

Shah, Ajay; Patnaik, Ila

**Working Paper**

## Managing capital flows: The case of India

ADB Discussion Paper, No. 98

**Provided in Cooperation with:**

Asian Development Bank Institute (ADBI), Tokyo

*Suggested Citation:* Shah, Ajay; Patnaik, Ila (2008) : Managing capital flows: The case of India, ADBI Discussion Paper, No. 98, Asian Development Bank Institute (ADBI), Tokyo

This Version is available at:

<https://hdl.handle.net/10419/53448>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



**Managing Capital Flows:  
The Case of India**

**Ajay Shah  
Ila Patnaik**

**May 2008**

**ADB Institute Discussion Paper No. 98**

The authors are senior fellows at the National Institute for Public Finance and Policy, New Delhi. They would like to thank the Centre for Monitoring Indian Economy (CMIE) for assistance with data.

The views expressed in this paper are the views of the authors and do not necessarily reflect the views or policies of ADBI, the Asian Development Bank (ADB), its Board of Directors, or the governments they represent. ADBI does not guarantee the accuracy of the data included in this paper and accepts no responsibility for any consequences of their use. Terminology used may not necessarily be consistent with ADB official terms.

ADBI's discussion papers reflect initial ideas on a topic, and are posted online for discussion. ADBI encourages readers to post their comments on the main page for each discussion paper (given in the citation below). Some discussion papers may develop into research papers or other forms of publication.

This discussion paper is part of the "Managing Capital Flows: Search for a Model" project.

Suggested citation:

Shah, Ajay and Ila Patnaik. 2008. Managing Capital Flows: The Case of India. ADBI Discussion Paper 98. Tokyo: Asian Development Bank Institute. Available: <http://www.adbi.org/discussion-paper/2008/05/21/2540.managing.capital.flows.india/>

Asian Development Bank Institute  
Kasumigaseki Building 8F  
3-2-5 Kasumigaseki, Chiyoda-ku  
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500  
Fax: +81-3-3593-5571  
URL: [www.adbi.org](http://www.adbi.org)  
E-mail: [info@adbi.org](mailto:info@adbi.org)

© 2008 Asian Development Bank Institute

## **Abstract**

From the early 1990s, India embarked on easing capital controls. Liberalization emphasized openness towards equity flows, both FDI and portfolio flows. In particular, there are few barriers in the face of portfolio equity flows. In recent years, a massive increase in the value of foreign ownership of Indian equities has come about, largely reflecting improvements in the size, liquidity and corporate governance of Indian firms. While the system of capital controls appears formidable, the de facto openness on the ground is greater than is apparent, particularly because of the substantial enlargement of the current account. These changes to capital account openness were not accompanied by commensurate monetary policy reform. The monetary policy regime has consisted essentially of a pegged exchange rate to the US dollar throughout. Increasing openness on the capital account, coupled with exchange rate pegging, has led to a substantial loss of monetary policy autonomy. The logical way forward now consists of bringing the de jure capital controls up-to-date with the de facto convertibility, and embarking on reforms of the monetary policy framework so as to shift the focus of monetary policy away from the exchange rate to domestic inflation.

**JEL Classification: F21, F34, E42**

## Contents

<b>1</b>	<b>Types and Magnitude of Capital Flows</b>	<b>2</b>
1.1	The Indian Approach to Capital Controls . . . . .	2
1.1.1	Inbound FDI . . . . .	2
1.1.2	Portfolio Flows . . . . .	4
1.1.3	Sovereign Debt . . . . .	6
1.1.4	Debt of Firms . . . . .	8
1.1.5	Capital Outflows . . . . .	8
1.2	<i>De Jure</i> Capital Controls in an International Context . . . . .	10
1.3	Evolution of Openness . . . . .	12
1.4	De Facto Openness Exceeds De Jure Openness . . . . .	14
<b>2</b>	<b>Determinants of Portfolio Flows</b>	<b>14</b>
2.1	The Evolution of Home Bias against India . . . . .	15
2.2	Time-series Evidence . . . . .	15
2.3	Explaining the Decline in Home Bias . . . . .	17
<b>3</b>	<b>Macroeconomic Impact of Capital Flows</b>	<b>19</b>
3.1	The Backdrop — a Pegged Exchange Rate . . . . .	19
3.2	Extent of Sterilization . . . . .	22
3.3	Loss of Monetary Policy Autonomy . . . . .	23
3.4	Impact on Inflation . . . . .	23
3.5	Summary: Pegged Exchange Rate Induced a Loss of Monetary Policy Autonomy . . . . .	24
<b>4</b>	<b>Appropriate Policy Responses</b>	<b>25</b>
4.1	Monetary Policy Reform . . . . .	26
4.2	Full Convertibility . . . . .	26
<b>A</b>	<b>Statistical Appendix</b>	<b>30</b>

# 1 Types and Magnitude of Capital Flows

## 1.1 The Indian Approach to Capital Controls

In the early 1990s India faced a balance of payments crisis. This crisis was followed by an IMF structural adjustment program, economic reforms and liberalization of the trade and capital accounts. Policy makers were, however, very cautious about opening up the economy to debt flows. The experience of the Balance of Payments (BOP) crises as well as the lessons learned from other developing countries suggested that debt flows, especially short term debt flows, could lead to BOP difficulties if the country faced macroeconomic imbalances and had an inflexible exchange rate. The emphasis was, therefore, on foreign investment — both foreign direct investment (FDI) and portfolio investment. Even these were opened up slowly and a system of capital controls remained in place. For a detailed treatment of the easing of capital controls in the 1990s, see Shah and Patnaik (2007a).

### 1.1.1 Inbound FDI

India opened up slowly to FDI in the 1990s. The limits on the share of foreign ownership was slowly increased in every sector. By 2000, while most sectors were open up to 100 percent, sectors where FDI was restricted include retail trading (except single brand product retailing), atomic energy, and betting. Table 1 shows the areas where FDI caps exist.

While inbound FDI investors have the ability to repatriate capital, so far, in the Indian experience, this reverse flow of capital has been tiny. As an example, in 2006–07, it was 0.01% of GDP. Hence, for all practical purposes, inbound FDI has been a one-way process of capital coming into the country.<sup>1</sup>

The easing of capital controls, coupled with strong investment opportunities in India, gave a strong rise in FDI flows into India: from 0.14% of GDP in 1992–93 to 0.53% in 1999–2000 and then to 2.34% of GDP in 2006–07. Figure 1 shows quarterly data, which suggests particularly strong growth in the recent period.

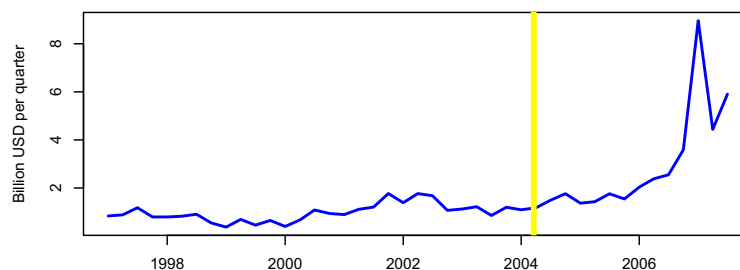
---

<sup>1</sup>There are four kinds of gross flows in the case of FDI. There are inbound flows, and repatriated capital, for FDI in India by foreigners. There are outbound flows, and then repatriated capital in the reverse direction, for outbound FDI from India. Some BOP statements for India show net FDI inflows into India as a single net number summing up these four components. In this paper, we are careful to separate out the net capital flows associated with two distinct phenomena: FDI in India and FDI by India. The latter is discussed in Section 1.1.5 as one of the mechanisms for outward capital flows.

