process enhances market liquidity by reducing the opportunities for taking advantage of less informed or professional participants. The inventory paradigm attributes liquidity to the inventory turnover rate and inventory risks and also such factors as marginal requirements and short selling constraints (Chordia *et al*, 2001).

Some studies test the implications of the trading system on market liquidity by analysing market performance with a different price

---

6.   A direct relationship is indicated between information asymmetry and the bid-ask spread, such that market depth is implied when bid-ask spread is narrow.

7.   Transparency is defined as the extent to which market makers can observe the size and direction of the current order flow.

discovery process; for example, Amihud *et al*, (1997) analyse the experience of Tel Aviv Stock Exchange with the shift from call to continuous trading process. Results show liquidity gain and positive liquidity externalities when stocks are traded in a continuous auction session than a call auction system. Chang *et al* (1999) also analyse the response of market liquidity to shifts in trading system for the Taiwan Stock Exchange and find no significant gain in liquidity when the market adopts a continuous auction system. However, Lang and Lee (1999) fail to support these results, finding improved liquidity as the market moves from the call to continuous trading system.

Other studies trace the intra-day pattern of liquidity to capture the implications of price discovery process at different trading sessions on liquidity. For example, Comerton-Forde (1999) compares the call opening of the Australian market with continuous opening of Jakarta Stock Exchange. Results indicate that the Australian market has higher liquidity and lower volatility at the open, which is attributed to the choice of the market opening procedure. Call auction is implied to enhance liquidity and reduce volatility at the opening of trade. Ahna and Cheung (1999), analysing the Hong Kong market, also find a U-shaped intra-day spread and trade volume and an inverted U-shape for depth. This implies a positive relationship between the spread and trade volume and a negative relationship between the spread and depth. These results corroborate Lee *et al* (1998) observation that the combination of wider (narrower) spread and smaller (greater) depth is sufficient to infer the decrease (increase) of liquidity. They attribute narrow depths and larger spread at the open and close to the limit order traders' strategy of avoiding possible losses from trading with informed traders when adverse selection problem is severe. Further, Foster and Viswanathan (1993) show a concentration of traded volume in the opening half-hour and more trading volume on Monday and significantly lower trading volume on Tuesday and Wednesday.

Studies focusing on the regulatory framework argue that tightening of disclosure requirements and adopting competitive auditing and accounting standards creates confidence among investors to commit their resources in the stock market (Roell, 1992; Khambata, 2000; Demirgiuc-Kunt and Levine, 1996), enhancing market liquidity. For example, comparing the developed and emerging stock markets, Khambata (2000) indicates that with well-established institutions, developed stock markets have higher levels of liquidity compared to the emerging stock markets, which have weak institutional infrastructure, and therefore tend to have thin trading and to be shallow in depth. It is observed that disclosure rules and insider trading regulations augment market liquidity by reducing the information asymmetry between the firm and investors, reducing the price impact of trade (Diamond and Verrecchia, 1991). Disclosure rules provide costless information about firms that increase the accuracy of informed traders, consequently enhancing market efficiency. Short-term investors are indicated to derive more use from the accuracy of prices that disclosures induce and therefore prefer more disclosure relative to the long-term investors. As a result, in the short run, short-term traders' activities drive market liquidity.

Prohibition of insider trading reduces structural transaction costs by excluding the most advantaged group of investors. This increases competition among the informed outside investors, reducing the total profits of insider traders, which are losses to the uninformed group. A reduction of the transaction costs therefore attracts trading increasing liquidity. However, Cornell and Sirri (1992) find that market liquidity increases even with information asymmetry as insiders are able to obtain superior execution for their trades relative to the contemporaneous liquidity traders, concluding that presence of informed traders to the market does not necessarily reduce market liquidity. Similarly, Glosten (1989), while analysing the implications of private information in the presence of market specialist, finds that a specialist increases liquidity in the presence of private information.

4. Empirical Predictions

To analyse the relationship between the instituted changes and the trading activity and liquidity of the stock market, this study invokes the microstructure theory. The main changes analysed include the shifts in trading system, tightening of the regulatory system, reform of taxation policy, and relaxation of capital controls. Table 1 summarises the implemented changes, their expected impact as hypothesised by the microstructure theory and the implications on the trading activities and the transactional properties (measures of liquidity). For example, relaxation of capital is expected to enhance foreign investors' participation and in turn facilitate further tightening of the regulatory framework especially because they are transient institutional investors.

Table 1: Summary of the hypotheses

Policy action	Expected impact	Traded volume	Tightness	Market depth	Resiliency
Foreign investors	Increase in the demand for shares Tightened regulatory system	*			
Taxation policy	Reduce explicit transaction costs	*			
Disclosure rules	Reduce information asymmetry	*		*	*
Investor's protection	Enhance investors' confidence	*		*	
Trading system shifts	Reduce transaction costs Enhance transparency	*	*		

* Implies the policy action has an impact on the transactional property

Aitken (1998) argues that inflow of capital could achieve stock price stability, enhance liquidity and lengthen investors' horizon. Foreign investors are mainly institutional investors and, as indicated by Falkenstein (1996) and Gompers and Metrick (1998), institutional investors are attracted to firms with high average trading volume and indicate a lower prices impact of trades. Therefore, it is expected that firms that adhere to the informative disclosure practices are likely to attract more foreign investors' participation. In turn, such firms are expected to show higher trading activities and if the regulatory system were tightened, then transaction costs would go down especially because of the improved quality of information. In addition, if foreign investors are information-based traders, then market resiliency will be achieved.[8] At the market level, it is expected that higher trading activities and market liquidity will characterise the period following the entry of foreign investors.

If trading system reform enhances transparency and reduces transaction period, then investors' participation will be enhanced. Therefore, the shift to floor trading should show gains in trading activities, while introduction of the DvP system should enhance investors' ability to transact quickly. More gains are expected when the central depository system (CDS), which reduces the transaction period to T+3, is introduced and the automation of the trading cycle. Further, adoption of continuous trading with a dealership system would allow continuity of the market and therefore achievement of market tightness especially if the market maker costs are low. However, market depth and resiliency will be achieved if these changes are accompanied by improved quality of information and increased information trading.

---

8. Most studies analysing the impact of foreign investors' participation concentrate on volatility and predictability of stock returns with little attention given to liquidity. See, for example Chan et al (1998); Kim and Singal (2000); and the *CPA Journal*, 64, 3 (1994): 73-74. These studies mainly indicate gains in efficiency and lower volatility with the entry of foreign investors.

Tightening of the regulatory system with enhanced investor's protection and tight disclosure rules should facilitate the achievement of market resiliency and depth given that the two transactional properties depend on the information capital. Therefore, we expect that the period following the tightening of the regulatory framework would be characterised by higher liquidity.

Taxation policy influences the explicit transaction costs and the competitiveness of shares among financial assets. Reduced dividend tax rate raises stock returns and enhances competitiveness of shares among the financial assets. Therefore, we expect gains in market liquidity in the period following the reduction of dividend income tax. Further, reduced listing barriers should show a rise in supply of shares such that investors are able to buy and sell shares quickly with no shortage of stock constraint.

5. Methodology

The main task of this study is to test the implications of the implemented institutional and policy change on liquidity of the stock market. This section discusses data and the empirical model used to test the hypothesis.

Data

The study uses market level data covering the period January 1990 to June 2002. The main source of information was NSE information desk, the NSE monthly bulletins and Central Bank of Kenya statistical bulletins. Information on the reforms was mainly collected from the CMA and NSE annual reports, NSE monthly bulletins, economic surveys, budget speeches and national development plans. Table 2 summarises the sample sub-periods by the type of reforms undertaken.

Firm level data was used to supplement the market data; however, it was only available for the period January 1996 to June 2002. A sample of 39 firms out of 51 was selected based on availability of data. For example, two firms were not selected because they were recently listed while the majority had missing information. Firms were distributed across the sectors as follows: five in agriculture, eleven in finance, sixteen in industry and seven in the service sector.

