# Does Globalization Cause the Loss of Monetary-Policy Independence in Developing Economies? A Case Study with India

**Biru Paksha Paul**[*]

**State University of New York at Binghamton**

This paper examines whether globalization causes the loss of monetary-policy independence in developing economies. By using India as a case study we find that globalization does not necessarily cause the loss of monetary-policy independence. A country with foreign exchange constraints may lose its monetary-policy independence even in the absence of globalization under limited capital flows as long as it attempts to maintain a fixed or a stable exchange rate. This was the case in the 1960s when India controlled capital flows, maintained a fixed exchange rate, and Indian interest rates used to follow US interest rates in a significant way. In contrast, a country can exercise monetary-policy independence even under free capital flows as long as it does not maintain a stable exchange rate. Thus, monetary-policy independence is anchored in the nature of the exchange-rate regime along with the state of foreign-exchange constraint, and not necessarily in globalization per se.

[*] I am thankful to Christopher Hanes, Daniel Henderson, and Susan Wolcott for their valuable advice. My special thanks to Tim Phillips and Alan Haight. Email: *paulb@cortland.edu* Tel 607-753-4110, Fax: 607 753-5983.

## Introduction

Globalization is usually thought to be responsible for the loss of monetary-policy independence in developing economies like India, which substantially opened capital flows in the 1990s. This belief is ingrained in both theory and empirics. For example, as predicted by the Mundell-Fleming model, when the exchange rate is fixed, capital flows will equalize domestic and international interest rates, with monetary policy losing its ability to influence domestic activity.[1] Obstfeld and Taylor (2003), and Obstfeld et al (2003) have reinforced this idea in their theories of the macroeconomic policy trilemma or the impossible trinity argument. The argument ascertains the impossibility of maintaining free capital flows, a stable or a fixed exchange rate, and an independent monetary policy in a simultaneous fashion.

These arguments are again grounded in the interest rate parity. Some countries like India welcomes free capital inflows in one hand, and maintains a stable exchange rate in other hand. Consequently, the country is left with no choice but to closely track the interest rate of the leading economies, which the capital is flowing from. This situation essentially raises a question: Does globalization invariably cause the loss of monetary-policy independence in developing economies? This paper attempts to answer this question.

Capital-market liberalization has created controversies in recent years. Stiglitz (2002, 2004) shows that capital-market liberalization has often led to increased instability, not to economic growth in developing countries. Stiglitz claims that the economic crises of the late 1990s and early years of the new millennium were partly or even largely attributable to capital-market liberalization. However, Stiglitz does not directly address the debate over monetary-policy independence and capital-market liberalization. Our work can fill out the gap in this regard. Mohanty and Scatigna (2004) argue that when countries maintain capital account restrictions, central banks may retain control over monetary policy even with a fixed exchange rate. We will examine this argument by involving an empirical exercise with Indian data.

To preview, we find that globalization does not necessarily cause the loss of monetary-policy independence. A country with foreign exchange constraints may lose its monetary-policy independence even in the absence of globalization under limited capital flows as long as it attempts to maintain a fixed or a stable exchange rate. In contrast, a country can exercise monetary-policy independence even under free capital flows as long as it does not maintain a stable exchange rate. Thus, monetary-policy independence is more anchored in the very nature of the exchange-rate regime along with the state of foreign-exchange constraint, and not necessarily in globalization per se.

This paper comprises five sections. Section I defines globalization and monetary-policy independence. The theoretical approach to monetary-policy independence across different exchange-rate regimes is presented in section II. Section III describes Indian exchange-rate regimes, monetary-policy tools, evolution of capital flows, and the background of

[1] As emphasized by Mundell (1968), authorities would require policy instrument, viz fiscal policy, for maintaining internal and external balance.

globalization in India. Section IV builds hypotheses about the relationship of India's interest rates with the US counterpart based on Indian exchange-rate regimes. And section V concludes.

**Defining Globalization and Monetary-Policy Independence**

Globalization refers to the increasing worldwide integration of markets for goods, services and capital. Carnegie Endowment for International Peace defines globalization as a process of interaction and integration among the people, companies, and governments of different nations, a process driven by international trade and investment and aided by information technology[2]. To make matters simple, here we define globalization as free flows of capital across countries.

Monetary-policy independence, on the other hand, refers to a situation where the central bank or the monetary authority of a country can handle their monetary tools without any significant influence of its foreign counterpart. In a two-country model of our exercise we use the US case as the leading economy, and India as an example of a developing economy. We know that the Fed funds rate is the leading monetary instrument for the US. We take the call money rate as India's interest rate. In section III, we will explain why we take the call money rate to represent the stance of India's monetary policy.

If the Fed funds rate, and henceforth the *Fed rate* cannot explain the movements in the Indian call money rate, and henceforth the *call rate*, the Indian central bank is assumed to have exercised monetary-policy independence. In contrast, if the Fed rate can explain a significant portion of India's money call rate, we can claim that Indian authorities have substantially lost its monetary-policy independence. Now we want to present a theoretical interpretation that describes the link between monetary-policy independence and exchange-rate regimes.

**Theoretical Approach to Monetary-Policy Independence**

Here we discuss a theoretical model that describes the co-movement of the interest rate between two countries under different exchange-rate regimes of the developing economy. We assume that the rest-of-the-world (ROW) forms the leading country and thus enabling us to have a standard two-country model of capital flows. The Keynesian open economy model that incorporates capital mobility and the exchange rate is our approach in this respect. Thus, perfect or imperfect capital mobility along with a fixed or floating exchange rate creates four different cases in theory. We will mainly focus on imperfect as well as perfect capital mobility under a fixed or a stable exchange rate. To make matters simple, we assume a fixed price level for both countries. As a result, expected inflation equals zero. The equation of aggregate expenditure can be framed as:

$$\text{(i)}\quad Y = E(r, \varepsilon, Y, Y_{ROW}) + e_1, \qquad E_r < 0,\ E_\varepsilon < 0,\ 0 < E_Y < 1,\ \textit{and}\ \ E_{Y_{ROW}} > 0$$

[2] http://www.globalization101.org/What_is_Globalization.html, visited on June 11, 2007.

where $Y$ is actual output, $E$ is planned expenditure, $r$ is the interest rate, and $\varepsilon$ is the exchange rate. The amount of foreign currency required to purchase one unit of domestic currency defines the exchange rate. $e_1$ is the error term of white noise. $E_r$, $E_\varepsilon$, $E_Y$, and $E_{Y_{ROW}}$ denote the partial derivatives of $E(\bullet)$. The balance-of-payment equation as composed of capital flows, net exports, and reserve gain can be framed as below:

