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# Why India Choked when Lehman Broke

## Introduction

*De jure* measures of capital account liberalization suggest that India's capital account is quite closed. *De facto* integration has risen sharply in recent years, but India still remains fairly closed. The rapid transmission of the impact of the Lehman bankruptcy into Indian financial markets was consequently unexpected. In this paper, we propose an explanation involving the treasury operations of Indian multinationals (MNCs). These MNCs are less subject to the capital controls imposed on Indian companies.

The developments in Indian financial markets in September and October following the death of Lehman Brothers in New York on September 14, 2008 were quite unprecedented. First, there was the sudden change in conditions in the money market. Call money rates shot up immediately after September 15. Despite swift action by the Reserve Bank of India (RBI), the tightness persisted through the month of October. The operating procedure of monetary policy broke down in unprecedented fashion. Rates were persistently above RBI's policy rate corridor. The call rate consistently breached the ceiling of the repo rate, of 9 percent, and attained values beyond 15 percent. There was a huge amount of borrowing from RBI. On some days, RBI lent an unprecedented Rs 90,000 crores through repos.

These events are surprising given the apparent scale of India's *de jure* capital controls. Our understanding of crisis transmission, the effectiveness of capital controls, and India's *de facto* openness would be enhanced by carefully investigating this episode and identifying explanations.

The main hypothesis of this paper is that many Indian firms (financial and non-financial) had been using the global money market before the crisis, avoiding India's capital controls by locating global money market operations

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in offshore subsidiaries. When the global money market collapsed after the failure of Lehman, these firms were suddenly short of dollar liquidity. They borrowed in the rupee money market, converted rupees to US\$, to meet obligations abroad.

This led to pressure on the currency market. The rupee depreciated sharply. RBI attempted to reduce rupee depreciation by selling dollars. It sold \$18.6 billion in the foreign exchange market in October alone. Ordinarily, we may have expected depreciation of the exchange rate on both the spot and the forward markets. However, instead of the forward premium going up when there was pressure on the rupee to depreciate, or remaining the same, it crashed sharply. Our hypothesis is that some Indian MNCs, who were taking dollars out of India, planned to bring the money back to India in a few weeks. To lock in the price at which they would bring money back after a month, they sold dollars forward. The one month forward premium fell sharply into negative territory.

Balance of payments (BOP) data shows outbound foreign direct investment (FDI) was the largest element of outflows in the “sudden stop” of capital flows to India of the last quarter of 2008. This supports this hypothesis. This was not a time when there was significant merger and acquisitions activity going on owing to the banking and money market crisis around the world. The explanation for the large FDI outflow when financial market conditions in India and the world were among the worst in many decades could lie in the offshore money market operations of Indian MNCs.

Finally, we analyze stock market data, and find that Indian MNCs were more exposed to conditions in international money markets as compared with non-MNCs.

The contribution of this paper lies in showing that Indian MNCs are now an important channel through which India is financially integrated into the world economy. This raises questions about the effectiveness of India’s capital controls which inhibit short-dated borrowing by firms. This restriction appears to be sidestepped to a substantial extent by Indian MNCs. This evidence fits into the larger understanding about the gap between India’s highly restrictive *de jure* capital controls but yet substantial *de facto* openness.

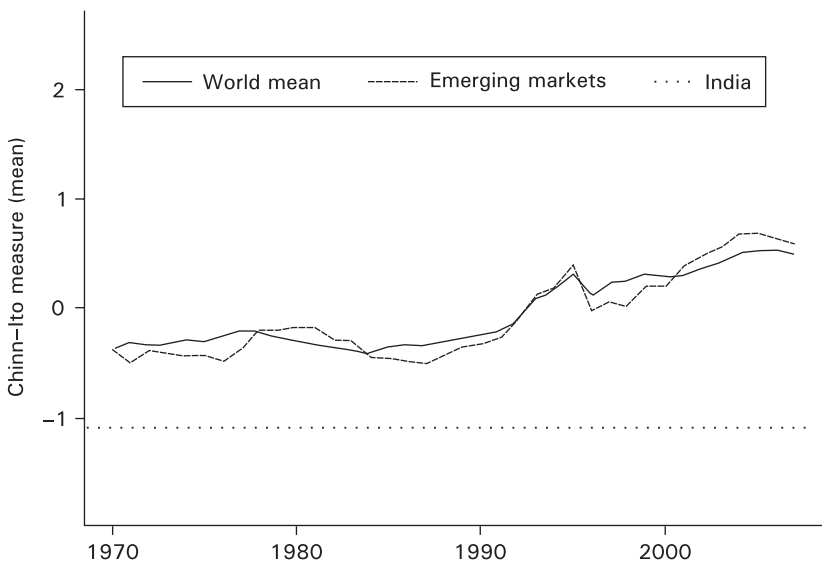
## **What Happened in India when Lehman Broke**

### *India’s Capital Account Liberalization*

The extent of capital account integration is usefully examined in terms of the apparent rules in place (*de jure* integration) as opposed to the effective ground reality (*de facto* integration).

One important database with cross-country evidence about *de jure* capital controls has been created by Chinn and Ito (2008). Figure 1 shows the time-series of the Chinn–Ito measure from 1970 till 2007 for India, for the world average and the emerging markets average. The Indian value of the score has been at  $-1.1$  all through, which highlights the limited progress that India has made in terms of removing *de jure* capital controls. The world mean went up from  $-0.38$  in 1970 to  $0.495$  in 2007. The average for emerging markets went up from  $-0.375$  in 1970 to  $0.59$  in 2007. Thus, regardless of whether India is compared against the world average or emerging markets, in both 1970 and 2007, its capital account has been significantly more closed, *de jure*.<sup>1</sup>

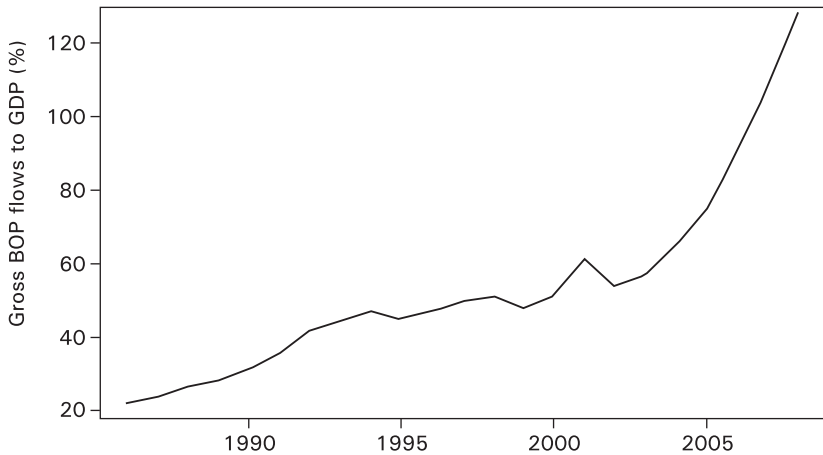
**FIGURE 1. *De Jure* Capital Controls**



Source: Chinn and Ito (2008).

In terms of *de facto* measures, there are two important approaches to measurement. The first involves a simple examination of the gross flows on the balance of payments, expressed as percent of GDP. This extends the intuition of the trade/GDP ratio. Figure 2 shows that gross flows have risen

1. The measurement of intensity of capital controls is itself a field where standard methodologies have not yet been fully established. Another measurement effort, Edwards (2007), finds that Indian *de jure* capital controls have eased significantly in the recent decade.

**FIGURE 2. Gross Flows to GDP**

Source: *Business Beacon*, CMIE.

dramatically in recent decades, growing from roughly 20 percent to roughly 125 percent. Of particular interest is the doubling which took place in the period after 2002, which suggests an accelerated pace of capital account integration in these years.

The second strategy for measuring *de facto* integration lies in arriving at estimates of the *stock* of external assets and liabilities, as has been done by Lane and Milesi-Ferretti (2007). Their database shows that India has been rapidly opening up. At the same time, as Prasad (2009) notes, on a cross-country comparison and relative to its size, India appears to have been one of the least financially open economies in the world.

## The Events of September 2008

When the global financial crisis erupted, at first it was believed that India would experience little turbulence, given a relatively closed economy and domestic financial system. The events went against these expectations (Aziz et al., 2008). Table 1 juxtaposes three time-series, observed at a daily frequency. The “TED Spread” measures financial distress in London.<sup>2</sup>

2. This is the spread between the three-month US\$ LIBOR and the 90 day US treasury bill (UST). This measures the extent to which financial firms mistrust each other. Under normal circumstances, this is near zero.