**Table 1** Sectoral FDI Limits

Sector	Limit on foreign ownership (percent)
Areas where restrictions exist	
Airlines	49
Atomic minerals	74
Asset Reconstruction Companies	49
Banking	74
Broadcasting	20 / 26/ 49/100
Defense	26
Insurance	26
Investing companies in infrastructure	49
Petroleum refining	26
Print media	26/100
Telecom	74/100
Single brand retailing	51
Satellites establishment and operation	74
<i>All other sectors</i>	100

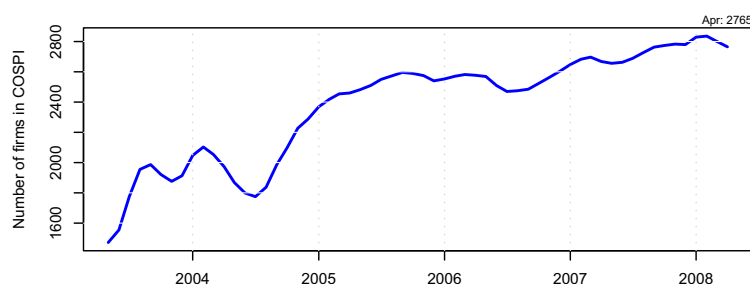
*Source: Foreign Direct Investment Policy, April 2006, Department of Industrial Policy and Promotion, Ministry of Commerce & Industry.*

**Figure 1** Inbound FDI**Table 2** Country Composition of FDI (April 2000 — August 2007)

Country	Value (Billion US\$)	Share (Percent)
Mauritius	17.4	44.7
USA	3.8	9.9
UK	3.3	8.6
Netherlands	2.2	5.7
Japan	1.8	4.6
Singapore	1.7	4.3
Germany	1.3	3.3
Total (all countries)	44.4	100

**Table 3** Sectoral composition of inbound FDI (April 2000 — August 2007)

Sector	Value (Billion US\$)	Share (Percent)
Services	8.1	20.6
Computer hardware and software	6.2	16.0
Telecom	3.5	8.7
Automobiles	1.7	8.7
Construction including roads	2.1	5.2
Electricity	1.3	3.4
Total (all industries)	44.4	100

**Figure 2** Number of firms with trading frequency > 66%

From April 2000 to August 2007, \$44 billion came into India through FDI. In terms of the country composition, the bulk of FDI into India came from Mauritius; the reason for this is that India has a preferential tax treaty with Mauritius.

Services, financial and non-financial, attracted the highest amount of FDI. Between April 2000 and August 2007, US\$8 billion, or 20.6% of all FDI flows, came into the services sector. Next was computer software and hardware which attracted 16% (8.7%), automobile industry (8.7%), construction (5.2%) and power (3.4%) came next.

### 1.1.2 Portfolio Flows

In the early 1990s, India opened up to portfolio inflows through “foreign institutional investors” (FIIs). This policy framework was largely in place by 2000. Equity investment by foreign institutional investors involves the following constraints:

- The aggregate foreign holding in a company is subject to a limit that can



be set by the shareholders of the company. This limit is, in turn, subject to “sectoral limits” which apply in certain sectors.

- No one foreign portfolio investor can own more than 10% of a company. Foreign ownership in certain sectors (telecom, insurance, banking) is capped at various levels.

Barring these constraints, portfolio investors have convertibility in the sense that they are free to bring capital in and out of the country without requiring permissions. Unlike the Chinese QFI framework, there are no quantitative restrictions or limitations on participation by global financial firms in the Indian market. More than a thousand global firms are now registered in India as “FIIs.”

In parallel, over the 1992–2001 period, a substantial policy effort took place in reforming the equity market (Thomas, 2006). As an example, Figure 2 shows the number of listed firms where trading takes place on at least two-thirds of the days of the year. By November 2007, the market value of this set of firms stood at \$1.6 trillion: this value marks a sea change when compared with the level of \$0.11 trillion found in November 1997. In recent years, the two Indian exchanges (NSE and BSE) have been ranked third and fifth in the world by number of transactions.

In many emerging markets, issuance on the ADR/GDR markets has been an important vehicle for financial globalization. In the case of India, the ADR/GDR market was significant in 1994–97 because in 1993, when FII investment into India first surged, the settlement system collapsed. Issuance on the ADR/GDR markets was seen as a way to avoid the weak institutions of the domestic stock market. However, by 1997 domestic equity market reforms had made substantial progress.

We express the flow of issuance on the GDR/ADR markets as a fraction of the stock market capitalization at the end of the year. This series showed large values averaging 1.08% over the period from 1993 to 1997. By 1997, the Indian equity market reforms had started falling into place. As a consequence, annual issuance on the GDR/ADR market dropped to 0.4% of market capitalization in the period from 1998 to 2007. In this respect, India’s experience has been different from that of many emerging markets, where deepening financial globalization has often been accompanied by a substantial scale of offshore listing.

The combination of easing capital controls, strong investment opportunities in India, and the sophistication of the domestic equity market led to sharp growth in portfolio inflows. These went from 0.11% of GDP in 1992–93 to 0.73% of GDP in 1999–00 and further to 0.84% of GDP in 2006–07.

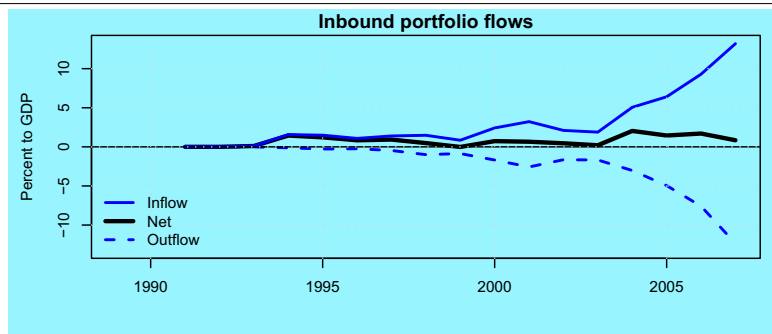
**Figure 3** Inbound Portfolio Flows

Figure 3 shows the time-series of portfolio flows, expressed as percent to GDP. Unlike FDI, a remarkable feature of portfolio flows has been substantial inbound and outbound flows, which leave a small net inflow. This reflects the *de facto* convertibility that has been granted to foreign portfolio investors on the equity market.

In 2007, the government introduced fresh capital controls against “participatory notes,” which are OTC derivatives sold by a financial firm which is a registered FII to an investor who is not registered. This was sought to be done in order to reduce capital inflows into the country that were inducing difficulties for the implementation of the pegged exchange rate. However, the economic impact of this was limited, since the capital control was only against the sale of OTC derivatives. Registration of FIIs took place at an accelerated pace, and there was no significant change in either net portfolio purchases by FIIs, or the role of FIIs in the domestic market.<sup>2</sup>

### 1.1.3 Sovereign Debt

One element of the policy framework of the early 1990s was encouragement for equity flows but barriers against debt inflows. Technically, the government of India has no sovereign debt program. Aid flows are miniscule. There is a cap on the *stock* of ownership of government bonds by FIIs which is set at a miniscule number of \$1.5 billion. Hence, as a practical matter, FII investment into rupee-denominated government bonds is zero.

<sup>2</sup>For a discussion about participatory notes, see Singh (2007). For a treatment of this episode of capital controls against participatory notes, see <http://ajayshahblog.blogspot.com/2007/10/middle-muddle.html> on the world wide web.

**Table 4** The Importance of Quasi-sovereign Borrowing

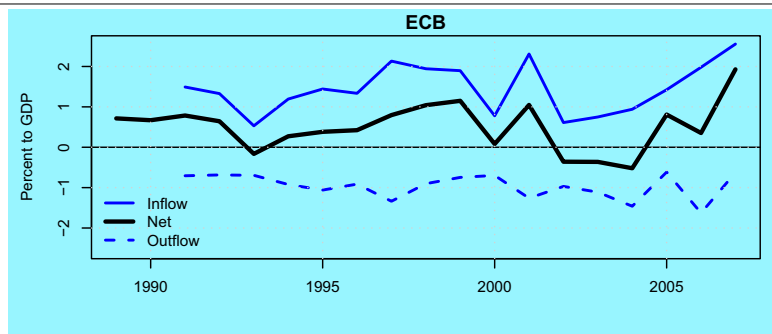
	1992	2000	2007
Stock of debt (Billion US\$)			
Sovereign debt	48.62	45.98	47.24
Quasi-sovereign debt	15.96	25.63	45.26
Private debt	20.71	26.65	62.54
Total debt	85.29	98.26	155.04
Ratios (in percent)			
Sovereign debt to GDP	20.20	11.30	6.08
Sovereign + quasi sovereign debt to GDP	26.83	17.59	11.90
Private debt to GDP	8.60	6.55	8.05
Private debt to total debt	24.28	27.12	40.34

However, from time to time, banks have borrowed abroad depending on the government's assessment of the stock of foreign exchange reserves and their adequacy. One form this has taken is borrowing in the form of bank deposits of Non-Resident Indians (NRIs) (Gordon and Gupta, 2004). The interest rates on these deposits are set by the RBI and fluctuate according to whether the government wishes to encourage or discourage inflows. Three-quarters of Indian bank deposits are with government-owned banks, which are explicitly guaranteed by the government. Even with private banks, there is an implicit liability of the State, for no significant private bank has ever been allowed to fail. The borrowing of an Indian bank is, then, visibly backed by the government.

