

**EXECUTIVE  
BOARD  
MEETING**

SM/15/26

January 30, 2015

To: Members of the Executive Board

From: The Secretary

Subject: **India—Selected Issues**

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|--|---|
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**\*At the time of circulation of this paper to the Board, the authorities have indicated that they need more time to consider whether they will consent to the Fund's publication of this paper. Publication will only proceed upon the receipt by the Fund of the member's explicit consent.**





# INDIA

## SELECTED ISSUES

January 29, 2015

Approved By  
**Asia and Pacific Department**

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## SUMMARY

The background papers for the 2015 Article IV explore key issues affecting the Indian economy, and implications for fiscal, monetary, financial sector and other structural policies.

The first chapter examines how surges in global financial market volatility (including those triggered by uncertainties about monetary policy normalization in advanced economies and/or geopolitical tensions) spill over to emerging market economies (EMs) including India. The results suggest that a surge in global financial market volatility is transmitted very strongly to key macroeconomic and financial variables of EMs, and the extent of its pass-through increases with the depth of external balance-sheet linkages between advanced countries and EMs.

The second chapter looks at food inflation, which has often been singled out as a key driver of India's high and persistent inflation. India's food inflation developments over the past decade appear to have reflected demand pressures driven by strong private consumption growth, which have often outpaced supply of key food commodities. Accordingly, supply side measures that will contain food inflation pressures on a durable basis remain critical to provide a robust foundation for the adoption of a low-inflation objective.

The third chapter employs a dynamic multi-country framework to analyze the macroeconomic transmission of El Niño weather shocks to India. The results show that India faces a short-lived fall in economic activity, as well as moderate inflationary pressures, as a consequence of an El Niño-based weather shock.

The fourth chapter examines monetary policy transmission in India, focusing on the interest rate and credit channels of transmission. The results indicate there is significant, albeit slow, pass-through of policy rate changes to bank interest rates. Furthermore, adjustment to monetary policy appears to be asymmetric: deposit rates adjust downwards in response to loosening but not upwards in response to tightening, while the lending rate adjusts more slowly to loosening than to tightening.

The fifth chapter examines India's experience with fiscal rules. It outlines the main features of the Fiscal Responsibility and Budget Management Act (FRBMA), which was placed in abeyance following the 2008 global financial crisis. A discussion of possible modifications for a successor arrangement is also provided, drawing from international experience with fiscal rules.

The sixth chapter estimates the short- and long-run price and income elasticities of Indian exports, and investigates the role of structural rigidities in shaping export demand for Indian goods. While Indian exports respond positively to exchange rate depreciation in the short term, binding supply-side constraints dampen this responsiveness. This underscores the importance of exchange rate flexibility as a shock absorber, including in responding to external demand shocks. Policies to improve labor market flexibility can also help enhance India's exports in the long run.

The seventh chapter assesses the effectiveness of major EMs' policy actions since the taper episode of May 2013, focusing on India and how its experience compares with others. The policy actions are evaluated both for their immediate impact—the announcement effect on asset prices—and for their more medium-term effect in strengthening fundamentals. From a medium-term perspective, EMs with decisive and comprehensive policy actions (such as India) saw the largest improvements in fundamentals, and were relatively less affected during later bouts of market volatility.

The eighth chapter assesses the susceptibility of India's non-financial corporate sector to a set of four commonly-used shocks—despite the positive turn that some financial variables have taken recently, corporate vulnerabilities remain at their highest level since about 2003. Furthermore, the profit margin is found to be highly correlated with future investments.

The ninth chapter uses firm-level data to investigate the role of corporate leverage in India's recent investment slowdown. About one-third of the decline in India's corporate investment-to-GDP ratio since 2011/12 can be attributed to the build-up of leverage, and the present strains in corporate and financial balance sheets will likely hold back investment activity in the near term.

The tenth chapter focuses on gains from enhancing financial inclusion and boosting access to credit in India. Using a micro-founded general equilibrium model, this chapter analyzes the effect of greater financial access on macroeconomic indicators, such as GDP growth, as well as on inequality and financial stability. It finds that removing certain constraints to finance, such as high collateral constraints, have large favorable effects on output and productivity while reducing income inequality.

The eleventh chapter catalogues India's performance thus far on the eight Millennium Development Goals, which have a target date for achievement of end-2015. Progress has been mixed—India appears to be on track to meet one-and-a-half of these goals, will likely miss three-and-a-half of the goals, and will likely partially meet three of the eight goals by the target date.

The twelfth chapter examines the determinants of female labor force participation in India, against the backdrop of India having one of the lowest participation rates for women among peer countries. This chapter finds that a number of policy initiatives can help boost female economic participation, including increased labor market flexibility, higher investment in infrastructure, and enhanced social spending.

# SPILLOVERS FROM SURGES IN GLOBAL FINANCIAL MARKET VOLATILITY<sup>1</sup>

*How do surges in global financial market volatility (including those triggered by uncertainties about monetary policy normalization in advanced economies and/or geopolitical tensions) spillover to emerging market economies (EMs) including India? Does the magnitude of spillovers depend on the depth of financial linkages between advanced countries and EMs (i.e. the size of their external balance-sheets)? We study these questions empirically within a GVAR framework containing an index of global financial market volatility (capturing pressures in banking, securities, and exchange markets). Our results suggest that a surge in global financial market volatility is transmitted very strongly to key macroeconomic and financial variables of EMs, and the extent of its pass-through increases with the depth of external balance-sheet linkages between advanced countries and EMs.*

**1. In the summer of 2013, an indication by the U.S. Federal Reserve on plans to taper its security-purchase program created a surge in global financial market volatility,** and resulted in adverse spillovers to EMs including India. Between May 22 and August 30, 2013, the rupee depreciated by about 20 percent, Indian 10-year domestic bond yields rose by 120 basis points, equity prices fell by 7 percent, and international reserves declined by 5 percent (reaching a low of US\$275 billion or 5½ months of imports). In addition, India experienced significant portfolio outflows (around US\$13 billion, primarily from debt markets).

**2. Eichengreen and Gupta (2014) argue that a key determinant of the severity of the impact of tapering talks was the volume of prior capital inflows,** and the external balance sheet exposure of EMs to advanced market economies (AMs). Countries that experienced rapid capital inflows and strong currency appreciation pressures during 2010-12 saw a sharp reversal in the 2013 episode of market volatility. Rey (2013) argues that there is a global financial cycle in capital flows, asset prices, and credit growth, and that cycle (proxied by VIX) is mainly driven by monetary policy settings of the United States—affecting leverage of global banks, and cross-border capital/credit flows. Moreover, Rajan (2014) has raised concerns about financial sector risks that may build up with prolonged use of unconventional monetary policies in advanced economies (due to increased leverage by banks and corporates; large cross-country capital flows; and excessive risk-taking by investors in a globally low-interest-rate environment). He has argued for more consideration by advanced countries of the effect that their policies will have on EMs and their eventual spillback to AMs.

**3. This chapter examines the international spillover effects of surges in global financial market volatility** (including those triggered by monetary policy normalization in advanced

<sup>1</sup> Prepared by Mehdi Raissi and Paul Cashin.

economies) and their dependence on the depth of financial linkages between advanced countries and EMs (i.e. the size of their external balance-sheets). Risk of excessive market volatility remains if advanced countries' monetary policy tightening takes an uncertain turn, or occurs at an accelerated pace, especially in an environment where there has been significant capital flows to EMs between 2010–2012 (one major concern is the risk of an abrupt reversal of capital inflows to EMs). Our results show that in the event of sudden shifts in markets' expectations about unconventional monetary policy (UMP) unwinding, asset prices can overshoot on the downside and normalization can be costly and may involve significant spillovers to other countries (including to EMs). In other words, with prolonged ultra-accommodative monetary policy in advanced economies, capital flows into recipient countries have often led to appreciating exchange rates, rising asset prices (beyond those justified by fundamentals), and procyclical policies. This makes the spillovers to EMs from an accelerated normalization larger, especially in EM countries with highly-leveraged corporates and large external/internal imbalances, which are at the same time more vulnerable to abrupt capital outflows.

**4. We use a dynamic multi-country approach to analyze the international transmission of global financial market volatility shocks**—based on an extended version of the global VAR (GVAR) models of Cashin et al. (2012, 2014a and 2014b).<sup>2</sup> The framework comprises 26 region-specific models (including a single Euro Area region comprising 8 of the 11 countries that adopted the euro in 1999). These individual models are solved in a global setting where core macroeconomic variables of each economy are related to corresponding foreign variables (constructed exclusively to capture each country's bilateral exposures to the other countries due to trade and financial linkages). The model has both real and financial variables: real GDP, inflation, the real equity price, the real exchange rate, short and long-term interest rates, and the price of oil. Furthermore, we add an index of financial stress (FSI) in advanced economies as an observable common factor to the GVAR framework, and investigate the effects of FSI shocks on macroeconomic variables of different countries.<sup>3</sup> All data are quarterly in frequency, for the period 1979Q2 to 2013Q1.

**5. Two key channels of transmission of financial market volatility shocks (which could be triggered by disorderly monetary policy normalization in AMs) are trade and financial linkages**—that is, the external balance-sheet exposures of countries to each other. Financial linkages between AMs and EMs have grown rapidly in recent years, through cross-border credit exposures

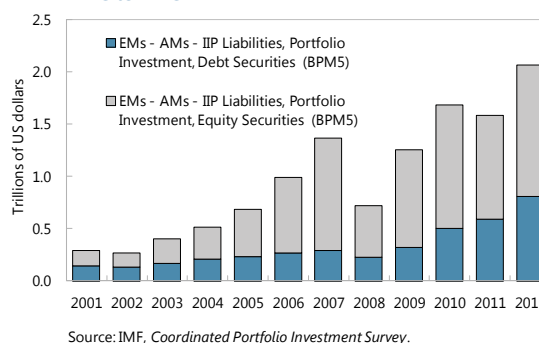
<sup>2</sup> See also Chudik and Pesaran (2014) for a survey on theory and practice of GVAR modeling.

<sup>3</sup> The FSI for advanced countries is constructed by Cardarelli et al (2009) as an average of the following indicators: the “beta” of banking sector stocks; TED spread; the slope of the yield curve; corporate bond spreads; stock market returns; time-varying stock return volatility; and time-varying effective exchange rate volatility. Such an index facilitates the identification of large shifts in asset prices (stock and bond market returns); an abrupt increase in risk/uncertainty (stock and foreign exchange volatility); liquidity tightening (TED spreads); and the health of the banking system (the beta of banking sector stocks and the yield curve).



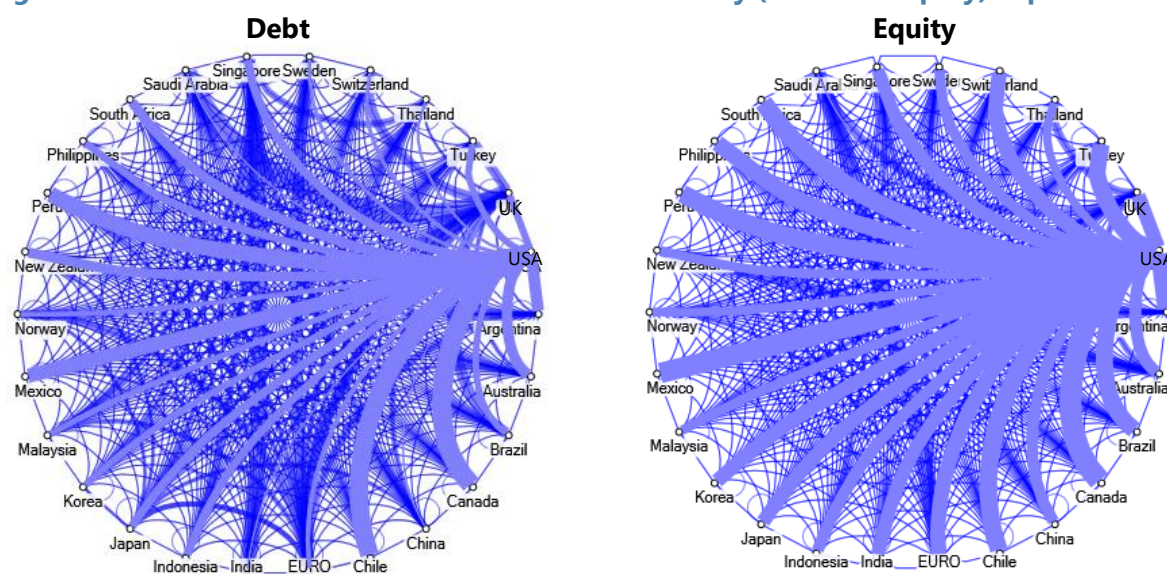
and cross-border holdings of debt and equity (see chart). This may be partly due (among other reasons) to prolonged use of ultra-loose monetary policies in AMs. Accordingly, we construct a series of financial weights at different points in time, 2009 and 2012, and study the size of financial market volatility spillovers originating in advanced economies over time. We construct the financial weights based on bilateral stocks of portfolio investment liability positions of countries, covering both equity and debt, derived from the IMF's Coordinated Portfolio Investment Survey.

**Figure. Portfolio Investment Liability Exposures of EMs to AMs**



**6. Figure 1 visualizes the network of bilateral financial weights for the twenty-six countries in our sample.** For each country in the network, the width of the line linking any given two economies is determined by the share of the bilateral portfolio investment liability (debt and equity) exposures in percent of the total as at end 2012. Not surprisingly, network-based indicators of the relative importance of any given country in global debt and equity markets point to the United States as the focal point. The U.S. is the world's largest holder of debt and equity assets of other countries, and if financial conditions in the U.S. and consequently the rest of the world were to deteriorate, they would have non-negligible macroeconomic/financial effects on countries which are financially exposed to the United States. Figure 1 shows that India's portfolio investment liability debt exposures to the rest of the world are relatively narrow (apart from exposures to Singapore), while equity exposures are stronger.