Measurement of variables

Liquidity

The study attempts to capture various aspects of liquidity identified in the earlier section under literature review. For example, following Amihud *et al* (1997) and Chordia *et al* (2001), the study proxies trading activities by the volume traded while trade counts are used as a measure

Table 2: A summary of the reform and the sub-sample periods

Period with the change implemented	Period of analysis with the reform
Statutory regulatory body established (January 1990)	Jan 1990- June 1991
Taxation reform: stamp duties abolished and withholding tax made final at 15% (June 1991)	July 1991- November 1991
Shift of trading system to open outcry floor trading (November 1991)	December 1991- June 1992
Withholding tax reduced to 10% (June, 1992)	July 1992- July 1994
New stockbrokers licensed (July 1994)	August 1994- December 1994
Foreign investors entry (January 1995)	January 1995- June 1995
Withholding tax reduced to 7.5% (June 1995)	July 1995- August 1995
The establishment of investors' compensation fund	September 1995- June 1996
Withholding tax reduced to 5% (June, 1996)	July 1996- November 1996
First issue of corporate bond (November 1996)	December 1996-December 1998
Guidelines to promote governance issued (January 1999)	January 1999- August 2000
DvP trading system adopted (August 2000)	September 2000- June 2002

of trading frequency; volumes traded and trading frequencies of given security are increasing functions of liquidity, other things equal. These proxies are measured as the logarithm of the total traded volume (*TVL*) and the logarithm of trade counts (*LTC*). To proxy for the transactional properties, the study uses the turnover ratio (*TUR*) for tightness. This is calculated as the ratio of shares traded to the total number of shares available for trading (that is the total number of shares listed minus the unavailable shares for trading in the secondary market). Market depth is measured using volatility-adjusted liquidity (*VAL*). This measures the ability of the market to absorb large order flows without significant

changes in prices, capturing the quantity effect of liquidity. A liquid market is characterised by a small impact on the market prices following the execution of large orders. A high ratio implies that a large order can be executed with only a small price movement while a low ratio suggests inability to absorb a large order without a large price movement. Amihud *et al* (1997) measure the *VAL* as the ratio of traded volume to the sum of squared price changes. Market depth is proxied by market-adjusted liquidity (*MAL*). The estimation procedure entails using the Hiu and Henbel (1984) model which is based on the argument that unsystematic risk reflects on liquidity where price changes of high (low) liquid stock can(not) be easily predicted by the market model and the residuals of the market model are smaller (greater). The model uses the squared residuals estimated using Schwert (1989) method and regresses the squared residuals on percentage change of volume traded to obtain a market-adjusted liquidity ratio b; $((e''_t)^2 = a + b\%v_t + e_t)$.

Chang *et al* (1999) measure liquidity as the implicit cost of market immediacy (the price effect of liquidity), using the ratio of long to short-term return variances (*PEL*), which is inversely related to the implicit costs of immediacy costs (bid-ask spread). A smaller variance ratio reflects a noise market/stock as it signifies greater friction in the market or market illiquidity. This is used to proxy for resilience or elasticity of liquidity. In the absence of the bid-ask prices and the short period of time covered, the study estimates the elasticity of volume traded to the stock price (*ELA*) as a proxy for resilience.

Institutional changes

The regulatory changes considered include the tightening of disclosure rules and enhancement of investors' protection. The disclosure rules are captured using *DISCO* which is a dummy variable taking the value of one for the period before the implementation of the disclosure rules and zero otherwise. Enhancement of investor's protection is captured

using *PROTE* a dummy variable that takes the value of one for the period after the introduction of the compensation fund and zero otherwise. The other institutional change considered is change in trading system which is proxied by *TSYS1* that takes the value of one for the period after the shift to floor trading and zero otherwise, and *TSYS2* that takes the value of one for the period after the introduction of DvP and zero otherwise. Further, the study captures the expansion of financial assets through introduction of bonds with *BOND* that takes the value of one with bonds trading and zero otherwise.

Policy changes

The main policy changes considered include taxation reforms aimed at reducing the transaction costs and the relaxation of capital controls allowing the entry of foreign investors. Taxation reforms are captured using the *TAX* which is measured by the level of tax rate on dividend income. The entry of foreign investors is captured by *FORE*, a dummy variable that takes the value of one for the period before the entry of foreign investors and zero otherwise.

Microstructure

Institutional reforms have implications on market microstructure characteristics. Therefore, the study analyses the relationship between liquidity and stock return volatility (*VOL*) and efficiency of stock prices (*RHO*). In addition, Chordia and Subrahmanyam (2001) observe that volatility influences liquidity and trading activity through its effect on inventory risk as well as the risk of engaging in short-term speculative activity. Stock returns volatility is measured as historical volatility calculated as the squared deviation of the present period stock returns from the mean value calculated as a rolling average over a period of 12 months. It is argued that stock return volatility proxies information asymmetry that managers try to reduce through improved disclosure of

information. Therefore, the higher the volatility, the riskier is the firm perceived to be and therefore the noisier is stock prices as a signal for firm value. For example, Bushee and Noe (2000) find that the more the disclosure, the lower the information asymmetry and the subsequent stock return volatility. However, it is also possible that higher disclosure is associated with higher volatility if institutional investors are transient, so that disclosure practices could result in indirect costs. Efficiency is proxied, following Fama (1970) definition, using *RHO* derived from a first order serial correlation model. This is captured at firm level for the entire sample period. The variable has implications on the adequacy of the institutional infrastructure, which is reflected, for example, by the level of information asymmetry. It is argued that when information disclosure is minimal, say at the firm level, investors assume the worst and therefore discount the price of their shares heavily. Firms are therefore driven to disclose information because its news would not be worse than the market would assume. As a result, prices will be less noisy and therefore more accurate, increasing the trading activities with enhanced ability to transact at current prices.

Firm specific factors

The firm specific factors considered include firm size (*SIZ*), which is proxied by the number of shares available for trading in secondary market. Alternative measure includes the total number of shares listed by the firms, the total assets and the concentration ratio (*TOP*), which is measured by the proportion of shares held by the top 20 shareholders in each firm.

6.   Descriptive Analysis of Trading Activity and Liquidity Attributes

Table 3 provides summary statistics of market liquidity measures and trading activities. Traded volume shows more variability compared to the trade counts, but both means are close to the medians. Trends in traded volume (*TVL*), trade counts (*TC*) and stock prices (*SP*) indicate an increasing tendency of trading activities for the period before the mid-1997 and a slow decline thereafter. Trade counts also show a declining tendency for the period when volume traded assumes a declining trend. The declining trading activity coincides with the period when the market witnesses outflow of foreign capital and suspension of donor support. The decline is also concomitant with the declining stock prices. These results imply that when the number of investors trading in the market goes down, the level of trading goes down, and thinned demand is coupled with declining prices.

Panel 2 of the table reports correlation results using the firm level data. A positive correlation is indicated between the measures of trading activities (*TVL* and *TC*) and also between these measures and the transactional properties. For example, a high correlation is reported between *TVL* and *LTC*, which implies, as predicted, that the two proxies measure similar aspects in the market. A positive correlation is indicated between the two measures of trading activity and the proxy for market tightness (*TUR*) and also with measures of market depth (*VAL*) and resiliency (*ELA*). These indicate that trading activities are highly correlated with transaction costs that influence the ability to transact quickly and also adequacy of institutional infrastructure, which influence the quality of information. The positive correlation between the *TVL* and *VAL* implies that market depth is achieved when market participation is high. The correlation between the *TVL* and *MAL* has an unexpected positive sign, while the coefficient of *ELA* implies that the more resilient the market the higher the liquidity.

Table 3: Descriptive statistics for the liquidity measures

Panel 1: Descriptive statistic for raw TVL and LTC

	TVL	*LTC*
Mean	15.2863	8.0033
Median	15.6053	7.9860
Maximum	17.1002	8.8547
Minimum	12.8942	7.1074
Std deviation	1.0443	.4127
Skewness	-.0571	.0972
Kurtosis	2.1075	2.1773
JB(prob)	13.1406 (.0014)	2.3228(.3130)

Panel 2 Correlation results using the firm level data

	TVL	*LTC*	*TURN*	*VAL*	*MAL*	*ELA*
TVL	1					
LTC	.8057(.000)	1				
TURN	.3970(.00)	.1355(.000)	1			
VAL	.0671(.000)	.0274(.145)	-.0032(.866)	1		
MAL	.0538(.004)	.0237(.204)	.1141(.000)	.0083(.656)	1	
ELA	.1357(.000)	.1266(.000)	.0134(.471)	1116(.000)	.740(.000)	1

RET is stock return defined as the first difference of the logarithm of stock prices; TVL is logarithm of total volume traded; VAL is volatility-adjusted liquidity defined as the ratio of traded volume to squared change in stock prices; LTC is logarithm of trade counts; ELA is proxy for market resiliency defined as the elasticity of volume traded to stock prices. TAX is tax reform measured by the level of tax rate on dividend income. VOL is historical volatility. LL is loglikelihood statistic; DW is Durbin Watson statistic. Level of significant is defined as 10% (*), 5% (**) and 1% (***).

Panel 3: Mean values of the liquidity measures by the regimes

	TVL	VAL	LTC	RET	VOL
Statutory regulatory body established (January 1990)	13.6175	.5088		.0091	.0024
Taxation reform; stamp duties abolished and withholding tax made final at 15% (June 1991)	14.1667	3.0062		.0006	.0004
Shift to open outcry floor trading system (November 1991)	13.6868	2.0123		.0268	.0089
Withholding tax reduced to 10% (June 1992)	14.5624	.0362		.0507	.1713
New stockbrokers licensed (July 1994)	15.2352	.0008		.0227	.0257
Foreign investors entry (January 1995)	15.5596	.0029		-.0458	.0057
Withholding tax reduced to 7.5% (June 1995)	15.2624	.0006		-.0531	.0217
Establishment of investors compensation fund	15.5877	.0168	8.0594	.0009	.0088
Withholding tax reduced to 5% (June 1996)	16.1935	.1244	8.3153	-.0066	.0013
First issue of corporate bond (November 1996)	16.0464	.7035	8.4205	-.0008	.0067
Guidelines to promote corporate governance issued (January 1999)	16.2120	.3395	7.8692	-.0221	.0144
DvP trading system adopted (August 2000)	16.0311	.0196	7.5399	-.0268	.0299

Panel 3 of Table 3 reports the mean values of liquidity measures over the different regimes. A marginal drop is indicated when the market adopts the open outcry trading process, for both the overall volume traded and tightness. This implies that shifts in trading system can increase trading activities but not necessary improve market tightness especially if the transaction costs have not come down significantly. A significant gain in volume traded is indicated when withholding tax is made final and also following the expansion of stockbrokerage industry. This means that shifts in trading system alone without efforts made to improve the investors' returns is not enough to enhance market participation.