The authorities claim that a massive reduction in offshore debt, particularly offshore sovereign debt, took place in the 1990s. By the official classification, the external debt of GOI stagnated at between \$45 billion and \$50 billion over 1998–2007. However, a more accurate rendition of the situation requires addressing a phenomenon that we term “quasi-sovereign” debt.

Table 4 shows statistics for quasi-sovereign borrowing, based on a reclassification of the detailed statistics for debt stock. While sovereign debt measured in dollars has stagnated, implying a rapid decline in sovereign debt expressed as percent to GDP (from 20% in 1992 to 6% in 2007), this decline is exaggerated by keeping quasi-sovereign debt out of this reckoning.

Until 2000, the private sector had roughly one-fourth of total debt. Between 2000 and 2007, the share of the private sector rose to roughly 40%, reflecting the liberalization of ECB. However, the economic significance of these changes is limited, for private debt to GDP in 2007 was below the level seen in 1992.

**Figure 4** External Commercial Borrowing

#### 1.1.4 Debt of Firms

Firms are allowed to borrow abroad through “External commercial Borrowing.” These include loans or bond issues abroad that are foreign currency denominated. Small transactions are processed by the government with “automatic approval,” and bigger transactions require permission. Under the present policy framework:

- External borrowing by firms must be of at least 3 years’ maturity for borrowing below \$20 million, and at least 5 years’ maturity beyond.
- Borrowing up to \$500 million by a firm for certain specified end-uses is allowed without requiring permissions.

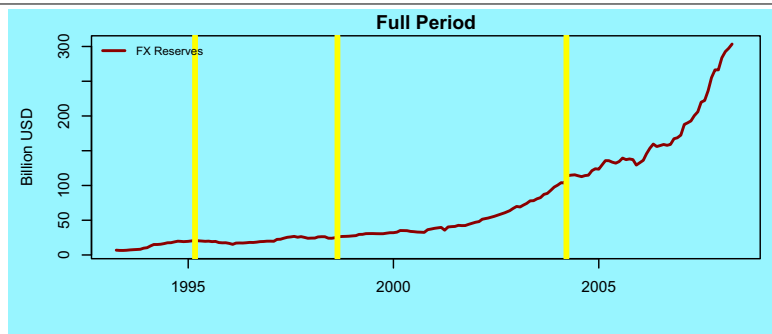
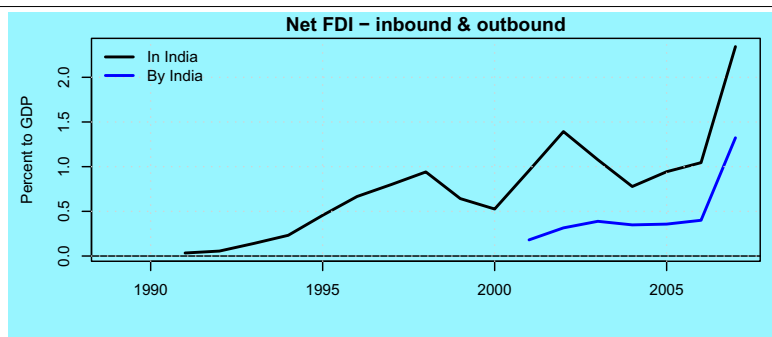
Figure 4 shows the evolution of ECB, expressed as percent of GDP. The borrowing of a given year inevitably induces repayment in the following years; the net inflows on account of ECB reflects the combination of fresh issuance of the year and repayments owing to older transactions.

Apart from ECB, foreign institutional investors can buy rupee-denominated corporate debt on the domestic market. However, there is a miniscule cap on ownership of corporate bonds by all FIIs put together at \$2.5 billion. Hence, as a practical matter, FII investment into corporate debt is non-existent.

#### 1.1.5 Capital Outflows

Outward capital flows primarily take two forms. The first and massive mechanism is the purchase of US treasury bills and other foreign assets by RBI when it builds reserves. This has seen a sharp increase in recent years as seen in Figure 5.

The other form of capital outflows that has become important in recent years is

**Figure 5** Buildup of Reserves by RBI**Figure 6** Inbound and outbound FDI

outbound FDI by Indian companies. Outbound FDI flows from India have risen sharply since 2004. India's overseas investment policy was liberalized in 1992. The rationale for opening up Indian investment overseas was to provide Indian industry access to new markets and technologies with a view to increasing their competitiveness. The policy was further liberalized in 1995. Since 2004 Indian companies have been allowed to invest in entities abroad up to 200% of their net worth in a year.

In response, thousands of Indian firms have embarked on turning themselves into multinational corporations. Overseas investment approvals have been steadily increasing since 1996. Approvals for investment abroad were at 1395 (\$2,855 million) in 2005–06 as compared to 290 approvals (\$557 million) in 1996–97. But the sharpest growth took place in 2006–07. In 2006–07, between April and October, 870 approvals were granted to Indian companies for overseas investments worth \$6,034.87 million as compared with 822 approvals worth \$1,191 million in the corresponding period of last year, a sharp jump of more than 5 times.

Figure 6 juxtaposes inbound and outbound (net) FDI flows, both expressed as

**Table 5** Sectoral Composition of Outbound FDI (April 1999 to October 2006)

Sector	Outbound FDI (Billion US\$)	Share
Manufacturing	11.1	53.4
Financial services	0.2	1.4
Non financial services	6.8	32.8
Trading	1.0	4.9
Others	1.6	7.5

percent to GDP. Outbound flows have risen sharply, to a level of over 1% of GDP a year. In 2006 the flow of outbound FDI as a percentage of gross fixed capital formation in India rose to 5gross outbound FDI rose to 1.5

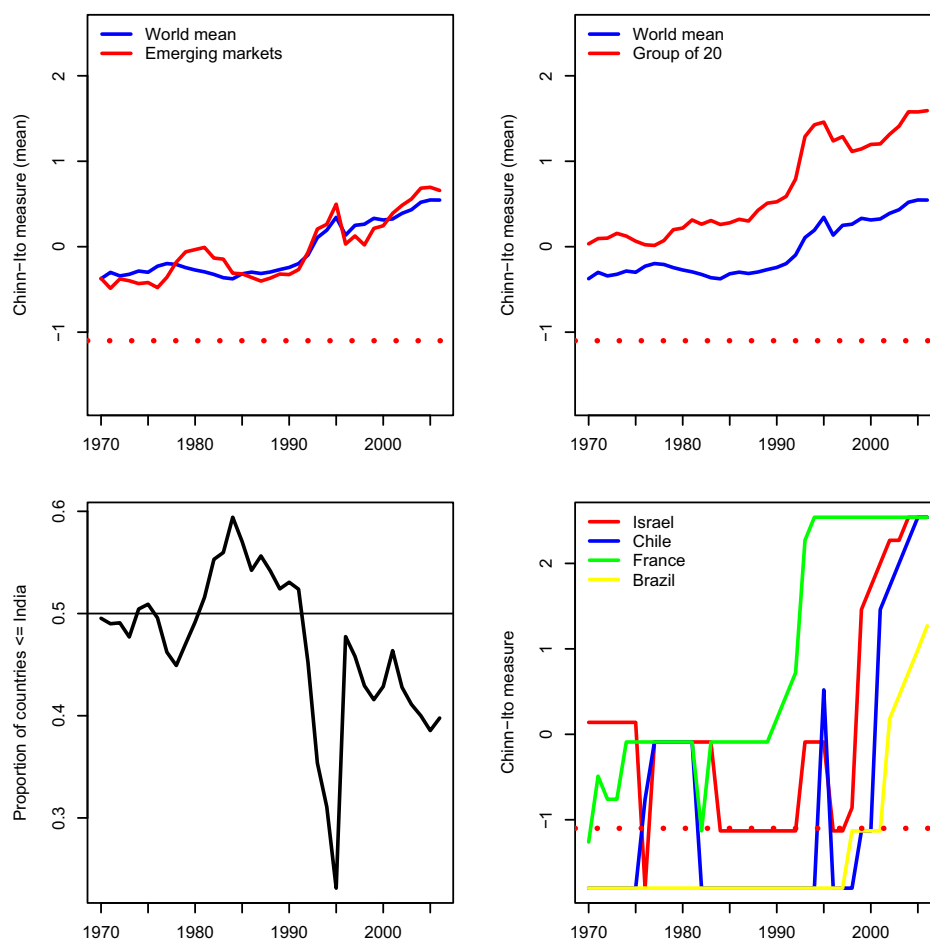
Software firms were among the first Indian firms that used overseas acquisitions as a way to better access the US market. Pharmaceutical firms were next, and they employed acquisitions to reach out to regulated overseas markets like Europe and the US. The share of the primary sector in overseas investment is still low; it consists of natural resource seeking companies such as ONGC, HPCL, BPCL and GAIL that have sought to get control over oil resources in several countries like Russia, Iran, Sudan, Angola, etc. Mining of coal and metals has also attracted investment by Indian companies. Three fourths of outbound investment from India between 2000 and 2007 went to developed countries, mainly the US and Europe.