**Figure 1. Network of Global Portfolio Investment Liability (Debt and Equity) Exposures 2012**

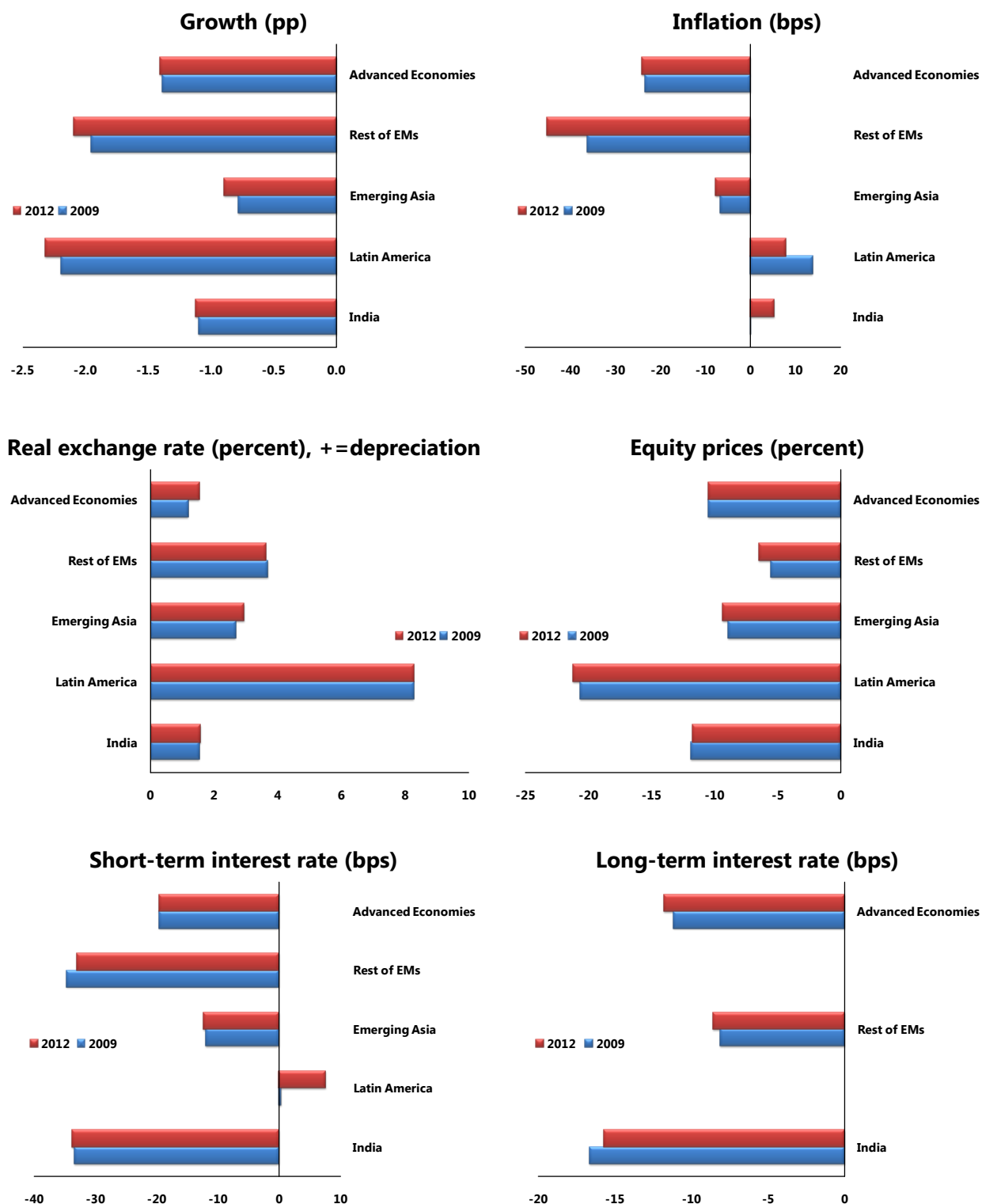


**7. Figure 2 focuses on the impact of a surge in global financial market volatility on a number of emerging market economies in Asia and in Latin America,** and compares it to the impact on advanced countries using time-varying financial weights. The results indicate that a one-unit shock to the financial stress index (FSI)<sup>4</sup>—implying greater financial market volatility— translates into lower overall economic growth globally, and creates disinflation pressures in most countries (apart from India and Latin America). For the case of India, such a shock generates an output loss of around 1.1 percentage points during the first year after the shock, operating through trade and financial linkages. In Latin American countries, the commodity-price channel conveys an even larger adverse impact on economic activity (as oil prices fall by about 20 percent in our framework), where growth falls by more than two percentage points after one year. A widening of the output gap and lower commodity prices is likely to moderate inflation slightly by 25 basis points in advanced countries (not in India though). Nevertheless, there are significant heterogeneities across countries in their inflation responses. Equity prices are likely to fall by 10–20 percent, reflecting increased risk aversion; while the real exchange rate would depreciate to different degrees across countries (the impact on India is relatively small due to its historically-high inflation). Moreover, in most countries the term-premium (long-term interest rate minus the short-term interest rate) increases in response to a surge in global financial market volatility. Since the GVAR framework takes into account interlinkages between countries, we can also see the spillback effects on AMs from financial shocks (see the top left chart of Figure 2). Finally, the magnitude of impulse responses is generally higher when one uses the 2012 financial weights as opposed to the 2009 exposures, reflecting the impact of increased cross-country financial flows during periods of UMP program implementation in advanced economies.

**8. The key findings of this chapter are as follows:**

- We confirm Rey's (2013) view that there is a global financial cycle in capital flows and asset prices, as derived from our GVAR modeling framework.
- We show that global financial market volatility (e.g. induced by monetary policy normalization uncertainty in advanced economies) has significant spillovers to emerging market economies (operating through trade and financial linkages, global liquidity and portfolio rebalancing channels).
- We observe that there are heterogeneities across countries in their responses to a surge in global financial market volatility. This would reflect the scale of EMs' trade and financial exposures to AMs, their individual cyclical positions, and their internal/external imbalances.
- Consistent with Rajan (2014), we conclude that a prolonged term-premium compression raises financial stability concerns as the magnitude of financial spillovers has become larger over time, while asset prices and interest rates have become more correlated globally during the period of unprecedented monetary easing by advanced economies (see Figure 2).

<sup>4</sup> One unit of FSI is equivalent to one standard deviation. This index measures price movements relative to trend, with a historical average value of zero (implying neutral financial market conditions). The magnitude of the shock is comparable to the 2002 episode of market volatility in AMs and is much smaller than the GFC shock.

**Figure 2. Responses of Key Variables to Global Financial Market Volatility Shocks**

Note: Depicts change in macroeconomic/financial variables of a given country/region after one year associated with a one unit positive shock to an index of financial stress (FSI), implying an increase in global financial market volatility. Financial weights in 2009 and 2012 are used. U.S. dollar is the numeraire.

- We argue that strong fundamentals and sound policy frameworks per se are not enough to isolate countries from an increase in global financial market volatility. This is particularly the case where there is a sudden adjustment of expectations triggered by monetary policy normalization uncertainty in advanced economies. This argument is supported by the impulse responses in Figure 3, where no country (neither AMs nor EMs) appears immune from the impact of a surge in global financial market volatility.
- There are also significant 'spillbacks' to advanced countries from financial shocks affecting EMs. We confirm that slowing growth in the rest of the world would weigh on advanced countries' recovery. It is therefore very much in the source countries own interest to ascertain that financial stress is contained when tightening their monetary policy stances.

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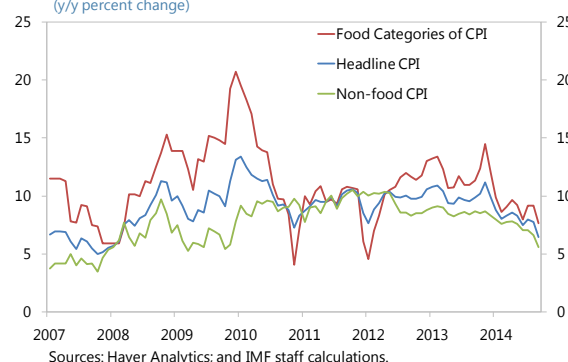
# INDIA'S FOOD INFLATION: CAUSES AND CONSEQUENCES<sup>1</sup>

*Food inflation has often been singled out as a key driver of India's high and persistent inflation. India's food inflation developments over the past decade appear to have reflected demand pressures (driven by strong private consumption growth), which have often outpaced supply of key food commodities. Therefore, despite recent moderation, India's food inflation pressures are likely to re-emerge as economic growth picks up. Supply side measures that will contain food inflation pressures on a durable basis remain critical to provide a robust foundation for adopting a low-inflation objective.*

## 1. Inflation is a key macroeconomic

**challenge facing India.** Elevated inflation coinciding with the recent growth slowdown has distinguished India from other major emerging market economies. A number of factors have caused high Indian inflation: food inflation feeding quickly into wages and core inflation; entrenched inflation expectations; cost-push shocks from binding sector-specific supply constraints (particularly in agriculture, energy and transportation); and pass-through from rupee depreciation.

**India: Headline and Food Inflation**  
(y/y percent change)

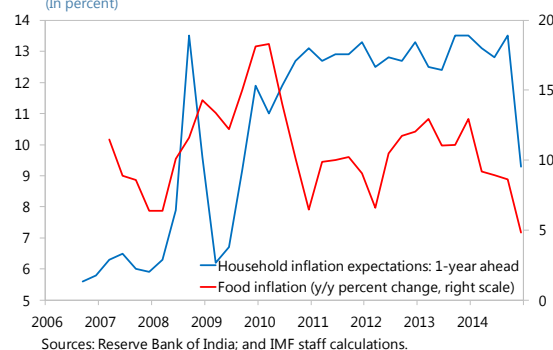


## 2. Food inflation has often been singled out as a key driver of India's high and persistent

**inflation.** High food inflation and its prominence in shaping wage setting and in forming inflation expectations are key features of Indian inflation. Food inflation, therefore, has had a non-trivial impact on aggregate retail inflation (headline consumer price inflation) in India, presenting a challenge for monetary policy management. The importance of food inflation in shaping inflation dynamics in India is due to the following factors (see also Anand and others, 2014):

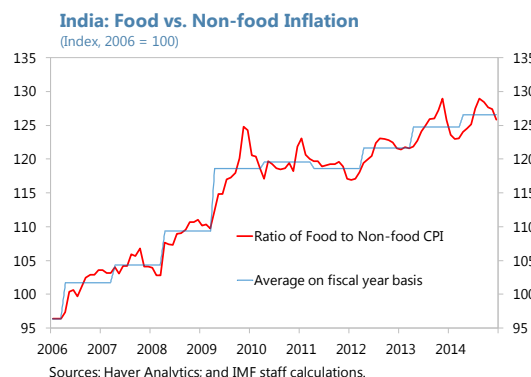
- High share of food expenditure in total household expenditure and the correspondingly high weight of food in the consumer price index (CPI) basket (49.7 percent);
- Inflation expectations are largely anchored by food inflation; and
- Wage indexation to consumer price inflation and thereby indirectly to food inflation.

**India: Food Inflation and Inflation Expectations**  
(in percent)

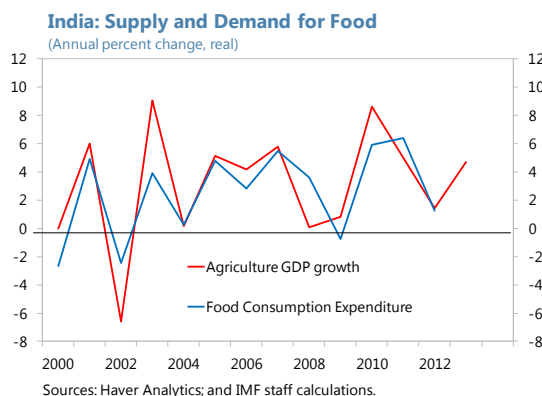
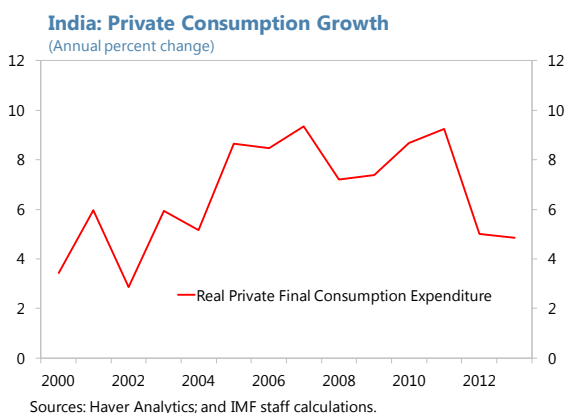
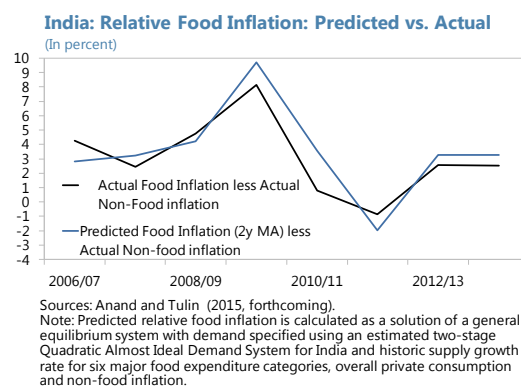


<sup>1</sup> Prepared by Volodymyr Tulin.

**3. Food inflation has exceeded non-food inflation by about 3½ percentage points on average during 2006/07–2013/14, thus contributing directly about 1¾ percentage points on average to headline CPI inflation.** Furthermore, through its second-round effects on core inflation, food inflation added to inflationary pressures. Growth in food inflation outpaced non-food inflation by almost 30 percentage points during 2006–10, exceeding non-food inflation by an average of almost 7½ percentage points per year during this period. However, since 2010, relative food prices staged a relatively moderate gain. In turn, non-food inflation picked up, averaging 9½ percent during 2010–13, a full 3 percentage points higher than the average of 6½ percent recorded during 2006–09. Thus, even as relative food prices rose only moderately during 2010–14, headline inflation remained high, with emerging entrenched inflation expectations, and firming of the food-nonfood inflation spiral (with food inflation feeding quickly into wages and core inflation).

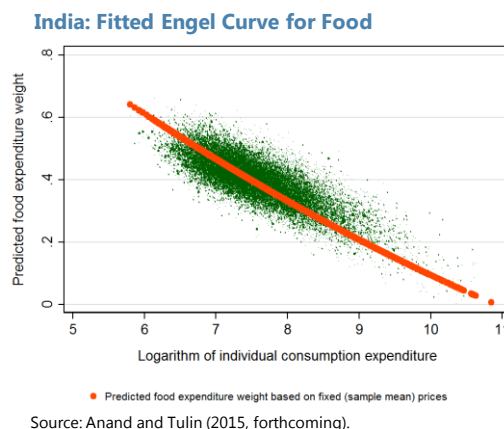


**4. Domestic food demand and supply factors underpin India's food price dynamics.** As India's food imports account for only about 1 percent of GDP, a large part of which is edible oil, relative food prices (food versus non-food prices) play a key role in equilibrating India's food demand and domestic supply. Acceleration of India's economic growth during 2003–11 to an average of about 8¼ percent (up from an average of just below 6 percent recorded during the preceding decade) was accompanied by an even stronger pickup in the growth of private consumption. At the same time, average agricultural GDP growth remained essentially unchanged at about 3¼ percent per year, resulting in excess demand for food, giving rise to relative food-price inflation.



