

Volatility of Returns and Financial Liberalization: New Evidence

(*Kemeruapan Pulangan dan Liberalisasi Kewangan: Bukti Baru*)

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ABSTRACT

The main objective of this paper is to reinvestigate the relationship between liberalization and returns volatility by considering different level of economic fundamentals and level of openness. The real impact of financial liberalization is expected to vary across countries with different macroeconomic fundamentals and level of liberalization. This study is different from previous studies because we do not impose priori linear restriction on the estimation. Employing endogenous threshold estimation methods, our finding shows that the relationship between liberalization and returns volatility is nonlinear and the negative impact of liberalization can be annulled for countries with strong and stable government.

Keywords: Financial liberalization; non-linear; return volatility; threshold regression

ABSTRAK

Objektif utama kajian ini adalah untuk menyelidik hubungan antara liberalisasi dan kemeruapan pulangan dengan mengambil kira faktor asas makroekonomi dan tahap liberalisasi kewangan yang berbeza. Impak liberalisasi kewangan ke atas kemeruapan dijangka bergantung kepada faktor asas makroekonomi dan tahap liberalisasi. Kajian ini adalah berbeza daripada kajian sebelum ini kerana kami tidak meletakkan syarat monotonik pada penganggar. Menggunakan kaedah penganggaran ambang ufuk endogen, dapatan kajian menunjukkan bahawa hubungan antara liberalisasi dan volatility pulangan adalah takmonotonik dan kesan negatif liberalisasi boleh dimansuhkan bagi negara yang mempunyai kerajaan yang kuat dan stabil.

Kata kunci: Liberalisasi kewangan; kemeruapan pulangan; tak-linear; regrasi ambang ufuk

INTRODUCTION

Impact of financial liberalization on returns volatility has been of interest of many researches over last few decades (Stiglitz 2000; Wang 2007 and Umutlu, Akdeniz and Attay-Salih 2010). Finding the correct answer is vitally important for smooth liberalization process for many economies. If liberalization caused market to be more volatile, it might not only have an adverse financial effect, but a real destabilizing effect on the economies. On the contrary, if liberalization does not cause excessive volatility of returns, then opening-up markets to the international investors should produce the sought-after results postulated by its advocates. However, the empirical evidence on the impact of liberalization on volatility is still far from conclusive. Some studies show an increase in volatility while others find a decrease in volatility (Sarmidi 2010).

The issue has attracted considerable attention from at least two different groups of economists. The first group postulates that liberalization will lead to increase in

volatility. For example Singh (1997), argue that financial liberalization could induce more instability in financial markets and bring no significant contribution to economic development. Singh (1997) vilifies untimely financial liberalization in emerging markets to be the main caused for creating more volatile market environment and at the same time may jeopardy economic growth. It is because most of emerging countries are not yet well equipped with the essential infrastructures that are necessary for well functioning markets such as sound regulatory and institutional framework to handle the problem of instant liquidity. Many empirical studies have found support for this view. Gabel (1995) who constructs the volatility indices based on the neo-classical and the Keynesian framework find volatility increases for most of the emerging stock market after liberalization. Jaleel and Samarakoon (2009) and Aitken (1996) tests weekly stock market return using variance ratio tests for a number of emerging markets finds evidence that volatility increases following liberalization. Experiences over the last decades seem to be in favour of this view since there was no



single period where equity markets in emerging countries in the post liberalization eras were free from turbulence (Eichengreen and Bordo 2002).

On the other hand, the advocates of financial liberalization, for instance Obstfeld (1998), argue that in the presence of efficient financial markets, the financial deepening associated with financial market liberalization should decrease overall market instability through market size expansion. Empirically this view is supported by many studies such as Kim and Singal (2000) and De Santis and Imrohorglu (1997) who find no significant evidence suggesting that volatility increases following liberalization. Bekaert and Harvey (2000) argue that even if volatility increases, this may not be long and damaging in the long run; as stated by Kaminsky and Schmukler (2003), 'short-run pain, long-run gain'. There are several reasons postulated by economist on why financial liberalization caused different returns volatility effect after the process. Among those reasons are incorrect sequencing of liberalization process (Indrawati 2002; Arestis and Demetriades 1999), weak domestic institutions (Stiglitz 1999; and, Bekaert and Harvey 2003), and improper market characteristics of host countries (Caner and Onder 2005; and Jayasuriya 2005).