**TABLE 1. Turmoil in the Money Market: From London to India**

<i>Date</i>	<i>TED spread</i>	<i>Call money rate</i>	<i>RBI repo (Rs crore)</i>
(Monday) 8 September	1.13	8.83	1,025
09/September	1.19	8.3	3,025
10/September	1.2	8.94	12,985
11/September	1.24	8.88	15,195
12/September	1.36	6.15	14,400
(Monday) 15 September	1.79	9.84	51,815
16/September	2.04	10.59	57,565
17/September	3.03	13.07	59,480

Source: Author's calculations based on data in Datastream and *Business Beacon*, CMIE.

This is compared against two measures of money market tightness in India: the call money interest rate and the quantity borrowed from RBI by the banking system.

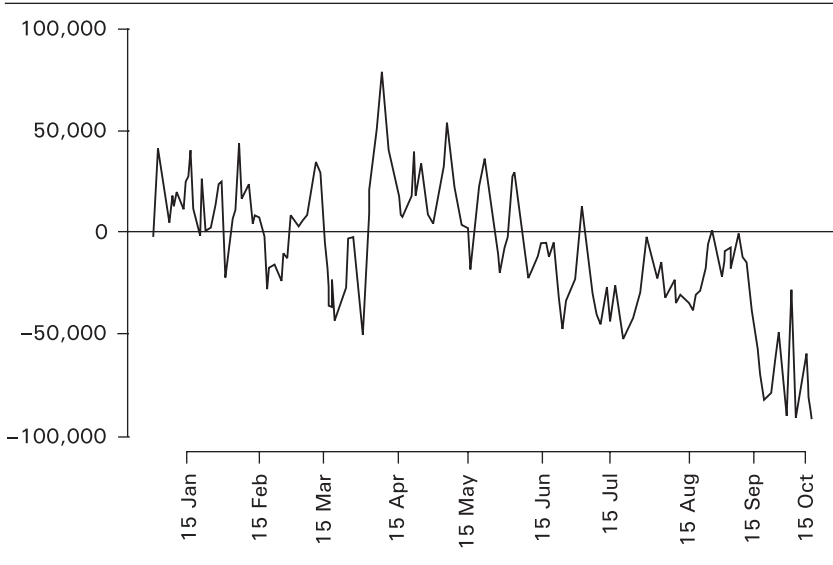
The last pre-crisis day was September 12, 2008, which was a Friday. On this day, the call money rate was 6.15 percent and the banking system had borrowed Rs 14,400 crores from RBI. Over the weekend, Lehman Brothers filed for bankruptcy. On Monday, the money market in Bombay opened in turmoil, even though this opens 5.5 hours before the money market in London. By September 17 (Wednesday), the quantity borrowed by banks from RBI had jumped to Rs 59,400 crores. The call money rate had risen to 13.07 percent.

Some of the Indian money market tightening was caused by the advance tax payment of September 15 and the unfortunate timing of a government-bond auction. However, tightness in liquidity owing to such events typically subsides rapidly. In this episode, money market tightness did not subside rapidly. On October 7, the call rate closed at over 16 percent. In a similar vein, the RBI repo operations surged from Rs 1,025 crores on September 8 to Rs 57,565 crores on September 16 and then to Rs 90,000 crores on September 29.

Figure 3 shows the status of RBI's "liquidity adjustment facility" (LAF) operations. The numerical values seen here are an inadequate depiction of the liquidity squeeze, since access to borrowing from RBI is restricted to a few financial firms and requires certain kinds of collateral. A lot more borrowing would have taken place if the rules would have permitted it. A better picture of liquidity conditions is obtained from observing interest rates.

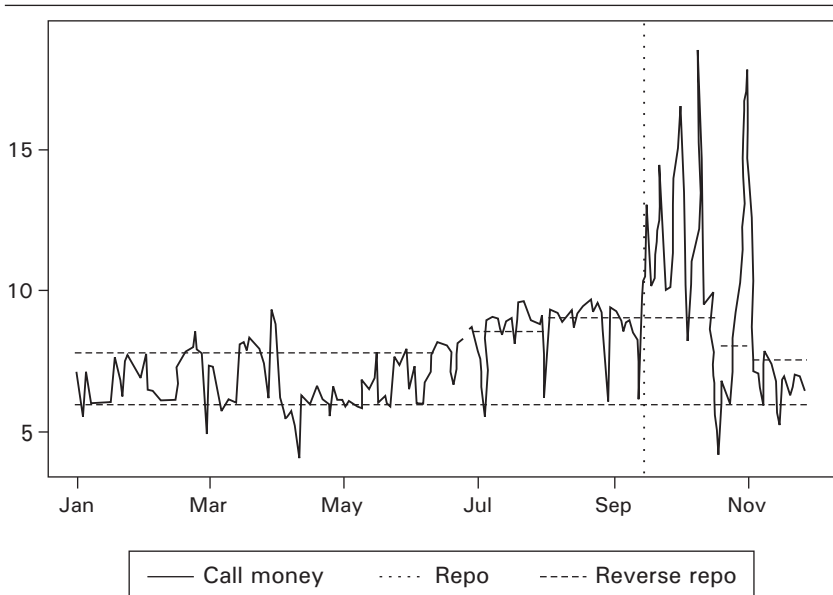
Figure 4 shows the time-series of the call money rate juxtaposed against the "corridor" defined by RBI's repo and reverse repo rates. For a while, the call money rate was closer to the top of the corridor. In the weeks following the Lehman bankruptcy, the call money rate consistently breached the ceiling

**FIGURE 3. Outstanding Position of RBI LAF Operations (Rs Crore)**



Source: *Business Beacon*, CMIE.

**FIGURE 4. The Call Money Rate vs. RBI's "Corridor"**



Source: *Business Beacon*, CMIE.

of 9 percent, often attaining values of above 15 percent. The operating procedure of monetary policy broke down in unprecedented fashion.

## The Question

Indian capital controls are a maze of rules, restrictions, quantitative controls, and outright bans. For instance, restrictions on external commercial borrowing prevent firms from borrowing short term (less than 3 years) in international money markets or to utilize the money borrowed for uses other than those specified such as capital goods imports and infrastructure. The total borrowing by India has a cap and every firm needs approval from RBI for such borrowing. India is one of the more closed economies in the world in terms of *de jure* controls. On the weekend of September 13/14, 2008, there was a near-universal consensus in India that the turmoil in global markets caused by the failure of Lehman Brothers was not going to affect India. Yet, in the week starting September 15, the Indian money market fell into turmoil. These events merit an exploration.

These events suggest a gap between *de jure* controls and the extent to which they bind. The international evidence suggests that over time, and particularly when given a sophisticated financial system, capital controls lose effectiveness as economic agents learn ways to get around these controls. This motivates the question: What were the aspects of the capital account which enabled substantial *de facto* integration despite the burden of *de jure* controls? In this paper, we argue that the new phenomenon of Indian MNCs is important to understanding these events.

## A Proposed Explanation: Offshore Operations of Indian MNCs

Our main argument involves the global treasuries of Indian MNCs.

The domestic operations of all Indian firms—MNCs and others—are subject to the same regime of capital controls concerning offshore borrowing. It is reasonable to expect MNCs to be no more effective at obtaining foreign borrowing, when compared with non-MNCs. However, MNCs are able to borrow in their overseas subsidiaries in a way that domestic firms cannot. In an environment where RBI enforced quantitative restrictions upon overseas access to debt capital for firms operating in India, MNCs could have done borrowing in their offshore subsidiaries.

When the global money market became illiquid on September 13/14, these firms were faced with dollar shortages associated with liabilities which could not be rolled over. It would be efficient for these firms to respond to this situation by borrowing in rupees in India, moving this money abroad, and thus discharging their dollar liabilities.

If this explanation is on track, then it has significant implications for the extent to which India will be able to maintain meaningful capital controls in the face of the rise of Indian MNCs. It is hence interesting to investigate this hypothesis further.

Information from within Indian MNCs which would directly resolve this question is not available. Hence, in this paper, we focus on three predictions that follow from this proposed explanation.

### *Prediction about the Currency Market*

Some of the MNCs taking capital out of the country in the week of September 15 would be anticipating the return of this money into India in the future. They could choose to hedge their currency risk by locking in the INR/US\$ exchange rate at which the capital would come back at a future date. The Indian currency derivatives market is fairly illiquid and inefficient; shocks to the order flow influence prices. Hence, if significant capital left the country in meeting short-term money market obligations, and if many firms chose to hedge the return of this capital into India at a future date, then an unusual decline in the INR/US\$ forward premium would be observed.

