MPRA

Munich Personal RePEc Archive

An Analysis of Exchange Rate Regime Duration

Hossain, Monzur

August 2010

An Analysis of Exchange Rate Regime Duration

Monzur Hossain[+]
Bangladesh Institute of Development Studies (BIDS)
E-17 Agargaon, Sher-e-Bangla Nagar, Dhaka 1207

Abstract:
The analysis of mean duration of exchange rate regime reveals that overall durability of regimes has been declining since the 1970s. The durability of intermediate regimes has decreased to the lowest in the 1990s than those in the 1970s and 1980s, which provides a basis for the hollowing out hypothesis. The changing pattern of regime distribution might be associated with the changing pattern of developmental stage.

1. Introduction

Since the breakdown of the Bretton Woods system in the early 1970s, countries have adopted a variety of exchange rate regimes. Major global and regional events, such as the debt crisis of the 1980s, the transformation of the economies of Central and Eastern Europe in the early 1990s, the formation of the European Monetary Union in 1999 and financial and currency crises in various emerging countries in the late 1990s have influenced exchange rate regime transitions. Crises in emerging countries in the late 1990s led to the emergence of the "hollowing out hypothesis". The hypothesis states that countries will move to either a fixed regime such as currency union, currency board or dollarization or a freely floating regime in the face of crisis if they are integrated with global financial and capital market[1]. As a result, intermediate regimes such as such as adjustable peg, crawling peg and crawling band will be hollowing out over time (Summer, 2000; Eichengreen, 1994). Masson (2002), by estimating transition probability matrix and its steady-state probabilities, however, concluded that there is no possibility of hollowing out of intermediate regimes. With these expositions, what would be the shape of long run exchange rate regime distribution is still unclear.

This paper takes a new empirical approach to analyze the regime transition dynamics. The trend of exchange rate regime distribution can be better judged by the mean duration of each regime among countries over a period of time, rather than analyzing the percentage of regimes in a static manner (Figure 1- A & B). Figure 1A shows that the percentage of intermediate regime has decreased in 1999 than those in 1980 and in 1990, but Figure 1B shows that the percentage of intermediate regimes remained almost the same in the 1980s and 1990s. This may not be correct because percentage of regimes at a point in time or over a period of time may not better reflect the distribution of regimes as countries move back and forth between regimes. This paper therefore attempts to analyze exchange rate regime durability to shed some insights into the choice of exchange rate regime. The paper mainly addresses two issues: (i) whether there is any pattern in the mean duration of regimes over time, and (ii) whether the duration of regimes has any particular links with the level of economic development. Mean duration of regimes is estimated from a fitted covariate-dependent and continuous time Markov chain model (the model is discussed in Section 2). Many authors link longer durability of a regime with better performance of that regime. Husain et al. (2005) find that fixed regime is the longest durable regime, but their performance varies with the level of economic development.

[+] *Correspondence: E-mail: monzur@bids.org.bd; Tel: +88-02-8129625; Fax: +88-02-8113023*

Figure 1: Percentage of regimes adopted by countries over time (1970-99)

