



# REGULATION OF DEPOSIT-TAKING INSTITUTIONS: PRICE EFFECT AT DISCLOSURES OF NEW REGULATIONS

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## Abstract

This paper presents findings on the impact of revisions to a unique bank regulation yet studied. An old hypothesis in banking literature is tested by examining share price reactions to two-way changes to statutory reserve ratio (SRR) requirement over a recent eight-year period. Announcements of these regulatory changes appear to lead to statistically and economically significant abnormal returns. These new findings suggest that a decrease in statutory reserve has a risk-reducing effect on financial institutions. Thus, this study provides a test of the prediction of theory that SRR is a powerful macroeconomic policy tool to revive an economy in the aftermath of a financial crisis.

JEL Classification: G14, G20 & G21

Key words: Financial institutions, Regulations, Risk, Price effect, Prudential rules

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## 1. Introduction

This paper reports new findings from an analysis of the impact of disclosures of new regulations relating to banking in Malaysia. The event studied is the share price reactions to a unique new regulation yet studied: statutory reserve ratios (SRR) changed up and then down. The regulatory change was a strategic move to address temporary problems affecting banking in the aftermath of the 1997 Asian financial crisis and also prior to this date. The resulting findings are the first to be reported on price reactions to changes in bank regulations in an emerging market. Although few studies (Slovnik *et al.*, 1990; Osborne and Zaher, 1992; and Carow and Kane, 2002) provide evidence on regulatory events affecting the value of bank shares, the revaluation effects arising from two-way changes to SRR of any country have yet to be reported in the literature. Carow and Kane

(2002: 439) point out that *removing a binding constraint creates value*. The event included in this study removed binding restriction on bank liquidity, thus permitting stakeholders in the banks to revalue their equity being affected by the rule change.

Fama (1980) suggests an increase in SRR on bank deposits is a tax on depositors and on banking activities, which should reduce bank lending. Hence, our hypothesis is that decreases in SRR should produce an opposite effect by increasing bank lending, and it could be considered good news by investors holding bank shares. Such a rule change is considered to be investor-friendly, thus, it is likely to lead to an upward revision of bank shares. This paper reports findings during a unique crisis period (the Asian financial crisis of 1997-8) when such market-friendly changes were implemented in the face of severe economic and financial crises.

The rest of the paper is organized as follows. Sections 2 and 3 provide a brief overview of literature and background. Section 4 is about methodology while the results are in Section 5. Conclusions are in Section 6.

## **2. Literature review on banking and regulations**

Stiglitz (2001) suggests that the underlying need for binding banking regulations is the discrepancy between social and private returns on assets. Incentives to secure private gains need to be restrained at some times, thus placing constraints on bank managers/owners. Carow and Kane say "...removing a binding constraint creates value. However, in the general equilibrium, the stakes of other parties in maintaining the constraint must be examined." (2002: 439). Thus, while regulation, which increases the cost of doing business, is needed to restrain risky behavior of bank owners to make private gains, such regulations are constantly under examination as to whether constraints are to be maintained in the light of changing financial circumstances. That is how removals of restrictions or an introduction of new restrictions occurs: both must have value relevance for the assets in place of shareholders as a class of stakeholder. Imprudent lending and moral hazard have been cited as causes for excessive risk-taking during a period of rapid economic growth experienced by Southeast Asian economies (see BNM 1998; Ariff and Khalid 2000; Stiglitz 2001). The Efficient Market Hypothesis too suggests that in an efficient market, a bank's stock price should reflect all available information. New information in the form of removal or imposition of constraints must lead to revisions of the value of assets held by the stakeholder.

Past studies on the impact of SRR reported mixed findings. Fama (1980) finds that reserve ratio reduces deposit rate, therefore it is a tax on depositors. While this result remains inconclusive, Romer (1985) reports that up-revisions of SRR increase loan rates, and reduce lending activities. An announcement of SRR decrease, for example, has been hypothesized to yield positive abnormal returns (see Slovin 1990 and Osborne and Zaher 1992) around the announcement

date. Osborne and Zaher (1992) as well as theories on risk predict that changes in SRR and share returns are inversely related. Increases in SRR produce loss of bank liquidity thus less lending, leading to a negative return. SRR decreases have a risk-reducing effect as banks may obtain higher profits from increased lending activities *ex post* the removal of high SRR restriction.