(ii)

$$CF(r-r^*)+NX(\varepsilon,Y,Y_{ROW})-RG+e_2=0,\quad CF'(\bullet)>0,\ NX_\varepsilon<0,\ NX_Y<0,\ NX_{Y_{ROW}}>0,\ and\ RG\geq 0$$

where $CF$ denotes capitals flows, $r$ is the domestic interest rate, $r^*$ is foreign interest rate, $NX$ means net exports, $RG$ denotes reserve gain, and $e_2$ is the error term of white noise. The simple way to model imperfect capital mobility is to assume that capital flows depend on the *interest-rate differential* (IRD) of domestic and foreign interest rates, as denoted by $r$ and $r^*$, respectively. Any domestic interest rate higher than its foreign counterpart will cause capital inflows, and vice versa. $NX_\varepsilon$, $NX_Y$, and $NX_{Y_{ROW}}$ are the partial derivatives of $NX(\bullet)$. We need to redefine capital flows as all of capital and financial flows other than the purchases and sales of foreign currency by the central bank (CB), and to define the reserve gain as the difference between the CB's purchases and sales of foreign currency. Now constraining reserve gain with non-negativity condition imposes a floor on domestic interest rate, which we denote as $\underline{r}$. The function can be stated as:

(iii) $$\underline{r}=\underline{r}(Y_{ROW},\varepsilon,r^*),\quad \underline{r}_{Y_{ROW}}>0,\ \underline{r}_\varepsilon>0,\ and\ \underline{r}_{r^*}>0$$

where $\underline{r}_{Y_{ROW}}$, $\underline{r}_{Y_{ROW}}$, and $\underline{r}_{r^*}$ are the partial derivatives of $\underline{r}$ $(\bullet)$. When the CB's desired interest rate would cause it to lose reserves, it must set an interest rate above its desired rate in order to preserve the exchange rate if the CB wants to keep it fixed. The CB is free to set a high interest rate, but it faces a limit to its ability to lower interest rates in comparison to its foreign counterpart. $\underline{r}$ is the interest rate that leads reserve gain to zero, and the CB cannot go below that. Any interest rate above that will ensure a reserve gain. However, raising interest rates is not domestically desirable. As a result, the CB has better incentives to follow the foreign interest rates. Thus, fixing exchange rates along with a non-negativity condition on reserve gain constrains monetary policy even with imperfect capital mobility.

Under perfect capital mobility and a fixed or a stable exchange rate, the domestic interest rate closely tracks its foreign counterpart in order to maintain a steady or fixed exchange rate, because the *Interest Rate Parity* suggests:

(iv) $$r - r^* = \frac{E_{t+1} - E_t}{E_t}$$

where $E_t$ is the current exchange rate, and $E_{t+1}$ is the forward exchange rate. If authorities attempt to ensure $E_t = E_{t+1}$, it implies r = $r^*$. As $r^*$ is given, the domestic interest rate must follow its foreign counterpart in a synchronized fashion. This parity is linked to the idea of the *impossible trinity proposition*, or the *macroeconomic policy trilemma* (Obstfeld and Taylor, 2003, Obstfeld et al, 2003), which ascertains the impossibility of maintaining free capital flows, a stable or fixed exchange rate, and an independent monetary policy in a simultaneous fashion.

Indeed, if capital is highly mobile, it becomes impossible to separate monetary policy and exchange rate policy (Joshi and Little, 1994). When the capital account is liberalized, the capacity of monetary policy to influence nominal interest rates for domestic purposes and resist exchange rate movements simultaneously is significantly eroded. As capital movements are freed, short-term interest rates will increasingly be determined by the covered interest parity condition, thus constraining the capacity of authorities to assign monetary and exchange rate policies to different macroeconomic objectives (Kohli 2005).

The theoretical approach lends credence to the loss of monetary-policy independence under free capital flows when the country attempts to stabilize its exchange rate. However, the theoretical approach also shows that a country even without free capital flows may lose its monetary-policy independence as long as it attempts to ensure non-negative reserve gain as well as a fixed exchange rate simultaneously. We will empirically examine the theoretical results in the next section.

## An Empirical Exercise with Indian Data

In this section we want to undertake empirical exercise with Indian data and examine monetary-policy independence across different exchange-rate regimes. Accordingly, we need to see how Indian exchange-rate regimes evolved over time, and how Indian authorities used monetary-policy tools. A picture of capital mobility is presented in this section as well. In addition, we want to preview the background of globalization in India.

*Indian Exchange-Rate Regimes:*

India underwent different exchange-rate regimes since independence. Figure 1 shows India's exchange rate on a monthly basis starting in April 1960.[3] The exchange rate is defined as the amount of the US dollar per unit of the Indian rupee. India's different exchange-rate regimes since 1960 are apparent in the figure. Post-independence India was under the Bretton Woods system where the US government undertook to convert the US dollar freely into gold. Other member countries of the International Monetary Fund (IMF) agreed to fix the parities of their currencies vis-à-vis the dollar with variation of 1% on either side of the central parity being permissible. The Indian rupee was pegged to the British sterling, which implies that it was pegged to the US dollar as well under the Bretton Woods system. While the country faced a severe inflation and balance of payments crisis in the mid 1960s, the rupee was devalued in 1966 along with some import liberalization. After the breakdown of the Bretton Woods in August 1971, the country temporarily maintained its tie with the US dollar till December 1971. Subsequently, the rupee was pegged to the pound sterling until September 1975.

After September 1975, Indian authorities moved to a policy, which was a float in essence. It was, however, politically unacceptable to call it a 'float', because float-driven devaluation was strongly unpopular in India. Indian officials rather described the regime as a 'peg to a basket of currencies with undisclosed weights'. As Joshi and Little (1994) argue, "The peg to a basket of currencies in 1975 helped to accustom the public and the

[3] We will subsequently explain the reason of starting since 1961 fiscal year (April 1960-March 1961).

politicians to frequent exchange rate changes against the intervention currency. It began to be used as a *smoke screen* behind which the exchange rate could be devalued". Indian authorities did not attempt to maintain a fixed exchange rate against any currency until 1993.

In March 1992, the authorities closed the peg to a basket of currencies and announced a dual exchange rate system that reflected a free market quote as well as an official quote of the rupee against the US dollar. Though the peg to a basket of currencies with undisclosed weights ended, ambiguity still persisted because of duality in the exchange rate. The World Bank (1997) considers this attempt an experiment by the Indian central bank, the reserve bank of India (RBI). The official rates very often differed from the market rates and created lot of inefficiency along with a corresponding black market (World Bank, 1997). This system could not last long and came to a close in February 1993.

In March 1993, the central bank approved an explicit and unified rate determined by market forces. There was, it turned out, a great deal of intervention in the market. Calvo and Reinhart (2000) found that the 'float' (of India) was extensively managed between 1993 and 1999 to achieve nominal and real exchange rate stability despite policy ostensibly meant to allow the rupee to float. Kohli (2003) asserts that the central bank endeavored to lean against the wind from 1993 to 1999. Acharya (2001), as a policymaker, admits that the exchange rate system had been managed as long as the stress from the East Asian flu lasted until December 1998.