A. Percentage in point of time

B. Percentage over a period of time
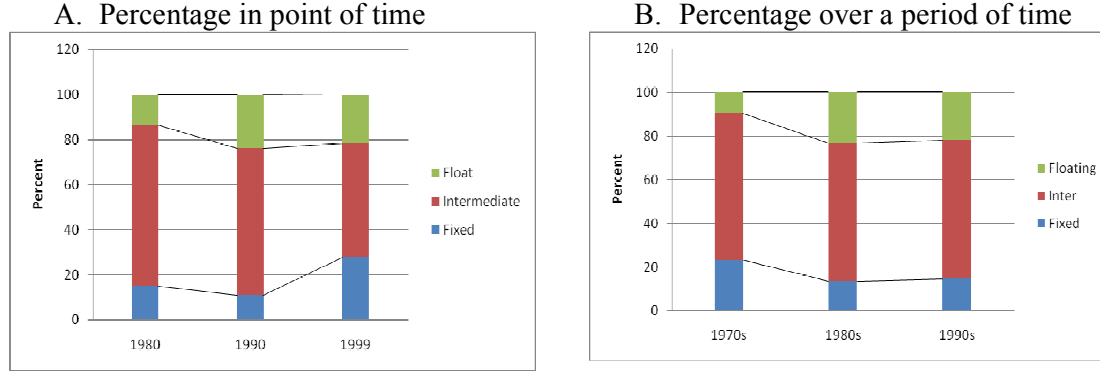
2. Methodology and Data

Since the duration of an individual regime is a continuous time variable, a continuous time Markov chain model is appropriate in analyzing the regime dynamics[2]. Therefore, a three-state continuous time Markov chain model is applied in this study to the *de facto* exchange rate regime data of 166 IMF member countries for the period 1970-1999 to analyze the regime transition dynamics as well as mean duration of regimes[3]. Since countries move back and forth between regimes in the face of an event, these characteristics of regime transition give rise to a Markov model, which assumes that the probability of transition to an alternative regime depends only on the current regime irrespective of past history. The model is therefore specified as,

$$\lambda_{ij}(t \mid z) = \lambda_{ij} e^{\beta_{ij} Z} \text{, (i, j = 1, 2, 3)}$$

where λ_{ij} represents baseline parameters (transition intensities), Z denotes the vector of explanatory variables and β_{ij} denotes the coefficients of explanatory variables on the transition from regime *i* to *j*.

The MSM model considers that countries often make transitions and reverse transitions among three exchange rate regimes— fixed (1), intermediate (2) and floating (3), either voluntarily or involuntarily. It is assumed that there is no absorbing state in the exchange rate regime transition process. The transition intensity matrix is defined as,

$$\Gamma = \begin{pmatrix} -(\lambda_{12} + \lambda_{13}) & \lambda_{12} & \lambda_{13} \\ \lambda_{21} & -(\lambda_{21} + \lambda_{23}) & \lambda_{23} \\ \lambda_{31} & \lambda_{32} & -(\lambda_{31} + \lambda_{32}) \end{pmatrix}.$$

The elements of the matrix Γ, λ_{ij}'s are assumed to be independent of time and the intensities follow the property $\lambda_{ii} = -\sum_{i \neq j} \lambda_{ij}$; i, j = 1, 2, 3, that is, row sum is zero. Mean duration of regimes is estimated by $-1/\lambda_{ii}$.

We consider only one explanatory variable "Developmental stage", which is categorized as developing (1), emerging (2) and developed (3) following the Morgan Stanley Capital

---

[2] Although Husain et al. (2005) estimated the mean duration of regimes using a discrete Markov chain model, their focus was on the performance of regimes, rather than regime transition dynamics.

[3] The *de facto* regime classification, developed by Reinhart and Rogoff (2004) is used in the analysis. We could not proceed to analyze the data for the current decade (2000s) because of unavailability of *de facto* data. *De facto* data are available only for five years, 2000-2004 in Levy-Yeyati (2005). The reason behind the use of *de facto* data is that *de jure* (official) data of regime is often misleading as countries, particularly non OECD countries, in most cases declares one regime officially, but pursues another regime in practice (Hossain, 2009).

Index (MSCI) (the list are given in the appendix), to examine the effect of developmental stage on regime transition dynamics from long-term perspectives. Moreover, inclusion of the "developmental stage" dummy in the model helps us estimate mean duration of individual regime under different developmental stage.

3. Results

Estimated coefficients of regime transition over the decades are reported in Table 1 (Panel A) and the effect of developmental stage on regime transition is estimated in Table 1 (Panel B). Transitions from fixed to intermediate as well as from floating to intermediate are significant in the 1970s, which may be the outcome of the collapse of the Bretton-Woods system. The similar pattern of transition between regimes is observed in the 1980s, which are mainly characterized by different crises occurred in the decade, particularly with the fixed regimes. The decade of 1990s saw various types of transitions. Both transition and reverse transition between intermediate and floating regimes are prominent in the 1990s. The estimated coefficients on β_{12} and β_{13} are significant and positive in the 1970s, indicating that relatively more developed countries moved from fixed to either intermediate or floating regimes during the period. However, none of the development coefficients are found to be significant in the 1980s. In the 1990s, developmental stages can explain transition from intermediate to fixed and floating to intermediate regimes—a trend towards more rigid regimes. While more developed countries move from intermediate to fixed regimes (the EU formation), less developed countries move from floating to intermediate regimes. These results place a question mark on the validity of the hollowing out hypothesis.