### *Prediction about Quarterly BOP Data*

Late 2008 was a difficult period in the Indian economy and the world economy. Ordinarily, outward FDI flows would be muted in this period. However, if Indian MNCs wanted to take money out of the country in order to meet obligations on the money market abroad, one path which they could use is RBI rules about outbound FDI. Hence, we would expect to see an unusual upsurge in outbound FDI in that quarter.

### *Prediction about Stock Market Price Fluctuations*

Offshore borrowing by Indian firms is constrained by capital controls. If Indian MNCs were evading these controls by borrowing through offshore subsidiaries, then their stock prices should be significantly exposed to fluctuations of the offshore credit spread relevant for emerging market corporations.



## The Rise of Indian MNCs

In recent years, there has been an upsurge of outward FDI from India (Demirbas et al., 2009; Pradhan, 2004). Hundreds of large Indian firms are now MNCs, and the most outwardly oriented of these increasingly have over 50 percent of their assets outside the country.

The literature on capital account openness or cross-border flows has focussed on portfolio, debt or FDI flows rather than on the internal flows and treasury operations of MNCs. However, there is a literature on how MNCs organise themselves, which suggests that MNCs make decisions about utilizing financial markets in different countries based on costs of financing. As an example, Desai et al. (2004) examine the ways in which firms use internal capital markets opportunistically to complement external financing opportunities when external finance is costly and when there are tax arbitrage opportunities.

In a world where MNCs run global treasuries, maximize the tax efficiency of their operations, and source capital at the cheapest price across multiple locations, it is reasonable to think that MNCs would also optimally exploit opportunities for engaging in cross-border finance, based on a sophisticated understanding of a given set of capital controls.

Another dimension is the explicit evasion of capital controls. MNCs engage in substantial intra-firm trade. These transactions can be used for transfer pricing, so as to recognize profits at low-tax locations, and to move capital across the world in ways that are not permitted by capital controls. There is thus a link between the rise of MNCs and the long-understood issues of misinvoicing as a mechanism for obtaining *de facto* capital account openness (Patnaik et al., 2009; Patnaik and Vasudevan, 2000).

## Data Description

We draw firm level data from the CMIE Prowess database, using data for firms in the CMIE COSPI index, which is a set of 2,500 companies with high stock market liquidity and good disclosure. This includes both financial and non-financial firms. Of these, the 2,162 companies which had full data availability for 2007–08 were included in the dataset for our analysis.

A firm is defined as a multinational if it holds more than 1 percent of total assets outside India. This emphasizes the abrupt transition which takes place when a firm becomes an MNC. When a firm is not an MNC, it is fully subject to RBI's capital controls. Once a firm establishes overseas

operations, a new set of techniques for doing corporate finance become available. This transition is about becoming an MNC, and not about the magnitude of foreign assets.

Symmetrically, we also define a firm as an exporting firm if it derives more than 1 percent of sales from exports. Table 2 shows the breakdown of firms based on their exporting status and their MNC status. Of the 2,162 firms in the database, there are 332 MNCs, of which 288 are exporters and 44 are not.

We use the terminology “D” for firms which only produce for domestic customers, “DX” for firms that export, “DXI” for firms that export and have FDI outside India, and “DI” for firms which are multinationals but do not export. Table 3 shows summary statistics about the four groups for the

**TABLE 2. Exporters and MNCs in the CMIE Cospi Firms**

	<i>Not MNC</i>	<i>MNC</i>	<i>Sum</i>
Not exporter	827	44	871
Exporter	1,003	288	1,291
Sum	1,830	332	2,162

Source: Author's calculations based on data in *Prowess*, CMIE.

**TABLE 3. Summary Statistics about Four Kinds of Firms**

<i>Variable</i>	<i>Units</i>	<i>D</i>	<i>DI</i>	<i>DX</i>	<i>DXI</i>	<i>All</i>
Age	Years	21	19.5	23	21	22
IQR		15	45.5	21	13	18
Total assets	Rs crore	131.48	577.78	226.82	615.2	214.07
IQR		490.51	1,765.42	501.7	1,678.96	631.35
Sales	Rs crore	92.25	257.94	202.76	352.59	174.55
IQR		354.88	1,517.58	472.51	1,075.8	523.26
Employees	Number	131.16	509.72	382.71	912.5	296
IQR		516.69	3,384.52	1,058.28	2,318.45	1,060
Market capitalization	Rs crore	68.18	686.83	98.93	551.8	111.79
IQR		368.27	3,889.4	387.28	2,128.44	591.54
Turnover ratio	Percent	80.8	97.88	77.27	92.77	80.51
IQR		139.07	127.05	111.26	151.65	126.31
Exports/Sales	Percent	0	0	15.18	40.17	3.53
IQR		0	0.15	33.36	69.88	25.18
OFDI/Assets	Percent	0	3.19	0	8.34	0
IQR		0	7	0	17.26	0.01
Size	Log Rs crore	4.8	5.95	5.41	6.22	5.34
IQR		2.67	2.65	1.88	2.31	2.3
Leverage	Times	2.1	2.2	2.48	1.91	2.26
IQR		1.99	2.48	1.71	1.32	1.78
Number of observations	Number	827	44	1,003	288	2,162

Source: Author's calculations based on data in *Prowess*, CMIE.

accounting year 2007–08. For each group of firms, for each variable of interest, the median and the inter-quartile range (IQR) is shown. Here, we define “size” as  $\log([\text{sales} + \text{assets}]/2)$ .

Table 3 shows sharp differences between the firm characteristics of these four groups. In particular, multinationals who are also exporters (the DXI group) have a median value for total assets and number of employees which is almost three times larger than that computed for the full dataset. They have a median value for market capitalization that is more than four times bigger than that seen for the full dataset. They are also much more export oriented with an export/sales ratio of 40.17 percent—when compared even with exporting firms which are not multinationals who have an export/sales ratio of just 15.18 percent. In terms of financing, multinationals have somewhat *less* leverage when compared with others.

Table 4 shows the industry distribution of the MNCs. The biggest single industry is information technology. At the same time, some multinationals are found in all the top-level industries. While financial firms are represented in this data, only 14 of the 332 multinationals are financial firms.

**TABLE 4. Industry Distribution of the Multinationals**

<i>Industry</i>	<i>Number of firms</i>
Chemicals	69
Diversified	2
Electricity	2
Food	14
Machinery	26
Metals	16
Mining	3
Miscellaneous manufacturing	4
Non-metallic minerals	18
Textiles	13
Transport equipment	16
Services (Construction)	7
Services (Finance)	14
Services (IT)	96
Services (Other)	32
Total	332

Source: Author's calculations based on data in *Prowess*, CMIE.

In this paper, we suggest that the microeconomic phenomenon of some firms becoming multinationals helps us understand a macroeconomic phenomenon—the crisis on the money market and the collapse of the operating procedures of monetary policy in India after Lehman Brothers failed. For this claim to be tenable, the size of multinationals (in the aggregate) has to be large enough to matter to macroeconomics.

In order to assess these issues, Table 5 sums up financial data for the 332 multinationals in our dataset, and compares them against the total for the full dataset of 2,162 firms. While the MNCs only account for 15.36 percent of the firms by number, they make up between 22 and 38 percent of the dataset when viewed through certain variables of interest. The sales of these 332 MNCs works out to 11.7 percent of GDP, and their total assets works out to 35.2 percent of GDP.

**TABLE 5. How Big are the Multinationals?**

<i>Variable</i>	<i>Units</i>	<i>Not MNC</i>	<i>MNC</i>	<i>All</i>	<i>Share of MNCs (Percent)</i>
Sales	Rs crore	2,112,181	586,082	2,698,263	21.72
Total assets	Rs crore	4,948,705	1,760,003	6,708,709	26.23
Market capitalization	Rs crore	3,408,303	1,517,651	4,925,955	30.81
Exports	Rs crore	264,906	159,761	424,668	37.62
Number of observations	Number	1,830	332	2,162	15.36

Source: Author's calculations based on data in *Prowess*, CMIE.

If, hypothetically, these 332 MNCs were financing 5 percent of their balance sheet through the money market in London, this translates to a sum of Rs 88,000 crore, which is of the same order of magnitude as the sudden increase in borrowing from RBI's lending window depicted in Figure 3.

This suggests that this set of 332 multinationals is large enough to matter to macroeconomics. To the extent that our dataset is incomplete, that is, to the extent that some MNCs exist which are not captured in our dataset, the influence of MNCs upon macroeconomic outcomes would be correspondingly larger.

