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INDONESIA'S STOCK MARKET: EVOLVING ROLE, GROWING EFFICIENCY

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The banking sector traditionally dominated Indonesia's financial system, and until the 1990s the stock market remained of little significance. Re-opened in 1977 after two decades of inactivity, the stock exchange made little contribution to Indonesia's development until a series of reform and deregulation measures were implemented from December 1987. This study examines the evolving role of the stock market in the financial system, and analyses changes in its efficiency over time. We find that stock market activity grew markedly in importance relative to banking after the reforms began to take effect, gaining the ascendancy in 2004 and moving well ahead subsequently. One contributor to this success is improvement in efficiency. Using two simple technical trading rules, we demonstrate that the stock exchange secondary market has indeed become significantly more efficient over time.

INTRODUCTION

Financial systems provide various means of channelling savings to investments, of which perhaps the two most obvious are banks and stock markets. The principal focus of these organisations is quite different. At the risk of over-simplification, we could say that banks mainly collect short-term deposits and use them to make short-term loans for financing working capital requirements, while stock markets facilitate the provision of equity capital by savers to finance longer-term investments (Levine and Zervos 1998; Ghosh 2006).[1] Both the providers and the users of funds choose between these and other intermediation channels on the basis of considerations such as pricing, risk and convenience.[2] The ability of each channel to compete with the others depends on both the nature and the condition of the economy and the regulatory environment. Compared with banking, equity financing of investment through stock markets is subject to far more significant economies of scale. This form of financing is therefore not feasible in the absence of numerous large firms in need of funds for investment, and of significant

1 The present study focuses on Indonesia's stock market; for the bond market, see World Bank (2006).

2 Other channels include trade credit, supplier credit and direct (non-intermediated) loans and equity finance.

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numbers of large funding institutions (such as life insurers and pension funds) able to mobilise savings from the general public.

From very early in its existence the Soeharto government came to see the lack of a stock market as a deficiency of Indonesia's financial system, leaving the economy too dependent on the banking sector. From 1968, 'efforts were initiated to develop ... capital markets' (Cole and Slade 1996: 148), although it was not until 1977 that the Jakarta Stock Exchange (JSX) was re-opened, following the issue of a supporting presidential decree (No. 52/1976) in December 1976.[3] At least some foreign advisers argued that it was premature to re-open the stock exchange at this time (Dickie 1981, cited in Cole and Slade 1996: 153–4). There were relatively few large firms in the economy, and many of them were either government- or foreign-owned and therefore did not really need equity finance contributions from the Indonesian public. Moreover, per capita incomes and savings were still very low, so there was little private sector demand for the services provided by savings mobilising institutions such as life insurance companies and pension funds. Thus the re-activation of the JSX in 1977 was not a market-driven process, and as a result very little was achieved. Only 24 stocks were listed on the JSX between 1977 and 1984, and none at all in the next four years.

If there is a demand for the services of a stock exchange, the profit motive can be relied upon to ensure that the demand is met (assuming a benign regulatory environment), just as the profit motive results in the provision of banking services. By contrast, virtually all of the activity generated on this newly revived stock exchange was artificial. Very few companies chose to list, and then did so mainly in response to government pressure and certain tax advantages. The demand for equities came mainly from government-owned institutions rather than from the general public. The stock exchange itself was government-owned and was operated by the Capital Market Supervisory Agency (Bapepam) under the bureaucratic mindset of the Ministry of Finance. It is hardly surprising that it did virtually nothing to challenge the dominance of the banks as financiers of long-term business investment. At that time, the mainly state-owned banks were offering loans at government-specified low interest rates, and derived a large part of their funds from abundant government oil revenue and foreign aid rather than from self-interested depositors.

By the mid-1980s the desirability of having an active stock market was becoming more apparent. World oil prices had fallen sharply from their peak in the early 1980s, greatly reducing the government's revenue and constraining the extent to which it could channel financial resources through the state-owned banks to the business community. The government deregulated the interest rates of state banks to encourage them to mobilise deposits from the general public, while various regulatory constraints on the expansion of privately owned domestic and foreign banks were greatly relaxed, and in some cases removed (McLeod 1999). On the one hand, all of this led to a quite rapid expansion of the banking sector relative to the economy; on the other, the removal of subsidies caused bank finance

3 This ended two decades of inactivity, beginning in the 1950s under former President Soekarno (http://www.idx.co.id/). For an account of the Jakarta Stock Exchange in the early 1980s, see McLeod (1984).

to become more expensive than previously, creating an opportunity for the stock market to play a bigger role.

However, this could not happen under the existing set of regulations, and under bureaucratic rather than profit-oriented management of the stock exchange. Accordingly, over the next several years the government embarked on a process of deregulation and privatisation of the capital market. This began in December 1987 with the introduction of an important policy package that came to be known as Pakdes I (December Package I). This and many of the other policy reforms introduced between 1987 and 2007 are listed in appendix 1.[4] They are too numerous for detailed discussion here; suffice it to mention a few that appear to have had the greatest impact.

First, recognising the lack of domestic demand on the savings side for a stock market (that is, demand for equities), the government overturned in Pakdes I a previous outright prohibition on share purchases in listed companies by foreign investors. The new policy allowed foreign ownership of up to 49% of the shares of companies other than banks. The 49% limit on foreign ownership of non-bank company shares was eventually lifted in 1997, and the prohibition on foreign ownership of bank shares in 1998.