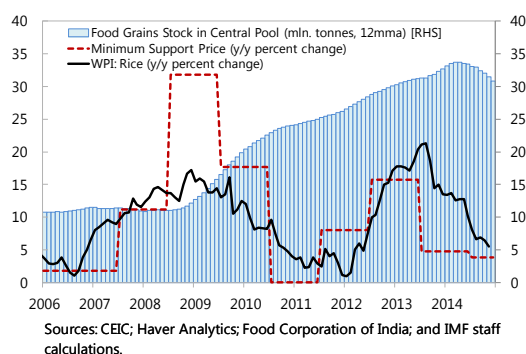


**5. As Indian economic growth picks up, food demand pressures are likely to re-emerge.** Analysis of Indian household demand patterns using a system of estimated demand equations suggests that relative food price pressures are likely to re-emerge as economic growth picks up. An estimated sample average household food budget expenditure elasticity of 0.64 implies that if food supply growth rates stay near their 10-year historic averages, then relative food price pressures will likely reappear when annual private consumption growth exceeds five percent.<sup>2</sup>

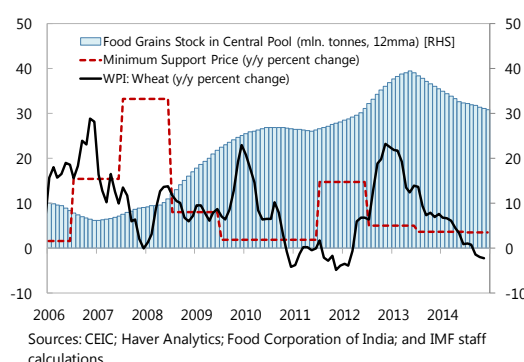


**6. Recent steps to contain food inflation will help in the short run, until durable measures to increase food supply are in place.** During the fiscal year 2014/15, the Government of India took several steps to rein in food inflation. Specifically, the rise of minimum support prices for key agricultural commodities, wheat and rice in particular, were set at low single digits. Additionally, the release of food grains from the Central Pool into the market, and adjustment of the buffers norms of these foodgrains to levels significantly below prevailing actual stocks, were announced. These measures have helped lower cereal (rice and wheat) inflation. Nonetheless, going forward, as excess demand will likely re-emerge, a durable increase in supply would be required to keep food inflation in check.

**Rice: Prices and Central Pool Stocks**



**Wheat: Prices and Central Pool Stocks**



**7. Demand pressures will remain strong for high-value foods, such as dairy products and animal-based proteins.** With rising incomes, food consumption typically shifts away from simple starchy plant-dominate diets towards more nutritious and high-value foods that include a range of dairy products, vegetables and fruits, and especially meat. Food expenditure elasticity estimates for animal-based proteins as well as dairy products suggest that growth of demand for such products will remain about 1.5–1.7 times the demand growth for cereals and pulses.

<sup>2</sup> The analysis is based on data on household food expenditure and consumption patterns taken from the India's household survey database (NSSO 68th round for 2011/12).



**Food Expenditure Elasticities: Relative to Total Household Expenditure**  
(weighted by sample actual household expenditures)

|   |      | Relative to pulses |
|---|------|--------------------|
| Egg, fish and meat                                  | 0.59 | 1.52               |
| Milk and milk products                              | 0.65 | 1.65               |
| Cereals and products                                | 0.47 | 0.59               |
| Pulses and products                                 | 0.39 | 1.00               |
| Vegetables and fruits                               | 0.48 | 1.23               |
| Other (oils and fats, sugar, condiments and spices) | 0.46 | 1.18               |

Source: IMF staff estimates.

**8. High-expenditure-elasticity food products have also experienced relatively higher supply growth rates, which if sustained would help contain food inflation.**

Estimates of domestic supply growth over the past decade suggest that products facing relatively higher demand growth have also seen relatively higher supply growth. For example, the growth rate of domestic supply of cereals has been about half of that of animal-based proteins. Therefore, if relatively higher supply growth can be sustained going forward, this will help contain relative food-price pressures associated with income growth.

**Average Growth in Domestic Supply**  
(in percent per year)

|                        | 2005/06 - 2012/13 |
|------------------------|-------------------|
| Egg, fish and meat     | 4.8%              |
| Milk and milk products | 4.6%              |
| Cereals and products   | 2.6%              |
| Pulses and products    | 5.0%              |
| Vegetables and fruits  | 4.8%              |
| Other                  | 3.6%              |

Source: CEIC; and IMF staff estimates.

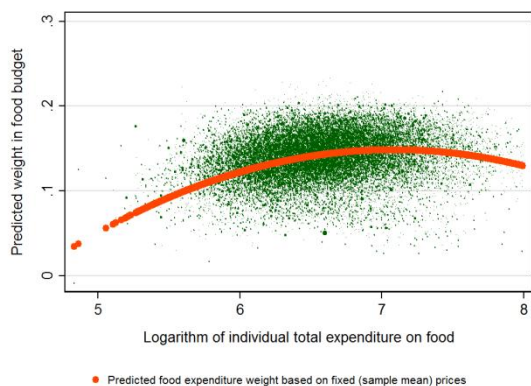
**9. In the absence of a stronger food supply growth response, relative food inflation can contribute about 1¼ percentage points to headline inflation annually.** Indian food inflation is likely to exceed non-food inflation by 2½–3 percentage points per year, assuming private consumption growth picks up to 7 percent per year and food supply growing at historic rates. Therefore, the suitability of a long-term inflation target of 4 percent—as recommended by Patel Committee Report—depends on enhancing food supply, agricultural market-based pricing, and reducing price distortions. As well, our simulation analysis indicates that in light of India's supply-side vulnerabilities, the recommended band around the inflation target of +/- 2 percent is broadly appropriate. Finally, at the current juncture where relative food prices do not appear to be a key driver of headline inflation, ensuring a durable reduction in headline inflation requires a continued tight monetary stance to lower core inflation, and to reduce inflation expectations and to anchor them at a lower level.

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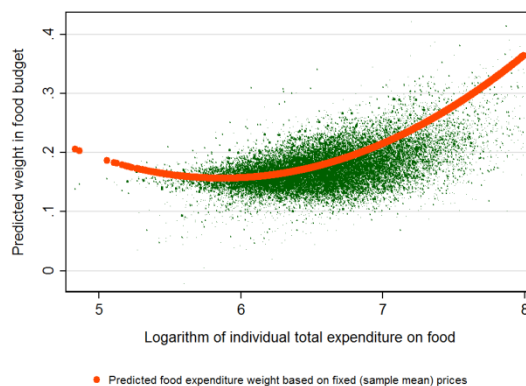
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- Ganesh-Kumar A., R. Mehta, H. Pullabhotla, S. K. Prasad, K. Ganguly, and A. Gulati, 2012, "Demand and Supply of Cereals in India," IFPRI Discussion Paper 01158, January 2012.

## Appendix. India: Fitted Engel Curves for Key Food Expenditure Categories

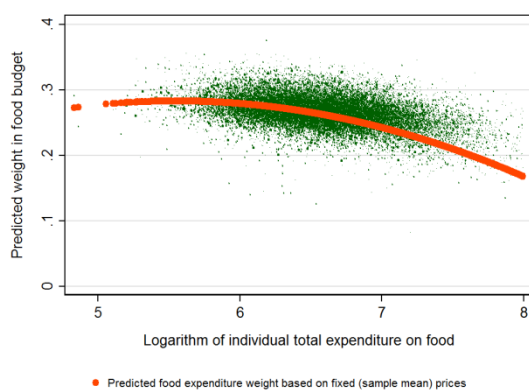
### Egg, Fish, and Meat



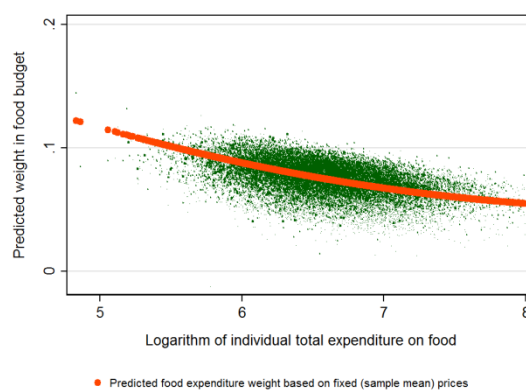
### Milk and Products



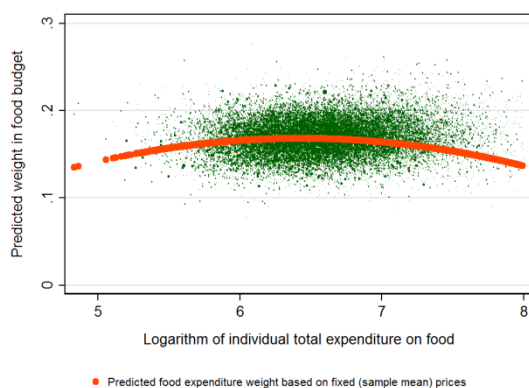
### Cereals



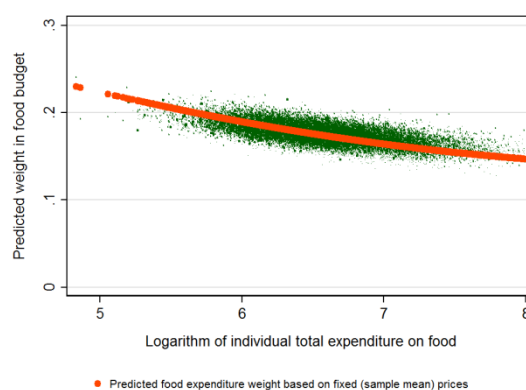
### Pulses



### Vegetables and Fruits



### Other Products



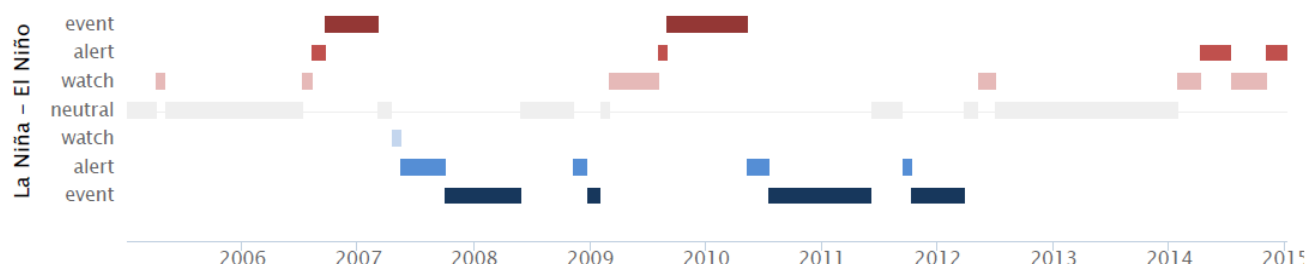
Source: Anand and Tulin (2015, forthcoming).

# EL NIÑO WEATHER SHOCKS AND THEIR IMPACT ON INDIA<sup>1</sup>

*This chapter employs a dynamic multi-country framework to analyze the macroeconomic transmission of El Niño weather shocks to India. The results show that India faces a short-lived fall in economic activity, as well as a moderate inflationary pressure, as a consequence of an El Niño shock.*

**1. According to the Australian Bureau of Meteorology, there is a 70 percent chance of an El Niño weather event developing in the first quarter of 2015 (Figure 1).** El Niño is a band of above-average ocean surface temperatures that periodically (every 3–7 years) develops off the Pacific coast of South America, lasts about two years, and causes major climatological change around the world (Figure 2). El Niño conditions usually coincide with a period of weak monsoon and rising temperatures in India, which adversely affects India's agricultural sector and increases domestic food prices.<sup>2</sup>

**Figure 1. El Niño Southern Oscillation (ENSO) Status (January-2005 to January-2015)**



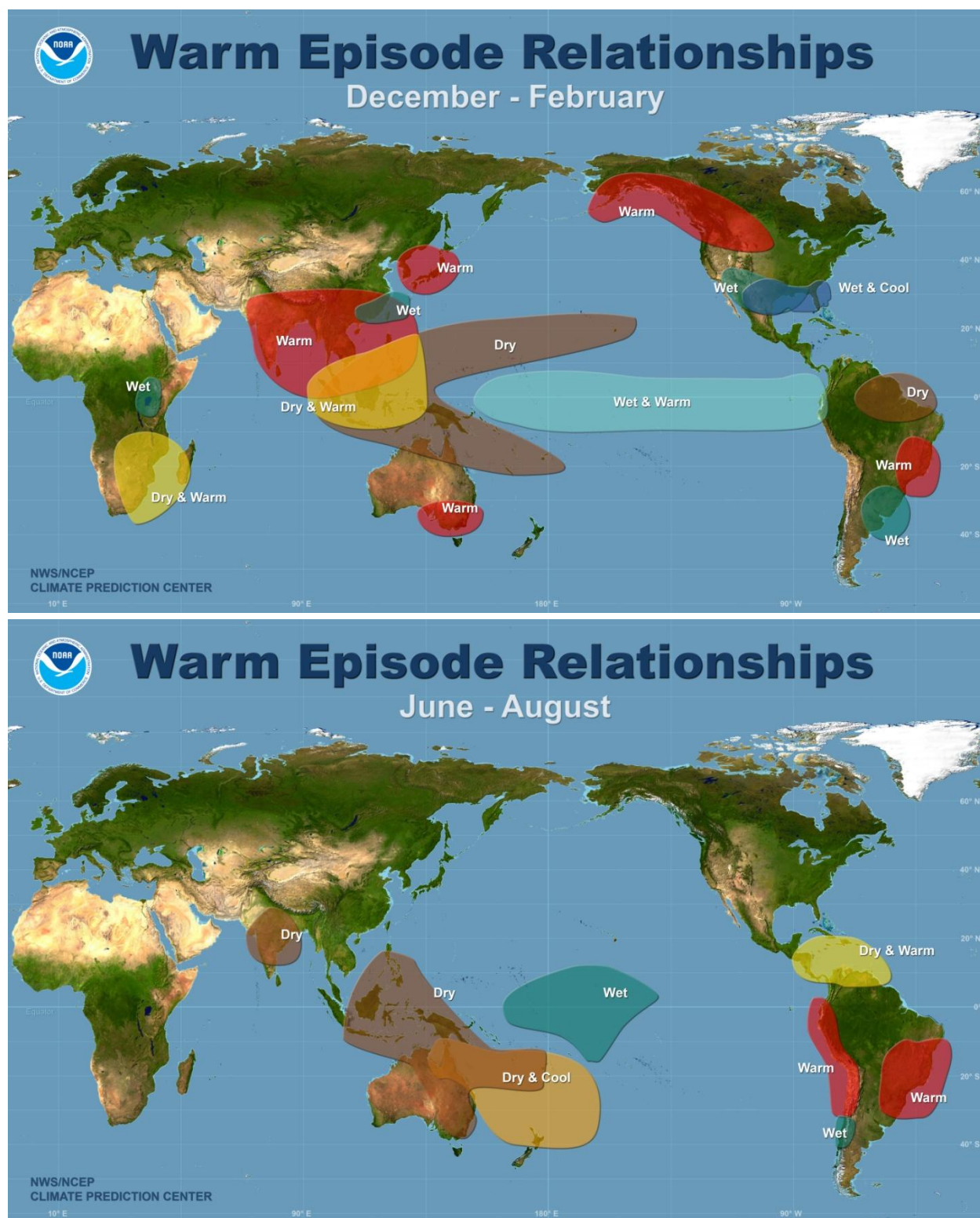
Source: Australian Bureau of Meteorology.