The entry of foreign investors alone does not show significant gain on *TVL*. However, when the dividend income tax is reduced to 5 percent and foreign participation expanded to 40 percent limit, all the liquidity measures *TVL*, *VAL* and *LTC* show significant gain. However, insignificant changes are recorded thereafter for *VAL* and *TVL*, while *TC* indicates significant drop even when the market introduces the T+5 trading cycle. It is possible that the volume traded rises in the period following the lowering of the dividend income tax because investors have preference for dividend income. It is also possible that the period saw significant loss in *VAL* because although the taxes went down, the CMA imposed a new fee structure, that had implications on investors trading costs, together with the establishment of investors' compensation fund.

7   Regression Analysis

The empirical model used for analyses takes the following general form.

$$X = f\,(SP,\ DISCO,\ PROTE,\ TSYS1,\ TSYS2,\ BOND,\ TAX,\ FORE,$$
$$VOL,\ RHO,\ SIZ,\ TOP)\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots1$$

where *SP* is stock price; *DISCO* is a dummy variable taking the value 1 when disclosure rules are tightened and zero otherwise; *PROTE* is a dummy variable taking the value of one when compensation fund is established and zero otherwise; *TSYS1* takes the value of one for the period after shifting to floor trading and zero otherwise; *TSYS2* takes the value of one when the trading cycle is T+5 and zero when T+7; *BOND* takes the value of one when bonds are in the market and zero otherwise; *TAX* is dividend income tax rate. *FORE* takes the value of one after the entry of foreign investors and zero otherwise; *VOL* is historical volatility; *RHO* is serial correlation coefficient. *SIZ* is amount of shares available for trading; *TOP* is proportion of shares held by the top 20 shareholders.

Before estimating the model, time series characteristics of the variables were analysed. To test for unit root, the study uses the augmented Dickey-Fuller test. Some studies report strong evidence of both linear and non-linear time trends in trading volume series. Therefore, stationarity is tested with detrended series where traded volume is regressed on a deterministic function to time.

$$V_t \;=\; \alpha + \beta_1 t + \beta_2 t^2 + \varepsilon_t \qquad\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots2$$

where V_t is the trading volume.

Unit root test results are reported in Table 4 Panel 1. Testing first the stationarity of the raw volume traded data series, results show that it is not stationary even when we included the trend. However, results of the residual of equation 2 indicate that detrended series is stationary. Only the linear term was statistically significant while the quadratic

term was not significant, therefore the detrended trading volumes are the residuals of the model with only the linear term. Similar results were indicated by *LTC* and *ELA*, while other measures of liquidity indicated stationarity at levels. Stock prices are non-stationary at levels but stock returns measured as the first difference of the log of stock prices are stationary. Test for cointegration between volumes traded, trade counts and the stock prices show that long-run relationship cannot be rejected. Correlation results between the volume traded and the independent variables are reported in Panel 2 of Table 4. A positive relationship is indicated between the volume traded and the stock returns, but a negative relationship with the market risk.

Table 4: Descriptive statistics

Panel 1 Unit root results			
Variable	ADF statistics	AR(1)	Trend
TVL	-1.9202(2.5772) -2.3867(3.1449)	-.0786 -.2099	.0034(1.6834)*
TVL (detrended)	-3.4091(2.5773)	-.6028	

Regression results of TVL on a deterministic function of time

C	6.4092(6.6366)***
TVL(-1)	.5367(7.6665)***
Trend	.0091(5.3469)***
R²	.7761

Unit root results for *LTC*			
LTC	-.6248(2.5871) -3.5761(3.1615)	-.0339 -.3273	-.0063(3.8177)***
LTC(detrended)	-5.1585(2.5874)	-1.1948	

Regression results of *LTC* on a deterministic function of time

C	2.7904(3.9517)***
LTC(-1)	.6762(8.2268)***
Trend	-.0053(3.5337)***
R²	.8825

Unit root results *ELA*			
ELA	-.6774(2.5772) -1.4794(3.1449)	-.0377 -.0956	-1.60E-05(1.7254)*
ELA(detrended)	-3.5775(2.5773)	-.726	

Regression results of *ELA* on a deterministic function of time

C	.0374(4.6943)***
ELA(-1)	.7312(12.7567)***
Trend	-2.5E-05(2.7427)**
R^2	.6470

SP	-1.3961(2.5772)	-.0154	
RET	-4.3575(2.5773)	-.6584	

Correlation results										
	TVL	*RET*	*TAX*	*TSYS1*	*TSYS2*	*VOL*	*BOND*	*DISCO*	*PROTE*	*RISK*
TVL	1									
RET	.2081									
TAX	-.1453	.1766	1							
TSYS1	.1317	-.0214	-.7191	1						
TSYS2	-.1759	-.1324	-.3218	.1513	1					
VOL	.0504	.4375	.0630	.1208	-.0475	1				
BOND	.0059	-.2036	-.7820	.3678	.4115	-.1706	1			
DISCO	-.1117	-.2084	-.5161	.2427	.6235	-.0922	.6600	1		
PROTE	.1064	-.2170	-.8448	.4541	.3333	-.2213	.8098	.5345	1	
RISK	-.0437	-.0658	.0199	.1820	-.1543	.1121	-.1991	-.2390	-.2045	1
FORE	.1439	-.3015	-.8608	.5087	.2975	-.2496	.7228	.4771	.8926	-.2195

The variables are defined as follows: *RET* is stock return defined as the first difference of the logarithm of stock prices; *TVL* is logarithm of total volume traded; *VAL* is volatility-adjusted liquidity defined as the ratio of traded volume to squared change in stock prices; *LTC* is logarithm of trade counts; *ELA* is proxy for market resiliency defined as the elasticity of volume traded to stock prices. *TAX* is tax reform measured by the level of tax rate on dividend income. *FORE* measures entry of foreign investors and is captured as a dummy variable taking the value of one for the period before the entry of foreign investors and zero otherwise. *TSYS1* takes the value of one for the period after shifting to floor trading and zero otherwise. *TSYS2* takes the value of one when the trading cycle is T+5 and zero when T+7. *BOND* takes the value of one when bonds are in the market and zero otherwise. *VOL* is historical volatility. *DISCO* is a dummy variable taking the value of one for the period before the implementation of the disclosure rules and zero otherwise. *PROTE* is a dummy variable that takes the value of one for the period after the introduction of the compensation fund and zero otherwise. Level of significant is defined as 10% (*), 5% (**) and 1% (***).

Table 5: Regression results for the basic model

Dependent variable	TVL	LTC	VAL	ELA
C	.0010(.0274)	.0254(1.2984)	-2.6176(5.1273)	-1.28E-06(.0039)
RET	1.0538(1.9504)*	1.2607(2.7373)**	-4.0196(1.3148)	.0058(1.2206)
ECM(-1)	-.5711(3.9274)***	-.4327(2.8439)**		-.3874(4.1931)
VAL(-1)			.2868(3.4977)***	
VAL(-2)			.1870(2.2851)**	
TVL(-1)	.3617(2.5261)**			
LTC(-1)		.8695(7.2948)***		
ELA				.8664(13.5046)
R^2	.1502	.5434	.1735	.5764
ADJ-R^2	.1324	.5243	.1562	.5676
LL	-91.8576	33.2816	-348.5050	608.8341
DW	2.0184	2.1759	2.0574	2.1154
F-STAT	8.4239(.000)	28.5586(.000)	10.0070(.000)	65.3209

This table reports regression results testing the relationship between market liquidity and stock returns. *RET* is stock return defined as the first difference of the logarithm of stock prices; *TVL* is logarithm of total volume traded; *VAL* is volatility-adjusted liquidity defined as the ratio of traded volume to squared change in stock prices; *LTC* is logarithm of trade counts; *ELA* is proxy for market resiliency defined as the elasticity of volume traded to stock prices. ECM is error correction term. LL is loglikelihood statistic; DW is Durbin Watson statistic. Level of significant is defined as 10% (*), 5% (**) and 1% (***).

Regression results: The basic model

The basic model is defined by the relationship between the volume traded and the stock returns. Regression results are reported in Table 5. Equation 1 and 2 relate the stock returns to the trading activity measures, showing a positive and significant relationship, which implies that in the short run, higher stock returns are accompanied by higher traded volume. Testing whether the direction of change in stock prices matter, the model was estimated with absolute returns and found insignificant results. To capture the impact of positive returns, the model was also estimated with a dummy variable (*RETD*), which takes the value of 1 with positive returns and zero otherwise. Results show insignificantly

higher trading activity with the positive returns as compared to the negative returns. However, considering an interaction variable *RETP* = *RETD*RET* results show that increasing positive returns are coupled with higher trading activities as compared to increasing negative returns. Similar results are indicated when we consider the mean difference using the t-ratio test; there is significantly higher trading activities with positive returns. Therefore, increasing stock returns are accompanied by higher trading activities; our test for granger causality indicates the volume traded precedes stock price.