The inverse relation postulated by Fama suggests that an SRR decrease is a favorable event to stakeholder as it removes a binding constraint, thus it has a risk-reducing effect, since liquidity and credit risks are reduced as liquidity improves when SRR is lowered. Rougani and Rush (1995) found that reductions in this ratio (proxy for money supply) were found to affect gross national product and stock returns positively. Catao and Rodriguez (2000) state that SRR is a powerful monetary tool to counter the effects of economic cycles.

Eisenbeis *et al.* (1984) revealed that the removal of a single regulation led to a significant rise in abnormal returns of 78 banks in a US study. A rule change in the US that led to 15 mega-bank mergers created value for shareholders while the bondholders lost value; Kane (2000). Saunders and Smirlock (1987) indicated that a single rule change approval given to Bank-America to acquire Charles Schwab and Co. led to a reduction in share value of 2 percent. Examining the impact the removal of 4 “Section 20 events” (this rule provided for relaxation of restriction on security issuing activities), reported in Ely and Robinson (1998) had significant abnormal returns to 24 banks. Hence, regulatory changes do affect the value of assets of stakeholders as the stakeholders reassess the value of removals/impositions of constraints on their behavior placed by the regulators.

### 3. Economic scenario and regulatory changes

Malaysia, as an emerging market experienced GDP growth rate of about 7.3 percent over a 13-year period with the highest growth of 10 percent in 1996. The economic growth was in tandem with loan growth as shown in Table 1.

The statistics in Table 1 reflect the great reliance on bank credits to finance economic activities during 1996 to 2001. This characteristic supports the dominant role banks continue to play in emerging market (Catao and Rodriguelz, 1998) and Malaysia falls in that category. With the onset in July 1997 of the Asian financial crisis (AFC), economic growth rate started to decline in 1998. With the new unexpected economic circumstance, there was a need to stimulate investment

**Table 1:** Trend in GDP and Loan in Malaysia: 1996-2002

RM million	1996	1997	1998	1999	2000	2001	2002
GDP	253,732	281,795	283,243	300,340	340,706	334,589	353,123
LOAN	226,750	442,469	436,068	464,511	513,519	504,667	713,236

RM=ringgit Malaysia was equal to US \$ 1 = RM 2.54 in 1996

since the collapse of the exchange rate during the financial crisis made all imports expensive, and exports very cheap. Bank credit was needed to stimulate investment to produce more domestic goods, and to produce more export goods, which became competitive with a 35 percent decline in the US-exchange rate within a short period of 6 months. The impact of the financial crisis in 1997 can be seen by the worsening statistics reported here as bad loans to GDP. This also led to sharp increases in NPL as a ratio of GDP from 1998 (see Table 2) declined.

In the face of crisis, a number of restrictive rules had to be liberalized given the impact the crisis was having on liquidity, bad loans and interest rates. In the

**Table 2:** Loan Quality deterioration in the banking sector in Malaysia

	1996	1997	1998	1999	2000	2001	2002
NPL/Loan (%)	3.6	3.2	10.3	8.8	8.1	10.5	9.6
NPL/GDP (%)	3.2	5.0	15.9	13.6	12.2	15.8	19.4

period before the crisis, the abundant liquidity from the bank loans contributed to the growth in broad money, M3, which recorded an annual double-digit growth for the first 11 years (1988-1998). The growth was so high that the SRR had to be increased to restrain further growth of credit/liquidity for fear of kindling inflation. The highest and the lowest growth of 23.5 percent and 2.7 percent were recorded in 1993 and 1998 respectively (BNM 1998).