A third front on which capital controls have been eased in recent years has been on outbound portfolio flows. There has been some response to these as various funds are now offering international diversification to the Indian customer. In addition, individuals are now permitted to take \$200,000 per person per year out of the country. However, so far, the magnitudes seen have been negligible.

## 1.2 *De Jure* Capital Controls in an International Context

India has retained strict control over the capital inflows that are permitted into the country. In the last 10 years these controls have mainly been eased, but there have been instances when they has also been tightened as in 2007 when the pressure on the currency increased.

Menzie Chinn and Hiro Ito have developed a measure of capital account openness (Chinn and Ito, 2006). This "Chinn-Ito measure" is an index of capital controls available for many countries, for many years. It is based on processing responses of countries to the IMF (the AREARs). In response to each question, the country scores 1 for saying "yes" and 0 for supplying a long paragraph which indicates that

**Figure 7** India's *De Jure* Opening, in the Context of the Chinn Ito Measure

there are controls. The Chinn-Ito measure shows the state of *de jure* convertibility. Their measure is a stringent one, where a need to obtain permission constitutes a restriction, even if the permission is "usually" or even "always" given. Their focus is on measuring the extent to which governments are trying to be involved in the capital account. Countries with a score of 2.6 have complete unquestioned capital account convertibility, where governments absolutely do not get involved in any private decisions about movement of capital.

Figure 7 shows some summary statistics from the Chinn-Ito database. India's score has been stable at -1.1 all through the period under examination.<sup>3</sup> The top

<sup>3</sup>The database released by Chinn and Ito shows a spike where India's score rose in 2000 and

**Table 6** Structure of net capital flows

	Debt	Equity	Other	Total
1993	2.99	0.25	-0.97	2.27
2000	0.89	1.24	0.35	2.47
2007	2.98	1.87	0.55	5.40

left graph shows the opening up of emerging markets (the red dotted line) juxtaposed against the world mean. The top right graph shows that members of the "Group of 20" have had a greater level and pace of opening the capital account when compared with the world mean. The bottom left graph computes the fraction of countries that are as closed as India, or worse. It suggests that in roughly 1980, India's closed capital account was roughly the median among countries in the world; by the end of this period, roughly 60% of countries were more open than India. Finally, the right hand bottom graph shows the experience of a few countries which undertook substantial reforms of capital controls: these trajectories are quite unlike those seen for India.

Comparisons for India are most interesting against large countries. Hence, we focus on the biggest 25 countries of the world by nominal GDP, the smallest of which is Austria. Among these countries, the Chinn-Ito measure takes values from -1.1 to 2.6. There are three countries at the bottom of the table — the last holdouts of nonconvertibility — with a score of -1.1: Turkey, India and People's Republic of China. Amongst these top-25 countries, the average score is 1.467 and half of them are above 2.33. Key peers to India are ahead in opening the capital account: Brazil is at 0.21, Russia is at -0.06, Mexico is at 1.23, Indonesia is at 1.23. When we go beyond these 25 countries to the full database of 180 countries, the median score is 0.18: much better than India's -1.1.

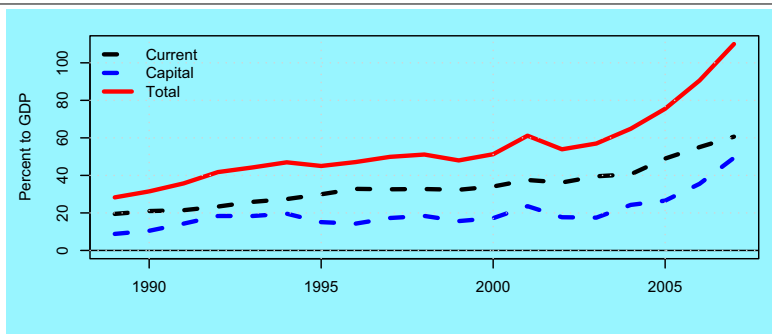
### 1.3 Evolution of Openness

Table 6 summarizes the structure of net capital flows into India, expressed as percent of GDP.

Net capital flows stagnated at roughly 2.5% of GDP from 1993 to 2000, and have since risen sharply to 5.4% of GDP by 2007. This has partly reflected a rise in equity flows, which were encouraged by policy makers, and went from 0.25% of

then dropped back to -1.1. This appears to be related to some difficulties in the data. A careful examination of India's experience with capital controls in 2000 suggests no important change took place in that year that was reversed in the next year.



**Figure 8** Integration into the World Economy, Measured Through Gross Flows**Table 7** Metrics of integration

	Current	Capital	Total
1993	25.88	18.35	44.23
2000	34.07	17.21	51.28
2007	60.63	49.38	110.01

GDP in 1993 to 1.24% of GDP in 2000 to 1.87% of GDP in 2007.

India's policy makers have believed that debt flows are dangerous, and at first, debt inflows dropped from 3% of GDP in 1993 to 0.9% of GDP in 2000. However, by 2007, debt inflows were back to 2.98% of GDP.

Table 7 and Figure 8 focus on gross flows as a metric of integration with the world economy. The familiar trade/GDP ratio sums up merchandise imports and exports, and expresses them as percent of GDP: it is used as a measure of merchandise trade integration. We sum up gross flows on the current and capital accounts, and express them as percent to GDP. This gives us three measures of integration.

All these measures show a massive increase in international integration. Gross flows on the current account rose from 25.88% in 1993 to 34.07% in 2000 and rose sharply to 60.63% in 2007. Gross flows on the capital account stagnated at roughly 18% from 1993 to 2000, but then rose sharply to 49.38% in 2007. Putting these together, the overall integration metric went from roughly 50% of GDP over the 1993–2000 period to roughly 110% of GDP in 2007, suggesting a rapid pace of globalization in the post-2000 period.

This change, of sixty percentage points of GDP in the post-2000 period, was an unprecedented one. For a comparison, total flows stagnated at roughly 20% of GDP between 1956–57 and 1986–87. The reforms of the early 1990s led to a much bigger value of 49.9% in 1996–97. This was followed by a dramatic ex-

pansion to 110% of GDP in 2006–07. This suggests a rapid and unprecedented globalization of the Indian economy (Kelkar, 2004).

## 1.4 De Facto Openness Exceeds De Jure Openness

A careful look at the system of capital controls reveals many aspects of openness that are not immediately apparent.

One element of this openness lies in remittances. A survey of banks found that roughly half of remittance flows were used for acquiring financial assets. In recent years, the correlation coefficient between the rupee–dollar interest rate differential, and remittance inflows, prove to be as high as 0.8. This emphasizes the extent to which capital account considerations shape what is apparently a current account transaction.

In terms of absolute magnitude, remittance flows have been roughly as big as net capital inflows. This suggests that if the capital inflows component of remittances were correctly measured, net capital inflows might need to be revised upwards by roughly 50%.

The other major source of openness is the *current* account. Indian and global firms with operations in India are able to move capital across the boundary through misinvoicing. A firm that is prevented from obtaining offshore debt by the system of capital controls could contract debt overseas under the name of an offshore subsidiary, and transfer-price this capital into India. Similar processes could be used for repayment. Given that gross flows on the current account are over 60% of GDP, if misinvoicing of 10% on average takes place in a single direction, this could add roughly 6% to net capital flows.

## 2 Determinants of Portfolio Flows

The most interesting element of capital flows into India that merits exploration is portfolio flows. The reason for this is two-fold. First, this was the first element where liberalization in the form of convertibility for foreign institutional investors came in, and ample data is available from a mature policy regime. Second, as Figure 3 suggests, the capital flowing in and out of the country on account of portfolio flows is large; this is the biggest single component of gross flows on the capital account.