The main objective of this paper is to shed light on the contradictory results found in the literature on the relationship between liberalization and returns volatility by considering different level of economic fundamentals and level of openness. This is necessary because the real impact of financial liberalization is expected to vary across countries with different macroeconomic fundamentals and level of liberalization.

This study is different from previous studies because previous studies that delve with the financial liberalization and returns volatility have imposed an important a priori restriction in their analysis i. e. the impact of financial liberalization is set to be linear and monotonic to returns volatility. It may be the case that the relationship might be non-linear and only after certain level of financial liberalization or any of its interaction terms that have increased volatility. In other words, it might be a point where if liberalization level is lower than this point, the impact of liberalization on returns volatility is negligible. And if liberalization is above the threshold point, then liberalization has negative impact on volatility. Therefore this research is affirmative to offer a possible answer to the dispute on the returns volatility and financial liberalization issue. If financial liberalization is indeed amplifying volatility, it might be true only in countries with weak macroeconomic fundamentals and full-intensity of liberalization. As the liberalization reaching a certain stage, the impact of liberalization on returns volatility may be hazardous. If it is true then, the policy makers should prudent not to exceed this threshold point to maintain stability in the markets or if they want to continue with full liberalization programmes, then the macroeconomic fundamentals should be of the stable one.

Our threshold estimation shows that the relationship between volatility and liberalization is nonlinear. Interestingly, the negative impact of liberalization can be annulled for countries with strong and stable government. Generally, economies characterized by moderate liberalization could experience minimum and insignificant volatility effects during the process of liberalization, while the opposite holds for countries inherent with political instability and high intensity liberalization programmes. We are thus hopefully able to reconcile the different views on the different impact of liberalization on volatility by considering different level of liberalization process.

The rest of the paper is organized as follows. Next section briefly outlines the econometrics procedures to estimate the threshold regression and discusses the data used in the analysis. Section 3 presents the results and econometric specification test analysis. Finally, Section 4 concludes the paper.

EMPIRICAL MODEL

The empirical model was based on Bekaert and Harvey's (1997, 2000) where the empirical linkages between liberalization and volatility using the following linear cross-country volatility equation:

$$VOL_i = \alpha_0 + \alpha_1 LIB_i + \alpha_2 X_i + \varepsilon_i \quad (1)$$

where VOL_i is the returns volatility in country i , LIB_i is the country's liberalization indicators, and X is a vector of fundamental variables. In our estimation procedure we use income per capita and political stability index, and e_i is a noise term.

To test the hypothesis outlined in the previous section, we argue that the following Equation (2) is particularly well suited to capture the presence of contingency effects and to offer a rich way of modelling the influence of financial liberalization on the volatility. The model, based on threshold regression, takes the following form:

$$VOL_i = \begin{cases} \beta_0^1 + \beta_1^1 LIB_i + \beta_2^1 X_i + e_i, & LIB \leq \lambda \\ \beta_0^2 + \beta_1^2 LIB_i + \beta_2^2 X_i + e_i, & LIB > \lambda \end{cases} \quad (2)$$

where LIB (i. e. , level of financial liberalization) is the threshold variable used to split the sample into regimes or groups and λ is the unknown threshold parameter. This type of modelling strategy allows the role of liberalization to differ depending on whether liberalization intensity is below or above some unknown level of λ . In this equation, financial liberalization programmes act as sample-splitting (or threshold) variables. The impact of liberalization on returns volatility will be β_1^1 and β_1^2 for countries with a low intensity or high intensity regime, respectively. It is obvious that under the hypothesis $\beta^1 = \beta^2$, the model becomes linear and reduces to (1).

The first step of our estimation is to test the null hypothesis of linearity $H_0 : \beta^1 = \beta^2$ against the threshold model in Equation (2). We follow Hansen (1996, 2000) who suggests a heteroskedasticity consistent Lagrange Multiplier (LM) bootstrap procedure to test the null hypothesis of a linear formulation against a threshold regression alternative. Since the threshold parameter l is not identified under the null hypothesis of the no-threshold effect, the p values are computed by a fixed bootstrap method. Hansen (2000) shows that this procedure yields asymptotically correct p values. It is important to note that if the hypothesis of $\beta^1 = \beta^2$ is rejected and a threshold level is identified, we should test again the threshold regression model against a linear specification after dividing the original sample according to the threshold thus identified. This procedure is carried out until the null of $\beta^1 = \beta^2$ can no longer be rejected.