Second, recognising that the profit motive was the main potential driver of stock market development, the government gave the private sector and market mechanisms a much greater role relative to the public sector and bureaucratic control. An earlier restriction on daily stock price movements to not more than 4% was removed. A 'Parallel Bourse' or 'over-the-counter market' was established, owned by private sector brokers and dealers, and with greatly relaxed listing requirements (naively and unsuccessfully intended to encourage smaller firms to raise long-term funding). A private stock exchange was also set up in Surabaya. More important was the decision to narrow Bapepam's role from one of both operator and regulator of the capital market to one of regulator alone. Ownership of the JSX was transferred to a large group of securities companies (clearly with a strong incentive to expand its activities), and the exchange's first boards of commissioners and directors were appointed in December 1991.

Private sector ownership led to a continuing range of initiatives intended to improve the functioning of the stock exchange. These included the introduction of a centralised settlement system; the substitution of automated trading for the previous manual system;[5] the establishment of a Clearing and Guarantee Corporation and a Central Securities Depository; and the introduction of a scripless settlement system, with the settlement date soon shortened from 4 to 3 business days after each transaction.

In the wake of these early reforms the stock market came to life. The Jakarta Composite Index (the benchmark indicator of stock prices) shot up from around 80 in 1987 to 305 in late 1988 and to 637 by 31 December 1996. A large number of new issues led market capitalisation to rise by a vastly greater proportion, from

4 For detailed discussions of stock market developments in the late 1980s and early 1990s, see Noerhadi (1994) and Cole and Slade (1996).

5 Many studies indicate that automation helps improve stock market efficiency; see, for example, Amihud and Mendelson (1988) and Naidu and Rozeff (1994).

around Rp 0.1 trillion in 1987 to Rp 0.5 trillion at the end of 1988 and to Rp 194 trillion by end-1996 (table 1).

We now chart the stock market's rise to dominate the financial system at the expense of the banking sector, and then compare its efficiency in the years before and after the Asian financial crisis.

THE CHANGING RELATIVE IMPORTANCE OF BANKS AND THE STOCK MARKET

Before the Asian financial crisis of 1997–98 the banking sector had dominated the financial system (table 1). In 1987, for example, total bank loans outstanding were Rp 33 trillion (equivalent to 29% of GDP) and stock market capitalisation was only Rp 0.1 trillion (0.1% of GDP); in 1997, the former was Rp 378 trillion (60% of GDP) and the latter was Rp 157 trillion (25% of GDP). Even with a dramatic decline in bank loans following massive write-downs in 1999, bank loans outstanding still exceeded stock market capitalisation by a significant margin.

The 1990s crisis brought home painfully to Indonesia the need to diversify its financial system. The rupiah and the stock market plunged, thousands of companies went bankrupt, the banking sector tottered and the economy contracted. A 2006 World Bank report correctly observed that 'banks were at the heart of Indonesia's economic crisis in 1997/98 …' (World Bank 2006).[6] In a famous 1999 speech, the then US Federal Reserve Chairman, Alan Greenspan, pointed out plainly the importance of having a well-diversified financial system (Greenspan 1999):

> [How] severe [would] East Asia's problems … have been during the past eighteen months had those economies not relied so heavily on banks as their means of financial intermediation[?] … Had a functioning capital market existed, the outcome might well have been far more benign. … Before the crisis broke, there was little reason to question the three decades of phenomenally solid East Asian economic growth, largely financed through the banking system, so long as the rapidly expanding economies and bank credit kept the ratio of non-performing loans to total bank assets low. The failure to have backup forms of intermediation was of little consequence. The lack of a spare tyre is of no concern if you do not get a flat. … East Asia had no spare tyres.

Perceiving that having a strong and well-diversified financial system – not just a sound banking sector – is essential for financial stability and long-term economic growth, Indonesian policy makers implemented further reform and deregulation measures after the Asian financial crisis. Measures related to the stock market included improving its liquidity and collaborating with other ASEAN countries to increase efficiency through better integration;[7] developing derivative markets

6 According to this source, more than 50% of 2000 GDP was spent on recapitalising Indonesian banks; see also Frécaut (2004).

7 See, for example, De Brouwer (1999) and Wang (2004). In principle, integration can enhance market liquidity and exert competitive pressure on individual markets, thus reducing transaction costs and increasing the incentives for innovation.