**Table 8** Change in Home Bias Against India

	March 2001	March 2007
ICAPM weight of India	0.42	1.53
Actual weight of India	0.04	0.24
Home bias metrics		
1 - (actual/ICAPM)	0.92	0.85
ICAPM /actual	11.8	6.47

*Source:* Shah and Patnaik (2007b)

## 2.1 The Evolution of Home Bias against India

Table 8 shows that over the 2001–2007 period, home bias against India declined. The ICAPM weight for India went from being 11.8 times bigger than the actual in March 2001 to being 6.47 times bigger in March 2007. The market value of shares held by portfolio investors went up by 12.8 times over this six-year period: from \$9.67 billion to \$124.2 billion or over 10% of GDP. These stylized facts demand exploration.

## 2.2 Time-series Evidence

Monthly data on net portfolio inflows from foreign institutional investors is available in India from 1996 onwards.<sup>4</sup> A key difficulty in dealing with this data lies in finding an appropriate parametrization, for portfolio flows measured in million dollars per month were small in 1996 and have become large in 2007. In order to stabilize the distribution, we focus on the net portfolio inflow of each month expressed as percent of the broad market capitalization of that month.<sup>5</sup> At the end of 2007, broad market capitalization was \$1.6 trillion. Hence, in this parametrization, a one percentage point of broad market capitalization corresponds to a net inflow in one month of \$16 billion.

In previous work (Shah and Patnaik, 2007a), currency expectations — measured by the Covered Interest Parity deviation — have been found to be useful in explaining portfolio flows. However, the CIP deviation takes on some extreme val-

<sup>4</sup>There are two time-series which are available, the above mentioned series from RBI, and a shorter series from SEBI. The correlation coefficient between the two series is 0.866. The results in the text are based on the longer RBI time-series. These results are qualitatively similar to those obtained with the shorter data from SEBI, and are available from the authors on request.

<sup>5</sup>The CMIE Cospi index is used as the broad market index.

**Table 9** Explaining Monthly Net FII Flows

Parameter	Value	<i>t</i> statistic
Intercept	0.2837	4.26
CIP Deviation	0.0235	3.57
CIP Deviation squared	0.0017	3.58
Lagged monthly returns on Nifty:		
1 month	0.0075	3.80
2 months	0.0038	1.86
3 months	0.0047	2.36
4 months	0.0030	1.55
CMIE Cospi P/E	-0.0061	-1.86
VIX	-0.0032	-1.48

ues and there is a danger of regression results being distorted as a consequence.<sup>6</sup> Hence, robust regressions are utilized.<sup>7</sup>

Table 9 shows a model that explains net FII inflows (expressed as percent of broad market capitalization).<sup>8</sup> The key features of this model are:

- Currency expectations, measured by the CIP deviation, matter strongly. If the CIP deviation shifts from 0 to 5, this induces additional portfolio inflows of 0.03% of the broad market capitalization. This indicates that expectations of currency appreciation attract portfolio flows into India. At the end of 2007, this corresponded to \$0.5 billion in one month.
- Nifty is the main stock market index of India. Lagged Nifty returns matter with lags of 1 through 4 months. Contemporaneous nifty returns are not utilized in this regression given the potential impact of portfolio inflows on the stock market index. Since monthly Nifty returns are roughly random, it is possible to get an estimate of the total impact of a 1% shock to Nifty in a month, over the coming four months, by summing up the coefficients. This yields a rough estimate of 0.019. In other words, if Nifty returns prove to be 10% in a month, this induces additional inflows of 0.19% of the market capitalization spread over the coming four months. At the end of 2007, 0.19% of market capitalization works out to \$3 billion.

<sup>6</sup>Section 13.5.2 of Shah and Patnaik (2007a) explains the unique interpretation of the deviation from CIP in India as a measure of currency expectations. Figure 13.3 and 13.4 there suggest that there may be difficulties with influential observations when using CIP deviation in a regression.

<sup>7</sup>We use robust regression using an *M* estimator, as implemented by Venables and Ripley (2002).

<sup>8</sup>This model is an improved version of Table 13.13 of Shah and Patnaik (2007a), which pertains to a shorter time-series.

- Foreign investors are deterred by a high value of the broad market P/E, and vice versa. When the market P/E is high, foreign investors expect it to go down and therefore flows fall.
- Finally, high levels of the VIX deter portfolio flows into India. The VIX measures the market's view about future volatility reflecting what the market thinks the volatility of the S&P 500 index, the stock market index for the biggest 500 US companies, will be over the next one month.<sup>9</sup> A low level of VIX implies that returns from the global market will lie within a narrow band. When the VIX goes up, it suggests that returns on stock prices are likely to be in a much higher band, in other words, much more volatile. When the market is complacent about the future it suggests that people feel that it is unlikely that returns from investment will be low. This encourages them to invest more in risky assets. And when the VIX goes up, people are less willing to take risks. A higher level of the VIX therefore results in lower portfolio flows into an emerging economy like India.

Table 9 shows results of a robust regression. The results are not unlike those found using an ordinary OLS.<sup>10</sup>

Variables which might have been expected to have an impact on portfolio flows into India but are *not* statistically significant in this regression include: the Indian short rate, the US short rates and the spreads between the two, industrial production growth, S&P 500 returns, the US long rate, the US Baa corporate bond rate, Nifty volatility, INR/US\$ currency volatility, the US term spread and the US credit spread.

## 2.3 Explaining the Decline in Home Bias

Recent literature has examined the characteristics of firms in emerging markets which are able to internationalize their shareholding (Claessens and Schmukler, 2006). Shah and Patnaik (2007b) obtain insights through the following decomposition of  $F$ , the value of foreign ownership of shares in an emerging market. Let  $F = g(1 - p)M$ , where  $M$  is the market capitalization of the country;  $p$  is the insider shareholding and  $g$  is the fraction of outsider shareholding that is held by

<sup>9</sup>Options on the S&P 500 are traded on the Chicago Board Options Exchange (CBOE). The option prices seen on the market imply a value for the future volatility that traders must have on their mind when trading the options. This value is reverse engineered out of the observed option prices, thus giving the VIX in real time.

<sup>10</sup>Details are available from the authors on request.

foreigners.<sup>11</sup> Total differentiation yields:

$$\Delta F \approx M(1 - p)\Delta g + g(1 - p)\Delta M - gM\Delta p$$

*The first term*,  $M(1 - p)\Delta g$ , can be interpreted as the change in  $F$  associated with a change in  $g$  holding other things constant. This corresponds to traditional home bias explanations. *The second term*,  $g(1 - p)\Delta M$ , measures the rise in foreign ownership owing to a higher  $M$ , holding other sources of home bias unchanged. It reflects foreign investors preserving their ownership of  $g(1 - p)$  on a larger  $M$ , reflecting ICAPM-style reasoning while ignoring changes in world market capitalization. *The third term*,  $-gM\Delta p$ , may be termed a “Stulz effect,” reflecting the drop in foreign ownership associated with a rise in insider ownership  $p$ , while holding other things constant.

This decomposition is not an economic model explaining the dynamics of  $F$ . Rather, it represents an attempt at accounting for the changes in  $F$  and obtaining a quantitative sense of the importance of the three forces at work. Shah and Patnaik (2007b) show these calculations with Indian data. As an example, in 2005,  $F$  went up by Rs.622 billion. This change breaks down to three elements: Rs.317 billion owing to traditional explanations of home bias, Rs.501 billion owing to bigger Indian market capitalization and a *decline* of Rs.182 billion since insider *increased* their ownership share in 2005.

This focuses interest on understanding  $g$ , the fraction of outside shareholding that is held by foreigners, estimated using firm-level data. Modelling this requires a two-stage “Heckman-style” model, because there is a large clump of firms with zero foreign ownership. This implies a distinction between selectivity and propensity effects.

The key finding of Shah and Patnaik (2007b) concerns the importance of year characteristics after controlling for firm characteristics. After controlling for firm characteristics, year fixed effects on the OLS equation exhibit little year-to-year fluctuation.

This suggests that the recent surge of foreign investment into India was largely induced by modified firm characteristics, and not a change in sentiment about India as a whole. The growth of the economy, economic reforms and particularly the successful reforms of the equity market have given a transformed situation in terms of *firm characteristics*. With these modified characteristics in place by

---

<sup>11</sup> Stulz (2005) has emphasized that insider ownership limits the extent to which home bias can go down.

2007, firms were much more attractive to global investors than was the case in 2001.

### 3 Macroeconomic Impact of Capital Flows

In India, the monetary policy framework is lightly specified. The RBI Act does not clearly specify the goals of monetary policy. Institutional mechanisms for independence, transparency and accountability are not specified. RBI has generally emphasized a “multiple objectives” framework, where the goals of monetary policy are not specified, and the market does not know a monetary policy rule.