Although the results of the basic model are significant and the model seems to be well fitted, R^2 is low, implying that we cannot rule out that other factors explain the variations in trading activities other than stock returns. Results with *ELA* and *VAL* indicate insignificant relationship; *VAL* shows a negative relationship, while *ELA* indicates positive results. This implies that when stock returns are positive, the market gains in terms of volume traded and market depth and resiliency.

Repeating the same exercise with the firm level data, a positive and significant relationship between *TVL*, *LTC*, *TUR*, *VAL* and *RET* was found. However, *ELA* and *MAL* showed insignificant relationship. This implies that the level of stock returns influences the trading activities and also market liquidity. For example, we cannot reject that stock returns influence the tightness and depth of the market, which may in turn reflect on the underlying institutional structure. High stock returns do not necessary imply achieved quality of informed trading and therefore resiliency is not achieved.

Regression results with changes in the trading system

If shifts in trading system from call to floor trading improve transparency in the price discovery process, then floor trading should be accompanied by higher returns and rising trading activities. Similarly, if the DvP

achieves a decline in trading period, then the after period should see high trading activities especially because of reduced transaction costs. A look at the trend in stock returns with the shifts in trading system indicate marginal decline with the shift to floor trading and a significant decline with the introduction of DvP system. However, in both cases, a significant increase in volume traded is recorded, though the shift to T+5 record a decline in tightness as proxied by *LTC*. The regression results reported in Table 6 show positive and significant relationship with a shift to floor trading (*TSYS1*) which implies increased trading activities. *TUR* and *VAL* show some gains in the market tightness with the shift to T+5 cycle but the results are not significant. However, *ELA* indicates a significantly negative relationship with the DvP system, which supports the argument that there is more information asymmetry problem in the period. A positive and insignificant relationship is indicated between the *ELA* and the shift to floor trading implying some marginal gains in resiliency. Similar results are indicated with a test of mean difference where *ELA* is significantly lower with T+5 as compared to the positive gain with T+7 system and floor trading. The implication of these results is that enhancing transparency in the trading system reduces transaction costs, increasing the trading activities. However, reducing the transaction period without realising increasing returns does not result into higher trading activities. In addition, change in the trading system does not necessary improve informed trading especially if the regulatory system is still weak curtailing the achievement of market resiliency. Further, when volatility is high and returns are low, changes in trading system do not achieve positive results, especially in terms of ensuring that investors are able to transact at the current price. High volatility is partially related to information asymmetry and therefore inefficiency in the market.

Table 6: Regression results with TSYS

Dependent variable	TVL	LTC	VAL	ELA
C	-.1411(1.3734)	.0226(.9952)	-1.5491(2.4023)	-.0007(.7326)
RET	1.0416(1.9142)*	1.2898(2.6978)**	-4.3368(1.4233)	.0038(.8117)
ECM(-1)	-.2417(3.0671)***	-.4422(2.8017)**		-.3516(3.5833)***
LTC(-1)		.8779(7.9255)***		
ELA(-1)				.7252(9.5618)***
VAL(-1)			.2363(2.8551)**	
VAL(-2)			.1469(1.7947)*	
TSYS1	.2057(1.8362)*		-1.7825(2.6482)**	.0013(1.1297)
TSYS2	-.2343(2.1282)**	.0109(.2487)	.1307(.2125)	-.0026(2.4776)**
R^2	.1528	.5438	2131	.5942
ADJ-R^2	.1289	.5181	.1851	.5799
LL	-91.6311	33.3147	-344.9016	612.0015
DW	1.9299	2.1757	2.0491	2.0756
F	6.4027(.000)	21.1553(.000)	7.6347(.000)	41.5794(.000)

This table reports the relationship between liquidity and trading system. The variables are defined as follows. *RET* is stock return defined as the first difference of the logarithm of stock prices; *TVL* is logarithm of total volume traded; *VAL* is volatility-adjusted liquidity defined as the ratio of traded volume to squared change in stock prices; *LTC* is logarithm of trade counts; *ELA* is proxy for market resiliency defined as the elasticity of volume traded to stock prices. *TSYS1* takes the value of one for the period after shifting to floor trading and zero otherwise. *TSYS2* takes the value of one when the trading cycle is T+5 and zero when T+7. *BOND* takes the value of one when bonds are in the market and zero otherwise. ECM is error correction term. LL is loglikelihood statistic; DW is Durbin Watson statistic. Level of significant is defined as 10% (*), 5% (**) and 1% (***).

Regression results with taxation policy changes

This section looks at the relationship between taxation policy changes and trading activity. Regression results in Table 7 with the tax variable indicate a significant gain in volume traded when tax rate on dividend income is reduced. However, both *VAL* and *ELA* show insignificant results implying that reduction of the explicit transaction costs may not necessary enhance transaction at the current price if the quality of information does not improve. With a high correlation between *TAX*

and *TSYS1*, the inclusion of *TAX* in the model makes *TSYS1* insignificant. Therefore, it is observed that positive gains in liquidity realised following the shift to floor trading were augmented by reduction in taxation costs.

Table 7: Regression results with taxation policy changes

Dependent variable	TVL	VAL	ELA
C	.5331(2.1477)**	-.7243(.4996)	-.0031(1.4092)
RET	1.3335(2.4747)**	-3.9392(1.2638)	.0029(.6011)
ECM(-1)	-.2803(3.6013)***		-.3791(3.7692)***
LTC(-1)			
ELA(-1)			.7833(9.6442)***
VAL(-1)		.2353(2.8365)**	
VAL(-2)		.1479(1.8021)*	
TSYS1	-.1260(.8068)	-2.18802(2.3567)**	.0025(1.6379)*
TSYS2	-.3367(2.9904)**	-.0028(.0043)	-.0022(2.0081)**
TAX	-.0451(2.9676)**	-.0551(.6356)	.0002(1.2077)
R^2	.2026	.2153	.5983
ADJ-R^2	.1743	.1817	.5812
LL	-87.1811	-344.6899	612.7631
DW	1.9992	2.0476	2.0784
F	7.1652(.000)	6.4026(.000)	35.0045(.000)

RET is stock return defined as the first difference of the logarithm of stock prices; *TVL* is logarithm of total volume traded; *VAL* is volatility-adjusted liquidity defined as the ratio of traded volume to squared change in stock prices; *LTC* is logarithm of trade counts; *ELA* is proxy for market resiliency defined as the elasticity of volume traded to stock prices. *TAX* is tax reform measured by the level of tax rate on dividend income. *FORE* measures entry of foreign investors and is captured as a dummy variable taking the value of one for the period before the entry of foreign investors and zero otherwise. *TSYS1* takes the value of one for the period after shifting to floor trading and zero otherwise. *TSYS2* takes the value of one when the trading cycle is T+5 and zero when T+7. LL is loglikelihood statistic; DW is Durbin Watson statistic. Level of significant is defined as 10% (*), 5% (**) and 1% (***).

Regression results with changes in the regulatory system

Table 8 reports regression results with tightening of investors' protection and the disclosure rules, which are aimed at enhancing the participation of investors. A positive and significant relationship is indicated between

PROTE and *TVL*, implying that enhancing investors' protection results in increased trading activity. A high correlation is indicated between *PROTE*, *TAX* and *TSYS1*, while regression results for *TSYS1* become insignificant when *PROTE* is introduced. Therefore, we observe that positive gains indicated following the shift to floor trading are attributable to gained confidence among investors with the establishment of a compensation fund. Tightening of investors' protection seems to enhance market depth, though it has insignificant impact on market resiliency. There are positive but insignificant gains in trading activity when efforts are made to tighten the disclosure rules, but significant gains are indicated with the *VAL,* though *LTC* indicates significantly lower number of investors' participation in the post-period. Tightening of disclosure rules shows a positive gain in market depth, implying that quality of information for trading is enhanced when investors have more information disclosure. However, this is not enough to increase the proportion of informed traders in the market. Therefore, we conclude that tightening of the regulatory system has promising impact on liquidity of the market.

Regression results with changes in bonds market

Introduction of corporate and treasury bonds is expected to enhance competition among financial assets and reduce risk factor to investors as they diversify their portfolio. The results in Table 9 show decline in volume of shares traded in the period following introduction of bonds, which may be attributed to higher yields and lower risk in the bonds market. Chordia *et al* (2001) observe that an increase in long-term treasury bond yields could cause investors to re-allocate wealth between equity and debt instruments stimulating trading activity and therefore affecting liquidity. The results with the *ELA* show a negative and significant relationship, emphasising that growth of the bonds market may be detrimental to share trading, with the indicated substitution effect.