At the same time, bank liquidity also increased as a consequence of an increased flow in foreign capital, resulting in strong expansion in credits. The ample liquidity and rapid GDP growth generated concomitant effects - rising inflation, high property prices (asset bubble) and the building up of credit risk stemming from imprudent lending and weak credit assessment (Ariff and Khalid, 2000; BNM, 1998). The bad loans made during the good economic period surfaced in the form of high non-performing loans during the post-financial crisis period.

**Table 3:** Announcement dates and the regulatory changes: 1991-1998

Announcement Date	Announcement of Statutory Reserve Ratio (SRR)
<i>RR Increases:</i>	
18.4.92	Increased SRR from 7.5% to 8.5%
3.1.94	Increased SRR from 8.5% to 9.5%
24.5.96	Increased SRR from 12.5% to 13.5%
<i>RR Decreases:</i>	
6.2.98	Decreased RR from 13.5% to 10%
27.6.98	Decreased RR from 10% to 8%
7.9.98	Decreased RR from 6% to 4%

Sources: BNM Press Releases and Circulars; BNM Library.

The government implemented several measures to curb the overheating economy during 1991-1996 by its restrictive policies. To revive the economy from the devastating effects of the 1997 Asian financial crisis, the regulations were relaxed. Some of these macroeconomic measures, which we have selected to gauge the share market responses are listed in Table 3.

#### 4. Data and methodology

##### A: Sample

Our sample consists of 16 deposit-taking institutions, which are the only listed banks. The daily closing prices and the daily closing KLSE Composite Index values were obtained from the EXTELL data stream: the research houses of KAF Discount Berhad, ASK Berhad and Bloomberg provided the data for the years 1988 to end 2001. The specific events were confined to announcements of reserve ratio changes. These were single-event announcements that were selected to establish the sole impact of a particular bank regulation is likely to have on the banks' stock returns and risk.

##### B: Variables and method

The Single Index Model of Sharpe (1963) is used to measure the impact of the regulatory disclosures on the stock returns. This model assumes that bank returns are a linear function of general market factor and specific company-relevant random factors as in:

$$R_{jt} = \alpha_j + \beta_j (R_{mt}) + \varepsilon_{jt} \quad (1)$$

Where,

$R_{jt}$ : return of bank  $j = 1, \dots, 16$  during period  $t = -60, 0, \dots, 30$  days,

$R_{mt}$ : returns on market portfolio using KLSE Composite Index,

$\varepsilon_{jt}$ : the error term which captures firm-specific effects, and

$\alpha_j$  and  $\beta_j$ : intercept and slope of a particular security respectively.

The bank return ( $R_{jt}$ ) and the market return ( $R_{mt}$ ) are calculated in natural logarithm to ensure normality in data distribution. To estimate the alpha and beta parameters for risk-adjustment, we collected 18,304 share prices, and stock index values. The event periods are classified as good or bad news: good news is when the restriction is removed: bad news otherwise. A common characteristic of most developing capital markets is thin-trading or non-synchronous trading, the effect of which on the market parameters, if uncorrected, will result in errors in their estimates: see Ariff *et al.* (1998: 196) for a procedure to correct this error. Dimson's (1979) procedure with 2 lags and 1 lead in an OLS multiple regression of the model has been shown to correct this errors in the U.S. studies as in:

$$R_{jt} = \alpha_j + \beta_{-2}(R_{mt-2}) + \beta_{-1}(R_{mt-1}) + \beta_0(R_{mt0}) + \beta_{+1}(R_{mt+1}) + \epsilon_{jt} \quad (2)$$

where,

$\alpha_j$ : the intercept and  $\beta_{-2}, \beta_{-1}, \beta_0, \beta_{+1}$  (with j subscript suppressed) are the respective beta estimates from two-day lagged, one-day lagged, the current and one-day lead and  $\epsilon_{jt}$  are the prediction errors.