The goals of monetary policy change from time to time but are not effectively communicated to the market. Dincer and Eichengreen (2007) score the transparency of central banks. On a scale of 0 to 15, Asian central banks have been improving as a whole, scoring 5.1 in 2005, compared to 3 in 1998. The People’s Republic of China’s transparency improved to 4.5 from 1. RBI has stagnated at a score of 2 all through. RBI in 2005 lagged behind the Asian average of 1998.<sup>12</sup>

This approach towards monetary policy has come under stress in the context of a pegged exchange rate and increasing *de facto* openness. In this section, we examine the macroeconomic impact of capital flows. Our treatment runs from the pegged exchange rate regime, to currency intervention by RBI, to the extent to which sterilization is achieved, the loss of monetary policy autonomy and its impact on inflation.

#### 3.1 The Backdrop — a Pegged Exchange Rate

According to RBI, the rupee is a “market determined exchange rate,” in the sense that there is a currency market and the exchange rate is not administratively determined. India has clearly moved away from fixed exchange rates. However, RBI actively trades on the market with the goal of “containing volatility” and influencing the market price.

In India, as in most developing countries, there has been a distinction between the *de facto* and the *de jure* currency regime. In the case of India, Patnaik (2007) shows that that the INR is *de facto* pegged to the US\$. As is typical with such an

<sup>12</sup>Poirson (2008) analyzes the difficulties of transparency at RBI and offers proposals about how this can be improved.

exchange rate regime, the nominal INR/US\$ exchange rate has had low volatility, while other exchange rates with respect to the rupee have been more volatile.

While the INR currency regime has been *de facto* pegged to the US\$, the *extent* of pegging has varied significantly through this period. The exchange rate regression, popularized by Frankel and Wei (1994), involves regressions of weekly percentage changes of the exchange rate of the INR against the Swiss Franc (a numeraire) against weekly percentage changes against the same numeraire for the US dollar, pounds sterling, the euro and the Japanese yen. The residual volatility of this regression is a measure of exchange rate flexibility. A mechanism for identifying structural breaks in the exchange rate regime that is consonant with this regression is required. Zeileis *et al.* (2007) have identified the following phases of the Indian currency regime.

**Period 1: April 2, 1993 to February 17, 1995** This was the period where trading in the INR first began. For most of this period, there was strong pressure to appreciate, which was blocked by purchases of US\$ by the central bank, giving a *de facto* fixed exchange rate at Rs.31.37 per dollar.

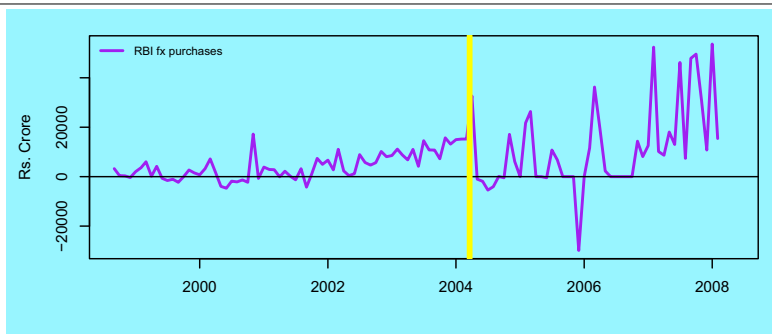
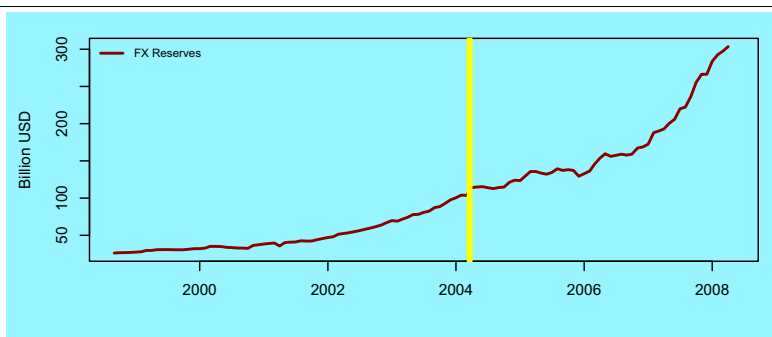
**Period 2: February 18, 1995 to August 21, 1998** In this period, which included the period of the Asian crisis, there was the highest-ever currency flexibility in India's experience. Even if the RBI made public statements about "managing volatility on the currency market," the credibility of these statements was low in the eyes of the market given the small size of foreign exchange reserves. In January 1998, an interest rate defense was employed to defend the INR: the short interest rate was raised by 200 bps.

**Period 3: August 22, 1998 to March 19, 2004** This was a period of tight pegging, with low volatility and some appreciation. A substantial reserves accumulation took place, which led to considerable distortion of monetary policy.

**Period 4: March 20, 2004 to January 31, 2008** In this period, there has been greater currency flexibility when compared with Period 3. However, currency flexibility was at lower levels when compared with Period 2. With massive reserves and a hectic pace of reserves accumulation, the risk of a large depreciation was absent.

The evolution of the currency regime reflected compulsions rooted in monetary policy and the evolution of capital controls (Patnaik, 2005). In turn, the difficulties of implementing the exchange rate regime have shaped tactical details of the evolution of capital controls. Since the evolution of the exchange rate regime is of essence in understanding capital flows and monetary policy, many graphs in this paper show a vertical yellow line at these dates of structural change of the exchange rate regime.



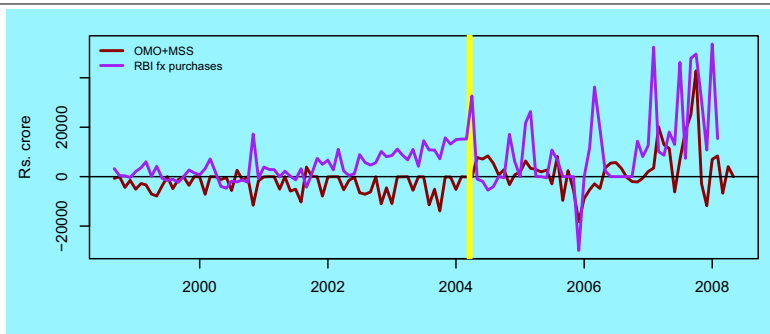
**Figure 9** Currency Trading by RBI**Figure 10** Reserves Growth

The pegged exchange rate regime has required a massive scale of trading on the currency market by the RBI. Figure 9 shows foreign currency purchases of RBI in the units of crore rupees per month.<sup>13</sup>

Figure 10 shows the time-series of foreign exchange reserves. In the early and mid-1990s, there was a motivation for building reserves in order to insure against adverse shocks. As demonstrated in Patnaik (2003), by the late 1990s, reserves were more than adequate for self-insurance, and currency purchases were primarily motivated by implementation of the pegged exchange rate. Over the 2003–2008 period, reserves were between eight to nine months of imports of goods and services, well in excess of what is considered safe. Total short-term external debt was between 10% and 15% of reserves over this period, well below what is considered dangerous.

This increase in Net Foreign Exchange Assets of the RBI would lead to a sharp increase in the monetary base. To prevent this from happening, sterilization has

<sup>13</sup>1 crore is 10 million. At an exchange rate of Rs.40 per US\$, one billion dollars is Rs.4,000 crore.

**Figure 11** Incomplete Sterilization

been attempted.

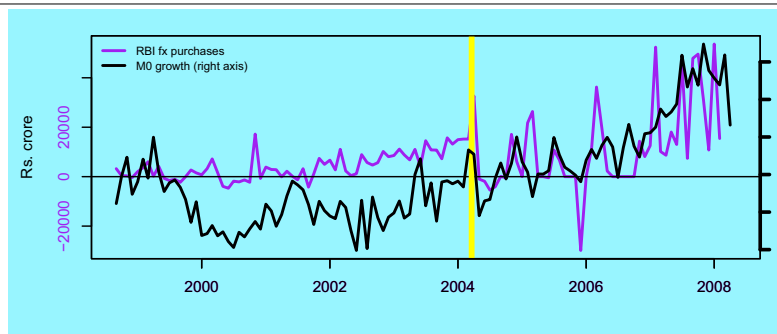
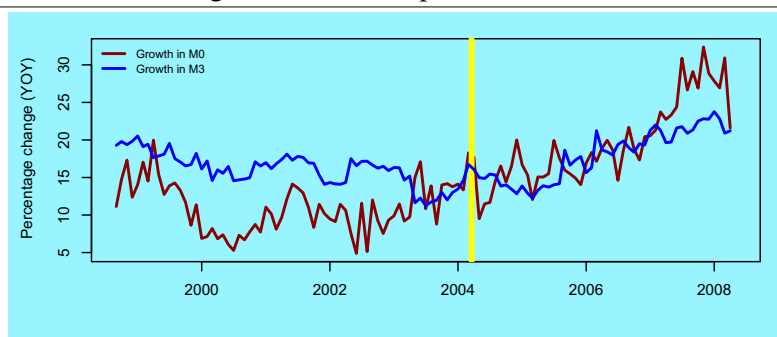
### 3.2 Extent of Sterilization

Figure 11 juxtaposes currency trading against sterilization. When sterilization was effective — as is the case from 2000 to 2004 — the two curves in the graph appear to be mirror images.