Even though financial liberalization may have positive effect on volatility, the results may have been driven by macroeconomic instability such as economic growth or political instability. In order to examine this possibility, Equation (2) is extended to include an interaction term between financial liberalization and political stability indicator:

$$VOL_i = \alpha_0 + \alpha_1 LIB_i + \alpha_2 STB + \alpha_3 (LIB \times STB)_i + \alpha_4 X_i + \varepsilon_i \tag{3}$$

If α_2 is negative and statistically significant, this implies that as the political stability index is getting weaker (politically unstable), returns volatility is gaining its momentum. However as α_3 is positive, then it indicates that liberalization will eliminate the adverse effect of political instability. After a certain level of openness the instability effect will fully being annulled. Equation (3) is estimated using the Hansen (1996 and 2000) endogenous threshold regression technique with the assumption that all right hand side variables are strictly exogenous to avoid biasness problem.

DATA

The threshold estimation of Equation (2) and (3) uses eighty cross-country of 2005 to 2009 average data. The detail countries are presented in Table 1. The four variables employ in the analysis are (i) volatility of stock market return (*VOL*); (ii) Gross Domestic Product at current price in US dollar (*INC*); (iii) market openness (*OPN*); and (vi), political stability index (*STB*).

In this study, we incorporate only unconditional volatility measures. The unconditional volatility is simply a rolling standard deviation of 12 months stock returns. The stock return used in this study is defined as the first difference of the logarithm of monthly average stock indices ($y_t = \ln(p_t/p_{t-1})$), where y_t is the stock return and p_t is the stock price. All stock market indices are retrieved from the Standard and Poor's/International Finance Corporation (IFC) Emerging Markets Database or respective domestic stock exchange index provided by Datastream.

Table 2 illustrates the descriptive statistics of the market returns. On average, Asian market returns have a lower mean and lower unconditional variance (as measured by standard deviation) compared to the others. On the other hand, for countries in America, returns generally show a considerably higher mean and standard deviation. In addition, the descriptive statistics show that returns are negatively skewed for most African, Middle Eastern and Latin American markets but positively skewed for Asian and European markets. This is suggesting that the market returns from Asia and Europe have a heavier tail of positive values relative to other regions in the sample. Furthermore, most of the returns show consistently leptokurtic series, which indicates non-normality in the returns. These returns characteristics conform to the majority literature concerning emerging markets (Bekaert and Harvey 2003).

We utilised the liberalization intensity index or the capital openness index (*KAOPEN*) developed by Chinn

TABLE 1. List of Markets Included in the Analysis

Europe
Austria, Belgium, Bosnia & Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom
Asia
Australia, Bangladesh, China, Hong Kong, India, Indonesia, Iran, Iraq, Japan, Korea Republic, Malaysia, New Zealand, Pakistan, Philippines, Singapore, Thailand, Vietnam
Africa and Middle-East
Egypt, South Africa, Tunisia, Uganda, Zambia, Bahrain, Israel, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Turkey, United Arab Emirates
America
Argentina, Bahamas, Brazil, Canada, Chile, Colombia, Jamaica, Mexico, Panama, Peru, Trinidad and Tobago, United States, Venezuela

TABLE 2. Descriptive of Average Statistic of the Markets Returns

Country	Obs	Mean	Median	Max	Min	S. D	Skewness	Kurtosis
America	13	0.0086	0.0092	0.45	-0.62	0.1279	-0.3345	7.9786
Asia	17	0.0029	0.0022	0.43	-0.38	0.0966	0.0545	7.3212
Africa and Middle East	14	0.0031	0.0059	0.41	-0.70	0.0982	-1.2129	19.2210
Europe	35	0.0085	0.0059	0.38	-0.32	0.1010	0.0983	5.1888

Note: Skewness measures the asymmetry of the distribution of the series around its mean. The skewness of a normal distribution is zero. Kurtosis measures the peakedness or flatness of the distribution of the series. The kurtosis of the normal distribution is 3. If the kurtosis exceeds 3, the distribution is leptokurtic and if less than 3 platykurtic relative to the normal distribution.

and Ito (2002) with an extension in Chinn and Ito (2005) to capture the changes in Exchange Arrangements and Exchange Restrictions (AREAER) classification in 1996. The KAOPEN index is constructed based on four binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on AREAER. The major restriction categories on external accounts are whether there exist multiple exchange rates or not, restriction on current and capital account transactions and the requirement for the surrender of export proceeds. The values of the binary variables of the AREAER series are reversed to capture the effect of financial liberalization rather than controls. High positive values of the index indicate a higher degree of financial liberalization. On average, most of the emerging markets are relatively open after the 1990's compared to developed markets, which have been well opened since before the 1970's. KAOPEN is a *de jure* measure of financial openness because it attempts to comprehensively proxy the extent and nature of the regulatory restrictions on external account transactions. Although the KAOPEN index does not specifically

measure stock market liberalization intensity, it represents a good proxy as it measures the restrictions on capital and current account transactions.