Thus, starting in 1993, no official peg prevailed, but the authorities clearly attempted to maintain a steady and stable exchange rate against the US dollar. However, the authorities failed to achieve that stability until the Asian crisis has been over in 1998. Indian markets of money and the foreign exchange encountered a series of turbulent events between 1993 and 1997. The first problem India faced after the reform was the foreign capital surge of 1993-1994 that left appreciating pressure on the rupee. But "despite contrary advice from the IMF, India decided to build up reserves and not permit the nominal rupee-dollar parity to appreciate" (Acharya, 2001). In August 1995, there was unexpected turbulence in the foreign exchange market. To prevent panic reactions to this unfamiliar variability the RBI intervened with substantial dollar sales.

Though the foreign capital surge was over by 1996, the Asian crisis hit the market. In July 1997, the Thai baht depreciated massively and ushered in the East Asian financial crisis,[4] which had worldwide repercussions. Indian markets of money and foreign exchange were subject to repeated bouts of speculative pressure until the mid 1998. The IMF asserts the end of the Asian crisis by May 1998 (Fischer 1998). But India experienced volatility in the markets of money and the exchange rate till June 1998

[4] The currencies of the neighboring countries such as Indonesia and Malaysia went under speculative attack as well. The overvaluation of currencies, inflated asset pricing, crony capitalism, and enormous short-term foreign debts are seen as the major causes of the crisis. The experience of the Asian crisis has underlined the weakness in the international financial architecture in coping with sudden panics and massive swings in cross-border flows of capital.

(Jones 1998). In June 1998, India's exchange rate came all-time low following India's nuclear tests in May 1998. The exchange rate began to stabilize since July 1998. Figure 1 confirms that as well.

Thus, India experienced different exchange rate policies since independence. They are basically: (i) a fixed exchange rate under a well-defined peg until the mid 1970s, (ii) a floating exchange rate under a peg to a basket of currencies with undisclosed weights from the mid 1970s to the early 1990s, (iii) an unstable exchange rate under a managed peg from liberalization to the Asian crisis, and finally (iv) a stable exchange rate in the post-Asian-crisis period. Considering the implications of the exchange rate, which are important in our study, we can combine the troubled period under (iii) with the period under (ii), and form a new period where the exchange rate were by and large floating and unstable.

Now, we can broadly define Regimes 1, 2 and 3 for India. Regime 1 covers the Bretton Woods system along with the dollar peg and the sterling peg. It lasted till September 1975. Despite devaluation in 1966 and some fluctuations during the first oil shock, the Indian rupee was pegged to either the dollar or sterling in a transparent way in Regime 1. Regime 2 with floating or an unstable exchange rate ranges from October 1975 to June 1998. The remaining period from July 1998 to March 2005 forms Regime 3.

*Monetary Policy Tools of the Indian Central Bank:*

In order to examine the monetary-policy link between the leading economy and the developing country, we need to find the indicator of monetary policy in each country. For the US case, the most useful tool for the Federal Reserve Bank is the Fed funds rate, and hence the Fed rate, which is the credible indicator of the monetary-policy stance. On the other hand, it is necessary to understand some aspects of Indian financial market structure and the role of the reserve bank of India (RBI) before we decide on its monetary-policy stance.

Before independence, India developed active financial markets in short-term marketable debt, as well as commercial banks, corporate bonds and equity markets. The Bombay call money rate, and henceforth the *call rate*, was the inter-bank interest rate at which one bank could borrow money from other banks. The borrowing bank had to return the fund at the 'call' of the lending bank.

To influence financial markets and economic activity, the RBI had two classic tools of central bank policy: a rate of discount on lending to commercial banks, and open market operations (OMO). In India, the former was known as the 'Bank Rate' at which the RBI was prepared to buy or rediscount bills of exchange. In addition, the RBI widely used two types of reserve requirements: cash reserve ratio (CRR) and statutory reserve ratio (SLR). The CRR specifies the proportion of deposits that a bank must hold in cash. The SLR stipulates the proportion of the deposit that banks must invest mainly in government securities.

Until 1997, a persistent problem faced by the RBI was deficit financing of the government. The RBI had to monetize whatever deficit the government would have incurred. The central bank could not counter this with OMO's. To counteract the effect of deficit caused by high-powered money (HPM) growth the RBI made extensive use of changes in reserve requirements. In addition to these correctional tools of monetary policy, the RBI and other government agencies made extensive use of direct controls on interest rates and commercial bank lending mainly since the early 1970s following the nationalization of the commercial banks in 1969. The regulations were substantially liberalized in the second half of the 1980s, and were eliminated following the economic reform in the early 1990s.

Because of the importance of reserve requirement changes and direct controls, changes in the Bank Rate and HPM growth may not be good indicators of the stance of Indian monetary policy. Outside the whole 1980 when the call rate was controlled, changes in the call rate are perhaps the best indicator of monetary policy. The experience in India has been that the call rate has a pervasive influence on all interest rates in the country. It would not be wrong to say that the call rate is the *true benchmark* rate of interest in the Indian economy (Varma, 1997).[5] In any event, the interbank rate of interest would be of significance for the RBI, since it provides informational content of the state of liquidity and financial intermediation (Vasudevan, 1997).

*Restricted Trade and Limited Capital Mobility in India*

India allowed limited capital mobility after independence. The country escalated import controls after the foreign exchange crisis of 1957. Since then there have been periods of severe tightening (1957-62 and 1968-74) and moderate relaxation (1966-68, 1975-79, and 1982-89) depending on the state of the foreign exchange reserves (Joshi and Little, 1994). The main instrument of import control has been the import licensing system. Imports were, of course, also subject to tariffs, which in some cases were well over 100 percent. Accordingly, the effective rate of protection was around 100 percent in 1969, and 70 percent in the mid 1980s.[6] The export sector experienced a haphazard system of subsidies. The principal means of subsidization had been cash assistance, duty drawbacks, and preferential treatment for some imports. India's exports as a share of its GDP were about four percent in 1961, and it remained almost four percent even in 1986. In 2005, it has reached to thirteen percent.

Historically, the international mobility of capital has been low in India (Haque and Montiel, 1990), and this was even lower in Regime 1. Despite low volume, there were some capital flows in the form of banking capital,[7] corporate capital and foreign

[5] The RBI Bulletin historically published the call rate in 'India's leading indicators'. Conducting the indicator analysis for India, Chitre (2001) used the call rate. Other studies that used the call rate include Ansari and Gang (1999), and Kar and Sarkar (2005).

[6] As calculated by Bhagwati and Srinivasan (1975), and the World Bank (1987), respectively.

[7] Banking capital comprises foreign assets and liabilities of commercial banks. Foreign assets consist of (i) foreign currency holdings, and (ii) rupee overdrafts to non-resident banks. Foreign liabilities consist of (i) non-resident deposits, and (ii) liabilities other than non-resident deposits which comprises rupee and foreign currency liabilities to non-resident banks and official and semi-official institutions. Additionally,

investments.[8] Interest-rate differential (IRD) used to influence these capital flows. From 1959 to 1961, for example,[9] there were continuous inflows of banking capital. The inflow during 1963 took place against the background of a return to lower interest rates in the U.K., tighter market conditions for funds in India. The RBI (1963) explicitly stated, "Movements in banking capital are closely related to changes in relative interest rates in India compared to rates abroad, principally in the U.K., as also the general demand and supply condition for funds."

