

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

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Abstract

We compare the behaviour of stock market cycles during repression, in the aftermath of financial liberalization, and in the short and long run following liberalization. We investigate the characteristics of stock market cycles in a group of Latin American (Argentina, Brazil and Chile) and Asian countries (Philippines, Korea, Taiwan and Thailand) during 1975–2005. This paper aims to apply the methodology of univariate structural unobserved components time series models. Our results indicate that liberalization triggers more volatile stock market in the short run. Still, liberalization seems to generate more stable financial markets in the long run. Stock market cycles of Asian countries continue to be very high in the post-reform 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.

Index terms— business cycle, emerging stock market, financial liberalization, structural unobserved components.

1 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. Aminsky and Reinhart (1998), Detragiache and Demirguc-Kunt (1998), Odrik (1998, Odrik, 2000), Oros (2002), Tiglitz (2002) and Lick and Hutchinson (2001) find that the propensity to crises increases in the aftermath of financial liberalization.

In contrast, the literature on liberalization claimed that financial liberalization helps to improve the functioning of financial systems and allowing crosscountry risk diversification. For example, Obstfeld (1998), Tulz (1999) and Ishkin (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 Ekaert and Harvey (1997), De Santis and Imrohroglu (1997), Huang and Yang

44 (1999), Kim and Singal (2000), Aggarwal and al. (1999), ??aminsky and Schmuckler (2003) and . Financial
45 liberalization cause financial extremes in the short-run and also brings a change in the institutional set up of
46 which will have a supporting and better functioning of financial markets.

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

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

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

58 The structure of the paper is as follows. In section 2 we present briefly reviews some of the previous
59 contributions on the relationship between financial liberalization and behaviour of stock market. In Section
60 3 we present he data and the methodology used to identify the characteristic of stock markets cycles. In Section
61 4, we present univariate unobserved components structural time series models.

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

64 2 II.

65 3 Literature Review

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

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

72 Studies analyzing the behaviour of stock prices over financial cycles have been are mixed. ??ekaert and Harvey
73 (1997) generally find that volatility decreases after liberalization. De Santis and Imrohorglu (1997) also find
74 evidence that volatility decreased after liberalization in a subset of countries, such as Argentina. However, Huang
75 and Yang (1999), using the dates of financial liberalization from De Santis and Imrohorglu (1997), show that the
76 unconditional volatility of the stock markets in three of the countries analyzed (South Korea, Mexico and Turkey)
77 increased after liberalization, whereas it decreased in another four countries (Argentina, Chile, Malaysia and the
78 Philippines). Aggarwal et al. (1999) find that most events around the time period when shifts in volatility occur
79 are local but that liberalization processes seem not to have induced the changes in variance. Also, they find both
80 increases and decreases in volatility depending on the country and on the sequence of events. Bekaert and al.
81 (2006), find that volatility of stock market cycles seems to decrease after liberalization. Time varying patterns of
82 financial cycles before and after financial liberalization was examined by ??aminsky and Schumkler (2001, 2002,
83 2003) in 28 countries using non parametric methodology (turning point detection). The results indicate that
84 more liberalization cause financial extremes in the short-run and also brings a change in the institutional set up
85 of which will have a supporting and better functioning of financial markets. In a study done by , the stock price
86 behaviour in six emerging economies is analyzed. The results they find that volatility after financial liberalization
87 has increased in Asian countries but not in Latin American countries.

88 4 III.

89 5 Description of Data and Methodologies

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

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

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

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

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

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

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

107 Where y_t is the logarithm of a series. T_t , C_t and $?_t$ are respectively the trend, cyclical and irregular
 108 components.

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

110 6 Stochastic trends

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

112 and $?_t$ are orthogonal white noises with variances and respectively. The noise allows the level of the trend to
 113 fluctuate while $?_t$ tilts the slope.

114 In the general case, it is clear that the trend defined by the equations is an ARIMA (0, 2, 1). But particular
 115 cases are interesting: -In the extreme case wheres = 0 the trend is simply a deterministic one.

116 -If only = 0, the slope is constant in time and the trend becomes a random walk with drift.

117 -If only =0, Slowly Moving Smooth Trend, the trend is still integrated of order two as in the general case but
 118 without white noise affecting its level.

119 7 Stochastic cycles

120 In recursive form the cycle component can be expressed as:

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

122 The disturbances $?_t$ and $?_t^*$ are two orthogonal white noises with identical variance $??^2$. The damping factor
 123 of the cycle is given by $?$, ($0 < ? < 1$) and its frequency is $? ? [0, ?]$, which corresponds to a period equal to $??$
 124 $/?$.