TABLE 1 *Stock Market Activity and Bank Lending*

	JSX/IDX Index[a]	Number of Firms	Market Capitalisation		Bank Loans	
			Rp trillion	% of GDP	Rp trillion	% of GDP
1987	82.6	24	0.1	0.1	32.9	28.7
1988	305.1	24	0.5	0.3	42.5	28.4
1989	399.7	56	4.4	2.4	62.9	35.0
1990	417.8	122	12.4	5.9	97.0	46.0
1991	247.4	141	16.4	6.6	112.8	45.1
1992	274.3	153	24.8	8.8	122.9	43.5
1993	588.8	172	69.3	21.0	147.3	44.7
1994	469.6	218	103.8	27.2	187.6	49.1
1995	513.9	248	157.4	34.6	234.6	51.6
1996	637.4	267	193.5	36.3	293.1	55.0
1997	401.7	306	156.8	25.0	378.1	60.2
1998	398.0	288	175.9	18.4	545.4	57.1
1999	676.9	277	206.7	18.8	277.3	25.2
2000	416.3	287	226.1	16.3	320.4	23.1
2001	392.0	316	231.3	14.1	358.6	21.8
2002	425.0	331	268.4	14.7	410.3	22.5
2003	691.9	333	460.4	22.9	477.2	23.7
2004	1,000.2	331	679.9	29.6	595.1	25.9
2005	1,162.6	336	801.3	28.9	730.2	26.3
2006	1,805.5	344	1,249.1	37.4	832.9	24.9
2007	2,745.8	383	1,988.3	50.2	1,045.7	26.4

[a] The Jakarta and Surabaya Stock Exchanges (JSX and SSX, respectively) were merged to form the Indonesia Stock Exchange (IDX) in 2007.

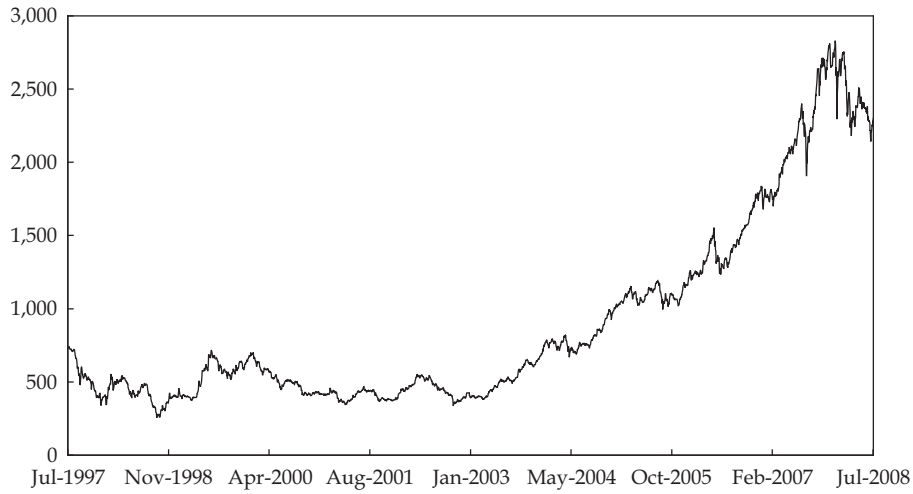
Sources: Datastream database; Bapepam/Bapepam–LK; Bank Indonesia.

for risk transfer and risk sharing;[8] and revising rules on corporate governance, information disclosure, conflicts of interest, investor protection, and enforcement of capital market laws (appendix 1).

Although the Jakarta Composite Index had recovered most of its crisis losses by mid-1999, this recovery could not be sustained. By September 2000 the index had fallen back to levels recorded in November 1998 (figure 1). It was not until March 2003 that a sustained and rapid upward trend emerged – a trend that would last until the incipient global financial crisis brought it to a halt at the end of 2007. As a consequence of the boom, market capitalisation increased from less than Rp 200 trillion at end-1998 to nearly Rp 2,000 trillion at end-2007 (table 1). Annual trading value rose from less than Rp 100 trillion to Rp 1,050 trillion during the

8 Derivative and spot markets are closely linked. Because derivative markets are very effective at re-allocating risk, more investors are willing to invest in the underlying assets (such as stocks) and, as a result, more companies are able to raise needed capital.

FIGURE 1 *Jakarta Composite Stock Price Index*



Source: Datastream database.

same period (not shown in table 1), and the number of listed companies increased from 288 to 383. With stock prices increasing rapidly from 2003, Indonesia's stock market capitalisation rose to surpass its total bank loans outstanding during 2004. By 2007, market capitalisation amounted to Rp 1,988 trillion (50% of GDP), far in excess of bank loans of only Rp 1,046 trillion (26% of GDP) (table 1).

There can be no doubt that policies aimed at harnessing the profit motive and removing regulatory impediments allowed the stock market's contribution to Indonesia's economic progress to increase dramatically relative to that of the banking sector. In addition, changes in the nature of the Indonesian and global economies had a significant impact: the emergence in Indonesia of numerous large firms in a wide variety of sectors; rapid growth in Indonesian per capita income; and the globalisation of financial markets, which has seen Indonesia become a target for large-scale foreign portfolio investment. It is not feasible to assess the relative influence of these factors. Rather, the empirical analysis that follows is intended to focus on their combined effect on the stock market's efficiency, which is a key determinant of its capacity to compete with other financial technologies for allocating savings to investments.

EFFICIENCY OF THE STOCK MARKET

By definition, a market is efficient if it is not possible for investors to make abnormal returns (other than by chance) using any publicly known investment strategies. There are innumerable technical strategies (or rules) available for stock trading purposes. In the analysis that follows, two simple but popular technical trading rules – moving average and trading range breakout – are employed to assess trading profitability in, and hence the efficiency of, the Indonesian stock market. Many researchers (for example, Brock, Lakonishok and LeBaron 1992; Hudson, Dempsey and Keasey 1996; and Bessembinder and Chan 1998) have used these rules to examine the efficiency of stock markets in other countries. The

rationale for this approach is that if the market is efficient it will not be possible for investors to make abnormally high returns using such rules.

