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The Effects of Financial Liberalization on Stock Market Cycles: Structural Time Series Models

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GJMBR-G Classification : JEL Code: C22, D53, E32, G15



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The Effects of Financial Liberalization on Stock Market Cycles: Structural Time Series Models

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I. INTRODUCTION

During the late 1980s and early 1990s several Latin America and Asian economies went through a number of economic reforms and financial liberalization. However, these processes have been tempered by financial crisis.

The crisis illustrates possible risks of financial liberalization.

There are two contrasting views of financial liberalization. In one view, financial liberalization strengthens financial development and contributes to higher long-run growth. In another view, liberalization induces excessive risk-taking, increases macroeconomic volatility and leads to more frequent crisis.

The effect of financial liberalization on growth and its impact on financial fragility and the propensity to crisis have been largely studied in separate strands of the empirical literature. The financial crisis literature tests whether financial liberalization increases the risk of financial crisis. Kaminsky and Reinhart (1998), Detragiache and Demirguc-Kunt (1998), Rodrik (1998, 2000), Soros (2002), Stiglitz (2002) and Glick and Hutchinson (2001) find that the propensity to crises increases in the aftermath of financial liberalization.

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In contrast, the literature on liberalization claimed that financial liberalization helps to improve the functioning of financial systems and allowing cross-country risk diversification. For example, Obstfeld (1998), Stulz (1999) and Mishkin (2003) claim that financial liberalization promotes transparency and accountability, reducing adverse selection and moral hazard while in financial markets.

The empirical research, so far, has not helped to resolve the conflicting views. In fact, the various lines of empirical research focus either on the short-run or the long-run effects of liberalization, without studying the possible time-varying effects of financial liberalization.

Studies analyzing the behaviour of stock prices have been undertaken in the recent years. It was confirmed in the study that owing to liberalization the stock markets tend to become more stable. Examples of analyses of emerging market cycles are Bekaert and Harvey (1997), De Santis and Imrohorglu (1997), Huang and Yang (1999), Kim and Singal (2000), Aggarwal and al. (1999), Kaminsky and Schmuckler (2003) and Edwards and al. (2003). Financial liberalization cause financial extremes in the short-run and also brings a change in the institutional set up of which will have a supporting and better functioning of financial markets.

In this paper we focus on analyzing whether the dynamic behaviour of stock market cycles has changed significantly over the period 1975-2005 for seven emerging countries. The choices of countries and period make the analysis especially relevant. Our sample period corresponds to years of profound development of both the financial and the productive sides in these emerging countries, but also to the years of the major financial crises.

The emerging stock markets analyzed in this paper represent a highly diverse sample. During the period under consideration they had different regulations regarding international capital mobility, different domestic supervisory systems and different exchange rate regimes. Moreover, all of them, with the exception of Chile, faced serious crises during the last few years. This diverse data set, then, allows us to investigate the behavior of business cycle market under different institutional settings and under different external environments. We are particularly interested in addressing the following questions:

Has stock market cycles characteristics been different across these countries? Has it changed through time?

What are the effects of financial liberalization on the behaviour stock market cycles? Has it changed through time?

The structure of the paper is as follows. In section 2 we present briefly reviews some of the previous contributions on the relationship between financial liberalization and behaviour of stock market. In Section 3 we present the data and the methodology used to identify the characteristic of stock markets cycles. In Section 4, we present univariate unobserved components structural time series models.

In section 5, we provide a discussion of the results in the context of our analysis. Finally, in section 6 we offer some concluding remarks.

II. LITERATURE REVIEW

During the last decades, many emerging countries have liberalized their financial systems. This financial liberalization has been linked to lending booms and crisis. However, markets may become informationally more efficient, behaviour of stock market reacts fully and more quickly to relevant information; also, increased volumes of speculative capital may induce excess volatility. After liberalization, the gradual development and diversification of the markets could lead to lower volatility and to a lower sensitivity to new information.

We briefly review this literature below to show the effects of financial liberalization on stock market cycles.

Studies analyzing the behaviour of stock prices over financial cycles have been mixed. Bekaert and Harvey (1997) generally find that volatility decreases after liberalization. De Santis and Imrohorglu (1997) also find evidence that volatility decreased after liberalization in a subset of countries, such as Argentina. However, Huang and Yang (1999), using the dates of financial liberalization from De Santis and Imrohorglu (1997), show that the unconditional volatility of the stock markets in three of the countries analyzed (South Korea, Mexico and Turkey) increased after liberalization, whereas it decreased in another four countries (Argentina, Chile, Malaysia and the Philippines).