Table 8: Regression results with regulatory changes

This table captures the relationship between liquidity and the regulatory changes including the tightening of disclosure rules (DISCO) and the introduction of investors compensation fund (PROTE). *RET* is stock return defined as the first difference of the logarithm of stock prices; *TVL* is logarithm of total volume traded; *VAL* is volatility-adjusted liquidity defined as the ratio of traded volume to squared change in stock prices; *LTC* is logarithm of trade counts; *ELA* is proxy for market resiliency defined as the elasticity of volume traded to stock prices. *TAX* is tax reform measured by the level of tax rate on dividend income. *FORE* measures entry of foreign investors and is captured as a dummy variable taking the value of one for the period before the entry of foreign investors and zero otherwise. *TSYS1* takes the value of one for the period after shifting to floor trading and zero otherwise. *TSYS2* takes the value of one when the trading cycle is T+5 and zero when T+7. *PROTE* is a dummy variable that takes the value of one for the period after the introduction of the compensation fund and zero otherwise. LL is loglikelihood statistic; DW is Durbin Watson statistic. Level of significant is defined as 10% (*), 5% (**) and 1% (***).

Dependent variable	TVL	TVL	LTC	VAL	VAL	ELA	ELA
C	-.1428(1.4158)	-.1412(1.3694)	.0465(1.6514)*	-1.6101(2.5086)**	-1.6565(2.5758)**	-.0007(.7120)	-.009(.9246)
RET	1.2959(2.3817)**	1.0553(1.9095)**				.0024(.5069)	.0023(.4828)
ECM(-1)	-.2672(3.4220)***	-.2426(3.0603)***	-.4629(2.8244)**			-.3796(3.8381)***	-.3480(3.5788)***
LTC(-1)			.8374(7.5347)***				.7424(9.0431)***
ELA(-1)						.7748(9.6189)***	
VAL(-1)				.2277(2.7572)**	.2192(2.6396)**		
VAL(-2)				.1414(1.7371)*	.1342(1.6434)*		
TSYS1	.0744(.6097)	.2023(1.7662)*		-2.3377(3.1352)***	-2.1227(3.0680)***	.0021(1.6760)*	.0020(1.6232)*
TSYS2	-.3183(2.8107)**	-.2492(1.7244)*	.0490(.9010)			-.0021(1.9757)**	-.0012(.9690)
PROTE	.2284(2.4925)**			.8654(1.7903)*	.9503(1.8936)*	-.0014(.0941)	-.0020(1.9236)*
DISCO		.0190(.1602)	-.0986(2.0373)**				

R^2	.186	.1530	.5248	.2183	.2203	.6022	.6045
$ADJ\text{-}R^2$	.1598	.1230	.4980	.1963	.1984	.5853	.5877
LL	-88.4619	-91.6177	31.7652	-344.4107	-344.2184	613.4773	613.9184
DW	1.9706	1.9276	2.0320	2.0299	2.0147	2.0702	2.0556
F	6.5527(.0002)	5.0922(.0003)	19.6009(.0000)	9.9133(.000)	10.0323(.000)	35.5719(.000)	35.9251(.000)

Table 9: Regression results with the bond and foreign entry

This table reports the relationship between liquidity and introduction of bonds (*BOND*) and foreign investors' entry (*FORE*). *RET* is stock return defined as the first difference of the logarithm of stock prices; *TVL* is logarithm of total volume traded; *VAL* is volatility-adjusted liquidity defined as the ratio of traded volume to squared change in stock prices; *LTC* is logarithm of trade counts; *ELA* is proxy for market resiliency defined as the elasticity of volume traded to stock prices. *TAX* is tax reform measured by the level of tax rate on dividend income. *FORE* measures entry of foreign investors and is captured as a dummy variable taking the value of one for the period before the entry of foreign investors and zero otherwise. *TSYS1* takes the value of one for the period after shifting to floor trading and zero otherwise. *TSYS2* takes the value of one when the trading cycle is T+5 and zero when T+7. *BOND* takes the value of one when bonds are in the market and zero otherwise. *VOL* is historical volatility. *DISCO* is a dummy variable taking the value of one for the period before the implementation of the disclosure rules and zero otherwise. *PROTE* is a dummy variable that takes the value of one for the period after the introduction of the compensation fund and zero otherwise. LL is loglikelihood statistic; DW is Durbin Watson statistic. Level of significant is defined as 10% (*), 5% (**) and 1% (***).

Dependent variable	TVL	TVL	TVL	ELA	ELA
C	.9937(2.7151)**	.5852(1.2318)	-.1405(2.2987)**	.0006(1.258)	-.0007(.7313)
RET	1.3043(2.4356)**	1.5042(2.7132)**		.0041(.8685)	
ECM(-1)	-.2864(3.7012)**	-.2809(3.6350)***	-.2672(3.4961)***	-.4233(4.5226)***	-.3713(3.7290)***
LTC(-1)					
ELA(-1)				.8674(13.6369)***	.7690(9.2994)***
VAL(-1)					
VAL(-2)					
TSYS1	-.2496(1.4571)	-.1904(1.0792)			.0022(1.7363)*
TSYS2	-.2828(2.4330)	-.2801(2.4164)**			-.0022(2.0422)**
TAX		-.0486(1.5695)			
DISCO	-.0758(3.2235)**				
BOND	-.2371(1.7030)	-.2389(1.7207)*		-.0013(1.8711)*	
FORE		.2168(1.3415)	.3087(3.7156)***		.0001(.0868)
R^2	.2188	.2288	.2095	.5865	.6015
ADJ-R^2	.1853	.1899	.1813	.5750	.5845
LL	-85.6709	-84.7253	-86.5365	610.6250	613.3465
DW	2.0538	2.0646	2.0068	2.0911	2.0518
F	6.5348(.000)	5.8904(.000)	9.4102(.000)	50.7168	35.4676(.000)

Regression results with foreign investors' participation

This section reports results on the impact of foreign investors trading on market liquidity. Considering the period before and after the entry of foreign investors, a higher and significant mean value of volume traded is reported in the after period. Foreign investors trading indicate a slow growth when the participation limit is set at 20 percent, and accelerated increase as the trading activity limit is raised to 40 percent. However, a significant drop is registered especially after the suspension of aid flow in July 1997. The mean difference between the period before and after the suspension show a significant drop of the total flow as a ratio to total trading from .2397 to .1534 (t = 2.44 (.023)) while ratio of total inflow to total market trading show a drop from .1980 to .0469 (t = 4.97 (.000)). Therefore, the drop in foreign trading is partially attributable to lack of sustaining the inflow especially when the economy is perceived to be a risky environment.[9] Therefore, sustaining inflow would have a positive impact on growth of volume traded and therefore the need to strengthen the pull-market factors.

Considering the performance of firms with and without foreign trading activities, our results in Table 10 show that firms with foreign investors trading have a higher level of trading activity as indicated by the volume traded and trade counts. However, there is no significant difference in tightness as proxied by the volatility-adjusted liquidity and the turnover, although firms with no foreign trading are more resilient. This corroborates the observation by Aitken (1998) that foreign investors assume a noise-trading behaviour with their investment in the emerging markets. As a result, this curtails achievement of market resiliency.

---

9. One of the aftermaths of the suspensions is the deterioration in exchange rate market. Therefore, we compare the correlation between the foreign trading and the exchange rate levels. We find a negative relationship where the correlation between the exchange rate and the total flows was -.2429 (.083), with inflows -.6218(.0000), total flows is -.2963 (.033) and the outflow .3512(.011). The correlation with the outflow is lower implying that the drop in total flow is mainly attributed to the drop in the inflow.

Table 10: Stock market performance with the entry of foreign investors

Panel 1 Trends in foreign investors trading

	Total foreign trading/total market volume ratio	Inflow/total market volume ratio	Inflow/outflows ratio
1996	.2030	.1752	.8781
1997	.2248	.2085	.8911
1998	.1353	.0624	.6355
1999	-	-	-
2000	.1882	.0103	.780
2001	.1366	.0346	.3475
2002	.1146	.002	.0004

Panel 2 Mean difference for the period with and without foreign investors trading

	TVL	LTC	TURN	VAL	MAL	ELA
Without	10.2678	3.0447	.0141	4.9749	.0007	.2212
With	11.2175	3.6445	.0135	4.9784	.0004	.0256
T-ratio(Prob)	11.70(.000)	10.03(.000)	.41(.681)	.02(.986)	.29(.775)	9.11(.000)

Foreign investors are mainly institutional investors and it is argued that institutional investors are attracted to firms with more informative disclosure practices if such disclosures reduce the price impact (the liquid firms). In addition, it is observed that foreign investors' participation result in higher volume traded especially if the entry is coupled with reduced information asymmetry as the regulatory system is strengthened. For example, De Santis and Imrohoroglus (1997) argue that foreign investors broaden the market dampening the effect of order flow shocks on prices, as a result making the prices more efficient by increasing the precision of public information regarding fundamental values. Sellin (1996) characterises foreign investors' net purchases of stocks as noise trading which result in high volatility, while Aitken (1998) argues that foreign investors' participation has portrayed a herd like behaviour. Therefore, we compare volatility and efficiency of the market for the period before and after the entry of foreign investors. We find that historical volatility decline from .0753 to .0142 (t = 2.44(.018)) while the *RHO* increased from .2079 to .2678 (t = 5.02 (.000)).