Table 1A. Estimated coefficients of regime transition intensities

Duration	λ_{11}	λ_{12}	λ_{13}	λ_{21}	λ_{22}	λ_{23}	λ_{31}	λ_{32}	λ_{33}
1970-79	-0.09+	0.08+	0.009	0.006*	-0.02	0.02	0.006	0.06*	-0.06*
	(0.02)	(0.02)	(0.007)	(0.003)	(0.006)	(0.005)	(0.009)	(0.03)	(0.03)
1980-89	-0.07*	0.05*	0.01	0.002	-0.04	0.04	0.001	0.04+	-0.04+
	(0.03)	(0.02)	(0.01)	(0.002)	(0.008)	(0.008)	(0.003)	(0.01)	(0.01)
1990-99	-0.04+	0.02*	0.02	0.01	-0.10+	0.09+	0.005	0.13+	-0.13+
	(0.01)	(0.01)	(0.009)	(0.004)	(0.01)	(0.01)	(0.004)	(0.02)	(0.02)

B. log-linear effects of developmental stage on regime transition

| Duration	β_{12}	β_{13}	β_{21}	β_{23}	β_{31}	β_{32}
1970-79	0.86+	1.57*	-0.37	0.39 (0.35)	1.02 (1.29)	0.12 (0.52)
	(0.29)	(0.75)	(0.71)			
1980-89	0.74 (0.61)	0.60 (1.22)	1.21 (1.01)	-0.11	1.74 (2.0)	-0.06
				(0.26)		(0.44)
1990-99	0.53 (2.08)	0.97 (1.93)	2.64+	-0.27	0.17 (1.74)	-1.38*
			(0.53)	(0.41)		(0.60)

*Note: λ_{ij} indicates the rate of transition from i to j over the period of time. β_{ij} indicates the estimated coefficients of developmental stage on transition from regime i to j over the period of time. Standard errors are given in parentheses. + and * indicates significance at 1% and 5% level respectively.*

From the estimated Markov model in Table 1, average duration (in years) of regimes is estimated for the 1970s, 1980s and 1990s, and plotted in Figure 2. The figure shows that mean duration of regimes are gradually decreasing over time except fixed regimes. The durability of fixed regime has increased in the 1990s (with the highest standard errors, 8.57)

compared to those in the 1980s and 1970s. The durability of intermediate regimes was the highest in the 1970s and 1980s (standard errors were also the highest), which has decreased substantially in the 1990s, and the durability of floating regimes remains almost the same during 1970-99. Interestingly, overall mean duration of regimes has declined over time, indicating that countries now move between regimes more frequently than before.