Two macroeconomic fundamental variables are considered i. e. domestic income and political stability index. The political stability index is obtained from the ICRG database to represent general domestic political stability. The index ranges from zero to one hundred, where zero indicates the highest risk and a hundred the lowest. The higher political stability index is expected to attract more investment. The interaction sign with returns volatility is expected to be negative.

The Gross Domestic Product (GNP) at current price in US dollar is used to represent domestic income. The data were obtained from World Development Indicator (WDI). We expect a negative coefficient for the domestic income. The higher is the income the lower the volatility due to better and efficient market in the country.

RESULTS

This study has revealed several interesting results. Generally, the estimations are statistically valid for making inferences about the relationship between volatility and liberalization. The heteroskedasticity specification test for cross section estimation is insignificant. First, the result shows (as shown in Table 3) that the *p*-value of the hypothesis of no threshold effect as computed by a bootstrap method with 1,000 replications and 15 percent trimming percentage are rejected at 10 percent significant level. The finding clearly indicates that the relationship between openness and returns volatility is non-linear and therefore the imposition of priori monotonic restriction on the relationship by previous researchers also can be very misleading. The effect of openness can be negligible to the returns uncertainty at certain level of openness.

Second, the presence of threshold level also indicates that the sample can be split into two different groups depending on the level of openness. The relationship between openness and returns volatility is different for low and high openness intensity. For instance Table 3 depicts that the coefficients of macroeconomic fundamentals and financial liberalization variable are insignificant at least at 5 percent level at lower intensity

TABLE 3. Global and Threshold Regression Estimates of Equation (2) and (3)

	Linear	<0.117	>0.117
Constant	7.626** (0.982)	8.932** (1.968)	6.423** (1.334)
GDP	0.236 (0.153)	0.374* (0.209)	0.039 (0.230)
Openness	-0.184 (0.345)	1.327 (1.857)	0.525 (0.536)
Political Stability	-0.416 (0.622)	1.812 (1.608)	-4.431** (1.301)
Openness × Political Stability	-0.234 (0.213)	1.121 (1.432)	1.893** (0.594)
Boot (<i>p</i> -value)	0.066		
R-sq	0.244	0.227	0.212
Het(<i>p</i> -value)	0.289		
No. Obs	80	22	58

Notes: The standard errors are reported in parentheses (White corrected for heteroskedasticity). Results correspond to trimming percentage of 15%. **and * indicate significance at 1% and 5% levels, respectively.

of openness. However, as financial liberalization higher than threshold level the contribution of political stability is not insignificant. The coefficient for political stability is -4.431 and significant at 1 percent level. This clearly indicates that political stability is an important factor influencing returns volatility at higher intensity of financial liberalization.

In addition, the regression's result of Equation 3 has provided new insight to the understanding of the returns volatility. The result (Table 3 Column 3) shows that the interaction term of ($LIB \times STB$) is positive and significant. This means that weak political stability is harmful for returns volatility if the market is relatively closed. The volatility impact of a marginal increase in political stability implied by regression (3) is. We notice that volatility is weaker as countries liberalize the countries. If the liberalization index could reach 2.34 levels then it will cancel-out the effect of the political instability.

CONCLUSION

In this paper, we re-examine the relationship between financial liberalization and returns volatility using a threshold regression with reference to different level of political stability. In particular, we endogenously determine the threshold level of financial liberalization and then used this threshold point to estimate different effect of macroeconomic fundamentals on volatility.

There are several major finding of this paper. First, priori monotonic restriction on the study of returns volatility and liberalization could lead to a premature conclusion. In this study, we significantly fail to reject the presence of threshold effect in the estimation. Further the study highlight the negligible effect of volatility for low intensity liberalization programmes. The study also finds the importance of liberalization to an economy with weak political stability. Weak political stability seems to be not harmful for liberalized economies with respect to returns volatility. In summary, it is very important for a nation to have gradual and well planned liberalization programmes.

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