Notes: The ENSO Tracker indicates the likelihood of an El Niño (red-colored) or La Niña (blue-colored) event occurring. The Southern Oscillation Index (SOI) measures air-pressure differentials (between Tahiti and Darwin). Deviations of the SOI from their historical averages indicate the presence of El Niño (warm phase of the Southern Oscillation cycle) or La Niña (cold phase of the Southern Oscillation cycle) events.

<sup>1</sup> Prepared by Mehdi Raissi and Paul Cashin.

<sup>2</sup> It should be noted that an El Niño year has not always resulted in weak monsoons in India. Since 1980 there have been nine El Niño events, and only six drought situations experienced in India.

Figure 2. Global Climatological Effects of El Niño



Source: National Atmospheric and Oceanic Administration's (NOAA) Climate Prediction Center.

**2. This chapter analyzes the macroeconomic transmission of El Niño weather shocks to India in a dynamic multi-country framework**—taking into account the economic interlinkages and spillovers that exist between different regions, and controlling for macroeconomic determinants of energy and non-fuel commodities. It models El Niño as a causal variable and conducts structural impulse response analysis in response to a fully-identified weather shock<sup>3</sup> and for a range of macroeconomic variables (including real output, inflation, real oil and non-fuel commodity prices).

**3. A dynamic multi-country approach is used for the analysis of the international transmission of El Niño shocks**—based on the global VAR (GVAR) model of Cashin et al. (2014).<sup>4</sup> The framework comprises 21 region-specific models (among which is a European region). These individual models are solved in a global setting where core macroeconomic variables of each economy are related to corresponding foreign variables (constructed exclusively to capture each country's bilateral trade structure). The model has real and financial variables: real GDP, inflation, the real equity price, the real exchange rate, short and long-term interest rates, commodity prices, and a measure of El Niño intensity. All data are quarterly in frequency, for the period 1979Q2 to 2013Q1.

**4. Economic growth in India is moderately affected by El Niño weather events.** Such an extreme weather condition can constrain the supply of rain-driven agricultural commodities; and reduce agricultural output, construction, and services activities. Results from the Global VAR model indicate that India's GDP growth would fall by 0.2% after the first quarter following an El Niño shock. The declining share of agricultural output in Indian GDP over time acts as a mitigating factor—the share of India's primary sector in GDP was 28% in 1997 and has dropped to 20% in 2013. The increase in the contribution of Rabi crops (sown in winter and harvested in the spring) and the decline in the contribution of Kharif crops (sown in the rainy monsoon season) over the past few decades is another mitigating factor, as sowing of Rabi crops is not “directly” affected by the monsoon. Moreover, due to more developed agricultural markets and policies, rising agriculture yield, and climatological early warning systems, farmers are better able to switch to more drought-resistant and short-duration crops (with government assistance).

**5. The El Niño weather phenomenon can significantly affect global commodity prices.** The higher temperatures and droughts following an El Niño event, particularly in Asia and Pacific countries, not only increases the prices of non-fuel commodities (by 5¼ percent after four quarters), but also leads to higher demand for coal and crude oil as lower output is generated from both thermal power plants and hydroelectric dams, thereby driving their prices up. For example, El Niño causes hot and dry summers in southeast Australia; increases the frequency and severity of bush fires; reduces wheat exports, and as a result drives up global wheat prices. El Niño-induced drought in Indonesia pushes up world prices for coffee, cocoa, and palm oil. Furthermore, mining equipment in Indonesia relies heavily on hydropower; with deficient rain and low river currents, less nickel (which

<sup>3</sup> El Niño episodes are defined as sustained negative Southern Oscillation Index (SOI) values below a certain threshold.

<sup>4</sup> See Chudik and Pesaran (2014) for a survey on theory and practice of GVAR modeling.



is used to strengthen steel) can be produced by the world's top exporter of nickel, pushing up global metal prices.

**6. Accordingly, an inflation “jump” is observed in India (60 basis points after three quarters), following an El Niño weather event.** This is due to a high weight placed on food in the CPI basket of India (47.6 percent). Note that production of perishables (i.e. fruits and vegetables) in India is affected less by monsoon than food grains, while the prices of fruits and vegetables are relatively more volatile. Moreover, inflation in food grains has historically been affected by government procurement policies and administered minimum support prices in agriculture. During the last decade, inflation increased sharply after the 2009 drought in India, however, in the previous episodes of drought in 2002 and 2004, inflation remained subdued. In 2009, drought conditions were accompanied by a steep increase in minimum support prices, resulting in high food grain inflation and consequently higher CPI inflation.<sup>5</sup> Overall, government food policies, alternate monetary regimes, water reservoir levels, and excess food grain stocks could somewhat offset the inflationary impact on India of El Niño shocks.

**7. Given these findings, macroeconomic policy formulation in India should take into consideration the likelihood and effects of El Niño episodes.** The sensitivity of growth, inflation, and commodity prices to El Niño developments raises the question of which policies and institutions would help ameliorate the adverse effects of such shocks. These measures could include changes in the cropping pattern and input use (e.g. seeds of quicker-maturing crop varieties), rainwater conservation, judicious release of food grain stocks, and changes in imports policies/quantities. These measures would all help to bolster agricultural production in low-rainfall El Niño years. On the macroeconomic policy side, any uptick in inflation arising from El Niño shocks should continue to be monitored closely, and the monetary policy stance adapted as necessary to avoid the emergence of second-round inflation effects, and to help anchor inflation expectations.

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<sup>5</sup> During the years 2002, 2004 and 2009 (all years of poor monsoons), Indian CPI inflation averaged 4.1 percent, 3.9 percent, and 12.3 percent, respectively.

# MONETARY POLICY IN INDIA: TRANSMISSION TO BANK INTEREST RATES<sup>1</sup>

*This chapter provides new evidence on the effectiveness of monetary policy transmission in India, focusing on the interest rate and credit channels of transmission. The analysis finds evidence of significant, albeit slow, pass-through of policy rate changes to bank interest rates in India. There is evidence of asymmetric adjustment to monetary policy: deposit rates do not adjust upwards in response to monetary tightening but do adjust downwards to loosening, while the lending rate adjusts more quickly to monetary tightening than to loosening.*

**1. Monetary policy transmission in India is often thought to be characterized by long and uncertain time lags** (Mohanty 2014). This hinders policy making by making it difficult to predict the effects of policy actions on the economy. The path for a strengthened monetary policy framework in India has been laid out recently in the Patel Committee report to the Reserve Bank of India (RBI).<sup>2</sup> Concerns about transmission are not unique to India, as the effectiveness of monetary policy transmission in developing countries as a whole has recently come into question. Mishra et al. (2013) survey the empirical literature and find that transmission is weak and unreliable in developing countries and Mishra et al. (2014) find large variation in the response of bank lending rates to monetary policy shocks across countries, with weaker transmission in developing countries.

**2. The analysis in this chapter focuses on the interest rate and credit channels of monetary transmission, as these are the dominant ones in India.** The following three questions are studied using a two-step Vector Error Correction (VEC) model:

- (i) What is the extent of pass-through from changes in the monetary policy rate to deposit and lending rates of Indian banks?
- (ii) What is the speed of adjustment to policy rate changes?
- (iii) Is the response to tightening and loosening symmetric?

To answer these questions, the pass-through from monetary policy to bank interest rates is estimated in two steps: (1) from the monetary policy rate (repo rate) to the interbank market rate that is targeted by the monetary policy framework (weighted average call money rate (WACMR)), and then (2) from the target rate (WACMR) to bank interest rates (deposit and lending rates). There are several advantages to this stepwise estimation. First, the results from the first step indicate how well the operating framework is set up to control its target market rate. Second, the interpretation of relationships is clearer than it would be in a VEC model with multiple (three) cointegrating relationships.

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<sup>1</sup> Prepared by Sonali Das.

<sup>2</sup> Report to the Expert Committee to Revise and Strengthen the Monetary Policy Framework, January 21, 2014, [www.rbi.in/scripts/PublicationReportDetails.aspx?UrlPage=&ID=743](http://www.rbi.in/scripts/PublicationReportDetails.aspx?UrlPage=&ID=743).



**3. The data used in the analysis consists of monetary policy rates (repo rate and the reverse repo rate), data on injections under the Liquidity Adjustment Facility (*LA Fnetinj*), market rates (WACMR, three-month deposit rate, and the prime lending rate) and bank balance-sheet information. Each observation is a two-week period and the sample runs from end-March 2002 to end-October 2014. All variables used in the analysis are nonstationary ( $I(1)$ ).**

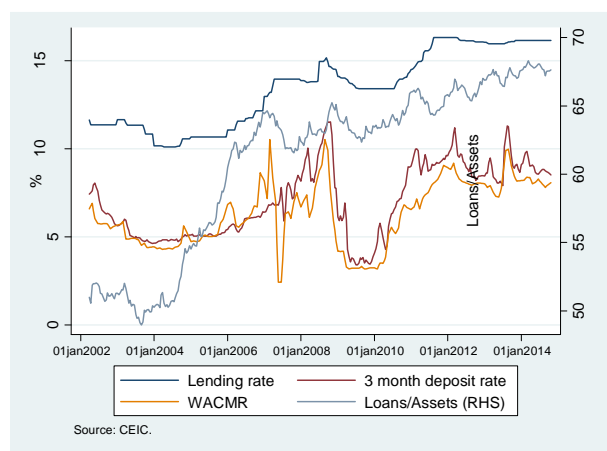
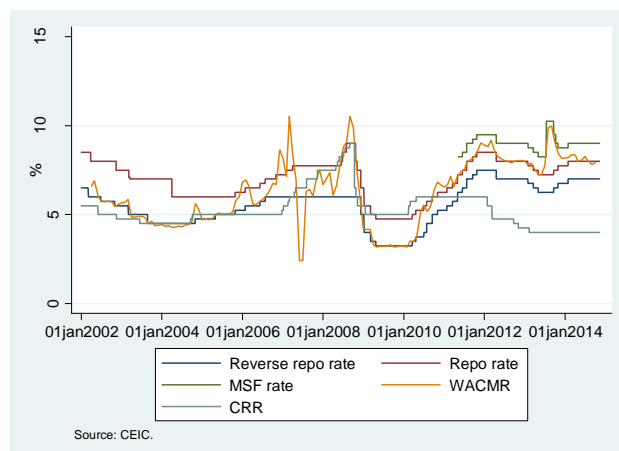
**Table 1. Descriptive Statistics**

|                            | mean | std dev | min   | max  |                       | mean | std dev | min  | max  |
|----------------------------|------|---------|-------|------|-----------------------|------|---------|------|------|
| Reverse repo rate          | 5.56 | 1.14    | 3.25  | 7.5  | WACMR                 | 6.30 | 1.82    | 2.42 | 10.5 |
| Repo rate                  | 6.99 | 1.09    | 4.75  | 9    | Deposit rate, 3-month | 7.03 | 2.05    | 3.4  | 11.5 |
| LAF net injection/NTDL (%) | 0.22 | 1.26    | -3.21 | 2.93 | Prime lending rate    | 13.4 | 2.12    | 10.1 | 16.3 |
| Cash reserve requirement   | 5.26 | 1.06    | 4     | 9    | Bank Securities/Loans | 52.0 | 15.6    | 36.9 | 85.7 |
| Statutory liquidity ratio  | 24.4 | 0.83    | 22    | 25   | Bank Loans/Assets     | 61.0 | 6.0     | 49.0 | 68.3 |

Source: RBI, CEIC; IMF staff calculations.

Note: 328 observations. NTDL refers to banks' net time and demand liabilities.

### Monetary Policy Rate and Bank Interest Rates



**4. The VEC estimation method is used due to the presence of cointegrating vectors in the variables.** In the first step, trace statistics suggest the presence of a cointegrating vector between the repo rate and the WACMR. In the second step, no cointegrating vector between the deposit rate and the lending rate is found, but test results indicate two cointegrating vectors between the WACMR, the deposit rate, and the lending rate.

#### Summary of Cointegration Test Results

| Variables                         | Maximum rank |
|-----------------------------------|--------------|
| WACMR, Repo rate                  | 1            |
| Lending rate, Deposit rate        | 0            |
| Lending rate, Deposit rate, WACMR | 2            |

Source: IMF staff estimates.

Note: Results from Johansen tests for cointegration, at 95% confidence level.

**5. Each step of the estimation has two stages,** estimating the long-run relationship (the cointegrating vector, equation *LR*) and then the short-run relationship from which the speed of adjustment is ascertained (equation *SR*).