Data

Our analysis of the efficiency of Indonesia's stock exchange uses daily closing prices of the Jakarta Composite Index from the first trading day in 1988 to the last trading day in 2007, but excluding the period 1997–98. The data for 1997–98 and for 2008 and beyond are excluded in order to remove the effect of the Asian financial crisis and the global financial crisis from the results; this leaves a total of 4,693 observations. Thus the entire sample period is divided into two equal sub-periods – the nine years before the Asian financial crisis (1988–96) and the nine years after it (1999–2007). Analysing these sub-periods separately enables us to examine whether there has been an improvement in the efficiency of the stock market over time.

Our analysis focuses on the efficiency of the secondary (trading) market rather than on that of the primary market (where the stock market serves as a channel for allocating savings to investments). The underlying presumption is that if the secondary market is liquid and efficient this will support the primary market, because it enables savers to hold easily liquidated assets on a short-term basis, while simultaneously providing firms with access to long-term funding.

Methodology

In the following sections, a brief description of the moving average and trading range breakout rules is given, and one-tailed hypothesis tests are set up to assess the profitability of buy and sell transactions using these rules.

Moving average rules

The n-day moving average (MA) of the Jakarta Composite Index is given by

$$M_{t,n} = \frac{1}{n} \sum_{k=t-n+1}^{t} P_k = \frac{1}{n}\left[P_{t-n+1} + P_{t-n+2} + \ldots + P_{t-1} + P_t\right] \quad (1)$$

where $M_{t,n}$ is the n-day MA on day t, and P_k is the closing price of the index on day k.

A buy signal indicates an expectation, based on the relevant trading rule, that the value of a stock will rise in the future, and a sell signal the reverse. According to the MA rules, buy and sell signals are generated by comparing a 'short' (small n) MA and a 'long' (large n) MA. Buy (sell) signals are generated when the short MA rises above (falls below) the long MA by a pre-specified percentage (or 'band'). A band is used to reduce the number of times the investor would have to alternate between taking a long position in (buying) the index and taking a short position in (selling) the index.[9] When a buy signal is generated, the investor takes a long position in the index and stays in the market until the short MA falls below the long MA. When a sell signal is generated, the investor takes a short position in the index and maintains this position until the short MA rises above the long

9 For example, Brock, Lakonishok and LeBaron (1992), Bessembinder and Chan (1998) and Siegel (2002) all used a 1% band for their technical rules.

MA.[10] A popular MA rule is 1–100, where the short MA is 1 day and the long MA is 100 days. This study uses the following MA rules: 1–50, 5–50, 1–100 and 5–100. Each rule is evaluated with bands of 0% and 1%, making a total of eight MA rules for each of the two sub-periods.

Trading range breakout rules

According to the trading range breakout (TRB) rule, a buy signal is emitted when the current price rises above the local maximum (that is, the maximum price over the specified number of past days) and a sell signal is emitted when the current price falls below the local minimum (that is, the minimum price over the specified number of past days). Algebraically, an m-day local maximum on day t ($L\max[m,t]$) and an m-day local minimum ($L\min[m,t]$) on day t are defined respectively as

$$L\max[m,t] = \max\left[P_{t-m}, P_{t-m+1}, \ldots P_{t-1}\right] \tag{2}$$

$$L\min[m,t] = \min\left[P_{t-m}, P_{t-m+1}, \ldots P_{t-1}\right] \tag{3}$$

where P_k ($k = t–m, t–m+1, \ldots, t–1$) is the closing price of the Jakarta Composite Index on day k. A buy signal is emitted if $P_t > L\max[m,t]$ and a sell signal is emitted if $P_t < L\min[m,t]$. When a buy signal is emitted, the investor takes a long position in the index the next day and holds the position for 5 days, after which it is liquidated.[11] Similarly, when a sell signal is emitted, the investor takes a short position in the index the next day and liquidates the position after 5 days. In either case, when the 5-day holding period is over the investor again waits for a buy or a sell signal. This study uses local maxima and minima over the preceding 20, 50 and 100 days. Again, each rule is evaluated with bands of 0% and 1%, making a total of six TRB rules for each of the two sub-periods.

One-tailed hypothesis tests

In this study a one-tailed hypothesis test is used to assess the efficiency of the market.[12] For either buys or sells, the null hypothesis H_0 is that the mean j-day return is equal to the unconditional mean j-day return (that is, the mean return from holding stock for j days, without reference to any trading rule), and the alternative hypothesis H_1 is that the former is greater than the latter, where $j = 1$ or 5. The test statistics for buys and sells, respectively, are as follows:

$$Z_b(j) = \frac{\overline{r_b}(j) - \mu(j)}{\sigma(j)\sqrt{\frac{1}{n_b(j)}}} \tag{4}$$

10 In practice, there is no such thing as literally investing in a market index. However, an index fund can be used as a proxy for the market index. An index fund is a mutual fund that holds shares in proportion to their representation in a market index.

11 In addition to a holding period of 5 days, we also used holding periods of 10 and 20 days. The results are not reported here, but are similar to those for 5 days.