125 The disturbances make the cycle stochastic and able to take into account the complexity of the apparent
 126 cyclical movement, which usually presents asymmetry and angular turning points. If we cancel the disturbances
 127 in equation, the cycle becomes deterministic. One can verify that the cycle is a stationary ARMA (2, 1) process
 128 when the coefficient $?$ is strictly inferior to one. There is equivalence between the statistic property of stationarity
 129 and the damping of the cycle.

130 V.

131 8 Estimation Results

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

138 9 a) Trend-Cycle Split of Asian Countries

139 The table ?? shows the characteristics of stock market cycles in Asian countries (Philippines, Korea, Taiwan and
 140 Thailand) during 1975-2005. We classify financial cycles in two categories, those that occur during repression
 141 times and those that occur after liberalization. $? t t t t T T ? ? + + = ? ? 1 1$

142 $(2)t t t ? ? ? + = ? 1 (3) ? ? 2 ? ? 2 ? ? 2 = ? ? 2 ? ? 2 ? ? 2 ? ? ? ? ? ? + ? ? ? ? ? ? ? ? ? ? ? ? =$
 143 $? ? ? ? ? ? ? ? * * 1 1 * \cos \sin \sin \cos t t t t t C C C C ? ? ? ? ? ? ? ? (4)$

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

147 -Normality Bowman-Shenton statistic NBS or Doornik-Hansen NDH (more adapted to small samples) based
 148 on third and fourth moments of the residuals and having a $?^2$ distribution with 2 degrees of freedom if the model
 149 is correctly specified. The normality test permits the detection of particular observations badly explained by
 150 the model. $? Serial correlation Box-Ljung statistic Q (p,q)$ based on the first p residual autocorrelations, tested
 151 against a $?^2 ?$ 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,
 152 without being always completely satisfactory.

153
 154 Table ?? : Characteristics of Asian stock market cycles in repressed and liberalized period Table ?? gives the
 155 results of the univariate split of the log monthly stock prices index for the repression and liberalization period.
 156 The results indicate that if liberalization triggers more volatile stock market, stock market cycles become more
 157 pronounced after liberalization. The estimated period of the Asian cycle after liberalization is appears longer
 158 than the repression years. We remind the reader that in such a kind of models, the cycle period corresponds
 159 to a virtual length. Its realisation is determined by the effective innovations sequence that generates the cycle.
 160 Philippines have a deterministic stock market cycle after financial liberalization; damping factor of the cycle is

161 equal to one. The stock market cycles of Korea, Taiwan and Thailand are stochastic and able to take into account
 162 the complexity of the apparent cyclical movement. The evidence for the Asian countries in the sample indicates
 163 that the amplitude and volatility substantially increases in the aftermath of liberalization.

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

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

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

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

168 10 Table 3 : Characteristics of Asian stock market cycles in the 169 post financial reform

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

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

177 11 b) Trend-Cycle Split of American Latin Countries

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

182 The American Latin countries in the sample indicate that the amplitude and volatility substantially
 183 decreases in the aftermath of liberalization. Comparisons among Latin American countries suggest some
 184 interesting differences. The Chile cycle showed less volatility (0.008) and amplitude (0.078) than the others;
 185 together with Brazil, they were also reluctant to open the capital account completely until the last few years.
 186 Argentina experienced sharper and more frequent policy reversals than the other, and international liberalization
 187 accompanied or even led domestic liberalization. Individual Latin America countries also demonstrated differences
 188 among themselves and with East Asian. Overall, the East Asian countries were less inclined toward financial
 189 liberalization than their Latin America counterparts.

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

191 Table ?? : Characteristics of American Latin stock market cycles in the post financial reform Table ?? gives
 192 the results of the univariate split of the log monthly stock prices index for the post reform period.

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

196 12 VI.

197 13 Conclusions

198 Our analysis showed that liberalization seems to generate more stable financial markets in the long run. The
 199 volatility and amplitude of the cycles have not intensified in the long run after financial liberalization. In fact,
 200 despite the claim that financial integration leads to volatile capital markets around the world, stock market cycles
 201 become less pronounced after liberalization. Still, in the short run, we found that financial liberalization does
 202 tend to trigger more volatile cycles. Stock market cycles of Asian countries continue to be very high in the A
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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		

Figure 1: Table 1 :

Characteristics	Philippines		Korea		Taiwan		Thailand		Liberalized
	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(+)	
? (damping factor 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	

[Note: G]

Figure 2: Table 4 :

¹S&P/IFC global index present the performance of the global activity of the stock market for each country. ²G. 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. ³In 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).

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