Aggarwal et al. (1999) find that most events around the time period when shifts in volatility occur are local but that liberalization processes seem not to have induced the changes in variance. Also, they find both increases and decreases in volatility depending on the country and on the sequence of events. Bekaert and al. (2006), find that volatility of stock market cycles seems to decrease after liberalization. Time varying patterns of financial cycles before and after financial liberalization was examined by Kaminsky and Schmukler (2001, 2002, 2003) in 28 countries using non parametric methodology (turning point detection). The results indicate that more liberalization cause financial extremes in the short-run and also brings a change in the institutional set up of which will have a supporting and

better functioning of financial markets. In a study done by Edwards et al (2003), the stock price behaviour in six emerging economies is analyzed. The results they find that volatility after financial liberalization has increased in Asian countries but not in Latin American countries.

III. DESCRIPTION OF DATA AND METHODOLOGIES

In this paper we analyze stock market cycles in a group of Latin American (Argentina, Brazil and Chile) and Asian countries (Philippines, Korea, Taiwan and Thailand). We investigate the characteristics of stock market cycles during 1975–2005. We make a distinction between the pre and post-financial reform periods, and we concentrate on the following characteristics of stock market cycles: Duration, amplitude and volatility. The data are taken from the S&P /IFCG1 (S&P/IFC monthly Global Index) (Standad and Poor / Global International Finance Corporation), which gives monthly series from 1975 to 2005.

In order to carry out our estimations, we used the application STAMP 7.0 (Structural Time Series Analyser, Modeller and Predictor, 2006) that has been designed especially to deal with unobserved components models (Koopman, Harvey, Doornik and Shephard, 2000).

The post financial reform is devised on two periods: short effect and long effect of financial liberalization.

Short run effect: include the four years after the date of liberalization.

Long run effect: include the fifth year after the date of liberalization.

The year thereafter, conditional on the deregulation is not being reserved.

The dates of liberalization (table1) are find by G. L. Kaminsky and S. Schmukler (2003)². Most of studies focus on the elimination of controls on just one particular financial sector, be it the capital account, the domestic financial sector and the stock market. Kaminsky and Schmukler find a chronology deals with the regulations in three sectors.

Table 1: The dates of financial liberalization

Asian countries		Latin American countries	
Philippines	01/94	Argentina	01 /90
Korea	01/96	Brazil	03/95
Taiwan	01/97	Chile	01/92
Thailand	01/98		

1 S&P/IFC global index present the performance of the global activity of the stock market for each country.

2 G. L. Kaminsky and S. Schmukler (2003): « short- run pain, long-run gain: The effects of financial liberalization», IMF Working Paper No WP/03/34; February 2003.

3 In order to carry out our estimations, we used the application STAMP 7.0 (Structural Time Series Analyser, Modeller and Predictor) that has been designed especially to deal with unobserved components models (Koopman, Harvey, Doornik and Shephard, 2000).

IV. UNIVARIATE MODELS: STOCHASTIC TRENDS AND CYCLES

This paper stands on results given by univariate unobserved components structural time series models³ proposed by the statistician Andrew Harvey (Harvey, 1989; Koopman and Harvey, 1997). The structural time series model splits every series into trend, cycles, and irregular components.

$$y_t = T_t + C_t + \varepsilon_t; t = 1, \dots, H \quad (1)$$

Where y_t is the logarithm of a series. T_t , C_t and ε_t are respectively the trend, cyclical and irregular components.

The model can include several cyclical components associated to different frequencies.

4.1. Stochastic trends

The trend is a local linear one for which both the level and the slope are random walks specified as follows:

$$T_t = T_{t-1} + \beta_{t-1} + \eta_t \quad (2)$$

$$\beta_t = \beta_{t-1} + \zeta_t \quad (3)$$

η_t and ζ_t are orthogonal white noises with variances σ_η^2 and σ_ζ^2 respectively. The noise allows the level of the trend to fluctuate while ζ_t tilts the slope.

In the general case, it is clear that the trend defined by the equations is an ARIMA (0, 2, 1). But particular cases are interesting:

- In the extreme case where $\sigma_\eta^2 = \sigma_\zeta^2 = 0$ the trend is simply a deterministic one.
- If only $\sigma_\zeta^2 = 0$, the slope is constant in time and the trend becomes a random walk with drift.
- If only $\sigma_\eta^2 = 0$, Slowly Moving Smooth Trend, the trend is still integrated of order two as in the general case but without white noise affecting its level.