The RBI ran out of government bonds for the purpose of sterilization in late 2003. From January 2004 onwards, a new mechanism for sterilization — the Market Stabilization Scheme (MSS) — was put in place. The MSS authorizes RBI to sell bonds on behalf of the government, for the purpose of sterilization. The government would not utilize the proceeds obtained by the sale of these bonds, so as to ensure there was no impact on the monetary system. There was an initial ceiling on the MSS at Rs.0.6 trillion, which has since been raised to Rs.2.5 trillion.

A key strength of MSS lies in the fact that it makes the cost of sterilized intervention more transparent. Interest payments for MSS have risen, and these expenses face scrutiny in the budget process. This may have helped keep MSS bond issuance under check.

As Figure 11 shows, in Period 4, the two curves are generally not mirror images. This underlines the limited sterilization which has taken place. Figure 9, coupled with Figure 11, shows that it was not possible to decouple RBI's currency trading from monetary policy; the implementation of the pegged exchange rate has had implications for reserve money.

**Figure 12** Loss of Monetary Policy Autonomy: High  $M_0$  Growth**Figure 13** This is Feeding on into  $M_3$  Despite CRR Hikes

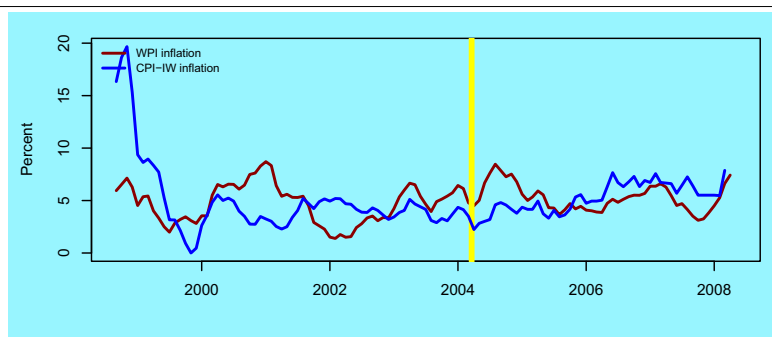
### 3.3 Loss of Monetary Policy Autonomy

Figure 12 juxtaposes the currency purchases of RBI (left scale, in rupees crore) and year-on-year reserve money growth (right scale, in percent). The incomplete sterilization that is visible in Figure 11 in the post-2004 period has led to a pronounced acceleration of reserve money growth.

One method through which high  $M_0$  growth can be confronted is to raise reserve requirements of banks. While reserve requirements have been raised in India in Period 4 — thus reversing a decade-long effort at phasing out reserve requirements which were seen as a tax on banking — they have not been able to prevent a significant acceleration in  $M_3$  growth. This is shown in Figure 13.

### 3.4 Impact on Inflation

The flip side of the coin of this atmosphere of unsterilized intervention and high money supply growth is low interest rates. As Figure 14 shows, real interest rates

**Figure 14** Expansionary Monetary Policy — Low Real Rates**Figure 15** Inflation

have been very low. Real rates in India have been low when compared with other Asian countries. With low real rates, the stance of monetary policy has been expansionary.

Figure 15 shows the experience with inflation, in response to this environment of high money supply growth and low real rates. While the Wholesale Price Index is widely watched in India, the Consumer Price Index is a better measure of inflation. It has risen after 2004, and has remained stubbornly high when compared with the aspirations of politicians and policymakers.

### 3.5 Summary: Pegged Exchange Rate Induced a Loss of Monetary Policy Autonomy

As is well understood, the pursuit of a pegged exchange rate in the context of increasing openness on the capital account is inevitably associated with the loss of monetary policy autonomy. In the Indian case, the strategies which have been

attempted for regaining monetary policy autonomy include:

**Augment mechanisms for sterilization** MSS bonds were created, to augment the capability for sterilization.

**Enhanced reserve requirements** Reserve requirements on banks were increased, so as to prevent accelerated  $M_0$  growth from spilling into higher  $M_3$  growth.

**Capital controls** RBI has advocated a significant reversal of liberalization of the capital account. However, this reversion to capital controls would hurt the interests of many participants in the democratic decision making process. In addition, the autarkic policy goals of RBI have been out of tune with the broad consensus in India about moving forward towards becoming a mature market economy that is integrated into the world economy. As a consequence, while some capital controls have been attempted, they have not been harsh enough to solve the difficulties described above.

**Currency flexibility** Episodes of currency flexibility have taken place when the implementation of the erstwhile exchange rate regime was difficult. The exchange rate regime in Period 4 has greater currency flexibility when compared with that in Period 3.

These strategies have not been adequate. The RBI has repeatedly argued that the impossible trinity is not a constraint: that it is possible to have both a pegged exchange rate and monetary policy autonomy. However, despite the use of these four mechanisms, the scale of currency trading required for implementing the pegged exchange rate regime has impacted upon monetary policy to a substantial extent.

Monetary policy in India is now acted out on a day-to-day basis in RBI's currency trading room. The pegged exchange rate regime, coupled with significant openness in the capital account, has induced a loss of monetary policy autonomy.

## 4 Appropriate Policy Responses

This paper has suggested that there is a substantial mismatch between the needs of India, a fast-growing and fast-globalizing trillion dollar economy, and the present policy framework of capital controls and monetary policy. The present policy framework, which served India well in the 1980s and 1990s, is under increasing stress. There is a significant possibility of experiencing an external sector crisis owing to the inherent contradictions of this policy framework. In addition, upholding this policy framework involves significant costs.

The appropriate strategy for policy involves two key elements: monetary policy reform and a rapid movement to convertibility.

## 4.1 Monetary Policy Reform

The most important weakness of the Indian policy environment is the monetary policy framework. The present framework, which involves a lack of specification of goals of the central bank, has come under tremendous stress owing to the combination of exchange rate pegging and increasing *de facto* openness.

There is now a strong consensus internationally about how monetary policy should function. Sound monetary policy involves attributes such as independence, transparency, predictability, rules rather than discretion, anchoring of inflationary expectations in the eyes of economic agents, and accountability. All these principles are violated in India. Monetary policy reform is required in India in order to achieve these principles (Mistry, 2007; Shah, 2008).

When monetary policy is structured in these ways, many important benefits are harnessed. Sound monetary policy stabilizes the business cycle, and is made effective by a properly functioning monetary transmission. Sound monetary policy is “speculation proof” in that the central bank completely controls the short-term interest rate but is not otherwise involved in trading on financial markets. A sound monetary policy framework stabilizes capital flows, and (in turn) is not attenuated by fluctuations of capital flows.

## 4.2 Full Convertibility

India is globalizing at a hectic rate. Gross flows in the current account and capital account stand at 110% of GDP, and have grown by 60 percentage points in a decade. Under this environment, capital controls have become increasingly ineffective.

The central planning approach that is in use with capital flows, where the government believes it knows what kinds of players and what kind of flows are best for the country, is reminiscent of the central planning that India once employed in industrial policy. However, a greater skepticism about this “industrial policy approach” to capital controls is called for. The analytical foundations of such claims are weak or non-existent, and the ingenuity of the private sector in dodging the system of capital controls is remarkable.

At this point in India's progression towards integration into the world economy, the rapid dismantling of capital controls appears to be the best strategy. The first elements where full decontrol is immediately feasible are: FDI, portfolio flows and rupee-denominated debt. In the case of FDI and portfolio flows, there is already convertibility, and all that is needed to be done is the removal of procedures and frictions. Rupee denominated debt does not involve "original sin" and should also feature in the early stages of opening up. This opening up needs to be accompanied by a monetary policy reform, a shift towards greater exchange rate flexibility, and the creation of currency derivatives markets. Once these are in place, liberalization of foreign currency debt and outflows can take place.