**Step 1 – Pass-through to WACMR (target rate) from monetary policy**

$$(LR) \text{ WACMR}_t = \beta_0 + \beta_1 \text{RepoRate}_t + \varepsilon_t$$

$$(SR) \Delta \text{WACMR}_t = \alpha \text{ECT}_t + \sum_{k=1}^K \delta_{2k} \Delta \text{WACMR}_{t-k} + \delta_{3k} \Delta (\text{LAFnetinj} / \text{NTDL})_{t-k} + v_t$$

where the error correction term:

$$\text{ECT}_t = \text{WACMR}_{t-1} - \hat{\beta}_0 - \hat{\beta}_1 \text{RepoRate}_{t-1}$$

is the residual from the *LR* equation, which measures period *t-1* deviations from the long-run stationary relationship.

- The average elasticity of WACMR with respect to the repo rate is  $\eta = \beta_1 \frac{\text{mean}(\text{RepoRate})}{\text{mean}(\text{WACMR})}$ .
- $\alpha$  gives the share of the deviation from the long-run equilibrium that is closed each time period, thus representing the speed of adjustment.

**Step 2 – Pass-through to bank interest rates from WACMR**

$$(LR1) \text{ LendingRate}_t = \theta_{10} + \theta_{11} \text{WACMR}_t + \varepsilon_{1t}$$

$$(LR2) \text{ DepositRate}_t = \theta_{20} + \theta_{21} \text{WACMR}_t + \varepsilon_{2t}$$

$$(SR1) \Delta \text{LendingRate}_{it} = \alpha_1 \text{ECT1}_t + \alpha_2 \text{ECT2}_t + \sum_{k=1}^K (\delta_{3k} \Delta \text{LendingRate}_{it-k} + \delta_{4k} \Delta \text{WACMR}_{t-k} + \delta_{5k} \Delta \text{Loans/Assets}_{t-k}) + v_{it}^l$$

$$(SR2) \Delta \text{DepositRate}_{it} = \alpha_1 \text{ECT1}_t + \alpha_2 \text{ECT2}_t + \sum_{k=1}^K (\delta_{3k} \Delta \text{DepositRate}_{it-k} + \delta_{4k} \Delta \text{WACMR}_{t-k} + \delta_{5k} \Delta \text{Loans/Assets}_{t-k}) + v_{it}^d$$

where  $\text{ECT1}_t = \hat{\varepsilon}_{1t}$  and  $\text{ECT2}_t = \hat{\varepsilon}_{2t}$

**6. The analysis find significant pass-through from policy rate changes to bank interest rates.**

Over the two-steps of the analysis, the cumulative long-run elasticity of the deposit rate with respect to the repo rate is 1.58. This indicates that a 1 percentage point decrease in the repo rate leads to a 1.58 percentage point decrease in the deposit rate over time. Pass-through to the lending rate is partial—the cumulative long-run elasticity of the lending rate with respect to the repo rate is 0.43.

**7. Pass-through to deposit and lending rates is relatively slow and the deposit rate adjusts more quickly to monetary policy changes than does the lending rate.** In the first step of transmission, it takes 13 months for 80 percent of the pass-through from a change in the repo rate to the WACMR. Eighty percent of a change in the WACMR passes-through to the deposit rate in 9.5 months, and to the lending rate in 18.8 months (Table 2).

**Table 2. Speed of Adjustment: Number of Months Required to Complete 80% Pass-through of Repo Rate**

| <b>Lending Rate</b>    | Repo-<br>WACMR | WACMR-<br>Lending | Total 1/ |
|------------------------|----------------|-------------------|----------|
| Adjustment coefficient | -0.060         | -0.042            |          |
| Number of periods      | 26.0           | 37.5              | 63.5     |
| Number of months       | 13.0           | 18.8              | 32       |
| <b>Deposit Rate</b>    | Repo-<br>WACMR | WACMR-<br>Deposit | Total 1/ |
| Adjustment coefficient | -0.060         | -0.081            |          |
| Number of periods      | 26.0           | 19.1              | 45.1     |
| Number of months       | 13.0           | 9.5               | 23       |

Source: IMF staff estimates.

1/ Upper bound on time to achieve 80% of pass-through.

**8. There is evidence of asymmetry in the pass-through to bank interest rates.** The estimates of the speed of adjustment coefficients indicate that the lending rate adjusts more quickly to an increase in WACMR than to a decrease. In Table 3, the coefficient on ECT1 pos (lending) corresponds to a decrease in WACMR and the coefficient on ECT1 neg (lending) corresponds to an increase in WACMR. Similarly, the estimated speed of adjustment coefficients indicate that the deposit rate adjusts downwards when WACMR falls, but not upwards to a monetary tightening. The coefficient on ECT2 pos (deposit) corresponds to a decrease in WACMR, while the coefficient on ECT1 neg (deposit) corresponds to an increase in WACMR.

**Table 3. Bank Interest Rates and WACMR: Asymmetric SR VECM Results**

|   | <b>Lending rate</b>           |   | <b>Deposit rate</b>           |
|---|-------------------------------|---|-------------------------------|
|   | D.Lending rate<br>Full sample |   | D.Deposit rate<br>Full sample |
| ECT1 pos (lending)                                | -0.034<br>(0.022)             | ECT1 (lending)                                    | 0.006<br>(0.025)              |
| ECT1 neg (lending)                                | -0.041***<br>(0.009)          |   |                               |
| ECT2 (deposit)                                    | 0.009<br>(0.008)              | ECT2 pos (deposit)                                | -0.137***<br>(0.033)          |
|   |                               | ECT2 neg (deposit)                                | -0.024<br>(0.033)             |
| Observations                                      | 324                           | Observations                                      | 324                           |
| F test: lending ECT<br>asymmetry ( <i>p-val</i> ) | 0.76                          | F test: deposit ECT<br>asymmetry ( <i>p-val</i> ) | 0.04                          |

Source: IMF staff estimates.

Notes: Standard errors in parentheses, \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Lags of differenced WACMR, lending rate, deposit rate, loans/assets, and constant not shown.

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## A NEW FISCAL RULE FOR INDIA?<sup>1</sup>

*India's public finances continue to be a concern and reining in fiscal deficits is a key policy priority. This chapter reviews India's experience with fiscal rules and suggests considerations in designing successor fiscal frameworks.*

1. **In 2003, India adopted a rules-based fiscal framework, the Fiscal Responsibility and Budget Management Act (FRBMA), at the central government level.** The Act's stated objective was to "ensure inter-generational equity in fiscal management and long-term macro-economic stability," in particular to engender fiscal sustainability through limits on central government debt and deficits. The central government fiscal responsibility law was accompanied by similar legislation in most states, as states were given incentives in the context of the Twelfth Finance Commission to adhere to fiscal responsibility laws at the sub-national level.
2. **To offset the effect of the global financial crisis on the economy, the FRBMA was placed in abeyance in 2008 to allow for countercyclical fiscal support.** Such support included discretionary fiscal stimulus (of around 3 percent of GDP) as well as full operation of automatic stabilizers in the form of the slowdown in revenues due to the deep crisis. The FRBMA targets were set in terms of budget balance rules and did not have the flexibility to allow for such countercyclical policy response. Subsequently, in 2013, the authorities modified the FRBM implementation rules to re-establish a deficit reduction path aiming to achieve the original medium-term target of 3 percent of GDP (authorities' definition, which treats proceeds from sales of assets as revenues) by 2016/17, rather than the original deadline of 2008/09.<sup>2</sup>
3. **This chapter is organized as follows.** The next section describes international experiences with fiscal rules. The following section outlines the main features of the FRBMA and provides an assessment, followed by a discussion on possible modifications in a successor arrangement. As Wyplosz (2012) notes, while fiscal rules like FRBMA are neither necessary nor sufficient to achieve fiscal discipline, evidence suggests that "they can and do help." One promising option is to introduce a more flexible budget balance rule, accompanied by a nominal expenditure growth limit to introduce a degree of countercyclicality. A fiscal council would also add credibility to countries' budget processes by depoliticizing macroeconomic forecasts.

### International Experience on Fiscal Rules

4. **Fiscal rules have been put in place in a number of countries to anchor medium-term fiscal policy and strengthen public finances.** A fiscal rule is defined as a permanent constraint on

<sup>1</sup> Prepared by Sonali Jain-Chandra and Thomas Richardson.

<sup>2</sup> See Ministry of Finance (2004), and FRBM (Amendment) Rules, 2013.

fiscal policy through simple numerical limits on budgetary aggregates (Kopits and Symansky 1998). They are formulated in a number of ways, with the main objective to promote fiscal sustainability, including: *budget balance rules* which can be defined on the overall balance or the structural balance; *debt rules* which set a target for public debt specifically; *expenditure rules*; and *revenue rules* (IMF 2009).

**5. Different fiscal rules trade off the extent of debt stabilization with the degree of countercyclical flexibility afforded.**

Rules anchored on a target formulated in structural or cyclically-adjusted terms offer the most room for countercyclical fiscal policy in response to economic shocks. Many advanced economies with fiscal rules define them over the cycle. Expenditure rules allow some room for countercyclical policy as revenues are not included in the target and can respond freely to the economic cycle. They are thought to be easier to monitor, and their countercyclical features are more implementable in cases, like in many Emerging Market and Developing Economies (EMDEs), where it is difficult to identify the economic cycle (Cordes et al. 2014). On the other hand, debt rules place more emphasis on reaching an explicit debt target, with little room for countercyclical policy response. The appropriateness of different rules depends on the specific characteristics of a particular economy, such as the extent of public indebtedness, openness, vulnerability to shocks, population aging among other considerations.

| Table 1. Properties of Different Types of Fiscal Rules Against Key Objectives 1/  |                     |                        |                 |
|---|---------------------|------------------------|-----------------|
| Type of Fiscal Rule   | Objectives          |                        |                 |
|   | Debt Sustainability | Economic Stabilization | Government Size |
| Overall Balance   | ++                  | -                      | 0               |
| Primary Balance   | +                   | -                      | 0               |
| Cyclically Adjusted Balance   | ++                  | ++                     | 0               |
| Balanced Budget Over the Cycle  | ++                  | +++                    | 0               |
| Public Debt-to-GDP Ratio  | +++                 | -                      | -               |
| Expenditure   | +                   | ++                     | ++              |
| Revenue   |                     |                        |                 |
| Revenue Ceilings  | -                   | -                      | ++              |
| Revenue Floors  | +                   | +                      | -               |
| Limits on Revenue Windfalls   | +                   | ++                     | ++              |
| 1/Positive signs (+) indicate stronger property, negative signs (-) indicate weaker property, zeros (0) indicate neutral property with regard to objective. |                     |                        |                 |
| Source: IMF (2009), "Fiscal Rules—Anchoring Expectations for Sustainable Public Finances," IMF Policy Paper.  |                     |                        |                 |

**6. Recent IMF research suggests that there is increased international reliance on fiscal rules, particularly to restore fiscal space used up by crisis-related stimulus plans.** Analysis based on a new database of 80 countries suggests that the use of fiscal rules has proliferated. The number of rules has surged from around 5 in 1990 to 76 by 2012 (Schaechter et al. 2012). Many countries also combine different rules to achieve multiple objectives. The use of fiscal rules has been empirically associated with improved fiscal performance, including stronger cyclically-adjusted primary balances.

**7. Fiscal rules have evolved over time to encompass multiple desirable objectives.** IMF studies also find that the “next-generation” fiscal rules have become increasingly complex as they combine the objectives of fiscal sustainability with the need for flexibility in policy response to economic shocks. These multiple objectives thereby create new challenges for implementation, communication, and monitoring (Schaechter et al. 2012). As a result, these rules are often accompanied by institutional arrangements such as fiscal councils.

### **Assessment of the Indian Experience**

**8. India adopted the FRBMA in 2003 in response to high and increasing public debt and persistently-large deficits.** The Act required the government to commit to multi-year fiscal targets, as well as report and publish deficit outcomes (which has been done). The government is required to make public a Medium-Term Fiscal Policy Statement, a Fiscal Policy Strategy Statement, and a Macroeconomic Framework Statement. These documents are meant to improve transparency and ensure the consistency of current and capital budget allocations by publishing rolling 3-year plans, though their effectiveness has been questioned (IMF 2014).

**9. The FRBMA specified targets for various formulations of the budget deficit and implementation were initiated in the 2004/05 Budget.** Numerical rules were as follows:

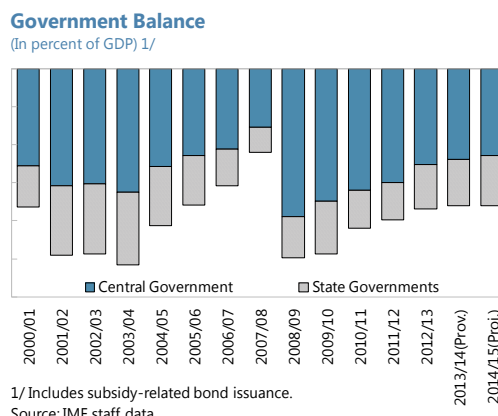
- A medium-term “revenue” deficit target of zero, to be achieved by March 2008 at the central government level.<sup>3</sup>
- The fiscal deficit in 2008/09 was to be below 3 percent of GDP.
- Rules under the 2003 FRBM Act additionally required that the revenue deficit must come down by 0.5 percentage points of GDP every year, and the fiscal deficit must come down by 0.3 percentage points of GDP every year.
- Limit of 0.5 percent of GDP on the incremental amount of guarantees provided by the central government.
- Annual initial limit of debt accumulations of 9 percent of GDP to be reduced by one percentage point a year.
- Within any given year, the Finance Minister was required to take corrective actions (notifying parliament of same) in the event of revenue shortfalls, or if 45 percent of the estimated full-year budget deficit was exceeded during the first half.

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<sup>3</sup> Indian fiscal definitions differ from international standards, though mapping from one to the other is possible. The “revenue” deficit concept essentially refers to recurrent revenue minus recurrent spending.

###### 10. Implementation of the FRBMA was followed by a sustained decline in the fiscal deficit.

The central government fiscal deficit declined to 3.1 percent of GDP in 2007/08 from 5.1 percent of GDP in 2004/05. About two thirds of the improvement in the central government deficit position stemmed from stronger revenues driven by rapid economic growth as well as better tax administration. The remainder of the fiscal adjustment came from declining interest payments as government debt levels began to fall (Simone and Topalova 2009).



**11. However, the FRBMA was put in abeyance at the onset of the 2008 global financial crisis as it did not provide room for countercyclical fiscal policy.** The FRBMA allowed breaches of the targets on exceptional grounds as specified by the central government, but it did not have built-in flexibility. Nor was the approach to corrective actions carefully spelled out. In the event, the deficit widened from 3.1 percent in 2007/08 to 7.8 percent of GDP in 2008/09 due to discretionary stimulus as well as a sharp deceleration of tax revenues in the aftermath of the crisis.