## **Evidence from the Foreign Exchange Market**

A sudden stop of capital flows or an outflow from the capital account would put downward pressure on the exchange rate. Evidence of this is seen partly in the depreciation of the rupee, and partly in the sudden and large sale of dollars by RBI. The normal reaction to a sudden jump in the exchange market pressure on the rupee would have been a rise in the forward premium as people would expect further depreciation. Even if the premium did not rise, it would remain the same. In fact, the reverse happened.

Under ordinary circumstances, currency forward pricing is done through covered interest parity (CIP). As a consequence, in most situations, the

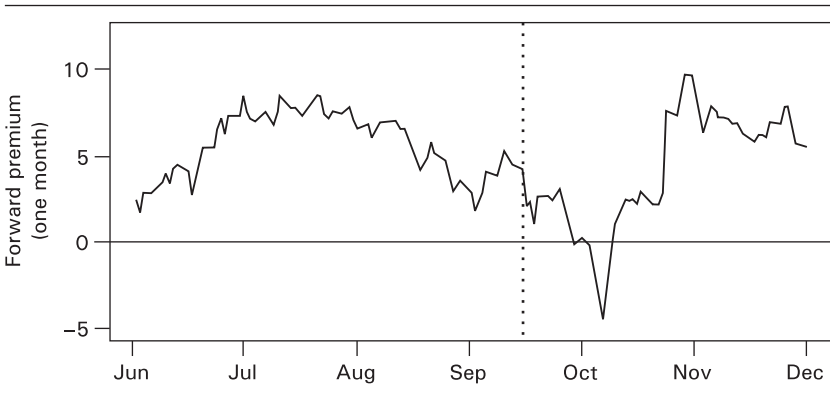
forward price is uninformative since it merely reflects CIP arbitrage. India is a rare situation in that CIP arbitrage is blocked by RBI (Shah and Patnaik, 2007). As a consequence, the price of the forward is disconnected from the spot exchange rate. Therefore, fluctuations of the order flow influence the forward price. This makes the forward price uniquely informative.

If MNCs were taking money out of the country in order to address a short-term exigency, they are likely to want to bring this money back at a future date. Some of them could choose to hedge this conversion of dollars to rupees at a future date by selling dollars forward. In particular, the rules for banks require that these short-term movements of capital be fully hedged.

Hence, the period where capital was leaving the country in response to the money market crisis worldwide would be a period where dollars were being sold forward. As a consequence, the forward premium would drop.

Figure 5 shows the time-series of the one-month rupee-dollar forward premium. The selling pressure on the forward market in the days after September 15 yielded an unprecedented crash in the forward premium. When the forward premium is negative, it means that a dollar at a future date is traded at a lower price than the spot price, which is an unusual configuration.

**FIGURE 5. The One-Month Forward Premium**



Source: *Business Beacon*, CMIE.

In the period from September 29 to October 8, negative forward premia were repeatedly seen on the one-month, three-month, and six-month forward markets. The most extreme value seen was a premium of -4.5 percent for the one-month forward premium on October 7. These events are consistent with our arguments about the global treasuries of Indian MNCs as the mechanism

through which money market difficulties in London were transferred to India. If the problem on the domestic money market was merely one of a withdrawal of foreign capital, these dramatic changes in forward premia would not have taken place.

## Evidence from the Balance of Payments

The balance of payment data, shown in Table 6, also provides important insights into what was happening in this period.<sup>3</sup> In this period, India experienced a sudden stop in capital inflows, with net capital flows going from an inflow of \$33.155 billion in the July/August/September 2007 quarter to an outflow of \$3.7 billion in the October/November/December 2008 quarter.

**TABLE 6. What Happened in the Sudden Stop?**

	<i>Million US\$ per quarter</i>					
	<i>09/07</i>	<i>12/07</i>	<i>03/08</i>	<i>06/08</i>	<i>09/08</i>	<i>12/08</i>
Loans	9,305	10,942	12,527	4,228	3,561	1,733
Banking capital	6,643	207	5,826	2,696	2,131	-4,956
Investment	13,027	16,892	4,760	4,778	4,254	-5,000
FDI in India	4,709	7,873	14,197	11,891	8,782	6,684
FDI by India	-2,581	-5,832	-5,701	-2,902	-3,218	-5,864
Portfolio investment	10,917	14,751	-3,764	-4,178	-1,301	-5,787
Others	4,180	2,976	2,916	-579	-2,094	4,540
Net capital inflows	33,155	31,017	26,029	11,123	7,852	-3,683

Source: *Business Beacon*, CMIE.

A striking fact in the balance of payment data for October–December 2008 is not that foreign capital flowed out, as it did from many emerging economies. The dominant story of the outflow in this quarter is capital being taken out by Indian companies. Capital leaving India through banks (“banking capital”) and through non-bank corporations (“FDI by India”) added up to \$10.8 billion which was bigger than the overall net capital outflow of \$3.7 billion. In comparison, the net capital outflow through portfolio investors was only \$5.78 billion.

Indian banks with overseas operations were under stress much like banks worldwide were facing stress when the global money market was

3. The phrase “sudden stop” was brought to prominence by Calvo (1998).

disrupted. Collateral requirements for outstanding CDS positions went up. When Indian non-financial firms faced shortages of dollar liquidity in the money market outside India, they often turned to Indian banks who lent them dollars outside India.

Turning to “FDI by India,” in the pre-crisis period, many large Indian firms were in the process of turning themselves into MNCs. This required sending capital out of the country for the purpose of acquiring companies, setting up global distribution systems, etc. This process was critically linked to (a) optimism about the outlook for the world economy and (b) benign conditions for access to equity and debt capital. In the quarter of October/November/December 2007, \$5.8 billion left the country in this fashion.

After December 2007, optimism about the world economy and financing conditions both turned relatively somber. Outbound FDI flows declined to \$2.9 billion in the quarter of April/May/June 2008. Ordinarily, one might expect that from July to December 2008, conditions *worsened* in terms of optimism on the outlook for the world economy and in terms of access to equity or debt financing. However, FDI by India *rose* to \$3.2 billion in the July/August/September 2008 quarter and further to \$5.9 billion in the October/November/December 2008 quarter. We would conjecture that these large values were not about Indian companies buying assets or building a business overseas. They were perhaps about Indian companies transferring capital to overseas subsidiaries, which had been using the global money market, and were now short of dollar liquidity.

Apart from the official flows through the permitted mechanism of FDI by Indian companies, there is a possibility of Indian firms transferring capital out of the country through transfer pricing with their own subsidiaries. Prior research has shown that India has substantial capital flows in both directions through trade misinvoicing. However, it is not possible to identify these flows in the crisis period of late 2008 using the available data.

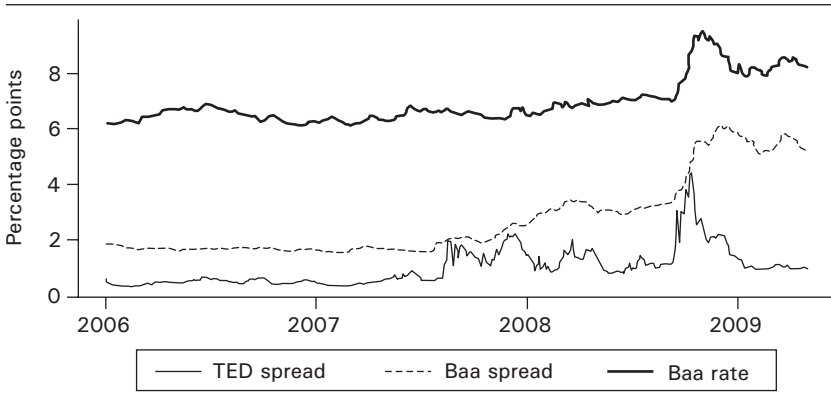
## Evidence from the Stock Market

In the period of crisis, did the firms with treasury operations abroad do worse than those without? It would be useful to examine how the stock market sees the share price of Indian MNCs. If a firm got into trouble in its global money market operations, its share price would do badly.

The most important measure of financing conditions for Indian firms outside the country is the Moody’s Baa spread. This is the spread between the Moody’s Baa bond and the 10-year US government bond. This measures

the credit risk of bonds that are roughly comparable to those issued by the best Indian firms. Figure 6 juxtaposes recent values of the TED spread, which measures the credit risk of large global financial firms, with the cost of borrowing for Baa firms and the Baa spread. The relevant question is: did the share prices of Indian MNCs get adversely affected with a change in the Baa spread?

**FIGURE 6. The Moody's Baa Spread**



Source: Author's calculations based on data from Datastream.