## References

- Chinn M, Ito H (2006). "What matters for financial development? Capital controls, institutions, and interactions." *Journal of Development Economics*, **81**(1), 163–192.
- Claessens S, Schmukler S (2006). "International financial integration through equity markets: Which firms from which countries go global?" *Technical report*, World Bank.
- Dincer NN, Eichengreen B (2007). "Central Bank Transparency: Where, Why, and with What Effects?" *Working Paper 13003*, National Bureau of Economic Research. URL <http://www.nber.org/papers/w13003>.
- Frankel J, Wei SJ (1994). "Yen bloc or dollar bloc? Exchange rate policies of the East Asian countries." In T Ito, A Krueger (eds.), "Macroeconomic linkage: Savings, exchange rates and capital flows," University of Chicago Press.
- Gordon J, Gupta P (2004). "Nonresident deposits in India: In search of return?" *Technical report*, IMF Working Paper No. 04/48.
- Kelkar V (2004). "India; On the growth turnpike." *Technical report*, Australian National University; K. R. Narayanan Memorial Lecture. URL <http://rspas.anu.edu.au/papers/narayanan/2004oration.pdf>.
- Mistry P (2007). "Making Mumbai an International Financial Centre." *Committee report*, Sage Publishing and Ministry of Finance, Government of India. URL <http://finmin.nic.in/mifc.html>.
- Patnaik I (2003). "India's policy stance on reserves and the currency." *Technical report*, ICRIER Working Paper No 108. URL <http://www.icrier.org/pdf/wp108.pdf>.
- Patnaik I (2005). "India's experience with a pegged exchange rate." In S Bery, B Bosworth, A Panagariya (eds.), "The India Policy Forum 2004," pp. 189–226. Brookings Institution Press and NCAER. URL [http://openlib.org/home/ila/PDFDOCS/Patnaik2004\\_implementation.pdf](http://openlib.org/home/ila/PDFDOCS/Patnaik2004_implementation.pdf).
- Patnaik I (2007). "India's currency regime and its consequences." *Economic and Political Weekly*. URL <http://openlib.org/home/ila/PDFDOCS/11182.pdf>.
- Poirson HK (2008). "Monetary policy communication and transparency." In "India: Selected issues," chapter 3. IMF.
- Shah A (2008). "New issues in Indian macro policy." In TN Ninan (ed.), "Business Standard India," Business Standard Books. URL [http://www.mayin.org/ajayshah/PDFDOCS/Shah2008\\_whatchanged.pdf](http://www.mayin.org/ajayshah/PDFDOCS/Shah2008_whatchanged.pdf).
- Shah A, Patnaik I (2007a). "India's experience with capital flows: The elusive quest for a sustainable current account deficit." In S Edwards (ed.), "Capital controls and capital flows in emerging economies: Policies, practices and consequences," chapter 13,



- pp. 609–643. The University of Chicago Press. URL <http://www.nber.org/papers/w11387>.
- Shah A, Patnaik I (2007b). “What makes home bias abate? The evolution of foreign ownership of Indian firms.” *Technical report*, NIPFP.
- Singh M (2007). “Use of participatory notes in Indian equity market and recent regulatory changes.” *Technical Report 07/291*, IMF. URL <http://www.imf.org/external/pubs/cat/longres.cfm?sk=21508.0>.
- Stulz RM (2005). “The limits of financial globalisation.” *Journal of Finance*, **LX**(4), 1595–1638.
- Thomas S (2006). “How the financial sector in India was reformed.” In S Narayan (ed.), “Documenting reforms: Case studies from India,” pp. 171–210. Macmillan India, New Delhi. URL [http://www.igidr.ac.in/~susan/PDFDOCS/Thomas2005\\_financialsectorreforms.pdf](http://www.igidr.ac.in/~susan/PDFDOCS/Thomas2005_financialsectorreforms.pdf).
- Venables WN, Ripley BD (2002). *Modern applied statistics with S*. Springer, 4th edition.
- Zeileis A, Shah A, Patnaik I (2007). “Exchange Rate Regime Analysis Using Structural Change Methods.” *Report 56*, Department of Statistics and Mathematics, Wirtschaftsuniversität Wien, Research Report Series. URL [http://epub.wu-wien.ac.at/dyn/openURL?id=oai:epub.wu-wien.ac.at:epub-wu-01\\_c48](http://epub.wu-wien.ac.at/dyn/openURL?id=oai:epub.wu-wien.ac.at:epub-wu-01_c48).

## **A Statistical Appendix**

**Table 10** Gross Inflows (billion US\$)

Year	Total	Debt	Banking	FDI	Portfolio	Errors
1991	25	9	10	0	0	3
1992	25	9	11	0	0	3
1993	24	9	12	0	0	1
1994	29	10	12	1	4	3
1995	26	11	7	1	4	2
1996	24	11	6	2	3	1
1997	36	18	8	3	5	3
1998	39	17	9	4	6	4
1999	34	15	9	3	3	5
2000	41	13	11	2	10	5
2001	54	24	10	4	14	3
2002	43	12	14	6	9	2
2003	46	12	19	5	9	2
2004	76	20	19	4	28	4
2005	99	30	15	6	41	7
2006	144	39	22	9	68	6
2007	232	55	37	22	110	8

**Table 11** Gross Outflows (billion US\$)

Year	Total	Debt	Banking	FDI	Portfolio	Errors
1991	16	4	9	0	0	1
1992	20	5	10	0	0	2
1993	19	8	8	0	0	1
1994	20	8	9	0	0	1
1995	19	8	7	0	1	0
1996	22	9	6	0	1	3
1997	25	13	6	0	2	3
1998	30	13	10	0	4	2
1999	26	10	8	0	3	3
2000	30	11	9	0	7	2
2001	45	19	12	1	11	3
2002	35	13	11	1	7	2
2003	36	15	9	2	8	1
2004	59	24	13	2	17	3
2005	71	19	11	2	32	6
2006	119	32	20	6	56	5
2007	186	30	35	14	103	4

**Table 12** Gross Inflows (Percent to GDP)

Year	Total	Debt	Banking	FDI	Portfolio	Errors
1991	8.47	3.25	3.48	0.04	0.00	1.07
1992	10.92	4.07	4.87	0.07	0.00	1.25
1993	10.15	3.63	5.02	0.14	0.10	0.57
1994	10.61	3.61	4.17	0.24	1.43	1.04
1995	8.02	3.38	2.17	0.42	1.36	0.68
1996	6.97	3.27	1.86	0.63	1.00	0.22
1997	9.42	4.61	2.09	0.75	1.29	0.68
1998	10.17	4.48	2.31	0.93	1.44	0.99
1999	8.29	3.58	2.16	0.61	0.78	1.12
2000	9.06	2.92	2.38	0.49	2.23	1.02
2001	12.06	5.31	2.17	0.90	3.03	0.64
2002	9.27	2.49	2.97	1.31	1.98	0.49
2003	8.98	2.24	3.67	0.99	1.71	0.36
2004	11.96	3.10	3.03	0.68	4.45	0.68
2005	13.65	4.19	2.02	0.84	5.66	0.93
2006	17.94	4.90	2.69	1.11	8.46	0.74
2007	24.14	5.69	3.87	2.30	11.39	0.80

**Table 13** Gross Outflows (Percent to GDP)

Year	Total	Debt	Banking	FDI	Portfolio	Errors
1991	5.63	1.34	3.24	0.00	0.00	0.41
1992	8.84	2.42	4.62	0.00	0.00	1.04
1993	7.98	3.46	3.42	0.00	0.00	0.59
1994	7.32	2.96	3.35	0.00	0.11	0.45
1995	5.74	2.44	2.28	0.00	0.25	0.07
1996	6.28	2.63	1.64	0.00	0.23	0.95
1997	6.55	3.36	1.51	0.00	0.43	0.75
1998	7.78	3.24	2.54	0.00	0.97	0.64
1999	6.34	2.51	1.99	0.00	0.80	0.68
2000	6.79	2.56	1.91	0.00	1.55	0.51
2001	10.10	4.13	2.61	0.18	2.42	0.57
2002	7.44	2.76	2.36	0.32	1.55	0.33
2003	6.88	2.99	1.65	0.37	1.52	0.24
2004	9.32	3.79	2.08	0.33	2.66	0.41
2005	9.77	2.68	1.48	0.32	4.37	0.84
2006	14.77	3.92	2.52	0.76	6.91	0.59
2007	19.38	3.14	3.67	1.50	10.66	0.39