To obtain the daily alpha, the weekly alpha using weekly interval data is recomputed as daily alpha value using the continuous return mathematics. The beta for stock j having corrected for thin trading is calculated as:

$$\beta_{jt}^{corrected(ct)} = (\beta_{-2} + \beta_{-1} + \beta_0 + \beta_{+1}) \quad (3)$$

The estimated abnormal return for bank j in time t ( $AR_{jt}$ ) and the abnormal portfolio return or prediction error in time t ( $AR_{jt}$ ) are respectively defined as:

$$AR_{jt} = \alpha_j + \beta_j (R_{mt}) + \epsilon_{jt} \quad (4)$$

$$AR_{jt} = AR_{jt} - \alpha_j - \beta_j^{ct}(R_{mt}) \quad (5)$$

where,

$AR_{jt}$ : the abnormal return of bank j at period t, and  $\beta_j^{ct}[R_{mt}]$ : the market return with beta corrected for thin trading.

The abnormal returns are calculated as the average of the abnormal returns to the event at each day: AAR. The AARs are cumulated to obtain the cumulative abnormal returns (CAR) of the institutions and are defined as:

$$CAR_t = \sum_{(t=m, n)} AAR_t \quad (6)$$

To conduct test of significance, we calculate t-statistics by dividing day t average abnormal return with its estimated standard deviation (Brown and Warner, 1985: 7). The standard deviation is estimated from the abnormal returns from day -60 to +30 representing 91 days of observations. The t-value for AR is calculated as:

$$t = AR_j / SEE \quad (7)$$

Where,

SEE is standard error of estimates (or residual returns) equivalent to

$$SEE = \sqrt{\frac{\sum_{j=-1, \dots, n} (AR_{jt} - A^*)^2}{n}} \quad (8)$$

A\* is the mean of the average abnormal returns in each day over -60 to 30 days relative to the announcement. The formula for t-statistics is:

$$t = \text{CAAR}_{(m,n)} / \text{SEE}. \quad (9)$$

Where,

SEE refers to standard error of estimates equivalent to

$$\text{SEE} = \sqrt{(T \text{ var} (\text{AR}_{(m,n)}))} \quad (10)$$

Where,

T equals the number of days in the CAAR statistics, and

$\text{var} (\text{AR}_{(m,n)})$  is variance of AR over days  $m$  to  $n$ .<sup>1</sup>

## 5. Empirical results and discussion

### *A: The impact of changes in SRR on share return*

Tables 4 and 5 are respectively the summaries of the results of t-tests on average abnormal returns (AAR) and cumulative average abnormal returns (CAAR). Overall, the AAR and CAAR have signs opposite to those of the changes in SRR: An increase (decrease) in SRR results in significant negative (positive) AAR and CAAR.

These results indicate significant market reactions to the SRR increases around announcement dates. Conversely, when SRR decreases, significant changes in the AAR and CAAR are also noticed around the announcement dates. The positive returns are consistent with the prediction of theory.

The plots in Figure 1 appear to depict the following characteristics of the impact of SRR disclosures on stock returns: (i) Share prices react significantly ahead of the announcement date; and (ii) SRR decreases (increases) which represent good news (bad news) respectively to the investors and bank shareholders, thus causing positive (negative) abnormal returns.

The trend suggests one to conclude that an SRR decrease has risk-reducing effect, and an increase has an opposite effect for deposit-taking institutions reaffirming Osborne and Zaher's (1992) findings. This regulatory intervention appears to be a powerful monetary tool that restored a crisis-laden economy towards economic recovery, which is consistent with the conclusions of Catañ and Rodriguelz (2000).

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<sup>1</sup> These six events occurred as clusters: that is, for each event announced, the prices of all 16 entities reacted at the same time. Brown and Warner (1980) reported on the appropriate methods for computing abnormal returns when an event creates clustered event effect. Their findings suggest that the risk-adjustment method as applied in this study is capable of providing reliable statistics for testing the hypothesis: See Brown and Warner (1980: 233-234). Market adjustment method using the beta as 1.00 and alpha as zero would introduce biased test statistics