12 A two-tailed test is not used because it is not relevant, for either buys or sells, to test an alternative hypothesis stating that the mean j-day return is less than the unconditional mean j-day return.

$$Z_s(j) = \frac{\overline{r_s}(j) - \mu(j)}{\sigma(j)\sqrt{\frac{1}{n_s(j)}}} \tag{5}$$

where $\overline{r_b}(j)$ and $\overline{r_s}(j)$ are the sample mean j-day returns for buys and sells, $n_b(j)$ and $n_s(j)$ are the numbers of buy and sell signals, and $\sigma(j)$ is the standard deviation for the j-day return.

Given the large sample size, the above two test statistics are distributed as N(0,1) if their null hypotheses are true. Accordingly, given a critical normal value $z(\alpha)$, if the test statistic in equation (4) is greater than $z(\alpha)$, we reject the null hypothesis and conclude that the mean j-day return for buys is greater than the unconditional mean j-day return at the α level of significance. Similarly, if the test statistic in equation (5) is greater than $z(\alpha)$, we reject the null hypothesis and conclude that the mean j-day return for sells is greater than the unconditional mean j-day return at the α level of significance. For the two one-tailed tests, the significance level α is set at 0.05 and 0.01. From the standard normal table, $z(0.05) = 1.64$ and $z(0.01) = 2.33$.

Summary statistics

Table 2 presents summary statistics for daily returns on the index for the two subperiods 1988–96 and 1999–2007. Let P_t and P_{t+1} be the closing prices of the index on day t and day t+1, and let R_{t+1} be the return from day t to day t+1. We calculate the return as the log difference of the index level; that is,

$$R_{t+1} = \log(P_{t+1}) - \log(P_t) \tag{6}$$

In an efficient market, security returns are independent of one another over time because new information comes to the market in a random and unpredictable manner, and security prices respond instantly and accurately to this new information. Hence, the magnitude of the autocorrelation in security returns can offer some clue as to the efficiency of the market. Simply put, autocorrelation should be insignificant if the market is efficient. From table 2 we note that the autocorrelation of daily

TABLE 2 *Summary Statistics for Daily Stock Exchange Returns*[a]

	1988–96	1999–2007
Number of observations	2,347	2,346
Unconditional mean daily return	0.00087	0.00082
Daily standard deviation	0.01662	0.01449
$\delta(1)$	0.42102**	0.11721**
$\delta(2)$	0.19503**	–0.00802
$\delta(3)$	0.01185	0.03273*
$\delta(4)$	–0.07385**	0.01286
$\delta(5)$	–0.05564**	–0.01086

[a] $\delta(i)$ is the daily autocorrelation at lag i for each series, where i = 1, 2, 3, 4 or 5 days. Figures marked * (**) are significant at 5% (1%) level for a two-tailed test.

returns is quite large for the 1988–96 sub-period at lags 1 and 2, and moderately large for the 1999–2007 sub-period at lag 1. In particular, the daily autocorrelation for 1988–96 is statistically significant at the 1% level at lags 1, 2, 4 and 5, whereas that for 1999–2007 is statistically significant at the 1% level only at lag 1. In other words, for the earlier sub-period, the return on day *t* is likely to depend on returns on days *t*–1, *t*–2, *t*–4 and *t*–5; whereas for the later sub-period, the return on day *t* is likely to depend only on the return on day *t*–1. Hence, the autocorrelations in table 2 provide a rough indication that Indonesia's stock market displayed relatively greater efficiency after the crisis.

We use the unconditional mean returns from a buy-and-hold (BH) strategy as a benchmark to assess the mean returns for the two technical rules. If the market is efficient, the mean *j*-day returns from either buy or sell signals for each rule should not greatly exceed their corresponding unconditional mean *j*-day returns from a BH strategy. Tables 3a–4b present the results for the two technical rules. In these four tables the first column specifies the rules (the length in days of the short and long positions and the percentage band of the difference between them), the next two

TABLE 3a *Daily Returns for Moving Average Rules, 1988–96*[a]

Rule	Number of Signals Emitted		Mean *j*-day Returns	
	Buy	Sell	Buy	Sell
(1, 50, 0%)	1,358	938	0.00221	0.00108
			(2.96911)**	(0.38516)
(5, 50, 0%)	1,351	948	0.00225	0.00114
			(3.04991)**	(0.49837)
(1, 100, 0%)	1,335	911	0.00168	0.00056
			(1.77862)*	(–0.56483)
(5, 100, 0%)	1,339	907	0.00183	0.00080
			(2.11156)*	(–0.12866)
(1, 50, 1%)	1,243	810	0.00227	0.00102
			(2.96789)**	(0.25517)
(5, 50, 1%)	1,230	803	0.00221	0.00118
			(2.82571)**	(0.52688)
(1, 100, 1%)	1,273	843	0.00166	0.00063
			(1.69389)*	(–0.42104)
(5, 100, 1%)	1,272	839	0.00181	0.00088
			(2.01514)*	(0.01569)
Average			0.00199	0.00091
Memo				
Unconditional mean daily return			0.00087	
Daily standard deviation			0.01662	

[a] Rules are identified as '(short, long, band)', where 'short' and 'long' are the durations (in days) of the short and long moving averages, and the 'band' is the percentage difference between them that is required to generate a buy or sell signal. Figures in parentheses are standard *z* values testing the difference between the mean buy 1-day return (or the mean sell 1-day return) and the unconditional mean 1-day return. Figures marked * (**) are significant at 5% (1%) level for a one-tailed test.

columns report the number of buy and sell signals generated by these rules, and the last two columns show the mean *j*-day returns from the buy and sell signals.