4.2. Stochastic cycles

In recursive form the cycle component can be expressed as:

$$\begin{bmatrix} C_t \\ C_t^* \end{bmatrix} = \rho \begin{bmatrix} \cos \lambda & \sin \lambda \\ -\sin \lambda & \cos \lambda \end{bmatrix} \begin{bmatrix} C_{t-1} \\ C_{t-1}^* \end{bmatrix} + \begin{bmatrix} \kappa_t \\ \kappa_t^* \end{bmatrix} \quad (4)$$

C_t^* is a technical variable needed to write the cycle in recursive form.

The disturbances κ_t and κ_t^* are two orthogonal white noises with identical variance σ_κ^2 . The damping factor of the cycle is given by ρ , ($0 < \rho < 1$) and its frequency is $\lambda \in [0, \pi]$, which corresponds to a period equal to $2\pi / \lambda$.

The disturbances make the cycle stochastic and able to take into account the complexity of the apparent cyclical movement, which usually presents asymmetry and angular turning points. If we cancel the disturbances in equation, the cycle becomes

deterministic. One can verify that the cycle is a stationary ARMA (2, 1) process when the coefficient ρ is strictly inferior to one. There is equivalence between the statistic property of stationarity and the damping of the cycle.

V. ESTIMATION RESULTS

The method of estimation used is maximum likelihood applied to the state-space form of the model, which is decomposed into observation and state equations. The extraction of the unobserved components uses the Kalman filter. This filter produces a recursive estimation of the state vector for the date t , conditioned by the information available until $t-1$: it is the filtering step. A set of diagnoses is available in order to assess the empirical fitness of the model. The basic indicators are the volatility and amplitude of the cycle. Three other specific diagnoses will be always considered:

- Normality Bowman-Shenton statistic NBS or Doornik-Hansen NDH (more adapted to small samples) based on third and fourth moments of the residuals and having a χ^2 distribution with 2 degrees of freedom if the model is correctly specified. The normality test permits the detection of particular observations badly explained by the model.
- Serial correlation Box-Ljung statistic Q (p,q) based on the first p residual autocorrelations, tested against a χ^2
- with q degrees of freedom, where q is equal to p-n+1 and n is the number of hyperparameters.
- Relative determination coefficient RD 2. These diagnoses have been complementarily used to select the models, without being always completely satisfactory.

a) Trend-Cycle Split of Asian Countries

The table 2 shows the characteristics of stock market cycles in Asian countries (Philippines, Korea, Taiwan and Thailand) during 1975–2005. We classify financial cycles in two categories, those that occur during repression times and those that occur after liberalization.

Table 2 : Characteristics of Asian stock market cycles in repressed and liberalized period

Characteristics	Philippines		Korea		Taiwan		Thailand	
	Repressed	Liberalized	repressed	liberalized	Repressed	Liberalized	repressed	Liberalized
Volatility	0.0017	0.0232(+)	0.0018	0.0922(+)	0.0014	0.0060(+)	0.0010	0.0057(+)
Amplitude	0.0541	0.0764 (+)	0.0564	0.1359(+)	0.0458	0.1015 (+)	0.0591	0.0925(+)
ρ (damping fact or of the cycle)	0.9777	1.0000	0.9919	0.9620	0.9821	0.9681	0.9040	0.8651
Period of the cycle (months)	14.9620	24.8691 (+)	19.4683	33.0416 (+)	15.2292	24.1301 (+)	10.8765	20.3719 (+)
Frequency	0.4199	0.2526	0.6031	0.1594	0.4125	0.2603	0.5776	0.3032

Table 2 gives the results of the univariate split of the log monthly stock prices index for the repression and liberalization period. The results indicate that if liberalization triggers more volatile stock market, stock market cycles become more pronounced after liberalization. The estimated period of the Asian cycle after liberalization is appears longer than the repression years. We remind the reader that in such a kind of models, the cycle period corresponds to a virtual length. Its realisation is determined by the effective innovations sequence that generates the cycle. Philippines have a deterministic stock market cycle after financial liberalization; damping factor of the cycle is equal to one. The stock market cycles of Korea, Taiwan and

Thailand are stochastic and able to take intoaccount the complexity of the apparent cyclical movement. The evidence for the Asian countries in the sample indicates that the amplitude and volatility substantially increases in the aftermath of liberalization.

The table 3 shows the characteristics of stock market cycles in Asian countries in the post reform.

The post financial reform is devised on two periods: short effect and long effect of financial liberalization.

Short run effect: include the four years after the date of liberalization.

Long run effect: include the fifth year after the date of liberalization.