The RBI routinely monitored US discount rates. For example, the RBI report discussed the gradual increase in the US discount rate during the 1960s.[10] Accordingly, India's call rate rose as well. The report asserts, "The emergence of interest-rate differential (IRD) over the decade has been an important factor in the movements of short-term funds". It also revealed that the international corporations had become another circuit for short-term funds. The international enterprises looked upon foreign credits as a substitute for or a complement to the credit facilities available in the domestic markets of India. The authorities tried to attract foreign investment by advocating a higher rate of return on investment. They claimed[11] that the average rate of return in India on the US and the U.K. investment was marginally higher than that on domestic investment in the US and the U.K. All these were the driving forces that induced Indian authorities to closely maintain a stable IRD with the external rates[12] while the RBI has always been poised on foreign exchange constraints until liberalization.

Equation (ii) in our model requires the CB to care about capital flows and net exports in the face of foreign exchange constraints. The RBI authorities were cautious[13] about capital flows and net exports position while foreign-exchange shortage was a common problem at least until the early 1990s. Acharya (2001) asserts that before the 1990s 'foreign exchange shortage' was the foundation on which a rickety structure of bad economic policy was built. Joshi and Little (1994) reconfirm that the balance of payment position had been fragile ever since the foreign exchange crisis in 1957.

---

banking capital include movement in balances of foreign central banks and international institutions like IBRD, IDA, ADB, IFC, and IFAD maintained with the RBI (RBI Bulletin, October 2006, p. S931).

[8] Portraying a picture of foreign investment in India in the 1960s, the RBI governor advocated, "Getting into the Indian economy now as producers, gives foreign investors the opportunity of getting in on the ground floor in the progress of the Indian economy. Hundreds of new foreign investment and collaboration agreements have been signed in the last few years." (Bhattacharyya, 1966)

[9] RBI Bulletin, July 1963, p. 902.

[10] RBI Bulletin, August 1970, p. 1374.

[11] RBI Bulletin, May 1966, p. 510.

[12] Vuyyuri (2004) found a steady-state relationship of short-term interest rates in India with both the US and Japan.

[13]The fact that there have been no speculative capital outflows nor has the change adversely affected the competitive position of our exports in the ultimate proof that the multi-currency peg has served us reasonably well (Narasimham, RBI Bulletin 6/77:430).

Figure 2 confirms that India's foreign exchange constraint was most acute until the reform.[14] Thus, in the face of foreign exchange constraints, India cautiously monitored capital flows and net exports position. That situation, as equation (ii) suggests, induced Indian authorities to maintain a stable IRD with external interest rates.

*Background of Globalization in India*

The economic policy of India tilted to socialist bias even before its independence of 1947.[15] As a result, planned industrialization along with import substitution was the major policy tool both to save foreign exchange and increase economic independence over the longer run. The Industries Development and Regulation Act of 1951 introduced a system of licensing to control the pace and pattern of industrial development across the country, which became known as *'License Raj'*. An industrial license was mainly required to (i) establish a new factory, (ii) expand an existing capacity, (iii) start a new product line, or (iv) change location. In 1969, the Indian Prime Minister Indira Gandhi announced the nationalization of domestically owned commercial banks. The Foreign Exchange Regulation Act (FERA) was passed in 1973,[16] controlling foreign investment in India in a comprehensive manner. An array of regulatory measures was added on to an already over-regulated economy.

The expansionary policies in the first half of the 1980s combined with modest liberalization led to faster growth. The liberalizing measures of the Gandhi government from 1985 to 1990 were directed to the deregulation of industrial and trade policy. The consolidated government's fiscal deficit, which was about five percent of GDP in the mid 1970s, rose persistently to reach about ten percent of GDP at the end of the 1980s (Joshi and Little, 1994). Given the unsound macroeconomic position before the Gulf war, the mini oil shock led to a rapid deterioration of the capital account. Agarwal (2003) asserts that India faced its worst financial crisis in 1991. To contain the crisis and restore economic health, the new Congress government announced a package of policies what we frequently refer to as 'reform' or 'liberalization' of India in the early 1990s (Acharya, 2001).

[14] The adoption of the Foreign Exchange Regulation Act (FERA) 1973 reflects the background of foreign exchange constraint. India had the FERA in place in 1957 to regulate the inflow of foreign capital. After initiation of a process of rapid industrialization of the country, the need to conserve foreign currency was keenly felt. Exports were not picking up and imports were surging, putting the country into a severe balance of payments crisis. In this background the government redesigned the old act and named the new one as the FERA 1973 with the main aim of conservation of foreign exchange rather than regulation of entry of foreign capital (FERA 1973, see http://www.geocities.com/kstability/learning/forex-market/fema.html).

[15] Jawaharlal Nehru, the first Prime Minister of India, and the Congress Party's Planning Commission (1951) were strongly influenced by the democratic socialism of the British Fabians, as well as the apparent Soviet success in achieving rapid industrial growth and political power. In addition, the Great Depression of the 1930s resulted in disillusionment with capitalism. There was also a fear of 'economic imperialism' replacing political imperialism if India encouraged foreign investment and trade dependency (Rosen, 1997). See Visveswarya (1934) and Nehru (1946) for detail.

[16] A short discussion along with the background of the FERA has been presented later in section IV.

The reform mainly involved freeing of industrial investment and the trade sector. The government dismantled the *License Raj* and encouraged foreign investments. The heavy anti-export bias in the trade and payments regime was reduced by a phased reduction in tariffs. Short-term debt was reduced as well. Foreign exchange reserves were accumulated to provide greater insurance against external uncertainties. The government moved from a pro-business stance in the 1980s to a pro-market stance in the 1990s (Rodrick and Subramanian, 2004).

India approved current account convertibility in 1994 and gradually moving towards capital account convertibility. Though India initiated liberalization in the early 1990s, current account convertibility in the mid 1990s is considered to be a milestone in its liberalization process. More precisely, India entered a period of higher capital flows after the Asian crisis. Accordingly, we will refer to the post-Asian-crisis period as globalization in India.

**Hypotheses on Monetary-Policy Independence across Exchange-Rate Regimes**

Here we want to assess the nature of the interest-rate movement between two countries depending on three different exchange-rate regimes.

*Regime 1:*

Regime 1 can be characterized by imperfect capital mobility with a fixed exchange rate. We learned in section II that in the face of foreign exchange constraints India cautiously monitored capital flows and net exports position and tried to track foreign interest rate, as equation (ii) suggests. Figure 3 shows how the call rate roughly tracked the movement of the Fed Funds rate in Regime 1.[17] If we regress the call rate on the Fed Funds rate, we expect to see a significant rate co-movement in India's call rate in response to the Fed Funds rate even in the absence of globalization.