**Table 4:** The effect of SRR changes measured as AAR and CAAR

Day	SRR Decrease			SRR Increase		
	AAR(%)	t-test	CAAR(%)	AAR(%)	t-test	CAAR(%)
-5	2.359	5.409***	2.359	0.162	0.726	0.162
-4	0.286	2.041**	2.625	-1.112	-4.902***	0.950
-3	0.761	1.182	3.386	0.194	1.040	-0.756
-2	0.068	-0.096	3.454	-0.606	-2.882**	-1.362
-1	-0.611	-1.257	2.843	-0.303	-0.804	-1.665
0	-0.831	-3.851**	2.012	-0.082	-0.274	-1.747
1	0.782	1.246	2.794	-0.251	-0.713	-1.998
2	-2.055	-6.788***	0.739	-0.742	-1.961*	-2.740
3	-0.358	-0.528	0.381	0.740	2.685**	-2.000
4	0.036	0.077	0.417	0.670	1.834*	-1.330
5	0.079	0.147	0.496	1.574	6.431***	0.244

\*\*\*0.01; \*\*0.05; and \*0.1 significance levels.

**Table 5:** Tests of CAAR on SRR changes

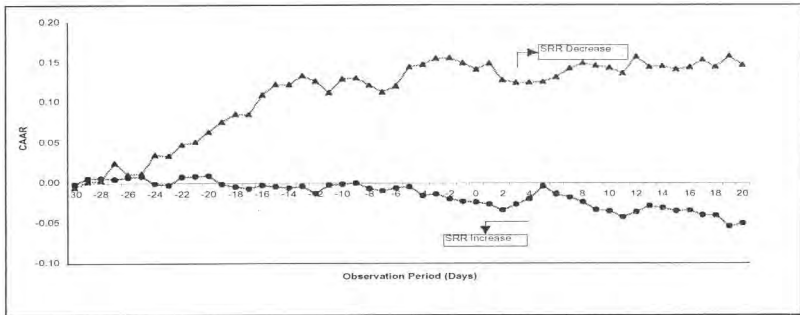
Period	SRR Decrease		SRR Increase	
	CAAR	t-test	CAAR	t-test
(-60, +30)	6.680	9.522***	-2.100	-12.650***
(-30, +20)	10.980	16.006***	-1.450	-6.103***
(-5, +0)	2.790	11.986***	-1.050	-3.629***
(-2, +0)	-0.620	-1.476	-0.840	-7.141***
(-1, +0)	-1.030	-2.470**	-0.340	-8.390***
(0, +2)	-0.990	-1.660*	-0.490	-1.666*
(0, +5)	-0.390	-0.984	0.320	0.934

\*\*\*0.01; \*\* 0.05; \* 0.1 significance levels.

## 6. Conclusions

The announcements of changes in SRR appear to induce statistically and economically significant abnormal returns to investors. These new findings suggest that a SRR decrease has a risk-reducing effect on financial institutions, and provided a test of theory prediction that it is a powerful macroeconomic policy tool to revive the economy in the aftermath of a financial crisis. The impact of SRR two-way revisions is not found in the literature. Our new findings add to the existing limited literature on event-induced valuation effects on bank regulatory



**Figure 1:** The Effect of SRR Changes on CAAR

changes being reported in the literature. The value-increasing effect arises from adopting market-friendly, more liberalized rules for the efficient working of the deposit-taking institutions. The economy showed remarkable improvement with GDP growth increased from  $-7.4$  percent in 1998 to  $6.1$  percent in 1999 which was sustained at  $6.8$  percent in third quarter 2004. Growth rate has increased to between  $4.8$  percent to  $7.6$  percent during each of the years from 1999 to 2005.

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**Author statement:** Nor Hayati Ahmad (the submitting author), who holds an associate professor position at the Universiti Utara Malaysia. Her current research interest spans the broad area of banking studies, in particular bank risk management. Mohamed Ariff holds a chair in finance at the Monash University, Australia; he holds a visiting endowed chair at the Universiti Putra Malaysia. His research papers in leading journals and books on Asian capital markets, banking, privatization, and taxation are widely cited; his current research interest is corporate performance methodology. The editors of the Journal made significant changes to the original version of the paper, for which we record our sincere appreciation. The errors remain our responsibility.

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