**Figure 2**: Durability of regimes during 1970-99
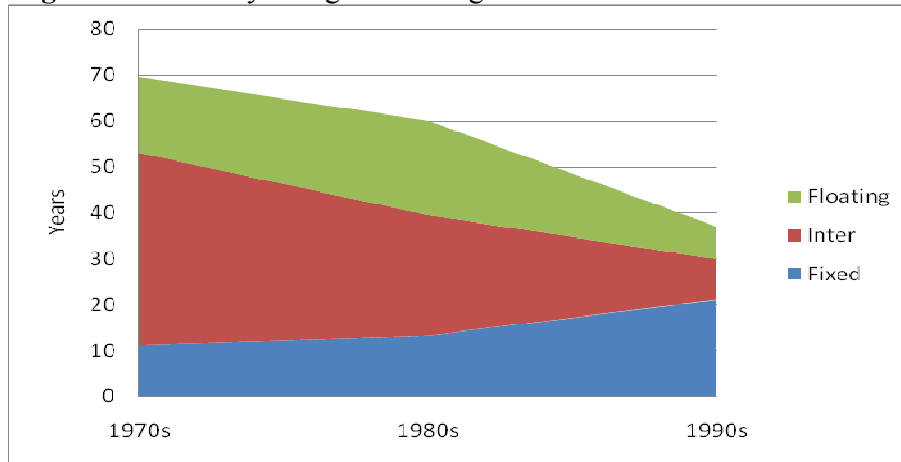
Next, we analyse the durability of regimes for specific decades and types of countries according to their developmental stage, which are plotted in Figures 3, 4 and 5. It can be observed from these three figures that the distribution of mean durability of regimes showed a convex pattern in the 1970s and 1980s, which turned into concave in the 1990s irrespective of developmental stage. Note that we consider the current level of development as constant over time, which might not be correct in absolute term as the level of development is changing. Therefore, the changing pattern of regime durability (convex to concave) might be associated with the changing pattern of development, particularly in the era of globalization. This is consistent with the findings of Hossain (2009). The estimated average durability of regimes in the 1990s provides some basis for the hollowing out hypothesis. The durability of intermediate regimes decreased to the lowest in the 1990s than those in the 1980s and 1970s.
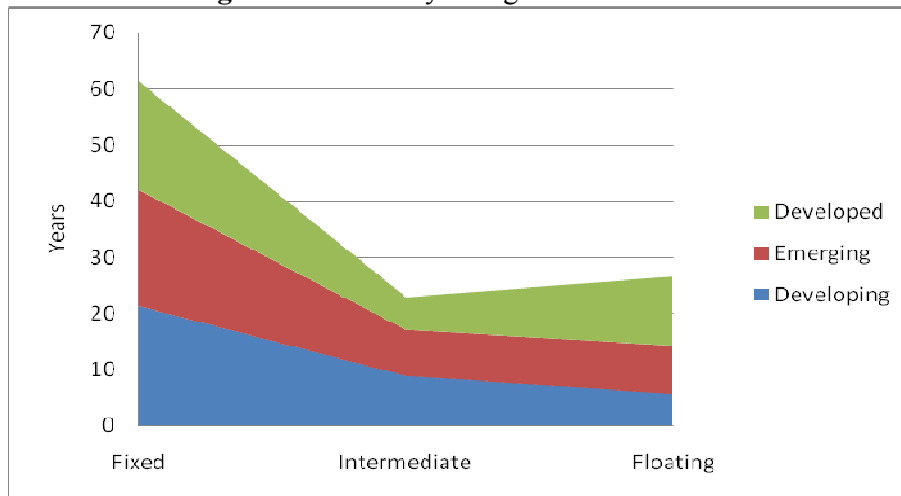
Figure 3: Durability of regimes in the 1970s
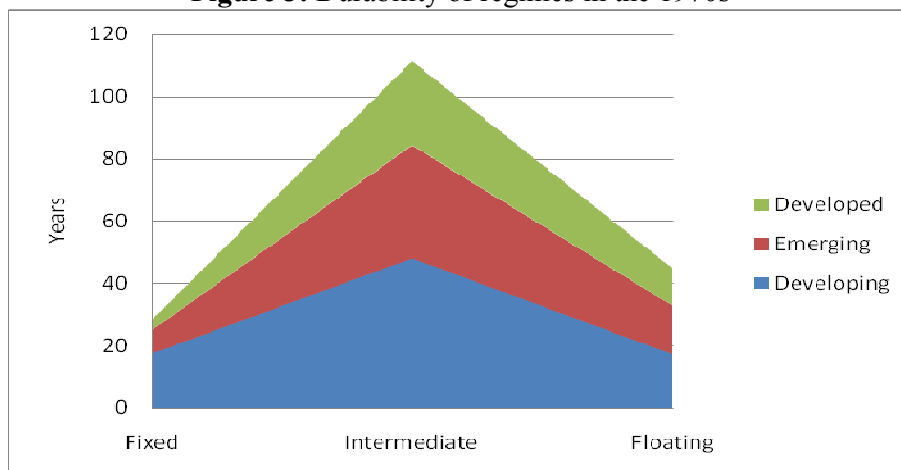
Figure 4: Durability of regimes in the 1980s
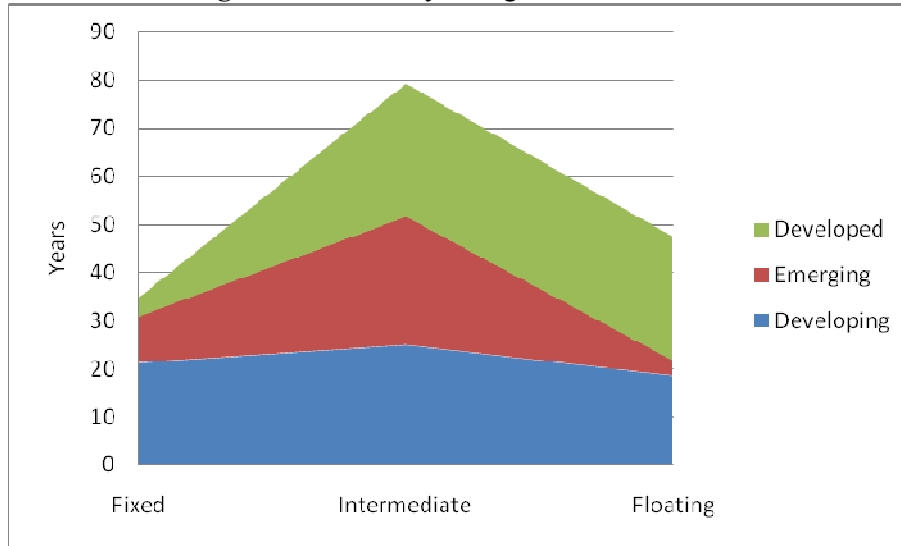
Figure 5: Durability of regimes in the 1990s