*Regime 2:*

Regime 2 can be characterized by the case of imperfect capital mobility with a floating exchange rate. In contrast to Regime 1, here the floating exchange rate does not constrain the country's monetary policy and thus the interest rate is not restrained either. Accordingly, maintaining a stable interest-rate differential between the two countries is unlikely to prevail. Figure 4 shows how the call rate and the Fed Funds rate moved in Regime 2. Visual inspection suggests a collapse in rate co-movement between the two countries.

[17] A temporary deviation in the wake of the great devaluation in 1966 was also endorsed by theory. We learned that devaluation raises net exports and the interest rate needed to maintain the exchange rate declines.

*Regime 3:*

Regime 3 falls under the reform where capital mobility has been more liberalized than ever before. We know that India approved current account convertibility in 1994. The country is gradually moving towards capital account convertibility in recent years. Accordingly, capital flows are larger than that in Regime 1 or 2, but less than perfect. The exchange rate can be assumed as fixed as it is stable by design. Indian authorities still care about reserve gain. These circumstances involve the concepts of equation (ii), interest-rate parity, and the impossible trinity argument while predicting the relation of interest rate between the US and India. Indian interest rates are likely to synchronize with those of the US in Regime 3.

Figure 5 shows that India poses a spectacularly stable interest-rate differential with the US in Regime 3. The purpose of India's stable exchange rate is to maintain foreign currency reserves at a safe level and thereby avoid any crisis in future. For example, if India raises the interest rate much higher than that of the U.S., the country will be swamped with capital inflows. A sudden surge in capital inflows will push the rupee to a higher notch, but this appreciation will harm its exports. In addition, the stronger rupee will stimulate its imports. This trend will worsen the current account balance and eventually cause another balance of payment crisis. That is why Indian authorities are more committed to maintain exchange-rate stability that requires maintaining a stable interest-rate differential as the corollary to the interest rate parity.

*Testing Hypotheses on Monetary-Policy Independence across Exchange-Rate Regimes:*

Here we intend to work with monthly data in order to test the hypotheses we developed earlier. The main reason to work with monthly data is twofold: (i) we can closely focus on different segments of the entire period with sufficient data points, and (ii) we can examine the behavior of India's interest rate across different regimes. As we want to see how Indian interest rates move in response to US interest rates, we need to collect interest rates of both countries. We collect most of our data from the official website of the RBI, and from different volumes of the 'Monthly Abstract of Statistics,' published by the Government of India. We described sources of our dataset in detail in the appendix. We start our exercise in 1961 fiscal year, because the call rate, being one of our vital series, first appeared as a weighted average figure in 1961 fiscal year on both annual and monthly basis.[18] Indian fiscal year ranges from April to March. Accordingly, our data ranges from April 1960 to March 2005. We collect the US Fed rate from the website of the St. Louis Fed Reserve.

Before we regress the call rate on the Fed rate, we need to consider other factors, which are thought to affect India's call rate. The factors that are arguably influential to the call rate include Indian monsoons, wars, and the global oil shocks. Out of them the influence of wars and oil shocks is somewhat clear, because they usually lead to higher interest rate in the money market. But the influence of monsoons on interest rate could be ambiguous.

[18] Statistical Abstract India 1962, p. 450, for annual, and Reserve Bank of India Bulletin January 1961, p. 99, for monthly figures.

It is likely that investment demand may fall causing a drop in interest rate in the wake of a bad monsoon, and vice versa. We expect to see a positive relation between monsoons and India's interest rate. The studies showing the monsoon-effect on India's agricultural growth include Mooley et al (1981), Mooley and Pant (1981), and Mooley and Parthasarathy (1982).

We indexed monsoon rainfall data[19] by assigning 100 to 853 millimeters of annual precipitation, which is thought to be the long period average (LPA) of annual rainfall in India.[20] We also took the deviation from that LPA in percentage value to derive the 'monsoon' variable. As we go by India's fiscal year, the monsoon rainfall of 1961 means the annual precipitation that took place from June to September 1960. The monsoon-dependent agricultural crops return to the peasants by January or February. We, therefore, expect to see the some effect of the monsoon in the same fiscal year, and greater effect in the following fiscal year.

Now we consider another regressor, namely 'war and Gandhi,' which includes three wars and two assassinations of Indira Gandhi and Rajiv Gandhi. India had one war with China (1962), and two wars with Pakistan (1965 and 1971). India experienced three assassinations of: (i) Mahatma Gandhi in 1948, (ii) Indira Gandhi in 1984, and (iii) Rajiv Gandhi in 1991. Our sample covers the later two incidences. Though the wars and the assassinations are not similar in effect, we combined them to make one dummy variable in order to mean war or warlike situations. Wars and warlike situations raise government spending causing an interest-rate hike in the market.

Finally, 'oil shocks' capture the major oil shocks in 1973 and 1979, which had global repercussions and raised the cost of fund. The energy crisis following the oil embargo by the oil exporting countries created supply-side shocks and inflation in all oil importing countries like India. Authorities are expected to raise interest rate in the wake of the oil shocks in order to combat inflation. Overall we expect to see a rise in the interest rate following the oil shocks.

Ansari and Gang (1999) claim that an unanticipated shock in foreign interest rates seems to have produced a positive impact on domestic interest rates in the following three months. We will test the contemporaneous effect of the Fed rate on the call rate. In order to test our hypothesis, we regress the call rate on a constant, the Fed Funds rate with lags from zero to three, the call rate with a lag of twelve,[21] 'monsoon' with a lag of twelve,[22] 'war and Gandhi', and finally 'oil shocks'. The specification becomes:

[19] The 'monsoon rainfall' data has been collected from Parthasarathy at el (1995) and the website of the Indian Institute of Tropical Meteorology (IITM) at http://www.tropmet.res.in

[20] Indian Institute of Tropical Meteorology states it on http://www.tropmet.res.in/~koli/MOL/Monsoon/Historical/air.html

[21] The monthly observation of the call rate by the RBI always mentions the call rate that existed twelve months ago, as a point of reference to see the changes on annual basis by netting out seasonality if any. Accordingly, we put a lag of twelve on call rate.

[22] We find that the lag of twelve months on 'monsoon' is an effective one in regressing the call rate on it. '*Monsoon*' is an annual rainfall figure what we have assigned against all months from June to May (monsoon year). Accordingly, any lag of twelve covers a period that can capture the rainfall effect from the last year or the year before.

(v)

$$call\_rate_t = \alpha + \beta_i\, fed\_rate_{t-i} + \theta_1 call\_rate_{t-12} + \theta_2 monsoon_{t-12} + \theta_3 war\_and\_Gandhi_t + \theta_4 oil_t + \varepsilon_t,$$
$$i = 0,1,2,or\ 3$$

*Regime 1:*

We have already assessed the implications on interest rate of India in response to the Fed rate, under three different regimes. We now begin our work with Regime 1 in order to test the implications. The estimation results following specification (v) appear in Table 1 under Regime 1 that includes Regressions 1 to 4. The four regressions clearly demonstrate that the Fed rate significantly influences the call rate. The coefficients on 'war and Gandhi', and 'oil shocks' are positive and significant as expected.