Results

For all of the technical rules in both sub-periods there are more buy signals than sell signals, which suggests that the market tended to drift upward over the entire period covered.

Moving average rules

Table 3a reports the results for the eight MA rules in the 1988–96 sub-period. The mean daily returns for buys are all large, with an average of 0.00199, and much higher than the unconditional mean daily return of 0.00087 from a BH strategy. All of the eight rules reject the null hypothesis H_{01} that the mean daily return for buys equals the unconditional mean daily return, at either the 5% or the 1% level of significance. In contrast, the mean daily returns for sells have an average of only 0.00091, very close to the unconditional mean daily return. In this case, none of the rules rejects the null hypothesis H_{02} that the mean daily return for sells equals the unconditional mean daily return from a BH strategy at either the 5% or the 1% level.

Table 3b shows the results for the 1999–2007 sub-period, which are quite different from those for 1988–96. The mean daily return for buys, at 0.00121, exceeds

TABLE 3b *Daily Returns for Moving Average Rules, 1999–2007*[a]

Rule	Number of Signals Emitted		Mean *j*-day Returns	
	Buy	Sell	Buy	Sell
(1, 50, 0%)	1,426	869	0.00164	–0.00041
			(2.12643)*	(–0.84219)
(5, 50, 0%)	1,433	862	0.00132	–0.00011
			(1.29571)	(–1.89235)
(1, 100, 0%)	1,464	781	0.00097	–0.00015
			(0.38550)	(–1.87839)
(5, 100, 0%)	1,463	782	0.00085	–0.00036
			(0.06863)	(–2.28484)
(1, 50, 1%)	1,319	711	0.00168	0.00044
			(2.14535)*	(–0.70659)
(5, 50, 1%)	1,305	700	0.00151	0.00000
			(1.71014)*	(–1.50445)
(1, 100, 1%)	1,394	722	0.00093	–0.00005
			(0.27311)	(–1.62062)
(5, 100, 1%)	1,400	729	0.00081	–0.00009
			(–0.03615)	(–1.70299)
Average			0.00121	0.00001
Memo				
Unconditional mean daily return			0.00082	
Daily standard deviation			0.01449	

[a] As for table 3a.

TABLE 4a *Five-Day Returns for Trading Range Breakout Rules, 1988–96*[a]

Rule	Number of Signals Emitted		Mean *j*-day Returns	
	Buy	Sell	Buy	Sell
(5, 20, 0%)	139	95	0.01544	0.01007
			(2.25031)*	(0.95897)
(5, 50, 0%)	103	67	0.01417	0.01059
			(1.71514)*	(0.87864)
(5, 100, 0%)	73	42	0.01531	0.01135
			(1.61166)	(0.78049)
(5, 20, 1%)	62	44	0.02218	0.01887
			(2.41688)**	(1.65791)*
(5, 50, 1%)	53	35	0.01733	0.01802
			(1.62651)	(1.39206)
(5, 100, 1%)	38	24	0.02061	0.01922
			(1.72545)*	(1.25398)
Average			0.01751	0.01469
Memo				
Unconditional mean 5-day return			0.00436	
5-day standard deviation			0.05807	

[a] Rules are identified as '(days, signal, band)', where 'days' is the number of days of the holding period, the 'signal' is the number of past days used to generate a maximum or minimum price, and the 'band' is the percentage difference needed to generate a signal. Figures in parentheses are standard *z* values testing the difference between the mean buy 5-day return (or the mean sell 5-day return) and the unconditional mean 5-day return. Figures marked * (**) are significant at 5% (1%) level for a one-tailed test.

the unconditional mean daily return of 0.00082 from a BH strategy by a relatively small margin. Only three of the rules reject the null hypothesis H_{01} (at the 5% but not the 1% level of significance) that the mean daily return for buys equals the unconditional mean daily return from a BH strategy. As in the results for 1988–96, none of the rules rejects the null hypothesis H_{02} that the mean daily return for sells equals the unconditional mean daily return from a BH strategy at either the 5% or the 1% level of significance. Clustering around zero, the mean daily returns for sells are generally small, averaging only 0.00001 – much lower than the unconditional mean daily return.