## Empirical Strategy

The simplest empirical strategy would involve examining how the stock prices of MNCs fluctuated in relation to the changing values of the Moody's Baa spread. There are three difficulties with this approach:

1. Individual stock prices contain substantial idiosyncratic risk. The signal (of the extent to which Indian MNCs are influenced by the Moody's Baa spread) would be weak when compared with the noise (of idiosyncratic stock price fluctuations).<sup>4</sup>

4. There is a small literature that argues that in many emerging markets, a substantial proportion of stock price volatility is explained by the overall market index. However, in the Indian case, the market model of the CMIE Cospi companies ranges from a median value of 0.273 in the top decile by size to 0.023 in the bottom decile (Table 4.14 of Shah et al. [2008]). The extent of idiosyncratic risk in India is hence broadly comparable with that seen in Organization for Economic Cooperation and Development (OECD) countries.



2. It could be argued that MNCs are firms with significant international exposure. When business cycle conditions in the world economy worsen, stock prices of Indian MNCs would do badly. Since the Moody's Baa spread is correlated with global business cycle conditions, there would be a bias in favor of finding that the Moody's Baa spread is linked to the stock price fluctuations of Indian MNCs.
3. It could be argued that MNCs tend to be large firms with more leverage. As a consequence, they are more exposed to credit market conditions. Indian firms do borrow abroad, though constrained by quantitative restrictions. All large leveraged Indian firms are likely to have some borrowing abroad, and would be adversely affected when the Moody's Baa spread rises. Interpreting this as a consequence of outbound FDI would be incorrect.

To address these problems, we resort to analysis of a special portfolio constructed through a matching procedure. We make two lists of firms: one of Indian MNCs, and another of exporting firms who are not MNCs. Each MNC is matched to a partner firm with similar size and leverage. We then form a portfolio which holds long positions in the MNCs along with holding short positions in their exporting partners. The performance of the portfolio shows the ways in which MNCs are different from companies in India which have not embarked on outbound FDI. This empirical strategy addresses the three problems described above:

1. *Idiosyncratic risk*: Idiosyncratic risk would be diversified away since the analysis only involves the returns on portfolios.
2. *Exposure to the world economy*: MNCs and exporting firms would both be exposed to the world economy. Hence, mere business cycle considerations would affect both the exporters portfolio and the MNC portfolio.
3. *MNCs tend to be large leveraged firms*: The matching procedure identifies exporting non-MNC firms which have similar size and leverage when compared with the MNCs. Credit market conditions onshore and offshore would influence both portfolios equally, since both kinds of firms operate under the identical capital controls onshore.

## Matching Procedure

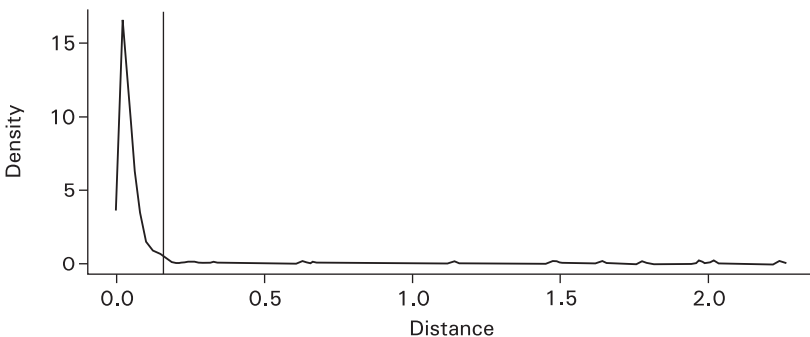
For the matching procedure, size is defined as the  $\log([\text{sales} + \text{assets}]/2)$ . Variables are standardized, but in the interest of robustness, the sample median is used instead of the sample mean and the inter-quartile range is used instead of the sample standard deviation.

Each firm  $i$  is a point  $z_i = (z_{1i}, z_{2i})$ , where  $z_{1i}$  is the standardized size and  $z_{2i}$  is the standardized leverage. Let  $E$  be the set of exporting, non-MNC firms. For each MNC  $i$ , the matching procedure involves finding the firm  $i^*$  such that:

$$i^* = \arg \min_{j \in E} \| z_i - z_j \|$$

We define  $Q_i = \| z_i - z_{i^*} \|$ . In order to improve the quality of matching, the worst 5 percent of firms in terms of the values of  $Q_i$  were deleted from the dataset. This corresponds to deleting the 17 firms with poor matching, leaving a dataset of 315 MNCs and their matched partners. This corresponded to deletion of firms where  $Q_i > 0.16$ . Figure 7 shows the kernel density plot of the match quality seen across all the firms. The 25th and 75th percentile of  $Q_i$  prove to be 0.02 and 0.06, which suggests that for most firms, excellent matches were obtained. After deletion of the 5 percent of firms with poor matching, the 25th and 75th percentile of  $Q_i$  works out to 0.021 and 0.056.

**FIGURE 7. Distribution of Quality of Match**



Source: Authors' calculations.

Some examples of matching are shown in Table 7. The firms in the left column are MNCs; they are matched against non-MNC exporting firms in the right column. As an example, Infosys is matched against Sterlite.

**TABLE 7. Examples of Matching Procedure**

<i>Firm</i>	<i>Standardized</i>		<i>Best match</i>	<i>Standardized</i>		
	<i>Size</i>	<i>Leverage</i>		<i>Size</i>	<i>Leverage</i>	<i>Distance</i>
Info-drive Software	3.24	1.16	Intellvisions Software	3.21	1.16	0.0122
Infosys	9.71	1.28	Sterlite	9.68	1.41	0.0752
Infotech Enterprises	6.38	1.19	Mahindra L. Devp.	6.37	1.16	0.0171
IPCA Labs	7.1	2.1	Kalyani Steels	7.06	2.2	0.0541
J B Chemicals	6.49	1.61	Jagatjit Industries	6.56	1.56	0.0402

Source: *Prowess*, CMIE.

Infosys has a standardized size of 9.71, while Sterlite is at 9.68. Infosys has a standardized leverage of 1.28 and Sterlite is at 1.41. Thus, Sterlite is a company with size and leverage much like Infosys. In this case,  $Q_j$  works out to 0.0752. In the table, the numerical values seen for distance are small, which is consistent with the distribution of seen in Figure 7.

Table 8 shows a broad array of summary statistics about the 315 MNCs where matching was successful, and the partner firms identified.

**TABLE 8. Summary Statistics about MNCs and Matched Partners**

<i>Variable</i>	<i>Units</i>	<i>MNC</i>	<i>Partner</i>
Age	Years	21	25
IQR		14	29
Total assets	Rs crore	581.82	458.45
IQR		1,415.24	1,272.55
Sales	Rs crore	328.69	437.92
IQR		1,004.61	1,022.98
Employees	Number	790.33	726
IQR		2,296.71	1,862.82
Market capitalization	Rs crore	536.11	352.63
IQR		1,850.24	1,272.48
Turnover ratio	Percent	92.77	71.35
IQR		151.44	106.73
Exports/Sales	Percent	31.36	11.59
IQR		68.73	28.8
OFDI/Assets	Percent	7.71	0
IQR		15.17	0
Size	Log Rs crore	6.15	6.12
IQR		2.17	2.2
Leverage	Times	1.91	1.95
IQR		1.29	1.27
Number of observations	Number	315	315

Source: Authors' calculations based on *Prowess*, CMIE.

Some rows merely constitute validation of the matching procedure. Partners were required to be exporting firms with no outbound FDI (OFDI).

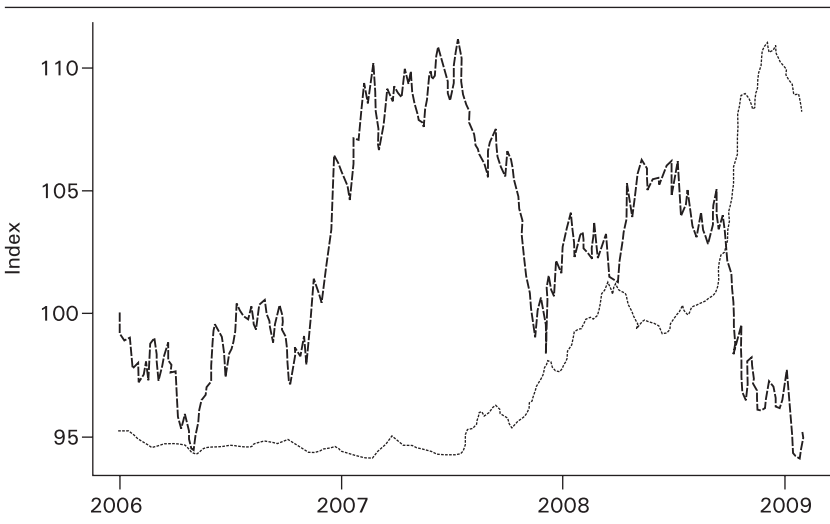
Hence, the OFDI/Assets ratio for partners is 0. Partners were chosen to match the size and leverage of MNCs. Hence, the median size of the partners, at 6.12, is similar to the median size of MNCs, at 6.15. Similarly, the median leverage of the partners, at 1.95 times, is similar to the median leverage of the MNCs, at 1.91 times.