**12. Since then, fiscal space has not been rebuilt fully as the 2009 stimulus has been only partially unwound.** Also, costly welfare schemes, in particular the expansion of the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) and the introduction of food subsidies (associated with the Food Security Act of 2013) has meant that fiscal consolidation has been slow. The fiscal impulse has been only slightly negative in the years following the 2008 crisis.

**13. In 2012/13 the authorities re-established a fiscal adjustment path under amendments to the implementation rules for FRBM.** The amended rules reset the deadline for reaching a 3 percent of GDP central government deficit at end-2016/17, and called for a more rapid reduction in the deficit than was required by the original FRBMA.<sup>4</sup> Upon taking office in June 2014, the newly-elected government reaffirmed this adjustment path by specifying deficit targets of 4.1 percent for 2014/15, 3.6 percent for 2015/16, and 3.0 percent for 2016/17.

## Proposal for a Successor Fiscal Rule

**14. As fiscal consolidation remains an important priority, potential further policy changes can strengthen the fiscal framework.** These include the adoption of a more flexible fiscal rule that can anchor macroeconomic policies, and comprehensive tax reform (including the early

<sup>4</sup> FRBM (Amendment) Rules (2013).



implementation of the goods and services Tax) which can help secure additional revenues to finance productivity-enhancing and social expenditure. This section will focus on possible modifications to the existing fiscal rule which can reduce procyclicality in fiscal policy and help build fiscal buffers during favorable cyclical positions (Bova et al. 2014). In addition to modifications enhancing flexibility, any strengthened fiscal rule should have incentives to prevent fiscal slippages, including enhanced accountability (IMF 2014).

**15. The previous fiscal target—the overall fiscal balance—did not offer sufficient flexibility to deal with shocks and led to procyclicality.** It also included imprecisely-defined escape clauses and limited accountability in the event of missed targets. In many instances over the implementation period of the FRBMA, fiscal policy was procyclical. One option is to adopt a structural balance rule to offset procyclicality and leave room to respond to economic shocks. Concerns about procyclicality have led other countries to specify targets that include adjustments for the cyclical position of the economy. At the same time, despite its merits, introducing a structural balance rule would also raise a number of implementation (technical and procedural) and communication challenges.<sup>5</sup> For example, estimation of the output gap in India, as in many EMDEs, has become difficult, with misidentification of the size and sign of the gap implying a potential policy mistake under a structural balance rule.

**16. An alternative would be to introduce a cap on expenditure growth to complement the new target on the fiscal deficit.** The cap on nominal expenditure growth would help contain spending, especially during periods of economic boom (Cordes et al. 2014), when spending pressures are likely to be significant. The formulation of an expenditure rule should be net of capital expenditure, to preserve such expenditure (akin to a “golden rule”), thus covering only current expenditure. An expenditure rule would allow for a countercyclical response, as automatic stabilizers would operate on the revenue side, as taxes would fall in the event of an economic downturn. Conversely, during economic booms, expenditure growth will be limited by the rule, leading to increased countercyclicality.

**17. In addition to increased flexibility in the targeted balance, a strengthened framework should be supported by other features to enhance credibility and accountability.** These include increased transparency, fiscal councils, enforceability and sanctions for non-compliance, and narrower escape clauses. Specifically:

- Tighter escape clauses from the fiscal responsibility law should be incorporated. Escape clauses should include a very limited set of triggers, clear guidelines on interpretation and determination of events, as well as specification on the path back to the rule and the treatment of accumulated deviations (Schaechter et al 2012).

<sup>5</sup> Tapsoba (2014) simulates a DSGE model for India in which fiscal policy is anchored on a structural fiscal balance rule.

- Consideration should also be given to introducing an independent review mechanism for fiscal policy such as a fiscal council. A council could help ensure robust medium-term forecasting, by assessing or even replacing the government's forecasts, and enhance enforcement by independently monitoring the government's progress in meeting the rules (IMF 2013).

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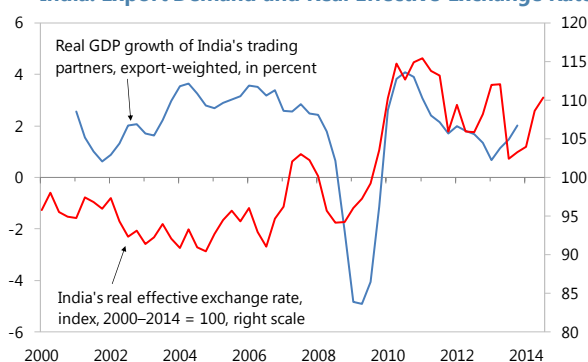
# PRICE AND INCOME ELASTICITY OF INDIAN EXPORTS—THE ROLE OF STRUCTURAL RIGIDITIES<sup>1</sup>

*This chapter estimates the short- and long-run price and income elasticity of Indian exports, and investigates the role of structural rigidities in shaping Indian goods exports. In this analysis we use disaggregated export volume data for 45 Indian industries over the period 1999–2013, as well as industry-specific international relative prices. To distinguish between short-term and long-run estimates, we adopt the traditional Panel ARDL (Auto-Regressive Distributed Lag) approach. Our results indicate that while Indian exports respond positively to international relative-price fluctuations in the short-run and export price competitiveness in the long-run, binding supply-side constraints (notably energy shortages) dampen price responsiveness in the short-term. Labor market rigidities affect Indian export performance over the long-term. This underscores the importance of exchange rate flexibility as a shock absorber, including in responding to external demand shocks, as well as policies to alleviate supply-side bottlenecks in the economy.*

## 1. The growth of India's merchandise exports has decelerated significantly since 2011.

India's goods exports grew on average by over 20 percent per year during 2000–2011, albeit dipping temporarily in the aftermath of the Global Financial Crisis, but have remained essentially flat since 2011. Global factors have certainly hurt India's exports, as did the appreciation of the real effective exchange rate. Moreover, binding supply-side bottlenecks have been another reason for India's sluggish export performance. This chapter empirically investigates the role of above factors in shaping India's export performance.

India: Export Demand and Real Effective Exchange Rate



Sources: World Economic Outlook; and IMF staff calculations.

**2. The first part of this chapter examines the responsiveness of Indian exports to international relative prices and external demand.** We estimate the short-run and long-run income and price elasticity of export demand using the Panel ARDL approach, where the long-run effects are calculated from OLS estimates of the short-run coefficients in the following equation:

$$\Delta y_{it} = c_i + \sum_{l=1}^p \phi_{il} \Delta y_{it-l} + \sum_{l=0}^p \beta'_{il} x_{it-l} + u_{it} \quad (1)$$

<sup>1</sup> Prepared by Volodymyr Tulin and Mehdi Raissi.

where  $y_{it}$  is the logarithm of export volume by industry  $i$  at time  $t$ ,  $x_{it} = (rp_{it}, y_{it}^*)'$ ,  $rp_{it}$  is the logarithm of product-specific international relative price, and  $y_{it}^*$  is a proxy for world demand for product  $i$ . The vector of long-run coefficients is given by:

$$\theta_i = \frac{\sum_{l=0}^p \beta_{il}}{1 - \sum_{l=1}^p \phi_{il}} \quad (2)$$

In a series of papers, Pesaran and Smith (1995), Pesaran (1997), and Pesaran and Shin (1999) show that the traditional ARDL approach can be used for long-run analysis, and that the ARDL methodology is valid regardless of whether the regressors are exogenous or endogenous, and irrespective of whether the underlying variables are  $I(0)$  or  $I(1)$ .<sup>2</sup> These features of the ARDL approach are appealing as reverse causality could be very important in our empirical application. Our panel ARDL specification also allows for a significant degree of cross-industry heterogeneity and accounts for the fact that the impact of international relative prices and world demand on export performance could vary across industries (that is, short-run slope coefficients differ). The long-run coefficients in equation (2), however, are estimated by the pooled mean group estimator. The lag order of ARDL is chosen to be one.

**3. We collect data on India's industry-level export volumes over the last fifteen years and take into account the role of sector-specific price competitiveness and global demand.** The export volumes and price indices are from the Reserve Bank of India (45 groups at 2-digit SITC Rev.3 classification covering over 90 percent of Indian goods exports) and global import demand indices at a similar trade classification detail are constructed from the UN COMTRADE database. Sectoral energy intensity rates are calculated from India-KLEMS Project database, and the labor regulation index is obtained from the Fraser Institute's Economic Freedom of the World Reports.

**4. The panel data regression estimates, described above, suggest that Indian exports are responsive to relative price levels in the long-run and their fluctuations in the short-term.** Column 1 of Table 1 summarizes the baseline findings from estimation of equation (1). The results indicate that, in the long-run, a one-percent increase in India's international relative export prices could reduce export volume growth by about 0.2 percent. The long-run coefficient on global demand is estimated to be slightly above one and is statistically significant, which suggests that India's exports move on par with global demand. Moreover, short term coefficients on global demand and relative prices have the expected signs and are statistically significant. Specifically, India's exports will increase by about ¼ of one percent in the short term in response to a one percentage point rise in global demand. Notably, export performance is also affected by short-term fluctuations in international relative prices, with an estimated elasticity of -0.35.

<sup>2</sup> Recent theoretical advances in dynamic heterogeneous panels include Pesaran (2006) and Chudik, Mohaddes, Pesaran, and Raissi (2013).

**5. The second part of this chapter investigates the role of structural rigidities in shaping the export demand relationship in India across a range of different industries.** To capture the effects of structural rigidities on industries' export performance in the short-term, we construct an indicator of supply bottlenecks pertaining to the availability of energy, and interact it with the change in international relative prices in equation (1). This is motivated by the fact that energy shortages could result in uncompetitive costs of production (partly through reducing the responsiveness of exports to relative price fluctuations) and lower India's exports. Given the long-term nature of labor market rigidities, we include a labor-market regulations index in the long-run relationship only and set the coefficients on short-term fluctuations to zero.

**6. The results show that energy shortages have reduced the responsiveness of Indian exports to shifts in relative prices in the short-term, while labor-market rigidities are an important determinant of export performance in the long run.** Specification 2 of Table 1 contrasts the results of the "baseline" regression with an "augmented" one that contains an interaction term involving the product of changes in international relative prices and the proxy for sector-specific energy shortages. This interactive term is statistically significant and has the expected sign, indicating that energy shortages exacerbate the negative impact of unfavorable relative price movements on India's exports. Finally, the specification 3 stresses the role of labor market flexibility in fostering merchandise export performance in the long term. Interestingly, the inclusion of this indicator renders the coefficient on relative prices statistically insignificant, likely suggesting the importance of enhancing labor market flexibility in the long-run to promote exports rather than just relying on price-based measures of competitiveness.

**7. Our results underscore the importance of exchange rate flexibility as a shock absorber, as well as structural reforms to ease supply-side bottlenecks in the economy.** Greater international relative price competitiveness of Indian exports, including from nominal exchange rate depreciation, can increase exports in the short run. In addition, continued progress on alleviating supply side bottlenecks, in the energy sector in particular, would help enhance the effectiveness of exchange rate flexibility in lessening impact of adverse external shocks. Policies to improve labor market flexibility can help enhance India's exports in the long run.

### Pooled Mean Group Estimates of the Long-run and Short-run Export Elasticities, 1999–2013

Dependent variable: India's sector-specific export volume

| Specification:                     | (1)                 | (2)                 | (3)                 |
|------------------------------------|---------------------|---------------------|---------------------|
| <b>Long-run coefficients</b>       |                     |                     |                     |
| Global demand 1/                   | 1.03 ***<br>(0.03)  | 1.07 ***<br>(0.03)  | 0.55 ***<br>(0.06)  |
| Relative price 2/                  | -0.16 *<br>(0.09)   | -0.23 ***<br>(0.08) | -0.07<br>(0.08)     |
| India's labor market regulation 3/ |                     |                     | 0.30 ***<br>(0.03)  |
| <b>Short-run coefficients</b>      |                     |                     |                     |
| Error-correction term              | -0.31 ***<br>(0.04) | -0.31 ***<br>(0.04) | -0.33 ***<br>(0.04) |
| Δ Global demand                    | 0.26 ***<br>(0.08)  | 0.26 ***<br>(0.09)  | 0.33 ***<br>(0.09)  |
| Δ Relative price                   | -0.35 ***<br>(0.10) | -0.35 ***<br>(0.10) | -0.41 ***<br>(0.11) |
| Energy deficit 4/                  |                     | -0.0006<br>(0.003)  | -0.004<br>(0.004)   |
| Energy deficit * Δ relative price  |                     | -0.06 *<br>(0.04)   | -0.06 *<br>(0.03)   |
| <i>NxT</i>                         | 671                 | 671                 | 671                 |

Source: IMF staff estimates.

Note: Standard errors are reported in parenthesis. \*\*\*, \*\*, \* denote significance at 1, 5, and 10 percent, respectively.

1/ Product-specific world imports, index.

2/ India's trade-weighted product-specific export price (in partner's currency) relative to partners' CPI, index.

3/ India's labor market regulations index, as measured in the Fraser Institute Economic Freedom of the World Index.  
Higher values indicate more flexible labor market.

4/ Energy deficit is defined as excess deficit over the economic cycle, weighted by sector-specific energy intensity.

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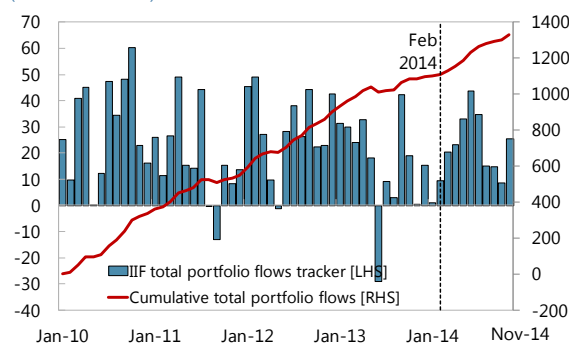


# EFFECTIVENESS OF EMERGING MARKET POLICY RESPONSES SINCE THE TAPER TALK<sup>1</sup>

Global financial markets have seen several bouts of volatility in 2014 amid U.S. tapering and other external shocks. Sentiment toward emerging markets (EMs) remains sensitive to global developments and the risk of a reversal is high. To this end, EMs could draw policy lessons from their shared experiences following the taper talk episode of May 2013. This chapter assesses the effectiveness of major EMs' policy actions in this episode, focusing on India and how its experience compares with others. Policy announcement effects are found to vary across countries, and the most positive ones for India include the NRI deposit and bank overseas borrowing schemes and the gold import duty. From a more "medium-term" perspective, EMs with decisive and comprehensive policy actions saw the largest improvements in fundamentals, and were relatively less affected during later bouts of market volatility.