Further, comparing firms with and without foreign trading, results show volatility is higher for firms with foreign trading; firms without foreign trading are also closer to the efficiency frontier. Therefore, we observe that the post-period low volatility is attributable to other factors and not necessarily foreign investors trading, while investors' participation in trading does not seem to show gains in price efficiency. If inefficiency reflects on the weakness of the underlying regulatory framework, then we can argue that the failure to sustain foreign trading is attributable to the transient characteristic of institutional investors who demand a strong regulatory framework. Therefore, in the absence of an adequate regulatory framework, institutional foreign investors move out of the market.

It would have been interesting to analyse the 'before' liquidity position of the firms to test the hypothesis that foreign investors are attracted to

firms with high liquidity. However, reliable trading data is not available at company level for the period before the entry of foreign investors. Regression results in Table 9 collaborates the observations made with a positive and significant relationship indicated with *TVL* while *ELA* indicates a positive but insignificant relationship. *VAL* also indicates insignificant results emphasising the observation that market depth is not necessarily achieved with foreign investors' entry. Therefore, we conclude that foreign trading contributes positively to liquidity but more positive gains are achievable if the institutional infrastructure is strengthened.

Microstructure characteristics

The study also looks at the relationship between the liquidity and other microstructure attributes including efficiency and volatility. Amihud *et al* (1997), for example, find that liquidity gains are associated with gains in efficiency and volatility. Similar results are indicated in this study where we find a negative correlation between volatility and measures of liquidity as reported in Table 11. Regression results with *TVL*, however, show negative and insignificant results, but negative and significant result with *VAL*, while a positive and insignificant relationship is indicated with *LTC*. The *RISK* variable indicates a positive correlation with *TVL* but negative with *LTC*. It is possible that when the risk of holding shares is high, investors enter the market to dispose their shares, and though the volumes may be high, the number of investors participating could be low. Regression results are indicated with the *RISK* variable. *RHO* is positively related to liquidity measures, implying the market may show liquidity despite the activities of noise trading.

Table 11: Correlation between liquidity measures and microstructure attributes and firm characteristics

RET is stock return defined as the first difference of the logarithm of stock prices; *TVL* is logarithm of total volume traded; *VAL* is volatility-adjusted liquidity defined as the ratio of traded volume to squared change in stock prices; *LTC* is logarithm of trade counts; *ELA* is proxy for market resiliency defined as the elasticity of volume traded to stock prices. *FORE* measures entry of foreign investors and is captured as a dummy variable taking the value of one for the period before the entry of foreign investors and zero otherwise. *TSYS1* takes the value of one for the period after shifting to floor trading and zero otherwise. *TSYS2* takes the value of one when the trading cycle is T+5 and zero when T+7. *TUR* is turnover. *DISCO* is a dummy variable taking the value of one for the period before the implementation of the disclosure rules and zero otherwise. *PROTE* is a dummy variable that takes the value of one for the period after the introduction of the compensation fund and zero otherwise. LL is loglikelihood statistic; DW is Durbin Watson statistic. Level of significant is defined as 10% (*), 5% (**) and 1% (***).

Panel 1: Correlation between liquidity measures and microstructure attributes

	TVL	LTC	TUR	VAL	MAL	ELA
RET	.0528(.004)	-.0609(.001)	.0687(.000)	.0383(.037)	.0210(.254)	-.0067(.714)
VOL	-.0773(.000)	-.0409(.026)	-.0838(.000)	-.0335(.068)	.0759(.000)	-.0356(.056)
RHO	.0670(.000)	.3211(.000)	.0606(.001)	.1512(.000)	-.0127(.490)	.3837(.000)
RISK	.1498(.000)	-.1783(.000)	.1157(.000)	-.1057(.000)	-.3277(.000)	-.1204(.000)

Panel 2: Correlation between liquidity measures and firm factors

	TVL	LTC	TUR	VAL	MAL	ELA
TOP	-.0968(.000)	-.1267(.000)	-.0108(.555)	-.0069(.705)	.2242(.000)	-.0484(.008)
SIZE	.5240(.000)	.4450(.000)	.5368(.000)	.0940(.000)	-.2359(.000)	.1459(.000)
1	9.3149	2.2425	.0168	4.5707	.0051	.1535
2	10.8126	3.3422	.0140	4.5600	.0007	-.1707
3	11.6551	4.0724	.0117	5.0895	-.0023	.1579
4	12.7635	4.7364	.0117	5.6682	-.0029	.1837
SECTOR						
1	10.2558	2.8647	.0072	5.0531	.0144	.0533
2	11.8176	4.3693	.0126	5.0112	.0008	.0107
3	10.4460	2.9616	.0170	4.4068	.0035	.1960
4	11.2124	3.6621	.0121	5.7106	.0043	.0029

Firm specific factors

The main factors considered are the number of shares available for trading and the proportion share ownership by the top twenty shareholders. Looking at share distribution, a sample of 24 percent of the listed firms, show that institutional shareholders dominate shareholding, while a sample of 38 percent indicate that majority of investors are locals. Considering the concentration of shares among the shareholders, a sample of 57 percent listed firms indicates that the top 20 shareholders, who represent 6 percent of the total shareholders, hold more than 50 percent of the listed shares.

Correlation results, reported in Table 11, indicate that firm size is positively correlated with the liquidity measures. Therefore, the larger the amount of shares available for trading, the higher the market tightness, depth and resiliency. A negative and significant correlation between the proportionate shares of top 20 shareholders to liquidity collaborates this result. Correlation results between *TOP* and microstructure attributes (*RHO* and *VOL*) indicate positive and significant relationship with *RHO* and positive and insignificant relationship with *VOL*. However, size of the firm shows a negative and significant correlation with the microstructure variables (*RHO* and *VOL*). This implies that higher concentration of shares among a small group of shareholders is associated with information asymmetry that works in disfavor of the liquidity gains in the market.

Looking at the trading activities and liquidity across the sectoral level, we find high trading activity among firms in the financial sector and low trading activity for those in the agricultural sector. While the agricultural sector reported low trading in the 1970s, this was attributed to the investors' tendency to refuse participating in the secondary market so as to reap the dividend gains of the remarkably performing agricultural sector. The low trading activity in the reform period is attributable to low returns due to the poor performance of the sector,

and the opposite applies to the financial sector. The *MAL* shows that financial sector firms have in addition higher market depth although the industrial firms indicate a higher turnover and more market resiliency.

Macroeconomic factors

Finally, the study considers the relationship between liquidity and the macroeconomic environment, following the argument that activities of the stock market imitate the general economic performance. Regression results in Table 12 indicate positive and significant relationship between the volume traded and economic growth proxied by GDP. This justifies efforts made by NSE to lobby for suitable economic policy reforms (see next page).

Table 12: Regression results with the GDP

RET is stock return defined as the first difference of the logarithm of stock prices; TVL is logarithm of total volume traded; VAL is volatility-adjusted liquidity defined as the ratio of traded volume to squared change in stock prices; LTC is logarithm of trade counts; ELA is proxy for market resiliency defined as the elasticity of volume traded to stock prices. TAX is tax reform measured by the level of tax rate on dividend income. FORE measures entry of foreign investors and is captured as a dummy variable taking the value of one for the period before the entry of foreign investors and zero otherwise. TSYS1 takes the value of one for the period after shifting to floor trading and zero otherwise. TSYS2 takes the value of one when the trading cycle is T+5 and zero when T+7. BOND takes the value of one when bonds are in the market and zero otherwise. VOL is historical volatility. DISCO is a dummy variable taking the value of one for the period before the implementation of the disclosure rules and zero otherwise. PROTE is a dummy variable that takes the value of one for the period after the introduction of the compensation fund and zero otherwise. LL is loglikelihood statistic; DW is Durbin Watson statistic. Level of significant is defined as 10% (*), 5% (**) and 1% (***).

Independent variables	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6
C	-.1216(1.9320)*	-.3616(2.7831)**	-.3427(2.6735)**	-.4360(3.2494)***	-.5451(2.6573)**	-.2559(3.3608)***
RET	1.3298(2.4349)**	1.2851(2.3654)**	1.5050(2.7682)**	1.5780(2.8435)**	1.5580(2.7925)**	1.7873(3.2309)***
ECM(-1)	-.2502(3.1142)***	-.2421(3.0588)***	-.2679(3.4025)***	-.2572(3.2748)***	-.2885(3.6379)***	-.2778(3.5303)***
TSYS1		.2781(2.4461)**	.1511(1.2097)	.2091(1.7874)*	-.1542(.7258)	
TSYS2		-.1261(.9701)	-.2152(1.6088)	-.2431(1.6002)	-.2333(1.7277)*	
TAX			.2090(2.2914)**		.1729(1.7334)*	
PROTE				.0723(.5077)		
DISCO				.1850(1.7320)*		
BOND					-.1101(.5620)	
FORE					-.0133(.0604)	.2409(2.9655)**
GDP	.610(2.5925)**	.0686(2.7009)**	.0622(2.4717)**	.0913(3.2867)***	.0577(1.4590)	.0558(2.4302)**
R2	.1569	.1966	.2269	.2265	.2484	.2081
ADJ-R2	.1384	.1669	.1923	.1858	.2028	.1848
LL	-88.6584	-85.2565	-82.5468	-82.5836	-80.5594	-84.2409
DW	1.9135	2.1079	2.0524	2.0539	2.0913	1.9682
F-STAT	8.4983(.000)	6.6077(.0000)	6.5549(.000)	5.5637(.000)	5.4530	8.9349(.000)

8 Conclusion and Policy Implications

This study analyses the response of the market liquidity to the implemented revitalisation reforms. Testing the predictions based on microstructure theory the study makes the following findings:

One, stock returns, to a large extent, influence trading activities. There are more positive gains in liquidity with positive returns than with negative returns. However, while trading activities may be high, it takes quality of information to achieve market resiliency and depth. It is, therefore, important to pursue policies that reduce negative shocks to the stock market and also support institutional changes that reduce information asymmetry. For example, the study finds that efforts made to fight the regulatory system ensures investors' protection and subsidises investors with costless information, reducing search costs and enhancing trading activity. It also helps to achieve market depth with enhanced information quality.