In other respects, the partners inevitably differ from the MNCs. There is surprising correspondence in some respects (for example, number of employees) but not in others (for example, sales or turnover ratio). A key fact, which influences the estimation strategy of the paper, concerns the export/sales ratio: this averages to 31.36 percent for MNCs but only 11.59 percent for the non-MNC exporters.

### Alternative Explanations, and Estimation Strategy

In this fashion, we compute the returns on this portfolio, which is long MNCs and short a matched portfolio of exporters who are not MNCs. Figure 8 shows the time-series of the value of this portfolio, which is indexed to start

**FIGURE 8. Long MNC + Short Exporter Portfolio, against the Moody's Baa Spread**



Source: Authors' calculations based on data from *Prowess*, CMIE and Datastream.

from 100. The time-series of the Moody's Baa spread, is also shown on this graph. Both these series are in levels in the graph. The notation  $H_t^{DX}$  denotes the daily *returns* of the hedged portfolio which is long MNCs and short non-MNC exporters.

An alternative explanation that limits the interpretation of these results concerns exposure to global business cycle conditions. While the portfolio that has been formed is long MNCs and short non-MNC exporters, both of which should have a trade exposure to the world economy, MNCs are more exposed to international trade.<sup>5</sup> The 315 MNCs where good matches were found have an average value for the exports/sales ratio of 31.36 percent. On average, the exporting non-MNC partner had an export/sales ratio of 11.59 percent. Hence, the impact of the Moody's Baa spread upon the hedged portfolio could merely reflect the bigger trade exposure of MNCs.

In order to address this concern, we construct a daily time-series which represents the Indian stock market implications of international trade exposure. We break the non-MNC exporting firms into two groups: the firms with an above-median exports/sales ratio and the firms with a below-median export/sales ratio. The same matching procedure is used to match all above-median exporting firms with a below-median exporting firm while mimicking the size and leverage. This gives us the returns series on another hedged portfolio: long high exports + short low exports. We interpret the returns series on this portfolio as reflecting pure trade exposure to the world economy, mapped into the Indian stock market returns. We use the notation  $H_t^{Xhi/Xlo}$  for the daily returns of the hedged portfolio which is long high-export non-MNCs and short low-export non-MNCs.

The natural estimation strategy is a regression explaining *returns* on these long/short portfolios using *changes* in the Moody's Baa spread. This is done using a daily time-series that runs from the start of the crisis (June 2007) till end-January 2009, which has 414 observations. To recapitulate, notation  $H_t^{DX}$  is the daily returns of the hedged portfolio which is long MNCs and short non-MNC exporters;  $H_t^{Xhi/Xlo}$  is the daily returns of the hedged portfolio

5. The exports/sales ratio is observed for all firms, so in principle, matching could be done to find firms with similar size, leverage, and the exports/sales ratio. The difficulty with this path is that for MNCs, sales outside India are tantamount to serving foreign customers by other means and induce trade exposure to global economic conditions. A fuller definition of sales to foreign customers (whether through exports or through outbound FDI) is not measured in the CMIE database.

which is long high-export non-MNCs and short low-export non-MNCs;  $S_t$  is the level of the Moody's Baa spread on date  $t$ . The simplest model<sup>6</sup> is:

$$H_t^{I/DX} = a_0 + a_2(1-L)S_t + e_{1t} \quad (1)$$

This model suffers from the problem that MNCs have a greater trade exposure to the world economy than non-MNC exporters. As a consequence, part of what is seen in  $\hat{a}_2$  is just the greater trade exposure of MNCs;  $\hat{a}_2$  cannot be interpreted as being only about offshore borrowing by MNCs. This motivates:

$$H_t^{I/DX} = a_0 + a_1 H_t^{Xhi/Xlo} + a_2(1-L)S_t + e_{2t} \quad (2)$$

The coefficient  $a_1$  would pickup the extent to which  $H_t^{I/DX}$  does well when global trade conditions improve. If it is the case that MNCs have greater trade exposure to the world economy when compared with non-MNC exporters with similar size and leverage, then we will observe  $\hat{a}_1 > 0$ .

A concern about these models lies in the extent to which shocks to  $(1-L)S_t$  influence Indian stock prices immediately. If there are weaknesses in information processing by the stock market, this information processing could take many days. To address this, we estimate models of the form:

$$H_t^{I/DX} = a_0 + a_1 H_t^{Xhi/Xlo} + \sum_{j=0}^{10} b_j(1-L)S_{t-j} + e_{3t} \quad (3)$$

where lagged values of  $(1-L)S_t$  are allowed to influence  $H_t^{I/DX}$  at time  $t$ .

6. When estimating models explaining stock market returns on a portfolio, the overall stock market index is often useful as an explanatory variable, to reflect overall market fluctuations. That is inappropriate here for two reasons. First, the hedged portfolio is long MNCs and short non-MNC exporters. Both groups of firms have similar leverage and are spread across all kinds of industries. Hence, the overall exposure of to the stock market index should be zero.

Further, the typical market-capitalization weighted stock market index attaches considerable importance to MNCs, who tend to be big companies with a bigger weightage in the index. For example, a disproportionate number of the big components of the Nifty index are likely to be multinationals. Hence, the typical market-capitalization weighted stock market index is likely to be contaminated with exposure to the very MNCness that we are trying to identify.

## Results

These results are shown in Table 9. Model 1, corresponding to equation (1), explains returns on the hedged portfolio (long MNC + short non-MNC exporters) using first differences of the Moody's Baa spread. This proves to be statistically significant at a 95 percent level, and economically significant with a coefficient of  $-1.5$ . In other words, a 100 bps rise in the Moody's Baa spread induces a negative stock market return for Indian MNCs of  $-1.5$  percent. The time profile of information disclosure here involves data emanating from the US about the Baa spread in the Indian night, which is impounded into Indian stock prices in the day.

**TABLE 9. Does the Moody's Baa Spread Matter in Explaining Stock Market Returns of Indian MNCs?**

	<i>M1</i>	<i>M2</i>	<i>M1 with lags</i>	<i>M2 with lags</i>
(Intercept)	-0.02 (0.02)	-0.02 (0.02)	-0.01 (0.02)	-0.01 (0.02)
$H_t^{Xhi/Xlo}$		0.15* (0.06)		0.15* (0.06)
dBaa.spread	-1.50* (0.43)	-1.47* (0.43)	-1.32* (0.46)	-1.31* (0.46)
dBaa.spread lag 1			0.22 (0.45)	0.29 (0.45)
dBaa.spread lag 2			0.62 (0.45)	0.65 (0.45)
dBaa.spread lag 3			-0.11 (0.46)	-0.13 (0.45)
dBaa.spread lag 4			-0.15 (0.45)	-0.11 (0.45)
dBaa.spread lag 5			-0.60 (0.47)	-0.63 (0.47)
dBaa.spread lag 6			0.18 (0.46)	0.11 (0.46)
dBaa.spread lag 7			-0.32 (0.46)	-0.22 (0.45)
dBaa.spread lag 8			-0.38 (0.45)	-0.48 (0.45)
dBaa.spread lag 9			-0.17 (0.48)	-0.14 (0.48)
dBaa.spread lag 10			-0.62 (0.46)	-0.52 (0.46)
<i>N</i>	413	413	403	403
R-squared	0.03	0.04	0.05	0.06
Adj. R-squared	0.03	0.04	0.02	0.03

Source: Author's estimation and results from the research.

Notes: Standard errors in parentheses.

\* indicates significance at  $p < 0.05$ .

Model M2 reflects equation 2, augmenting Model M1 with an additional explanatory variable. This measures the Indian stock market impact of trade exposure to the world economy. This coefficient is statistically significant and has a value of 0.15. On average, when  $H_t^{Xhi/Xlo}$  is +1 percent, the portfolio  $H_t^{I/DX}$  gains 0.15 percent. This suggests that in the hedged portfolio  $H_t^{I/DX}$ , the MNCs have more trade exposure to the world economy than their matched partners with similar size and leverage. At the same time, after controlling for this, the Moody's Baa spread coefficient is essentially unchanged at  $-1.47$ . This shows that our main result is robust to the problem of MNCs having greater trade exposure than non-MNCs.