Trading range breakout rules

Table 4a shows the 1988–96 results for the six TRB rules, which can be seen to be similar to the 1988–96 results for the MA rules. The mean 5-day returns for buys are all large, with an average of 0.01751, by comparison with the unconditional mean 5-day return of 0.00436. Four of the six rules reject the null hypothesis H_{01} that the mean 5-day return for buys equals the unconditional mean 5-day return from a BH strategy, at either the 5% or the 1% level. The mean 5-day return for sells is also large relative to the unconditional mean 5-day return, with an average of 0.01469. Nevertheless, only one of the six rules rejects, at the 5% level, the null

TABLE 4b *Five-Day Returns for Trading Range Breakout Rules, 1999–2007*[a]

Rule	Number of Signals Emitted		Mean *j*-day Returns	
	Buy	Sell	Buy	Sell
(5, 20, 0%)	140	69	0.00707	0.00543
			(1.02062)	(0.31845)
(5, 50, 0%)	114	38	0.00611	0.00378
			(0.62148)	(–0.06088)
(5, 100, 0%)	88	22	0.00501	0.00018
			(0.24451)	(–0.53972)
(5, 20, 1%)	89	49	0.00695	0.00638
			(0.78067)	(0.46267)
(5, 50, 1%)	76	29	0.00455	0.00439
			(0.11005)	(0.04280)
(5, 100, 1%)	58	16	0.00140	–0.00057
			(–0.60485)	(–0.54794)
Average			0.00518	0.00327
Memo				
Unconditional mean 5-day return			0.00412	
5-day standard deviation			0.03422	

[a] As for table 4a.

hypothesis H_{02} that the mean 5-day return for sells equals the unconditional mean 5-day return from a BH strategy.

Table 4b shows the TRB results for 1999–2007, which, like those for the MA rules, are in sharp contrast to the results for 1988–96. The mean 5-day return for buys, at 0.00518, is in the neighbourhood of the unconditional mean 5-day return of 0.00412 from a BH strategy, and none of the six rules rejects the null hypothesis H_{01} that the mean 5-day return for buys equals the unconditional mean 5-day return at the 5% level. As in the case of the MA rules, the mean 5-day return for sells, at 0.00327, is lower than the unconditional mean 5-day return from a BH strategy. Again, none of the six rules rejects the null hypothesis H_{02} that the mean 5-day return for sells equals the unconditional mean 5-day return at the 5% level.

In short, with a single exception, neither of the trading rules for sells performed well (that is, generated high and statistically significant returns) in either of the sub-periods, while the MA rules performed somewhat better than the TRB rules for buys. More importantly for present purposes, the results suggest that there are obvious differences in returns for buys between the two sub-periods. In relation to buys, both types of rule generated much higher (statistically significant) returns in the earlier sub-period than would have been obtained from a BH strategy. By contrast, there were few cases of the rules generating such returns in the later sub-period. Mean returns in 1999–2007 were much closer to those from a BH strategy. In only three cases – all relying on MA trading rules – were the mean returns significantly different from the unconditional return (and only at the 5% level).

CONCLUSION

The relative importance of banks and the stock market in Indonesia changed dramatically in the period under review. Banks dominated formal finance initially, and the stock market was almost negligibly small. It began to grow rapidly from the late 1980s, however, such that by 2004 the value of all listed stocks had overtaken total bank loans; by 2007 the former were almost twice as large as the latter. Changes in government policies have played an important part in this transformation of the financial sector. In the late 1970s policies were nominally favourable to the stock market but poorly designed, presuming a much stronger demand for the services of a stock market than actually existed, and relying mainly on the bureaucracy to drive development. At the same time, firms in the real sector were encouraged to rely on bank finance at subsidised interest rates, made possible by the channelling of oil and aid revenues of the government through the state-owned banks. The severe contraction of oil revenue in the mid-1980s led to policy changes — first in relation to banking, and later in relation to the stock market. Subsidised loans ceased to be available, and development of the stock exchange was put in the hands of the private sector, thus substituting profit-oriented behaviour for bureaucratic inertia. Banking deregulation led to a rapid expansion of that sector, but the stock market grew even more rapidly, eagerly exploiting new opportunities that presented themselves as per capita incomes grew, large firms began to proliferate, and the globalisation of finance generated much greater demand for Indonesian equities.

The key policy changes relating to the stock exchange have harnessed private sector initiative and, somewhat grudgingly, opened the market to foreign investors. Both aspects could be expected to have created pressures for improved efficiency of the stock market, because bank lending remains a formidable competitor to equity finance, and because foreigners have the choice of numerous other emerging markets in which to invest. Accordingly, the empirical analysis presented here has focused on the efficiency of the secondary market in the nine years leading up to the Asian financial crisis and the nine years following it. The first of these periods begins shortly after the introduction of the key policy changes, when it is reasonable to expect that opportunities to profit from rapid expansion were so great that efforts to profit from improved efficiency would take a back seat.

The analysis has shown that there are indeed statistically significant differences in the returns generated by the stock market prior to, and following, the Asian financial crisis. In general, the two types of trading rule we have looked at generated relatively high returns between 1988 and 1996, but returns roughly equal to those from a BH strategy between 1999 and 2007. Given these findings, policy makers can take some comfort from the fact that the reform and deregulation measures implemented appear to have provided a strong basis for the stock market to compete with banking and other financial technologies in allocating savings to investments, not least by increasing its efficiency over time.

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APPENDIX 1
MAJOR REFORM AND DEREGULATION MEASURES[a]

1987 The 1987 Pakdes package allowed stock prices to move according to market forces (rather than being restricted to daily movements of not more than 4%); permitted foreign entities to invest in Indonesian equities (to a maximum of 49% in any company, with the exception of banks); and foreshadowed the introduction of over-the-counter trading on a 'Parallel Bourse'(intended to provide small and medium companies with a means of raising capital, and owned and managed by the Securities and Money Trading Organization, whose members are private sector brokers and dealers).