*Regime 2:*

There is no significant co-movement in India's interest rate under Regime 2. All four regressions (5 to 8 in Table 1) show that all the coefficients on the Fed rate with lags from zero to three are highly insignificant. The signs on the coefficients are awkwardly negative as well. A floating exchange rate is coupled with the loss of the interest-rate dependence in India. Simply, India is liberty to set its interest rate without being influenced by the US counterpart. The coefficients on monsoons, and war and Gandhi are positive and significant as expected, though the coefficients on oil shocks become insignificant.

*Regime 3:*

Regime 3, as we predicted before, is supposed to generate results similar to that of Regime 1. The results, as shown by the four estimations (9 to 12 in Table 1) evidence a stronger emergence of India's rate co-movement with the US. All the coefficients on the Fed rate are strongly positive and higher than those under Regime 1. The $R^2$ against all lags are as good as those in Regime 1. Thus, we claim that a stable exchange rate is contributing to the high rate co-movement of India with the US. India's monetary-policy dependence on the US is clear and robust.

**Conclusion**

This paper examines whether globalization causes the loss of monetary-policy independence in developing economies. By using Indian data in our case study we find that globalization does not necessarily cause the loss of monetary-policy independence. A country with foreign exchange constraint may lose its monetary-policy independence even in the absence of globalization under limited capital flows as long as it attempts to maintain a fixed or a stable exchange rate. This was the case in the 1960s when India controlled capital flows, maintained a fixed exchange rate, and Indian interest rates used to follow US interest rates in a significant way. In contrast, a country can exercise monetary-policy independence even under free capital flows as long as it does not maintain a stable exchange rate. Thus, monetary-policy independence is more anchored in the nature of the exchange-rate regime along with the state of foreign-exchange constraint, and not necessarily in globalization per se.

Our findings raise a number of issues. What would be a cost-benefit analysis for the loss of monetary-policy independence in the age of globalization? Can countries like India sustain a stable exchange rate by confronting greater capital inflows? What would be an optimal amount of reserve gain for a developing economy? All these aspects are left for future research.