Two additional specifications are shown, which utilize lagged values of the Moody's Baa spread. These investigate the idea that the Indian stock market is not fast enough in understanding these things, that the process of domestic price discovery is not able to understand the implications of last night's value of the Moody's Baa spread for the valuation of hundreds of Indian MNCs. This conjecture is not substantiated. Ten days of lagged values are not significant, the adjusted actually declines, and the basic results stand. This suggests that stock market speculators are quite aware of the implications of fluctuations of credit conditions in the US for valuation of Indian MNCs.

The interpretation of these results is as follows. All firms—MNCs or otherwise—face the same capital controls that inhibit foreign borrowing and prohibit short-dated foreign borrowing. It is reasonable to think that MNCs and non-MNCs of similar size and leverage would have the identical incentives to engage in foreign borrowing (within the constraints of the capital controls). In both cases, capital controls that blocked short-dated borrowing should have implied that turmoil on the money market in London was not so important to Indian firms who were supposed to not have money market operations. Yet, we find that Indian MNCs had a credit exposure to the Moody's Baa spread over and beyond what non-MNC exporters with a similar size and leverage had. This suggests that there is something about MNCness which induces a bigger exposure to the Moody's Baa spread.

## Conclusion

*De jure* capital controls have not made India as closed to global financial markets as expected. The expectation that a global financial market crisis would not hit India owing to these controls proved to be incorrect when the financial crisis was transmitted to India with unprecedented speed.



In this paper we have explored one element of India's capital account which answers some of the puzzles about the speed of transmission and behavior of domestic financial markets. With a large presence outside India, Indian MNCs appear to have escaped the capital controls that are imposed on Indian companies. As a result, they are exposed to the global money market. Since they are the large firms, who are significant players in the Indian economy, their operations on money markets, foreign exchange markets, and India's balance of payments are large and important. This dimension of India's integration with global capital markets gives a new insight into India's *de facto* capital account convertibility.

## Comments and Discussion

**Eswar Prasad:** This paper by Patnaik and Shah is a very useful contribution to the debate on capital controls, a debate that has become especially topical in the aftermath of the global financial crisis. As the panic resulting from the crisis has subsided, there has been a pullback of international investors from the safe haven of the dollar and money is once again flowing toward the major emerging markets, which have to deal with the mixed blessings of such inflows. While many of these economies can certainly use foreign capital, surges in inflows bring with them the pain associated with exchange rate appreciation, which hurts export competitiveness, and the risks of asset market bubbles. In response, economies such as Brazil and Taiwan have already imposed taxes on certain types of inflows, China has tightened up its controls on inflows and many other emerging markets including India are considering the imposition of various types of controls.

This is of course a sharp turnaround from the period around the height of the crisis when international investors were pulling capital out of emerging markets and rushing to the safe shores of the US Treasury bond market. At that time, emerging markets were concerned about the deleterious effects of sudden stops or reversals of capital flows. And some of these countries were contemplating controls on outflows.

While the effects of surges in inflows or sudden stops are quite different, the instinctive reaction of policy-makers to use capital controls to deal with the volatility of capital flows is one common thread between these two types of episodes. And this is where the study by Patnaik and Shah sheds some light on an important element of the debate on capital controls.

A key question is whether capital controls are in fact effective in managing capital flows. As noted by authors such as Kose et al. (2009), there is a widening chasm between *de jure* capital account openness and *de facto* financial openness. Rising trade flows provide a conduit for disguising capital flows through misinvoicing of trade transactions. Increasingly sophisticated financial players can easily circumvent capital controls by disguising flows among their subsidiaries or branches in different countries. Even when capital controls are effective, evidence shows that this effectiveness is ephemeral as investors and other market participants quickly find ways to evade controls if the incentives for such evasion are strong enough.

Patnaik and Shah provide a case study of the effects of the collapse of Lehman Brothers on Indian money markets. Their contribution is to trace out, using a variety of different pieces of evidence, how Indian MNCs reacted to the worldwide dollar shortage in September 2009 and use the evidence they muster to make the broader point that multinationals are now making a major contribution to increasing the *de facto* openness of India's capital account, irrespective of the *de jure* controls in place.

## Suggestions

This is a competent study that pulls together different strands of evidence to tell a plausible story about how Indian MNCs are able to effectively move capital across borders. While the data are limited and it is difficult to construct persuasive counterfactuals to some of the authors' propositions, they are quite creative about using the available data to tease out some of the implications of their hypotheses. My main suggestions are to increase the value of the paper by increasing its descriptive content, which would provide a better context for understanding its results and thereby make it more self-contained.

The authors use a number of benchmarks in evaluating the effects of the collapse of Lehman on Indian money markets. One of their points is that India experienced a fair amount of turbulence in its money markets despite the expectation that, given its relatively closed economy and financial system, it would not be vulnerable. However, this was a truly global shock that reverberated around the world and virtually every significant financial market, whether in an advanced or developing economy, experienced turmoil around that period. It would have been useful to explore in some detail whether India experienced a larger effect than other countries with similar levels of *de jure* capital account openness.

The authors interpret the evolution of the one-month premium on the rupee-dollar forward market as evidence that Indian MNCs anticipated that their need for capital to meet dollar obligations abroad would be a temporary exigency. It is not obvious if and why only Indian MNCs saw this as a temporary problem and that they anticipated bringing capital back to India once the crisis passed. Some additional evidence to bolster this assertion would be useful.

Given the importance of disentangling the *de jure* controls on Indian MNCs versus what they were actually able to accomplish through their

cross-border operations, the paper would have benefited from a more detailed description of controls that these corporations are subject to, in terms of both inflows and outflows, and how these controls have evolved in terms of both legal tightness and enforcement intensity over time. Some other details that would be useful include how important the MNCs are in terms of Indian markets, along with their shares in exports, capital flows, and other indicators. Such indicators would provide better context for the interesting points made by the authors.

## Implications

The bottom line is that the paper makes an interesting contribution to the debate on capital controls by providing an excellent case study of the experience of the Indian money markets around the time of extreme global financial stress induced by the events surrounding the fall of Lehman Brothers.

The implication of the study and others in its genre is that rising global integration of trade, finance, and supply chains are making *de jure* capitals increasingly ineffectual as a policy tool. These results do not necessarily imply that these countries should throw up their hands and open up their capital accounts at one shot. Rather, it suggests that emerging markets should move forward on strengthening their financial systems and macroeconomic policy frameworks to better cope with volatile inflows rather than relying on the crutch of capital controls. They could also consider opportunistically opening up their capital accounts in a measured manner in order to deal with some of the pressures of inflows or outflows, as the case may be (see Prasad and Rajan, 2008). There are no easy answers to the question of what emerging markets should do to deal with the vagaries of fickle international capital flows. The research program that this study is part of, at least shows that a knee-jerk resort to capital controls is probably not the right answer.

**Abhijit V. Banerjee:** The thesis of this very nice paper is that Indian MNCs might be using the ability to export long-term capital to undertake short-term movements of capital. This has the important implication that by permitting Indian MNCs to invest abroad, the Reserve Bank of India's ability to keep the market for short-term capital closed.

The evidence they present starts with the observation that Indian money market rates spiked when Lehman closed even though Indian money markets are supposed to be closed. This was followed by large capital outflow after

the Lehman episode, ostensibly in the form of FDI, even though this was hardly the most upbeat time for the world economy and in general there were not a lot of new businesses created. Moreover while the rupee tanked, futures rates predicted recovery, suggesting future inflows had been planned. Finally Indian MNCs lost value relative to non-MNC firms that had a similar export profile when the relevant US money market rate spiked.

This is an interesting story engagingly told; it marshals data carefully and uses a clever indirect strategy to get around the lack of direct evidence. My comments are in two parts:

- Do these facts necessarily mean that the Indian firms were borrowing short-term abroad?
- Do they have to mean that capital markets are *de facto* open?

Starting with alternative interpretations, I think the fact that Indian short rates spiked is certainly not surprising in itself. After all there was a massive increase in perceived risk in the global economy and many Indian firms were exposed to it, and not just through credit relations. There were exporting firms that were worried whether they will be paid for their last shipment by the foreign buyers and importing firms that felt that they may be required to pay cash right away for their current purchase rather being able to get some trade credit, because their suppliers are cash strapped. This, in turn must have affected the banking sector's confidence in its own liquidity—what happens if the exporters started to delay payments because they had no cash? All of this would inevitably raise short rates.