1988 The 1988 Pakdes package was enacted to improve the effectiveness of the capital market and non-bank financial institutions.

1989 The privately owned Surabaya Stock Exchange (SSX) began to operate, with the majority of shares listed on the JSX (Jakarta Stock Exchange) also listed on the SSX.

1992 The JSX became a privately operated exchange, and the dual role of Bapepam (the Capital Market Supervisory Agency) as both regulator and operator of the capital market was reduced to that of regulator alone.[b]

1994 The JSX introduced a centralised settlement system for all listed securities. Bapepam, together with the Indonesian Accounting Institute, set up new accounting standards to promote information disclosure, transparency and fairness.

1995 The JSX replaced its manual trading system with an automated system that could process over 140,000 orders a day. Bapepam approved the trading of warrants. The largely inactive Indonesia Parallel Bourse was merged with the SSX. Capital Market Law 8/1995 was enacted. It required issuers and listed companies to file audited annual and semi-annual financial statements with Bapepam, prepared in accordance with generally accepted accounting principles. New penalties for illegal trading activities were also introduced.

1996 The Indonesian Clearing and Guarantee Corporation was set up in accordance with Law 8/1995, to provide regulated and efficient clearing services and transaction settlement guarantees.

1997 The Indonesian Central Securities Depository was established to provide orderly, fair and efficient central depository and transaction settlement services. The 49% restriction on foreign ownership of listed companies (with the exception of banks) was lifted.

1998 The bankruptcy law was modified to modernise bankruptcy proceedings and promote fair and expeditious resolution of commercial disputes. The restriction on foreign ownership of bank shares was lifted.

[a] This appendix is based on information obtained from Bank Indonesia; the Capital Market Supervisory Agency of Indonesia; Cole and Slade (1996); the Indonesia Stock Exchange and joint ministerial statements from the ASEAN Finance Ministers Meetings in Vietnam (Government of Vietnam 1999), the Czech Republic (Government of the Czech Republic 2000), Myanmar (Government of Myanmar 2002) and Laos (Government of Laos 2005).

[b] This resulted in a name change from 'Capital Market Supervisory Agency' to 'Capital Market Regulatory Agency'; the acronym 'Bapepam' did not change, however.

1999 Bapepam introduced rule III.A.3 on the appointment of commissioners and directors for stock exchanges and rule V.D.4 on control and protection of securities held in the custody of securities companies on behalf of their clients. The first code of good corporate governance was developed by the National Committee for Corporate Governance. Bapepam introduced rule XIV.B.1 on fines for violation of capital market rules. The ASEAN countries reached an agreement on the liberalisation of financial services to strengthen their individual financial sectors.

2000 The JSX introduced a scripless settlement system for equity trading. Henceforth, trades were to be executed simply by transferring the ownership of the securities from seller to buyer in the registry of scripless securities. Bapepam introduced rule VIII.G on the preparation of financial statements and rule IX.A.7 on the responsibilities of under-writers with respect to subscriptions and allotments of securities in a public offering. An ASEAN working committee was set up to collaborate with the private sector in developing infrastructure, institutions and instruments that would assist in the formation of well functioning and competitive capital markets in the ASEAN countries.

2001 The SSX began trading in bonds and in derivatives such as equity index futures. Rule III.A.3 was revised with the aim of improving the integrity and quality of stock exchange management.

2002 The Jakarta Islamic Index (JII) was launched, to be used as a benchmark for measuring market activities in accordance with *syariah* (Islamic law). The JSX began to implement a remote trading system. The settlement date for the scripless system was shortened from 4 to 3 business days after each transaction. The ASEAN countries adopted the International Organization of Securities Commissions' principles for securities regulators, in order to strengthen corporate governance and provide greater transparency and information disclosure.

2003 Bapepam stepped up enforcement efforts aimed at improving information disclosure and transparency on the part of listed companies. Bapepam and the Indonesian Central Securities Depository implemented a system called E-Monitoring of Investment Funds, aimed at monitoring and overseeing the activities of investment funds and investment managers.

2004 Bapepam imposed sanctions on 313 companies for late submission of financial statements and reports on the use of funds received from public offerings, and for violations of rules on disclosure of information. The SSX began trading in stock options. Bapepam introduced new rules to raise the net working capital requirements of securities firms, with the objective of reducing the number of such firms. The Capital Market and Financial Institutions Supervisory Agency (Bapepam–LK) was formed through the merger of Bapepam and the Financial Institutions Directorate General of the Ministry of Finance.

2005 Rule No. IV.C.4 on management of capital protected funds, capital guaranteed funds and index funds was introduced. The JSX began trading in equity options. Two value-weighted FTSE/ASEAN equity indices were launched, with the objective of grouping the ASEAN-5 equity markets

(Indonesia, Malaysia, the Philippines, Singapore and Thailand) as an asset class.

2006 The National Committee for Corporate Governance issued a new code of good corporate governance. New regulations were introduced to encourage more listings on the stock market. New regulations on licensing requirements and a standardised code of ethics were introduced for mutual fund sales representatives.

2007 Companies Law 40/2007 was enacted to govern disclosure and transparency in the annual reports and financial statements of listed companies. Investment Law 25/2007 was enacted. The JSX and the SSX were merged to become the Indonesia Stock Exchange (IDX).