4. Conclusion

This paper provides some interesting insights into the choice of a regime by analyzing the duration of regimes by applying a sophisticated econometric technique, the multi-state Markov model. One, overall durability of regimes has decreased over time. Two, durability of intermediate regimes decreased from the highest level in the 1970s and 1980s to the lowest level in the 1990s. This provides a basis for the hollowing out hypothesis with a clear preference for the fixed regime. Finally, the changing pattern of durability of exchange rate regimes is associated with the changing pattern of developmental stage. That is, the durability of exchnage rate regime or the choice of regime might have dependency on time periods.

References:

Eichengreen, Barry. 1994. "International Monetary Arrangements for the 21st Century", *Brookings Institution,* Washington DC.

Hossain, Monzur. 2009. "Institutional Development and the Choice of Exchange Rate Regime: A Cross country Analysis", *Journal of the Japanese and International Economies,* Vol. 23, 1, March

Husain, Aasim M., Ashoka Mody and Kenneth S. Rogoff. 2005. "Exchange Rate Regime Durability and Performance in Developing Versus Advanced Economies", *Journal of Monetary Economics,* Vol. 52, 1, January.

Levy Yeyati, Eduardo and Federico Sturzenegger. 2005. Exchange Rate Regime Classifications, *Universidad Torcuato di Tella.* available via the internet at: www.utdt.edu/~fsturzen.

Masson, Paul. 2001. "Exchange Rate Regime Transitions", *Journal of Development Economics*, Vol. 64, 571-586.

Reinhart, Carmen M. and Kenneth Rogoff. 2004. "The Modern History of Exchange Rate Arrangements: A Reinterpretation", *Quarterly Journal of Economics*, Vol. 119, **1,** February.

Summers, Lawrence H. 2000. "International Financial Crises: Causes, Prevention and Cures", *American Economic Review,* Papers and Proceedings, Vol. 90, No. 2, pp. 1-16.

Appendix:

List of emerging and developed countries

Emerging Countries (31)	Developed Countries (22)
Argentina, Brazil, Bulgaria, Chile, China, Colombia, Czech Republic, Ecuador, Egypt, Greece, Hungary, India, Indonesia, Israel, Jordan, Korea, Malaysia, Mexico, Morocco, Pakistan, Panama, Peru, Philippines, Poland, Qatar, Russian Federation, Sri Lanka, South Africa, Thailand, Turkey and Venezuela	Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, United Kingdom and United States.