Table 3 : Characteristics of Asian stock market cycles in the post financial reform

Characteristics	Philippines		Korea		Taiwan		Thailand	
	Short run	Long Run	Short run	Long run	Short run	Long run	Short run	Long run
Volatility	0.0296(+)	0.0016(-)	0.1462(+)	0.0090(-)	0.0242(+)	0.0013(-)	0.0031 (+)	0.0008 (-)
Amplitude	0.1817(+)	0.0446(-)	0.3902(+)	0.0886 (-)	0.2172(+)	0.0488(-)	0.0747 (+)	0.0385 (-)
ρ (damping factor of the cycle)	1.0000	1.0000	0.9962 (+)	0.9511 (-)	1.0000	1.0000	0.8396	0.9783
Period of the cycle (months)	25.258	21.235	33.849	19.246	27.461	14.098	15.441	14.593
Frequency	0.2487	0.2958	0.1856	0.3264	0.2288	0.4456	0.4069	0.4305

Table 3 gives the results of the univariate split of the log monthly stock prices index for the post reform period.

We classify financial cycles in two categories, those that occur in the short run after liberalization, and those that occur in the long run following liberalization. Financial liberalization triggers more volatile stock market, stock market cycles become more pronounced in the short run. The amplitude and volatility substantially increases in the immediate aftermath of liberalization. But equity markets stabilize in the long run if liberalization persists, with the amplitude and volatility smaller than in repression times. Philippines and Taiwan have a deterministic stock market cycle after financial liberalization; damping factor of the cycle is equal to one.

b) *Trend-Cycle Split of American Latin Countries*

The table 4 shows the characteristics of stock market cycles in Latin American countries (Argentina, Brazil and Chile) during 1975–2005.

Table 4 : Characteristics of Latin American stock market cycles in repressed and liberalized period

Characteristics	Argentina		Brazil		Chile	
	Repressed	liberalized	Repressed	Liberalized	Repressed	Liberalized
Volatility	0.128	0.029(-)	0.069	0.032(-)	0.018	0.008(-)
Amplitude	0.224	0.109(-)	0.222	0.0885(-)	0.099	0.078(-)
ρ	0.996	0.971	0.924	0.7276	0.828	0.801
Period of the cycle	39.927	27.530	41.622	34.327	32.994	24.254
Frequency	0.151	0.186	0.104	0.119	0.551	0.732

Table 4 gives the results of the univariate split of the log monthly stock prices index for the repression and liberalization period. The stock market cycles become less pronounced after liberalization. The estimated period of the American Latin cycles after liberalisation is appears shorter than the repression years. Argentina, Brazil and Chile are stochastic and able to take into account the complexity of the apparent cyclical movement.

The American Latin countries in the sample indicate that the amplitude and volatility substantially decreases in the aftermath of liberalization. Comparisons among Latin American countries suggest some interesting differences. The Chile cycle showed

less volatility (0.008) and amplitude (0.078) than the others; together with Brazil, they were also reluctant to open the capital account completely until the last few years. Argentina experienced sharper and more frequent policy reversals than the other, and international liberalization accompanied or even led domestic liberalization. Individual Latin America countries also demonstrated differences among themselves and with East Asian. Overall, the East Asian countries were less inclined toward financial liberalization than their Latin America counterparts.

The table 5 shows the characteristics of stock market cycles in American Latin countries in the post reform.

Table 5 : Characteristics of American Latin stock market cycles in the post financial reform

Characteristics	Argentina		Brazil		Chile	
	Short run	Long run	Short run	Long run	Short run	Long run
Volatility	0.206	0.007 (-)	0.070	0.003(-)	0.038	0.005(-)
Amplitude	0.229	0.115 (-)	0.315	0.064(-)	0.206	0.0579(-)
ρ (damping factor of the cycle)	0.998	1.000	0.999	1.000	0.805	0.951
Period of the cycle (months)	27.269	23.398	33.309	19.036	25.212	22.699
Frequency	0.230	0.268	0.188	0.330	0.992	0.276

Table 5 gives the results of the univariate split of the log monthly stock prices index for the post reform period.

The stock market cycles become more pronounced in the short run. The amplitude and volatility substantially increases in the immediate aftermath of liberalization. But equity markets stabilize in the long run if liberalization persists, with the amplitude and volatility smaller than in repression times.

VI. CONCLUSIONS

Our analysis showed that liberalization seems to generate more stable financial markets in the long run. The volatility and amplitude of the cycles have not intensified in the long run after financial liberalization. In fact, despite the claim that financial integration leads to volatile capital markets around the world, stock market cycles become less pronounced after liberalization. Still, in the short run, we found that financial liberalization

does tend to trigger more volatile cycles. Stock market cycles of Asian countries continue to be very high in the postreform period, mostly because of the influence of the Asian crisis. However, after financial liberalization, Latin American stock market leads to more stable stock market cycles.