Two, enhancing transparency in the price discovery process by shifting to floor trading increases investors' participation, but does not necessarily improve the transactional properties. Similarly, reducing the transaction period without achieving positive returns does not result into gains in trading activity. This implies that the on-going efforts to introduce CDS trading system and automate the trading system must be coupled with an enabling macroeconomic environment that will sustain positive stock returns. Similarly, institutional infrastructure that reduces information costs must accompany shifts in trading system. For example, the Johannesburg Stock Exchange (JSE) saw the introduction of JET system accompanied with a pre-trading session that is carried out using the auction system to reduce information asymmetry and tighten the surveillance of the market, including efforts made to minimise insider traders' activities.

Three, taxation policy plays a major role in facilitating share trading when it is aimed at reducing transaction costs and ensuring

competitiveness of shares among the financial assets. However, it is also true that investors make a choice between the capital gains and dividend income, especially in achieving their interests in the firm. A taxation policy that tilts preferences to dividend income may not be conducive for sustaining market liquidity especially if this is accompanied by a concentration of shares among a few individuals who want to take advantage of the dividend income.

Fourth, the results show that high concentration of shares among a few shareholders in one firm and across the market makes the market less liquid. This implies that however efficient the trading system being adopted can be, as long as most of the shares are not put into the market, trading activities will not substantially improve. The stock market authorities should find a way of limiting share ownership in individual companies and across the market by individual shareholders both local and foreign. Interestingly, proportionate shareholding has a relationship with directorship of companies and therefore management of the company. This could also be discouraging the listing of firms whose main interest is to raise funds in the market, but not to see a takeover.

Fifth, growth of the bonds market may be detrimental to share trading especially if there are huge differences in yields and investment risk across the financial assets. Presently, government bonds dominate the bonds market, taking a good lead of the market. However, government bonds are considered less risky to corporate bonds and therefore safer for investors. It is important to encourage listing of corporate bonds and, over time, to reduce the government bonds activity in the market. A high concentration of government bonds may crowd out the private sector in the stock market like it did in the banking sector.

Sixth, although foreign investors enhance trading activity, their significant contribution to liquidity is curtailed by their noise trading behaviour and weak regulatory system that transient institutional investors thrive on for trading activity. Enhancing the pull factors for

foreign investors in the market is important in order to experience gains in trading activities. This should be coupled with creation of a favourable macroeconomic environment for investment.

Seventh, weak market microstructure curtails achievement of market liquidity. For example, volatility of the stock market is inversely related to market liquidity. Volatility is partially attributed to information asymmetry in the market. To a large extent, this reflects on the microstructure infrastructure including the tightness of disclosure rules. The results show that any efforts made to tighten the disclosure rules and protect the investors go a long way in improving liquidity as information costs are reduced. Information asymmetry can also be improved by tightening market surveillance like putting in place effective and efficient circuit breakers.

Ninth, economic performance has a direct influence on investors' participation especially because it affects their earning and their ability to participate in the market. Therefore, a favourable macroeconomic environment that enhances growth of the economy and economically empowers the private sector would go a long in improving trading activities.

Finally, in conclusion, we observe that trading activities are influenced by the institutional set-up of the stock market, the policy environment and the general economic performance. Improvement of trading activities, therefore requires coherence between the micro and macro issues affecting the stock market. Therefore, the NSE investments into improving the market microstructure will bear fruitful results if accompanied by a favourable policy environment.

References

Admati, A.R. and P. Pfleiderer (1988). "A theory of intraday patterns, volume and price variability", *Review of Financial Studies*, 1:3-40.

Ahna, H.J. and Y. Cheung (1999). "The intraday patterns of spreads and depth in a market without market makers: The stock exchange of Hong Kong", *Pacific-Basin Finance Journal*, 17: 539-556.

Aitken, B. (1998). "Have institutional investors destabilized emerging markets?" *Contemporary Economic Policy*, 16: 173-184.

Amihud, Y., H. Mendelson and B. Lauterbach (1997). "Market microstructure and securities values: Evidence from Tel Aviv Stock Exchange", *Journal of Financial Economics*, 45: 365-390.

Amihud, Y., H. Mendelson and R.A. Wood (1990). "Liquidity and the 1987 stock market crash", *The Journal of Portfolio Management*, 16(3): 65-69.

Black, F. (1976). "Studies of stock price volatility changes." Proceedings of the 1976 Meeting of Business and Economic Statistics Section, *American Statistical Association*, pp. 177-181.

Bushee, B.J. and C.F. Noe (2000). "Corporate disclosure practices, institutional investors and stock return volatility", *Journal of Accounting Research*, 38: 171-202.

Capital Markets Authority (CMA) of Kenya, Annual Reports, 1995-2001.

Chan, K., G. Mcqueen and S. Thorley (1998). "Are there rational speculative bubbles in Asian stock markets?" *Pacific-Basin Finance Journal*, 6: 125-151.

Chang, R.P.*et al* (1999). "The effects of trading methods on volatility and liquidity: Evidence from Taiwan Stock Exchange", *Journal of Business Finance and Accounting*, 26(1/2): 137-170.

Chordia, T., R. Roll and A. Subrahmanyam (2001). "Market liquidity and trading activity," *Journal of Finance,* LVI(2): 501-530.

Comerton-Forde, C. (1999). "Do trading rules impact on market efficiency? A comparison of opening procedures on Australian and Jakarta Stock Exchanges," *Pacific-Basin Finance Journal*, 7: 495-521.

Cornell, B. and E.R. Sirri (1992). "The reaction of investors and stock prices to insider trading," *Journal of Finance*, 47: 1031-1059.

De Santis, G. and S. Imrohoroglus (1997). "Stock returns and volatility in emerging financial markets," *Journal of International Money and Finance*, 16: 561-579.

Demirguc-Kunt, A. and R. Levine (1996). "Stock market development and financial intermediaries: Stylized facts," *The World Bank Economic Review*, 10(2): 341-369.

Diamond, D. and R. Verrecchia (1991). Disclosure, liquidity and cost of capital. *Journal of Finance*, 66,1325-55.

Falkenstein, E. (1996): Preferences for stock characteristics as revealed by mutual fund poertfolio holsings. *Journal of Finance*, 51, 111-35.

Fama, E.F. (1970). "Efficient capital markets: A review of theory and empirical work." *Journal of Finance*, 25(2): 383-423.

Foster, F.D. and S. Viswanathan (1993), "Variations in trading volume, return volatility, and trading costs: Evidence of recent price formation models," *Journal of Finance*, XLVII (1): 187-211.

Glen, J. (1994). "An Introduction to the microstructure of emerging markets," International Finance Corporation, Discussion Paper # 2, Washington DC: IFC.

Glosten, L.R. (1989). "Insider trading, liquidity and the role of the monopolist specialist," *Journal of Business*, 62(2): 211-235.

Gopers, P. and A. Metrick (1198). How are large institutions different from other investors? Why do these differences matter? Working Paper, Havard Business School.

Government of Kenya (1975). *Economic Survey*.

Hiu, B. and B. Henbel (1984). "Comparative liquidity advantage among major US stock markets, *DRI financial Information Group Study Series*, # 84081."

Khambata, D. (2000). "Impact of foreign investment on volatility and growth of emerging stock market," *Multinational Business Review*, 8: 50-59.

Kim, E.H. and V. Singal (2000). "Stock market openings: Experience of emerging economies", *Journal of Business*, 73(1): 25-66.

Kyle, A.S. (1985). "Continuous auctions and insider trading," *Econometrica* 53(6): 1315-1335.

Lang, L.H. and Y.T. Lee (1999). "Performance of various transaction frequencies under call: The case of Taiwan," *Pacific-Basin Finance Journal*, 7: 23-39.

Lee, J., *et al* (1998). "Market efficiency hypothesis on stock prices: International evidence in the 1920s." *Applied Financial Economics*, 8(1): 61-65.

Littman, M.J. (1994), "World of opportunity-investing in overseas markets." *The CPA Journal*, 64(3): 73-74.