In addition there was some concern that a number of the banks had invested in global toxic assets and may now be required by the regulator to scale down lending to meet the prudential rules. In general, it seems clear that both banks and firms were trying to judge their own vulnerability, and the option value of cash was going up and the supply of even secured money was upward sloping—this why the RBI bands get breached.

What would be the alternative explanations for the capital outflows? Suppose, for example, my firm's global profits were supposed to repay my foreign currency long-term bonds that were maturing in December 2008. Or just pay wages in my foreign subsidiary. Suddenly demand crashes. Profits vanish. Bond markets freeze-up. Stock markets tank. What am I supposed to do? It makes sense that I would export capital to replace the profits that I no longer have. It would also interesting finding out if there was any real FDI—was there some fire sale FDI? Clearly more information about debt structure of the major MNCs would help here, as will as a sense of their non-debt liabilities (how much was wages as fraction of profits, etc.).

How about what happened to the futures premium? The sudden rise of the dollar against all currencies was mysterious given the billowing deficit in the US (it was described as a flight to “quality,” bizarrely enough). Many expected a turn around, which eventually happened. So may be people were simply speculating against an irrational movement in the dollar. It may be worth checking whether this same pattern also shows up in other countries that were much more open (from the capital market point of view) or in only in countries that allow FDI but not short-term capital movements.

Finally what about the relatively fall in MNC value? The authors discuss the possibility that export market exposure may have differed for MNCs versus other firms and try to deal with it. My sense is that the biggest exposure for many of these MNCs was foreign currency risk given that they were holding long-term foreign currency debt, their foreign holdings were having teething problems and the rupee was tanking. There was even speculation about Tata’s having to restructure the debt used to acquire Jaguar. There needs to controls for the ratio of export earnings to the part of long-term debt that was maturing to really nail this and given the non-linear nature of debt, we probably should introduce this control non-linearly.

Turning to the second question that they try to answer: what does all this say about the RBI’s regulation? Clearly there are limits to how well the RBI controls the margin between short- and long-term capital movements. But a part of that is less a statement about the cupidity of Indian firms or the competence of the RBI than a recognition of the essential incompleteness of concepts like long-term capital. How is the RBI supposed to know whether a particular investment is long term or short term: For example, if you pay wages for the workers who are setting up your plant, is that short term or long term? Presumably the RBI uses some information about what the specific projects are combined with some guess-work to regulate these flows. This will never be perfect, even if everyone tries their best and there is no malfeasance.

However it is worth emphasizing that the RBI was not just using the regulation margin. It was also making the monetary supply curves steeper—this is why the call market rate went outside the promised band. I don’t want to argue that this is the best way to regulate—it may well be less than optimal in many ways—but there is also no evidence that the combination of these instruments did not effectively protect the markets from something worse. More generally, I am not convinced that the RBI has lost control over capital markets, though it may be possible to improve upon their particular model of regulation.

## General Discussion

Shankar Acharya commented that the explanations provided by the authors regarding the spike in call rates, and other economic occurrences in India after the fall of Lehman were actually somewhat different from those being discussed in policy circles at the time of the actual crisis. While he did allow for the fact that some of those previous explanations may have been incorrect, he felt that there were four or five of them that needed to be taken into account by the paper, to at least justify if they actually mattered.

The first factor that he described was that of the sharp squeeze in trade credit from both foreign bankers, distressed by the events at Lehman, and (to a lesser extent) Indian banks. The second factor revolves around the sharp and almost sudden outflow of FII money in the wake of Lehman's collapse (September 15). The third relates to the stress present on the liability side amongst the foreign branches of many Indian firms in New York, London, etc. These branches contributed to the additional demand for short-term money in the Indian market, as they turned to their headquarter banks for money as a result of the aforementioned stress they faced. Lastly, Acharya talked about the role played by Indian MNCs involved in foreign acquisitions. These firms eventually took bridging loans, often from foreign lenders, which helped transmit the shock in Western markets to the Indian market.

Surjit S. Bhalla disagreed with the second factor presented by Acharya. In his opinion, FII outflow could not have played a role in the events discussed by the paper, due to its relatively stable value between September and December 2008.

On a different note, Bhalla agreed with the authors' use of the matching method (in their analysis), claiming that it probably told the story of the events that affected Indian MNCs better than any other procedure. He was though somewhat uncertain as to why there had been a lack of emphasis, in the paper, on the regulatory framework being run by the RBI. Elucidating on this framework, he offered an alternative explanation of the events that took place in the Indian MNCs after the collapse of Lehman. Taking advantage of the high interest rates placed on foreign borrowings, Indian MNCs brought money from abroad hoping to gain benefits through the expected appreciation of the rupee. This process seemed to be working, especially after March 2007 when the RBI relaxed some of its controls on the exchange rate, leading to an appreciation of the currency. However, the aftermath of Lehman's collapse provided a different scenario, one in which the currency depreciation exceeded, to a great extent, any difference in

interest rates. This provoked MNCs to take their capital out of the country, which created the post-Lehman mess. While this was his own explanation, Bhalla stressed that it was one that was consistent with the majority of the authors' work.

On a related note, Dilip Mookherjee claimed that Bhalla's argument was only a slight variation to the one proposed by the authors. He also brought up the idea of capital convertibility, and how the cost of capital for Indian companies is different from foreign companies and MNCs. In regards to this, he queried whether there exists an appropriate measure of the extent of capital convertibility.

There were also some questions regarding the more technical aspects of the study. In her comments, Anusha Chari chose to discuss aspects regarding the forward premium and its components, specifically the effects on the forward rate due to the limitations in the CIP arbitrage. She suggested that the paper tackle the possibility that the CIP crash might have been caused by downward pressure in the spot market, or by interest rate differentials. Rajnish Mehra suggested that it would have been interesting to differentiate the MNCs with American Depository Receipts (ADRs) outside India from those without ADRs, and see whether a loss in value in both types of firms was because they were in the same model.

Suman Bery felt that there were three clarifications that needed to be made by the authors; firstly the main focus of the paper, was it a paper on capital controls or a paper on multinationals in India? Settling on one of these topics, he felt, would lend greater weight to the arguments put forward by the paper. Second, and echoing Shankar Acharya, why was the role played by banks in creating the post-Lehman economic climate in India not mentioned? Lastly, were the authors more interested in (a) capital inflows, (b) capital outflows, (c) the porous nature of the total inflows, or (d) leakages on the outflow side? Apart from these three queries, Bery also thought it would be interesting for the authors to explore how the capital controls of the RBI worked in non-crisis scenarios, or in essence whether there was some kind of policy story to be told.

In his response to the questions put forward, Ajay Shah first addressed the points raised by Shankar Acharya, specifically the four factors mentioned by the latter in connection with the post-Lehman effect on India. Regarding the first of these, Shah agreed that the trade credit squeeze could well have caused money market tightness, however he felt that it was not the paper's intention to quantify the sources of such tightness in Indian markets. Shah did not buy the FII argument, as he believed that FII going out of the country had no impact on the money market per se. Shah responded to the last two



points by highlighting the fact that Indian banks with operations and assets abroad were part of the dataset, as they are considered to be multinationals. In fact, Shah went on to state that the last two factors were, in essence, the focus of the paper.

In response to the point raised by Anusha Chari on the CIP arbitrage, Shah stated that further details on that subject's components would be provided in the revised form of the paper, which would include improved graphs and perhaps one on CPI deviation. On the suggestion of using ADRs given by Rajnish Mehra, Shah contended that the dataset would be too small, as there exist only eleven Indian MNCs with ADRs.

Regarding the questions raised by Suman Bery, Shah described the policy story of the paper to be one whose basis lies in the fact that the Indian MNCs reacted very differently after the fall of Lehman from what many people expected. The crisis showed these companies to be fairly open—and more tellingly, open to foreign shock, and not closed as believed by many (including the authors) due to the presence of capital controls. Shah explained that in terms of policy, this new openness of the MNCs has to be taken into account in any future fiscal, financial or monetary policy conducted in the country.

The discussion culminated with a brief comment by the Chair, Guillermo Calvo, who suggested to the authors that a comparison of India's current situation in terms of capital controls with that of Latin America's would perhaps be of interest, due to the presence there, once upon a time, of similar capital regimes. He took the example of Chile, and explained how controls were once levied on capital inflow, only to be suddenly dispensed with after a certain point. At that point the government in Chile took it upon itself to learn the ways in which companies had bypassed the previous capital controls (akin to the Indian MNCs of today). If such a scenario presented itself to India, then the Reserve Bank would do well to follow such a procedure.

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