**Figure 1: India's exchange rates over three regimes: 1961-2005**

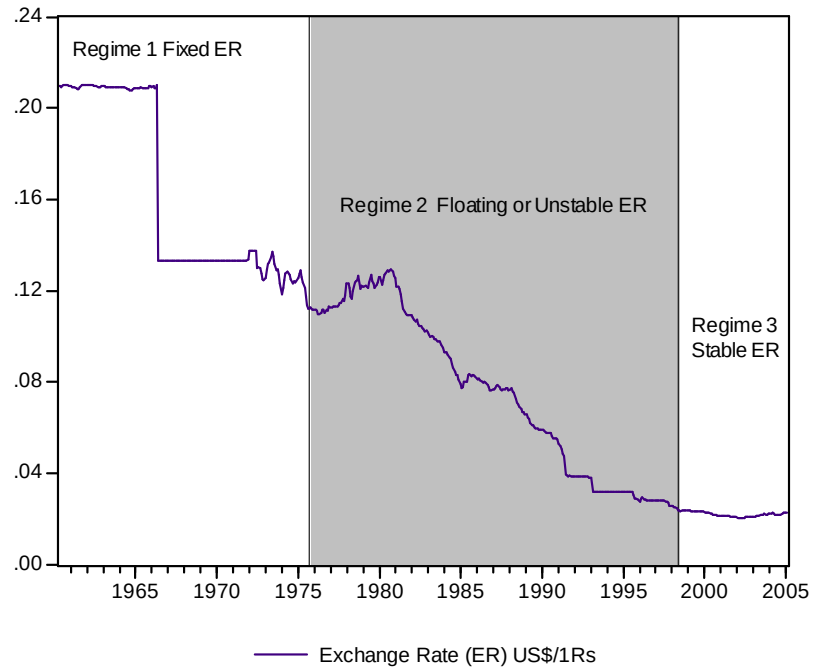


**Figure 2: India's Foreign Exchange Reserves: 1961-2005**

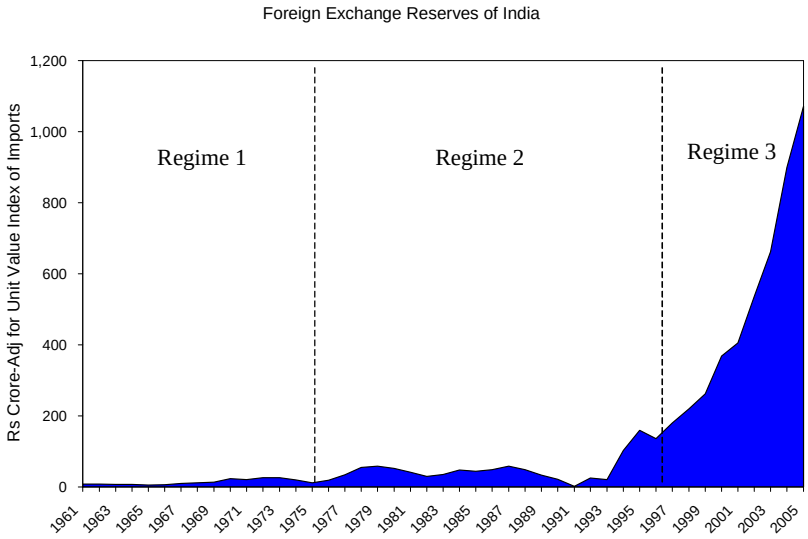

**Figure 3: India's call money rates and US Fed funds rates in Regime 1 (Apr 1960-Sep 1975)**

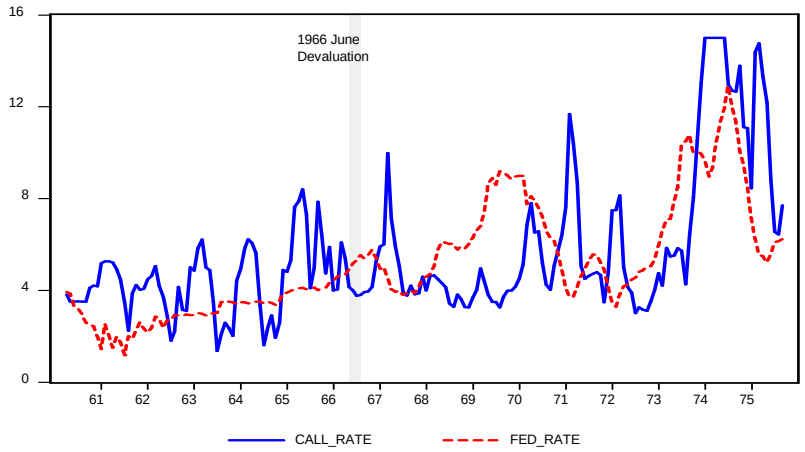


**Figure 4: India's call money rates and US Fed funds rates in Regime 2 (Oct 1975-Jun 1998)**

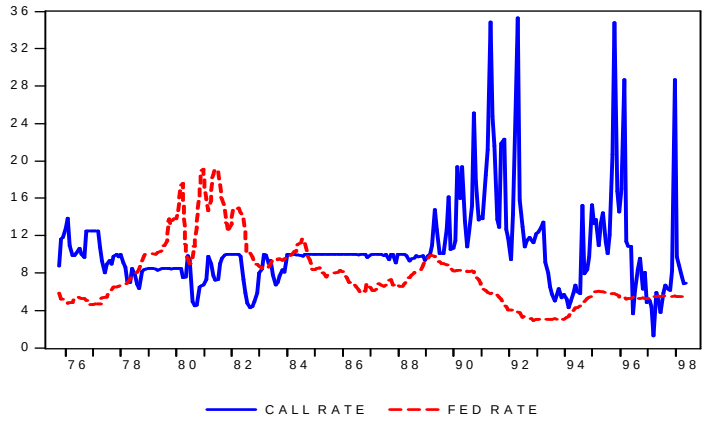


**Figure 5: India's call money rates and US Fed funds rates in Regime 3 (Jul 1998-Mar 2005)**

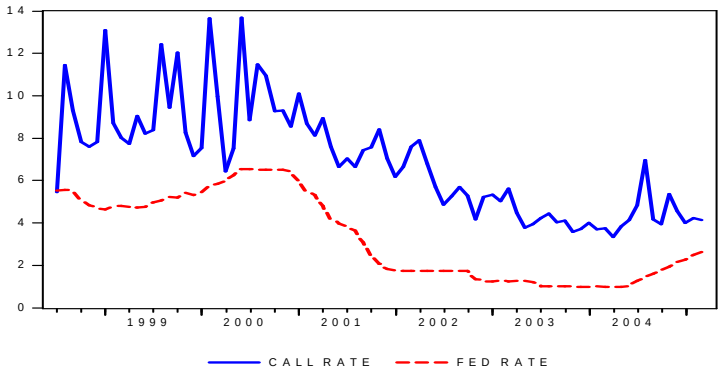

**Table 1: LHS Variable: India's Call Money Rate: In Three Different Regimes**

| *Reg. No.* | *Regimes* | *Regressors* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *Constant* | ***Fed Rate** (t)* | ***Fed Rate** (t-1)* | ***Fed Rate** (t-2)* | ***Fed Rate** (t-3)* | *Call Rate (t-12)* | *Monsoon (t-12)* | *War and Gandhi (t)* | *Oil Shocks (t)* | $R^2$ |
| **1** | **Regime 1** | 1.7998 | **0.1636** | | | | 0.5708 | -0.0008 | 0.9710 | 7.5528 | 0.71 |
| | **Apr 1960 - Sep 1975** | (1.5156) | **(0.0712)** | | | | (0.0485) | (0.0017) | (0.4217) | (0.6447) | |
| | | [0.24] | **[0.02]** | | | | [0.00] | [0.65] | [0.02] | [0.00] | |
| **2** | | 1.4428 | | **0.2166** | | | 0.5599 | -0.0006 | 1.0209 | 7.2799 | 0.72 |
| | | (1.4742) | | **(0.0694)** | | | (0.0481) | (0.0017) | (0.4168) | (0.6356) | |
| | | [0.33] | | **[0.00]** | | | [0.00] | [0.72] | [0.02] | [0.00] | |
| **3** | | 1.0759 | | | **0.2820** | | 0.5406 | -0.0004 | 1.0822 | 6.9616 | 0.73 |
| | | (1.4203) | | | **(0.0671)** | | (0.0476) | (0.0016) | (0.4080) | (0.6181) | |
| | | [0.45] | | | **[0.00]** | | [0.00] | [0.79] | [0.01] | [0.00] | |
| **4** | | 0.6827 | | | | **0.3427** | 0.5116 | -0.0001 | 1.1108 | 6.7168 | 0.74 |
| | | (1.3731) | | | | **(0.0645)** | (0.0472) | (0.0016) | (0.3964) | (0.5935) | |
| | | [0.62] | | | | **[0.00]** | [0.00] | [0.93] | [0.01] | [0.00] | |
| **5** | **Regime 2** | -3.9992 | -0.1246 | | | | 0.2906 | 0.0144 | 2.5398 | 0.8828 | 0.20 |
| | **Oct 1975 - Jun 1998** | (3.1403) | (0.0846) | | | | (0.0622) | (0.0034) | (1.3106) | (1.1266) | |
| | | [0.20] | [0.14] | | | | [0.00] | [0.00] | [0.05] | [0.43] | |
| **6** | | -4.2865 | | -0.1132 | | | 0.2940 | 0.0146 | 2.5415 | 0.7944 | 0.19 |
| | | (3.1036) | | (0.0838) | | | (0.0620) | (0.0034) | (1.3116) | (1.1178) | |
| | | [0.17] | | [0.18] | | | [0.00] | [0.00] | [0.05] | [0.48] | |
| **7** | | -4.6373 | | | -0.0856 | | 0.3022 | 0.0147 | 2.5481 | 0.6969 | 0.19 |
| | | (3.1037) | | | (0.0834) | | (0.0620) | (0.0034) | (1.3146) | (1.1157) | |
| | | [0.14] | | | [0.31] | | [0.00] | [0.00] | [0.05] | [0.53] | |
| **8** | | -4.8541 | | | | -0.0675 | 0.3075 | 0.0147 | 2.5544 | 0.6351 | 0.19 |
| | | (3.1068) | | | | (0.0831) | (0.0619) | (0.0034) | (1.3173) | (1.1134) | |
| | | [0.12] | | | | [0.42] | [0.00] | [0.00] | [0.05] | [0.57] | |
| **9** | **Regime 3** | 0.7223 | **0.8389** | | | | 0.2393 | 0.0020 | | | 0.72 |
| | **Jul 1998 - Mar 2005** | (2.2564) | **(0.1064)** | | | | (0.0511) | (0.0029) | | | |
| | | [0.75] | **[0.00]** | | | | [0.00] | [0.50] | | | |
| **10** | | -0.1659 | | **0.8079** | | | 0.2332 | 0.0032 | | | 0.72 |
| | | (2.2266) | | **(0.1049)** | | | (0.0521) | (0.0029) | | | |
| | | [0.94] | | **[0.00]** | | | [0.00] | [0.26] | | | |
| **11** | | -1.0243 | | | **0.7768** | | 0.2240 | 0.0045 | | | 0.71 |
| | | (2.2242) | | | **(0.1053)** | | (0.0539) | (0.0028) | | | |
| | | [0.65] | | | **[0.00]** | | [0.00] | [0.12] | | | |
| **12** | | -1.6710 | | | | **0.7648** | 0.2125 | 0.0054 | | | 0.71 |
| | | (2.1926) | | | | **(0.1046)** | (0.0549) | (0.0028) | | | |
| | | [0.45] | | | | **[0.00]** | [0.00] | [0.06] | | | |

Note: Standard error is inside ( ), and p-value is inside [ ] under each coefficient. The coefficients of interest are in bold when they are significant.