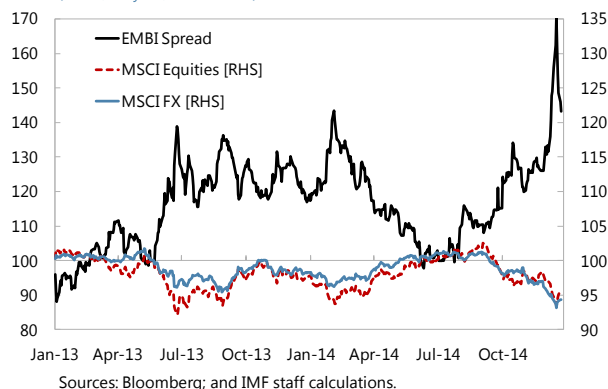
**1. Global financial conditions were volatile in 2014 and risks of a sentiment reversal remain high.** While portfolio inflows to Emerging Markets (EMs) have resumed in 2014, concerns about rising U.S. interest rates and falling Chinese growth triggered several bouts of market volatility, with the latest round of major sell-off of EM assets in September 2014, suggesting that sentiment toward EMs remains sensitive to global developments.

**Selected EMs: Gross Portfolio Inflows, 2010-14**  
(In billions of USD)



Source: Institute of International Finance, Portfolio Flows Tracker.  
Selected EMs include India, Indonesia, Malaysia, Thailand, Brazil, Chile, Mexico, Peru, Hungary, Poland, South Africa and Turkey.

**Emerging Markets: Currencies, Spreads and Equities**  
(Index, May 22, 2013 = 100)



Sources: Bloomberg; and IMF staff calculations.

**2. To prepare for the possibility of another abrupt surge in financial market volatility, countries could draw lessons from their experiences following the taper episode of 2013.** The policy responses among EM countries following the taper talk of May 2013 have varied, with some (e.g., Brazil, India and Indonesia) deploying a more comprehensive package of policy actions

<sup>1</sup> Prepared by Ran Bi.

spanning fiscal, monetary and structural policies, and others (particularly South Africa) relying solely on the exchange rate as the main shock absorber.<sup>2</sup> Lessons on the effectiveness of these policy actions can be drawn to better prepare for the next bout of financial market volatility.

**3. This chapter assesses the effectiveness of major EMs' policy actions in the post-taper talk episode of summer 2013, focusing on India and how its experience compares with others.**

The policy effectiveness is examined both in terms of the immediate impact on asset prices and the more “medium-term” impact on fundamentals. For the former, an event study is used to analyze whether EMs' policy announcements had a countervailing effect on their exchange rate depreciation, equity price declines, and bond yield increases in two-day windows from May 23, 2013 to January 31, 2014, controlling for possible announcement effects from the Federal Open Market Committee (FOMC) meetings and the release of their minutes during that episode. For the analysis, policy announcements are grouped into six main categories: monetary policy (separating interest rate changes and liquidity measures), FX intervention (separating interventions in the spot market and forward market), capital flow measures (separating measures to encourage inflows and discourage outflows), financial sector policies, fiscal measures and import restrictions. Major EMs included in the event study are Brazil, Colombia, India, Indonesia, Malaysia, Mexico, Peru, Poland, Russia, South Africa, Thailand, and Turkey.<sup>3</sup> To gauge the “medium-term” effect of major EMs' policy packages on their fundamentals, a more descriptive cross-country comparison is used. The effectiveness of EMs' policy responses can also be seen from their experiences in later bouts of market volatility, such as in late January 2014.

***Immediate Impact of Policy Announcements: Event Study Analysis***<sup>4</sup>

**4. Assessments based on main policy categories suggest that, for India, measures to encourage capital inflows, gold import restrictions and fiscal actions had the largest immediate effects.** On average, an announcement of a capital inflow measure (e.g., the NRI deposit and overseas FX borrowing scheme and the increase in FII limit) was followed by an exchange rate appreciation of 0.3 percent in the two-day window following the announcement. The announcements of an increase in the gold import duty and the cutting of non-planned current expenditure by 10 percent led to an exchange rate appreciation of 0.9 percent and an equity price increase of 1.5 percent, respectively, in the following two days. However, as the gold import duty increase and the expenditure cut were announced in the same two-day window, it is difficult to

<sup>2</sup> See Annex IV of the 2014 India Article IV Staff Report (IMF Country Report 14/57) for a detailed discussion of major EMs' earlier policy responses to the taper talk.

<sup>3</sup> These EMs were largest hit by markets during May–August 2013—that is, their exchange market pressure index (a combination of changes in exchange rates and reserves) exceeds one standard deviation in at least one of those months.

<sup>4</sup> See also Sahay et al. (2014).

disentangle their effects on asset prices. Assessments based on policy categories suggest that other policy announcements do not seem to be effective on average.

**5. However, assessments based on main policy categories may mask significant differences across announcements within the same policy category.** Several factors may contribute to such differences. First, policy announcements that surprised the market may trigger more significant asset price changes but the “surprise” element is not captured if both anticipated and unanticipated announcements are grouped together. Second, different magnitudes of policy change may lead to different market reactions, and this is not captured if announcements of different magnitude are grouped together.

**6. A more granular analysis of each policy announcement in India following the May 22, 2013 taper episode suggests that other actions also had a significant impact on asset prices** (see Table). As expected, market reactions to the NRI deposit and bank overseas borrowing schemes were very positive. Same for the restrictions on gold imports—in fact, the impact of an increase in the gold import duty seems even larger than that of a gold import quantity restriction, but again the former may partly benefit from the announcement of cuts in non-planned current expenditure by 10 percent in the same two-day window. Moreover, some monetary policy actions also helped. In particular, the repo rate hike in September 2013, the first in the post-taper period, helped boost market confidence, reflected in an exchange rate appreciation and increase in equity prices. The liquidity tightening measures of July 2013, on the other hand, triggered negative bond and equity market reactions, though it helped support the exchange rate. Finally, restrictions on capital outflows seem to have been counterproductive, with both the bond yield and exchange rate suffering.

| Policy Announcements with Significant Impact on Asset Prices |   |                                 |                                   |              |
|--|---|---------------------------------|-----------------------------------|--------------|
| Date   | Policy Announcement   | Impact<br>(in percentage point) |                                   |              |
|  |   | Bond yield                      | Exchange rate<br>(- appreciation) | Equity price |
| 16-Jul-13  | MSF rate increase by 200 bps  | 0.3                             | -0.3                              | -0.3         |
| 23-Jul-13  | Quantity restriction on gold import   | 0.3                             | -0.4                              | 0.4          |
| 14-Aug-13  | Restrictions on outward FDI   | 0.2                             | 0.3                               | 0.3          |
| 6-Sep-13   | Swap window introduced for FCNR(B) deposits   | 0                               | -1.3                              | 1.9          |
| 10-Sep-13  | Swap window introduced for banks overseas borrowing                                 | 0                               | -0.5                              | 0.7          |
| 18-Sep-13  | Increase of gold import duty  | 0.1                             | -0.9                              | 1.5          |
| 19-Sep-13  | Cutting non-planned current expenditure   |                                 |                                   |              |
| 20-Sep-13  | Repo rate hike from 7.25 to 7.5 percent; MSF rate lowered from 10.25 to 9.5 percent | 0                               | -0.9                              | 0.8          |

Source: IMF staff calculation.

Note: A dark grey shade indicates statistical significance at 1 percent, a lighter grey shade at 5 percent and no shade is statistically insignificant. Estimates in green indicate “desirable” movements, while those in red are “undesirable” movement.

**7. For other major EMs, effective policy announcements differ across countries depending on their circumstances.**<sup>5</sup> For *Indonesia*, the announcement in early July 2013 that Bank Indonesia would have bi-weekly auctions of FX swaps with resident banks supported the rupiah. *Malaysia's* announcements of cuts in fuel subsidies, together with steps towards fiscal consolidation, helped reduce bond yields. *Poland's* FX intervention in the spot market proved effective. *Thailand's* and *Russia's* announcements to strengthen their financial sectors, though not direct responses to the taper talk, helped support asset prices. Finally, *Brazil's* FX intervention program was found to be effective in mitigating foreign exchange market volatility<sup>6</sup> and *Turkey's* macro prudential measures were successful in curbing household credit growth, even though the immediate announcement effect of these policies were not statistically significant.

### ***Impact of Policy Actions on Fundamentals: "Medium-term" View***

**8. Many major EMs undertook further policy adjustments in 2014 to address market volatility and strengthen their fundamentals:**

#### **Exchange Rate Policy and FX Intervention**

**9.** In June 2014, *Brazil* extended the FX intervention program to end-2014. *Indonesia* has allowed exchange rate flexibility and taken steps to deepen currency and swap hedging, including by large FX users (notably energy-related state-owned enterprises). *Mexico* reinstated its rules-based FX intervention policy aimed at reducing volatility in FX markets.

#### **Monetary Policy**

**10. A number of major EMs tightened monetary policy further in 2014 to better anchor inflation or reduce pressures on their currencies.** *Brazil* hiked its policy rate by 375 bps between April 2013 and April 2014, and then by another 75 bps since October 2014. *South Africa* has increased the policy rate by 75 bps in 2014. Following the latest round of fuel price increases in November 2014, *Indonesia* raised its benchmark and lending rates by 25 and 50 bps, respectively. *Turkey* increased interest rates by 550 bps in an effort to normalize its monetary policy framework in January, following the market turbulence in early 2014. Subsequently, the policy rate was eased by 175 bps from May to October 2014.

**11. Other EMs eased to support growth.** *Hungary* cut its policy rate to a record-low level of 2.1 percent from 3 percent at end-2013, and the Funding for Growth Scheme (FGS)—aiming to easing access to finance for SMEs—was extended until end-2015 with a doubling of the allocated

<sup>5</sup> The results of the event study should be interpreted with caution. For many policy announcements, the impact on asset prices is ambiguous or even counter-intuitive—this does not necessarily mean that the policy action is ineffective. Market reactions are driven by many underlying factors and are particularly complicated in an episode with high market volatility and numerous policy actions both domestic and abroad. Although the use of a very short time window for the event study limits the impact of non-domestic policy-related factors, it cannot eliminate such an impact.

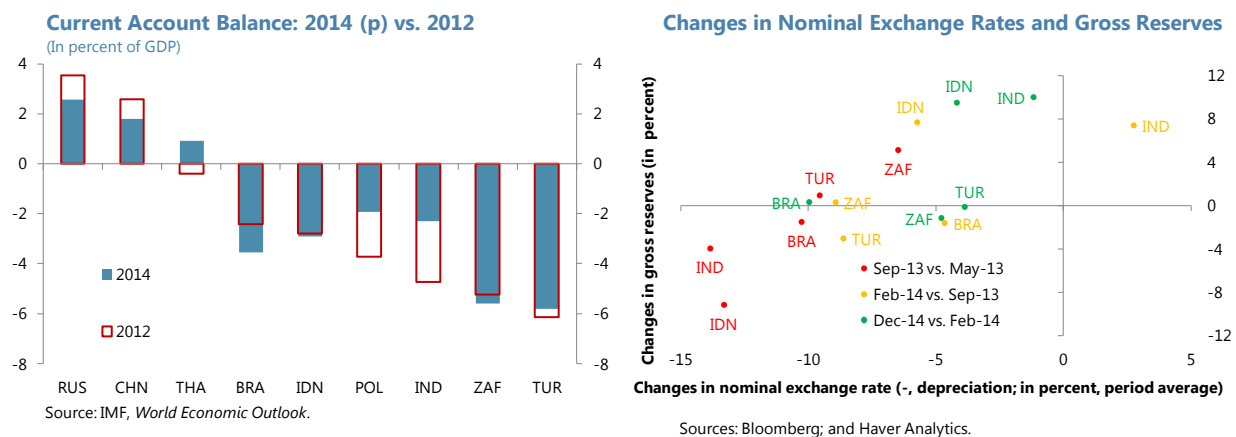
<sup>6</sup> See Saborowski and Kang (2015).

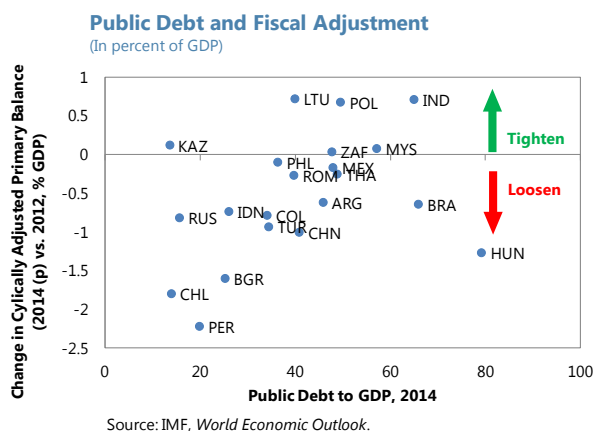
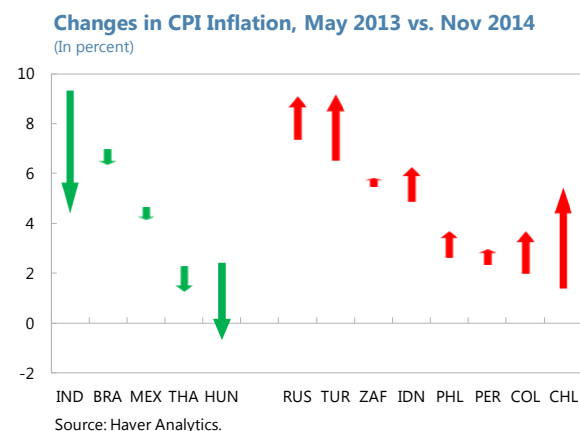
amount for the second phase to the equivalent of 3¼ percent of GDP. **Mexico** reduced the policy rate by 50 bps in June 2014 to help support the incipient economic recovery in the context of limited inflationary pressures.