Madhavan, A. (1992). "Trading mechanism in securities market." *Journal of Finance*, XLVII (2): 607-641.

Ngugi, R.W. (2003). "Development of the Nairobi Stock Exchange: A historical perspective", KIPPRA Discussion Paper No. 27. Nairobi: Kenya Institute for Public Policy Research and Analysis.

Ngugi, R.W. (2002). Four essays on corporate financial issues in emerging stock markets. Unpublished PhD thesis, University of Birmingham.

Pagano, M. and A. Roell (1996). "Transparency and liquidity: A comparison of auction and dealer markets with informed trading," *Journal of Finance*, LI (2): 579-611.

Roell, A. (1992), "Comparing the performance of stock exchange trading systems," In *The internationalization of Capital Markets and Regulatory Response*, edited by J. Fingleton and D. Schoenmaker. London: Graham and Trotman.

Schwert, W. (1989). "Why does stock market liquidity change over time?" *Journal of Finance*, 44: 1115-1153.

Sellin, P. (1996). "Inviting excess volatility? Opening up a small stock market to international investors," *Scandinavian Journal of Economics*, 98: 608-612.

KIPPRA PUBLICATIONS

Conference Proceedings

Report of the proceedings of the AERC-KIPPRA World Trade Organization (WTO) Workshop, 2000

Report of the proceedings of the International Conference on Finance and Development: Evidence and Policy Issues, 2001

Discussion Papers

Njuguna S. Ndung'u (2000). *The exchange rate and the interest rate differential in Kenya: a monetary and fiscal policy dilemma.* KIPPRA DP No. 1

Karingi, S. N. and Njuguna S. Ndung'u (2000). *Macro models of the Kenyan economy: a review.* KIPPRA DP No. 2

Ronge, E. E. and H.O. Nyangito (2000). *A review of Kenya's current industrialization policy.* KIPPRA DP No. 3

Nyangito, H.O. (2001). *Delivery of services to smallholder coffee farmers and impacts on production under liberalization in Kenya.* KIPPRA DP No. 4

Njuguna S. Ndungu and R. W. Ngugi (2000). *Banking sector interest rate spread in Kenya.* KIPPRA DP No. 5

Karingi, S.N., M.S. Kimenyi and Njuguna S. Ndung'u (2001). *Beer taxation in Kenya: an assessment.* KIPPRA DP No. 6

Ikiara, M.M. (2001).*Vision and long term development strategy for Kenya's tourism industry.* KIPPRA DP No. 7

Geda, A. and Njuguna S. Ndung'u (2001). *Specifying and estimating partial equilibrium models for use in macro models: a road map for the KIPPRA-Treasury Macro Model.* KIPPRA DP No. 8

Geda, A., Niek de Jong, G. Mwabu and M.S. Kimenyi (2001). *Determinants of poverty in Kenya: household-level analysis.* KIPPRA DP No. 9

Were, M., A. Geda, S.N. Karingi and Njuguna S. Ndungu (2001). *Kenya's exchange rate movement in a liberalized environment: an empirical analysis.* KIPPRA DP No. 10

Huizinga, F., A. Geda, Njuguna S. Ndung'u and S.N. Karingi (2001).*Theoretical base for the Kenya macro model: the KIPPRA-Treasury macro model.* KIPPRA DP No. 11

Mwabu, G., M. S. Kimenyi, P. Kimalu, N. Nafula and D. K. Manda (2002). *Predicting household poverty: a methodological note with a Kenyan example.* KIPPRA DP No. 12

Manda, D.K., G. Mwabu, M. S. Kimenyi (2002). *Human capital externalities and returns to education in Kenya.* KIPPRA DP No. 13

Bedi, A., P.K. Kimalu, D.K. Manda, N.N. Nafula (2002).*The decline in primary school enrolment in Kenya.* KIPPRA DP No. 14

Odhiambo, W. and H. Nyangito (2002). *Land laws and land use in Kenya: implications for agricultural development.* DP No. 15

Were, M. and S. Karingi (2002). *Better understanding of the Kenyan economy: simulations from the KIPPRA-Treasury Macro Model*. KIPPRA DP No. 16

Nyangito, H., M. Ikiara and E. Ronge (2002). *Performance of Kenya's wheat industry and prospects for regional trade in wheat products*. DP No. 17

Nyangito, H. and L. Ndirangu (2002). *Impact of institutional and regulatory framework on the food crops subsector in Kenya: 1990-1999*. KIPPRA DP No. 18

Ikiara, M. (2002). *Impact of tourism on environment in Kenya: status and policy*. KIPPRA DP No. 19

Ronge, E., L. Ndirangu and H. Nyangito (2002). *Review of government policies for the promotion of micro and smallscale enterprises in Kenya*. KIPPRA DP. No. 20

Kiringai, J., Njuguna S. Ndung'u, and S.N. Karingi (2002).*Tobacco excise tax in Kenya: an appraisal*. KIPPRA DP No. 21

Were, M., Njuguna S. Ndung'u, A. Geda and S.N. Karingi (2002). *Analysis of Kenya's export performance: an empirical evaluation*. KIPPRA DP No. 22

Ikiara, M.M., L. Ndirangu (2003).*Prospects of Kenya's clothing exports under AGOA after 2004.* KIPPRA DP No. 24

Nyangito, H. (2003). *Agricultural trade reforms in Kenya under the WTO framework*. KIPPRA DP No. 25

Odhiambo, W. and H. Nyangito (2003). *Measuring agricultural productivity in Kenya: a review of approaches*. KIPPRA DP No. 26

Ngugi, R.W. (2003). *Development of the Nairobi Stock Exchange: a historical perspective*. KIPPRA DP No. 27

Angelica, E.N., Karingi, S.N. and Kimenyi, M.S. (2003). *Alternative methodologies for measuring Kenya's potential output and output gap*. KIPPRA DP No. 28

Occassional Papers

Gitu, K. W. (2001). *Strengthening the link between policy research and implementation*. KIPPRA OP No. 1

Kimenyi, M.S. (2001). *Effective private sector representation in policy formulation and implementation*. KIPPRA OP No. 2

Kimenyi, M.S. (2002). *Agriculture, economic growth and poverty reduction*. KIPPRA OP No. 3

Nyangito, H. (2002). *Post-Doha African challenges in the sanitary and phytosanitary and trade related intellectual property rights agreement*. KIPPRA OP No. 4

Policy Papers

Nyangito, H.O. (2001). *Policy and legal framework for the tea subsector and the impact of liberalization in Kenya*. KIPPRA PP No. 1

Nyangito, H.O. (2001). *Policy and legal framework for the coffee subsector and the impact of liberalization in Kenya*. KIPPRA PP No. 2

Ikiara, M.M. and H. Nyangito (2001). *Effects of visa waiver and increase in airport tax on Kenya's tourism industry*. KIPPRA PP No. 3

Special Reports

Legal and other constraints on access to financial services in Kenya: survey results. KIPPRA Private Sector Development Division. SR No. 1, 2001

Thinking about regulating? The better regulation guide. KIPPRA Private Sector Development Division. SR No. 2, 2002

Policy timeline and time series data for Kenya: an analytical data compendium. KIPPRA Macroeconomics Division, SR No. 3, 2002

Working Papers

Wasike, W.S.K. (2001). *Road infrastructure policies in Kenya: historical trends and current challenges*. KIPPRA WP No. 1

Ikiara, M.M. (2001). *Policy framework of Kenya's tourism sector since independence and emerging policy concerns*. KIPPRA WP No. 2

Manda, D.K., M.S. Kimenyi and G. Mwabu. *A review of poverty and antipoverty initiatives in Kenya*. KIPPRA WP No. 3

Kimalu, P.K., N. Nafula, D.K. Manda, G. Mwabu and M.S. Kimenyi (2001). *Education indicators in Kenya*. KIPPRA WP No. 4

Geda, A., S.N. Karingi, Njuguna S. Ndung'u, M. van Schaaijk, M. Were, W. Wassala and J. Obere (2001). *Estimation procedure and estimated results of the KIPPRA-Treasury macro model*. KIPPRA WP No. 5

Kimalu, P., N. Nafula, D.K. Manda, G. Mwabu and M.S. Kimenyi (2002). *A situational analysis of poverty in Kenya*. KIPPRA WP No. 6

Kiringai, J. and G. West (2002). *Budget reforms and the Medium-Term Expenditure Framework in Kenya*. KIPPRA WP No. 7

Ikiara, M. and L. Ndirangu (2003). *Developing a revival strategy for Kenya's cotton-textile industry: a value chain approach*. KIPPRA WP No. 8

Ng'eno, N.K., H.O. Nyangito, M.M. Ikiara, E.E. Ronge, J. Nyamunga (2003). *Regional integration study of East Africa: the case of Kenya*. KIPPRA WP No. 9

Manda, D. K., P.K. Kimalu, N. Nafula, Diana K. Kimani, R. K. Nyaga, J.M. Mutua, G. Mwabu, M.S. Kimenyi (2003). *Cost and benefits of eliminating child labour in Kenya*. KIPPRA Working Paper No. 10