**References**

Acharya, S (2001): *"India's Macroeconomic Management in the 1990s"*, Leading Paper presented at seminar on September 3, 2001, "Ten Years of Economic Reform", Indian Council for Research on International Economic Relations, New Delhi, p. 1-67.

Agarwal, J.D. (2003): *"Challenges Before Indian Economy"*, Finance India, Indian Institute of Finance. vol. 17, n. 3, September, p. 861-65.

Ansari, M.I. and Gang I.N. (1999): *"Liberalization Policy: 'Fits and Starts' or Gradual Change in India"*, Comparative Economic Studies, v. 41, n. 4, Winter, p. 23-46.

Bhagwati, J and Srinivasan, T.N. (1975): *"Foreign trade Regimes and Economic Development: India"*, Columbia Press, New York.

Calvo, G and Reinhart C (2000): *"Fear of Floating"*, www.puaf.umd.edu/papers/reinhart/papers.html

Chitre, V.S. (2001): "Indicators of Business Recessions and Revivals in India: 1951-1982." Indian Economic Review; Special Issue on Analysis of Business Cycle; Vol-36, no. 1, pp. 79-105.

Dua, P, and Pandit, BL (2002): *"Interest Rates Determination in India: Domestic and External Factors"*, Journal of Policy Modeling, 24, North-Holland, p. 853-875.

Fischer, S (1998): *"Asia is on the Road to Recovery from Economic Crisis,"* Address at the International Economic Symposium organized by the IMF, reported on the Washington Post, June 3.

Fleming, JM (1962): *"Domestic Financial Policies under Fixed and Floating Exchange Rates"*, IMF Staff Papers 9 (November), p. 369-379.

Haque, N and Montiel, P (1990): *"Capital Mobility in Developing Countries: Some Empirical Tests"*, IMF Working Paper WP/90/117, Washington, D.C.

Jones, K (1998): *"The Asian Crisis and India,"* http://www.wsws.org/news/1998/jun1998/ind-j27.shtml, June 27.

Joshi, V. and Little I.M.D. (1994): *"India: Macroeconomics and Political Economy 1964 – 1991"*, Oxford University Press, Delhi, p.1-361.

Kar, R and Sarkar, N (2005): *"Testing Predictability and Nonlinear Dependence of Indian Rupee/US Dollar Exchange Rate in the Framework of Appropriate Specification"*, Indian Statistical Institute Working Paper, Kolkata, available at: http://www.isid.ac.in/~planning/rpk.pdf.

Kohli, R. (2005): *"Liberalizing Capital Flows: India's Experiences and Policy Issues"*, Oxford University Press, New Delhi, p. 1-241.

Mohanty, MS, and Scatigna, M (2004): *"Has Globalization Reduced Monetary Policy Independence?*" The Bank of International Settlement (BIS) paper no 23, p. 17-58.

Mooley, DA, Parthasarathy, B, Sontakke, NA and Munot, SA (1981): *"Annual rain-water over India, its variability and impact on the economy"*, Journal of Climatology, Vol. 1, p. 167-86.

Mooley, DA and Pant, GB (1981): *"Droughts in India over the last 200 years, their socio-economic impact and remedial measures."* In Wigley TML Ingram, MJ and Farmer, G (eds), Climate and History. Cambride: CUP.

Mooley, DA and Parthasarathy, B (1982): *"Fluctuations in deficiency of the summer monsoon over India, and their effect on economy"*, Arch. Met. Geoph. Biokl, Ser. B. 30: p, 383-98.

Mundell, RA (1968): *"International Economics"*, The Macmillan Company, New York.

Nehru, J. (1946): *"The Discovery of India,"* The John Day Company, New York, p. 403.

Obstfeld, M and Taylor, AM (2003): *"Globalization and Capital Markets"*, in M.D. Bordo, AM Taylor and JG Williamson (eds.) Globalization in Historical Perspective, Chicago University Press

Obstfeld, M; Shambaugh M and Taylor, AM (2003): *"The Trilemma in History: Tradeoff Among Exchange Rates, Monetary Policies, and Capital Mobility"*, DNB Staff Report No. 2003/94.

Planning Commission (1951): *"The First Five Year Plan,"* Government of India. New Delhi, p. 42.

RBI, The (1963): *"India's Balance of Payments: Capital Account",* The RBI Bulletin, July, p. 902

Romer, D (2006): *"Imperfect Capital Mobility: Fixed Exchange Rate",* in his book, Advanced Macroeconomics, McGraw-Hill Irwin, Boston, p. 236.

Rosen, G (1997): *"Economic Policy of India: Planned Development and the Search for Self-Reliance",* in 'The India Handbook: Prospects onto the 21st Century', ed. by C. Steven LaRue at el, Fitzroy Dearborn Publishers, Chicago, p. 62-69

Stiglitz, JE (2002): *"Capital-Market Liberalization and Exchange Rate Regimes: Risk without Reward,"* Annals of the American Academy of Political and Social Science, Vol. 579, p. 219-248

Stiglitz, JE (2004): *"Capital-Market Liberalization, Globalization, and the IMF,"* Oxford Review of Economic Policy, Spring, Vol. 20, Issue 1, p. 57-71.

Varma, J. R. (1997): *"The shochastic dynamics of the Short Term Interest Rate in India."* Indian Journal of Applied Economics, Vol. 6, No. 1, p. 47-58.

Vasudevan, A. (1997): *"Analytical Issues in Monetary Policy in Transition",* C.N. Vakil Memorial Lecture Delivered by the Executive Director, Reserve Bank of India (RBI) at the Indian Economic Association Conference, Hyderabad on December 28, RBI Bulletin January 1998. p. 45-52.

Visveswaraya, Sir, M. (1934): *"Planned Economy for India",* Bangalore Press, p. 351-353.

Vuyyuri, S. (2004): *"Linkages of Indian Interest Rates with the US and Japanese Rates",* Applied Econometrics and International Development, University of Alberta, v. 4 n. 2, April-June, p. 19-34.

World Bank, The (1997): *"India: Sustaining Rapid Economic Growth",* A World Bank Country Study, Washington D.C. p. viii.

**Data Sources**

1. Monthly Abstract of Statistics and Statistical Abstract India: Central Statistical Organisation. Dept. of Statistics, Ministry of Planning, Delhi, Apr 1961 to Dec 2005.
2. Parthasarathy, B., Munot, AA and Kothawale, DR: (1995): *"Monthly and seasonal rainfall series for All-India:1871-1994."* Indian Institute of Tropical Meteorology, RR-065, August, Pune, India.
3. Reserve Bank of India (RBI) Bulletin, Jan 1960 to Dec 2004. http://www.rbi.org.in/home.aspx
4. St. Louis Fed Reserve for US data: http://research.stlouisfed.org/fred2/categories/

Note: The econometric package we used here is *Eviews*.