

The impact of technological improvements on developing financial markets: The case of the Johannesburg Stock Exchange

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Abstract

Can a significant technological improvement make an economically justifiable contribution to a financial market's development? The Johannesburg Stock Exchange (JSE) incorporated the SETS system from the London Stock Exchange in 2002. It is certain that SETS is a technologically efficient trading system, and it would undoubtedly improve trading in the JSE. We test whether SETS represents a structural break by examining whether there was an increase in the JSE's liquidity, market efficiency and international integration after the introduction of SETS. While SETS is certainly a technological improvement with increased liquidity, it is not a sufficient factor to render it efficient. After the incorporation of SETS, the JSE has become more independent and it now offers better diversification opportunities for international investors.

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1. Introduction

The mood was certainly buoyant at a celebratory dinner on 17 May 2002, where South African President Thabo Mbeki gushed about the Johannesburg Stock Exchange's (JSE) new partnership with the London Stock Exchange (LSE). The partnership entailed the incorporation of the LSE's SETS trading platform by the JSE. In obligatory political fashion, Mbeki proclaimed that the new trading platform,

will add the necessary impetus in our work of reconstructing and developing not only our country but the entire continent of Africa [by encouraging investment]. Strategic partnerships with a number of globally prominent companies [such

as the one with LSE] have had the simultaneous impact of exposing the South African capital markets sector to the rest of the world, bringing world-class services and infrastructure to the JSE and entrenching the JSE in the mind of the international investor as the gateway into the African market (Mbeki, 2002).

The development of financial markets is important in facilitating economic development. For countries where access to capital is of the utmost importance, financial markets play a crucial intermediary role between savings and investment. If domestic and international banks are unable or unwilling to invest in such economies, capital can become scarce and prohibitively costly.

When developing countries try to develop their financial markets, five issues arise. (1) Protecting investors seems to be an a priori prerequisite for financial development (i.e. La Porta et al., 1998, 2000). (2) If the investment choice offers no diversification benefits, then there is limited reason for international investors to consider investing. If the major markets are the main drivers of returns, then the developing market does not offer a unique investment opportunity. While the return to risk ratio might be appealing, the market's contribution toward diversifying a portfolio would be minimal. (3) Questionable market efficiency hampers the market's development (Liu, 2010). There will be limited interest in the market by foreign investors if information is unavailable or asymmetric, or returns are predictable or

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manipulatable. More importantly, there will be limited interest by local companies to be listed due to the associated inefficiency risks. (4) A lack of liquidity will hamper the development efforts. Institutional investment in emerging markets may be conditional on the availability of liquidity (Chuhan, 1992). Bekaert et al. (2007) show that liquidity is a priced risk and part of the expected return model. Finally, (5) a lack of trading activity (i.e. volume) implies a lack of interest in the market. With the diminishing interest, the expectation for market development will fade away.

In terms of financial market structure, the JSE's adoption of SETS is a milestone for the JSE. SETS is a system used by the London Stock Exchange. Thus, its adoption should alleviate the five issues listed above for the development of the JSE and therefore for the development of the South African economy overall. (1) The anonymity of trades and traders allows higher investor protection. Institutions can trade without revealing their information, and individuals can trade without revealing their identity. (2) With a system that can accommodate a high number of listed companies, there will be more local companies listed. With diverse listed companies, unique opportunities for international investors will be offered by the JSE. (3) While SETS has a limited impact on the informational aspect of market efficiency, a system that can accommodate high transaction speeds, high number of market participants, and high volumes will increase market efficiency. (4) Having more investors and faster trades will provide liquidity (cheaper trades). Competition between investors will increase liquidity and lower the transaction costs. It will also allow for the emergence of market makers who in turn will provide liquidity. (5) A higher number of listed companies, investors, faster trades and cheaper trades will increase trading activity (volume).

In the present study, we examine the impact of SETS on the statistical properties of the JSE – in terms of returns, liquidity, and efficiency. Are returns in the JSE correlated with those in markets of more developed countries? In other words, is the JSE a good source of diversification? Are there inefficiencies in the South African exchange that could perhaps account for why even more capital does not find its way to Johannesburg? And just as importantly, has the incorporation of a more efficient trading platform paid off in terms of increased market efficiency and liquidity?

The paper is structured as follows. First, we explain why the JSE is of interest as a case study on market efficiency and development. We describe the institutional evolution of the JSE, pointing to a likely structural break in 2002. We follow this by reviewing the earlier empirical research on the JSE's efficiency, potential for diversification, and structural breaks. Then, we perform several comparison-of-means tests of returns, liquidity, and volume. We also test for structural breaks of the predictability of returns (a test of market efficiency) and international integration. We conclude with a discussion of the implications of our study on equity markets in other developing countries.

2. The JSE and its performance

The JSE's development sets an example for other, less developed, financial markets in the region. The JSE is the largest

African stock market by a large margin. Its liquidity is growing, as is its relative size in terms of the world's market capitalization (Jefferis and Smith, 2004).

Is the JSE relatively efficient? Earlier studies of the JSE's market efficiency are largely inconclusive. Thompson and Ward's (1995) paper reviews the literature on the efficiency of the JSE, finding that the studies differ over methodology, time periods, samples, and conclusions. In their words, "the evidence on the efficiency of the JSE is at best mixed, particularly regarding weak and semi-strong form efficiency" (p. 59), and generally is not strong-form efficient. For example, Glass and Smit (1995) conclude that the JSE is not semi-strong form efficient, while Jefferis and Okeahalam (1999) conclude that it is.

Ferret and Page (1998) analyzed four South African futures contracts and their corresponding spot market indices for cointegration. Ideally, these sets of equities should be perfectly correlated. Ferret and Page find a long-term linear relationship between these two sets of equities, but they also find that changes in the futures contracts lead those of the spot market by up to three days. This finding points to an exploitable lack of efficiency in the JSE.

While the studies before 2002 offered contradictory results, the studies conducted after 2002 tend to detect more efficiency than the earlier studies. For example, Jefferis and Smith (2004) find that large-cap indices are random walks and are weak-form efficient, whereas the smaller indices are not. Furthermore, among the 40 most capitalized individual stocks, and among the 40 most liquid small-cap stocks, 32 seem to follow random walks. Auret and Rudolph (2006) find that the announcement of CPI has no effect on stock prices, implying that the market is informationally efficient.

Overall, it seems that the JSE's market efficiency has been increasing, perhaps, attributing to the incorporation of SETS in 2002.

How well integrated is the JSE into the rest of the world's equity markets? International markets provide options for diversification. Diversification can reduce risk while maintaining returns. In order to accomplish this, though, the varying assets must be uncorrelated so that changes in one will not necessarily offset the changes in another. If investment choices have the same return generating process, or they have a lead/lag relationship, then diversification cannot be achieved with these related instruments. The results to date have been mixed.

Appiah-Kusi and Pescetto (1998) find volatility spillovers between the JSE and the Namibian stock exchange, while Humavindu and Floros (2006) find no such volatility.

Several studies have investigated the integration of the various African stock exchanges. Piesse and Hearn (2002, 2005) and Tyandela and Biekpe (2001) find that the Southern African stock exchanges are highly integrated, while Hearn and Piesse (2008) find some integration only between selected pairs of countries. Samouilhan (2006) finds that the JSE and LSE move almost simultaneously: if there is a causal effect from one market to another, Samouilhan hypothesizes that the causation happens at a frequency that is higher than daily data can reveal. He restricts his sample to daily data on broad aggregate and sectoral indices.

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