REFERENCES RÉFÉRENCES REFERENCIAS

1. Aggarwal, R., Inclan, C., Leal, R., 1999. Volatility in emerging stock markets. *Journal of Financial and Quantitative Analysis* 34, 33-55.
2. Bekaert, G., Harvey, C.R., 1997. Emerging equity market volatility. *Journal of Financial Economics* 43, 29-78.
3. Bekaert, G., Harvey, C.R., 2000. Foreign speculators and emerging equity markets. *Journal of Finance* 55, 565-613.
4. Bekaert, G., Harvey, C.R., 2002. Research in emerging market finance: Looking to the future. *Emerging Markets Review* 3, 429-448.

5. Bekaert, G., Harvey, C.R., 2003. Emerging markets finance. *Journal of Empirical Finance* 10, 3-55.
6. Bekaert, G., Harvey, C.R., Lumsdaine, R.L., 2002a. Dating the integration of world equity markets. *Journal of Financial Economics* 65, 203-249.
7. Bekaert, G., Harvey, C.R., Lumsdaine, R.L., 2002b. The dynamics of emerging market equity flows. *Journal of International Money and Finance* 21, 295-350.
8. Bekaert, G., Harvey, C.R., Lundblad, C., 2006. Growth volatility and financial market liberalization. Forthcoming, *Journal of International Money and Finance*.
9. De Santis, G., Imrohorglu, S., 1997. Stock returns and volatility in emerging financial markets. *Journal of International Money and Finance* 16, 561-579.
10. Edwards, S., Gómez Biscarri, J., Pérez de Gracia, F., 2003. Stock market cycles, financial liberalization and volatility. *Journal of International Money and Finance* 22, 925-955.
11. Edwards, S., Susmel, R., (2003): "Interest Rate Volatility and Contagion in Emerging Markets: Evidence from the 1990s". *Review of Economics and Statistics* 66, 505-532.
12. JHARVEY A. C., (1989): "Forecasting, Structural Time Series Models and the Kalman Filter", Cambridge University Press.
13. HARVEY A. C., (2000): « Testing in Unobserved Component Models », *Journal of Forecasting*.
14. Huang, B.N., Yang, C.Y., 1999. The impact of financial liberalization on stock price volatility in emerging markets. *Journal of Comparative Economics* 28, 321-339.
15. Kaldor N. (1939): "Speculation and Economic Stability", *Review of Economic Studies*, n° 1.
16. Kaminski G. & C. Reinhart (1996): "The Twin Crises: the Causes of Banking and Balance of Payments Problems", *IMF Discussion Papers*, n° 544, mars.
17. Kaminsky, G., Reinhart, C., (2002): "Financial Markets in Times of Stress". *Journal of Development Economics* 69, 451-470.
18. Kaminsky, Schmukler (2003): "Short- run pain, long run gain", *NBER WP* n°9789.
19. Kaminsky, G and S. Schmukler (2003): « short- run pain, long-run gain: The effects of financial liberalization », *IMF Working Paper No WP/03/34*; February 2003.
20. Kim, E.K., Singal, V., 2000. Opening up of stock markets: Lessons from emerging economies. *Journal of Business* 73, 25-66.
21. KOOPMAN S.J. , A.C. HARVEY, J.A. DOORNIK J.A. et N. SHEPHARD, 2000, *State Space Structural Time Series Analysis, Modelling and Prediction*, Timberlake Consultants, London.
22. KOOPMAN S.J. ET A.C. HARVEY, (1997): «Trends and Cycles in Multivariate Time Series », in *System Dynamics in Economic and Financial Models*, C. Heij, H. Schumacher, B. Hanzon and C. Praagman (eds), John Wiley and Sons.
23. Michel Aglietta, (1998) : « Pourquoi la contagion a-t-elle eu lieu ? », *Problèmes économiques* n°2559, 11 Mars 1998.
24. Pagan, A.R., Sossounov, K.A. (2003): "A Simple Framework for Analyzing Bull and Bear Markets". *Journal of Applied Econometrics* 18,23-46.
25. Paul Krugman, (1999): « Monomoney mania », in *Slate*, 15 avril 1999.
26. World Bank, (1989): "World development report 1989: Financials systems and development", New York, Oxford University Press.

ANNEXE

Trend-cycle split