### Fiscal Policy

**12.** With falling oil prices, **India** and **Indonesia** took the opportunity to de-regulate fuel prices and undertake fuel subsidy reforms. **South Africa** announced a fiscal consolidation plan to reduce the fiscal deficit and stabilize the public debt-to-GDP ratio in their 2014 Medium Term Budget Policy Statement.

**13.** **EMs with more decisive policy actions experienced the largest improvements in fundamentals, and were relatively less affected during later bouts of market volatility** (see Figure). In particular, **India** had the most significant narrowing in its current account, especially compared with other EMs that were hit hard following the taper talk (i.e., Brazil, Indonesia, South Africa and Turkey). While several of these EMs recovered some of their losses in reserves and exchange rates, **India** and **Indonesia** saw the most improvement, thanks to their more comprehensive policy packages. These improvements are also reflected in their relative stability amid the market turmoil of late January 2014, especially for **India**, which was hardly affected at all. Moreover, **India** has managed to reduce inflation since May 2013, whereas **South Africa** and **Turkey** saw a further increase in inflation from already-high levels. On the fiscal front, **India** has undertaken more consolidation in the past two years than most major EMs. Despite this progress, inflation and public debt remain high in India, calling for further efforts to reduce vulnerabilities in these areas.





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# INDIA'S CORPORATE SECTOR: HEALTH AND PROFITABILITY<sup>1</sup>

Despite recent gains in Indian equity markets, and an improved macroeconomic picture given robust capital inflows and a much-reduced current account deficit, based on four common indicators of corporate financial conditions (interest cover, profitability, liquidity, and leverage), a historically-high share of corporate debt is still owed by firms with relatively weak financials. Stress tests of corporate balance sheets derived from four economic shocks (domestic and foreign interest rates, the exchange rate, and profits) demonstrate continuing high vulnerabilities. Profit margins are also positively correlated with future investment, suggesting that more business investment will need to be accompanied by improvements in profitability.

## 1. The first decade of the 2000s was a period of robust economic expansion, accompanied by a strengthening of India's corporate balance sheets.

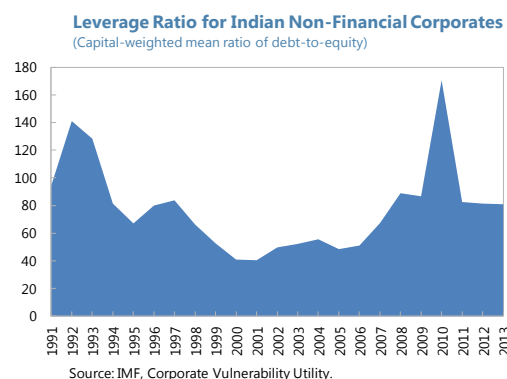
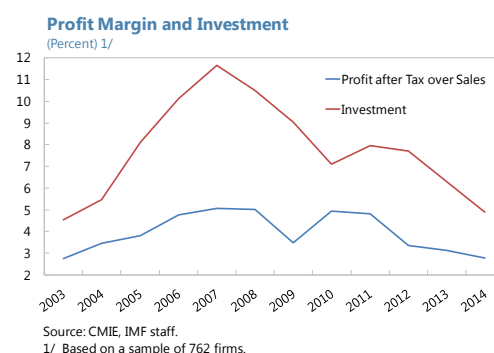
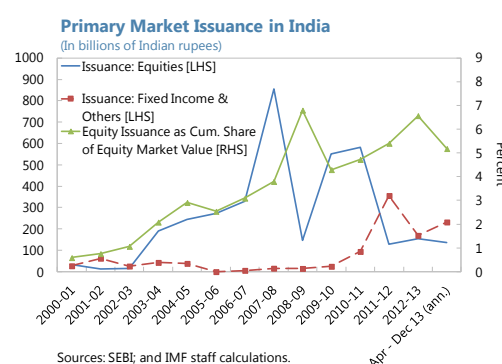
Between March 2001 and March 2008, the Bombay Stock Exchange (BSE) Index rose almost four-fold, while the value of BSE-listed equities increased nine-fold. As a consequence, primary market equity issuance became an important means of financing for Indian corporations (see Oura 2008).

## 2. With profitability rising, capital investment increased, particularly in the last few years before the global financial crisis (GFC) of 2008.

Both median profit margins and investment increased substantially starting in 2003, reaching a peak in 2007. After a recovery in 2010–2011, both variables declined to levels roughly where they started out in 2003.

## 3. However, in recent years, various indicators of corporates' financial health have deteriorated.

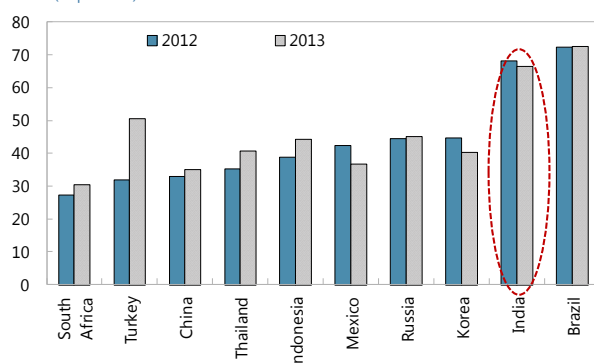
Domestic credit to corporates continued to rise prior to and after the GFC, driven by growth in lending by public banks, mostly for infrastructure projects. In addition, external commercial borrowings (ECBs) rose by 107 percent between March 2010 and March 2014. Corporate leverage also increased as the equity market saw relatively few issuances following the GFC, and stock price performance was tepid. As a result,



<sup>1</sup> Prepared by Peter Lindner.

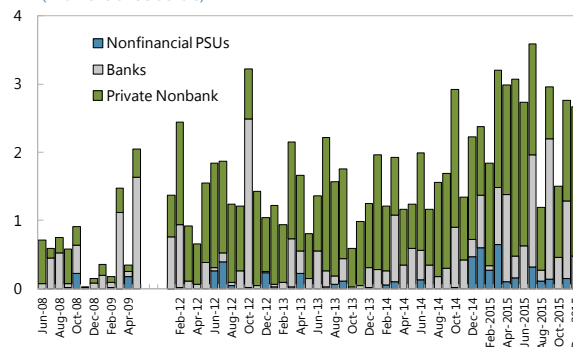
the (capital-weighted) mean ratio of debt to equity for Indian nonfinancial companies increased from 40 percent in 2001 to 81 percent in 2013. Indian corporates are now among the more leveraged when compared with their emerging market (EM) peers, with quite large cross-sectoral differences in leverage across sectors—specifically in manufacturing and construction. In addition, greater external funding has exposed Indian corporates to external shocks, as they rely on foreign sources for more than one-fifth of their debt financing (primarily through external commercial borrowings (ECBs), trade credits, and bonds). This increased exposure to non-rupee debt has led to large foreign currency repayment obligations by India's corporates.

**Corporates: Median Debt to Equity**  
(In percent)



Sources: IMF, Corporate Vulnerability Utility.

**Foreign Currency Debt Payments**  
(In billions of US dollars)



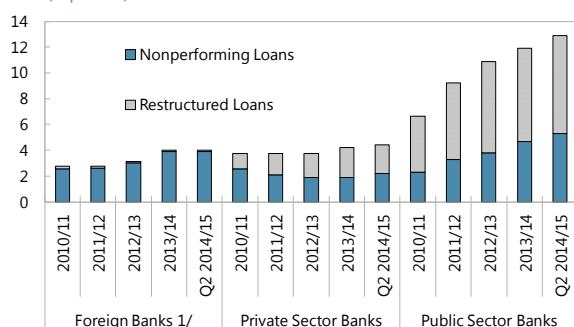
Sources: Dealogic; and IMF staff calculations.

**4. The weakening of corporate balance sheets and diminished profitability is being reflected in market-based indicators of credit risk, and increased rates of stressed assets on banks' balance sheets.** On the positive side, default probabilities as estimated by Moody's KMV,<sup>2</sup> after a three-year period of increasing (particularly in the tail of the corporate default distribution), have come down since the spring of 2014. However, this is likely to be more a function of higher stock prices and reduced equity volatility, rather than a reflection of improved economic fundamentals. Evidence of corporate India's worsening financial performance is found in the rising share of stressed loans in banks' portfolios—both non-performing assets (NPAs) and restructured loans have continued to increase, and are at their highest levels since 2003.

<sup>2</sup> Moody's KMV is a model of default risk based on the Black-Scholes-Merton model, incorporating balance sheet and equity market data. See Moody's (2004).



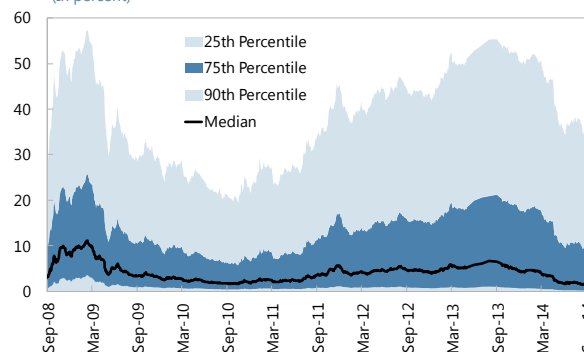
**Stressed Loans in India's Banks**  
(In percent)



Sources: RBI; and IMF staff estimates.

1/ Foreign bank data for Q2 2014/15 are estimated.

**Expected Default Frequencies of Indian Corporates**  
(In percent)



Sources: Moody's KMV and IMF staff calculations.

**5. We follow Lindner and Jung (2014) and gauge India's corporate health based on four commonly used indicators: interest-cover ratio (ICR), profitability, liquidity, and leverage.** ICR and profitability are dynamic indicators, assessing the degree to which current revenues are able to fund interest expenses, or whether a firm's operations and financial activities are essentially self-funding, respectively. An ICR below one does not indicate that insolvency is imminent. Firms can have investments that can be made liquid, unused credit lines, or other sources of funding which could assist them in remaining solvent.<sup>3</sup>

**6. Based on these four indicators, we find that corporate stress in India is at present at its highest since the early 2000s.** The table below suggests that the share of corporate borrowing accounted for by companies with extremely weak financial health indicators (ICR, profitability, liquidity and leverage) has increased through 2012/13, while stabilizing in the last year. The percentage of debt owed by loss-making firms reached 23 percent in 2013/14. Indian companies whose leverage exceeds two (that is, debt exceeds twice equity) account for more than 31 percent of borrowing by Indian corporates.

<sup>3</sup> This analysis is based on data from the Prowess database of the Centre for the Monitoring of the Indian Economy (CMIE).

**Interest Cover, Profitability, Liquidity and Leverage for Major Indian Non-Financial Corporates:**

Share of Debt below/above Thresholds

|         | ICR (<1) 1/                            | Profitability (<0) 2/ | Liquidity (<0.5) 3/ | Leverage (>2) 4/ |
|---------|--|-----------------------|---------------------|------------------|
|         | (percent of total borrowing in sample) |                       |                     |                  |
| 1988/89 | 3.2                                    | 31.7                  | 0.0                 | 12.6             |
| 1989/90 | 1.7                                    | 7.3                   | 0.0                 | 19.8             |
| 1990/91 | 4.5                                    | 7.3                   | 2.1                 | 35.6             |
| 1991/92 | 1.5                                    | 11.8                  | 7.7                 | 20.1             |
| 1992/93 | 8.1                                    | 13.1                  | 7.0                 | 15.6             |
| 1993/94 | 9.4                                    | 11.0                  | 7.4                 | 23.6             |
| 1994/95 | 2.2                                    | 8.4                   | 8.5                 | 10.9             |
| 1995/96 | 6.8                                    | 8.3                   | 6.0                 | 9.7              |
| 1996/97 | 5.4                                    | 8.1                   | 7.2                 | 22.7             |
| 1997/98 | 8.7                                    | 13.4                  | 6.8                 | 28.5             |
| 1998/99 | 17.9                                   | 27.1                  | 8.9                 | 30.1             |
| 1999/00 | 17.9                                   | 26.7                  | 8.4                 | 28.7             |
| 2000/01 | 8.8                                    | 27.6                  | 7.4                 | 26.2             |
| 2001/02 | 15.5                                   | 27.6                  | 6.3                 | 28.1             |
| 2002/03 | 11.2                                   | 24.0                  | 6.4                 | 27.0             |
| 2003/04 | 4.5                                    | 11.6                  | 5.7                 | 18.7             |
| 2004/05 | 5.3                                    | 6.8                   | 7.0                 | 13.1             |
| 2005/06 | 3.0                                    | 4.9                   | 7.8                 | 16.1             |
| 2006/07 | 3.4                                    | 3.8                   | 5.9                 | 17.9             |
| 2007/08 | 2.6                                    | 7.2                   | 13.2                | 17.0             |
| 2008/09 | 5.8                                    | 13.6                  | 11.0                | 23.4             |
| 2009/10 | 4.2                                    | 8.3                   | 14.8                | 21.2             |
| 2010/11 | 6.3                                    | 12.9                  | 9.1                 | 20.7             |
| 2011/12 | 7.8                                    | 17.0                  | 12.1                | 28.0             |
| 2012/13 | 16.3                                   | 22.4                  | 19.2                | 31.3             |
| 2013/14 | 13.8                                   | 22.9                  | 21.3                | 31.4             |

Sources: CMIE Prowess; IMF staff calculations. Sample size about 2,000 firms.

1/ EBITDA / Interest expenses

2/ Profit after tax / Sales

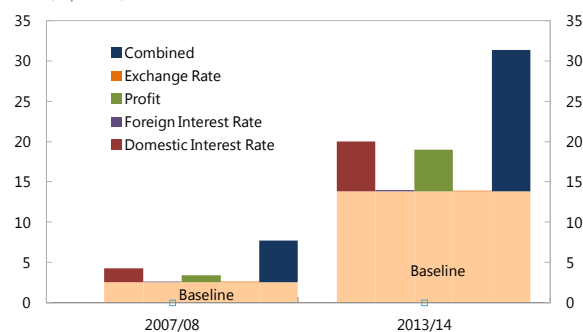
3/ 'Current Ratio' = Current assets / Current liabilities

4/ 'Debt Equity Ratio' = Debt / Equity

## 7. Indian corporates' balance sheet

**vulnerabilities have increased since the GFC.** While during FY 2013/14 the share of all debt owed by firms in the sample with an ICR below one fell (see Table), a stress test of Indian corporates' balance sheets reveals a further increase in vulnerabilities. In this analysis, four financial variables (domestic and foreign interest rates, profitability, and exchange rates) were shocked individually and also jointly, and the shares

**Share of Debt of Companies with ICR <1**  
(In percent)



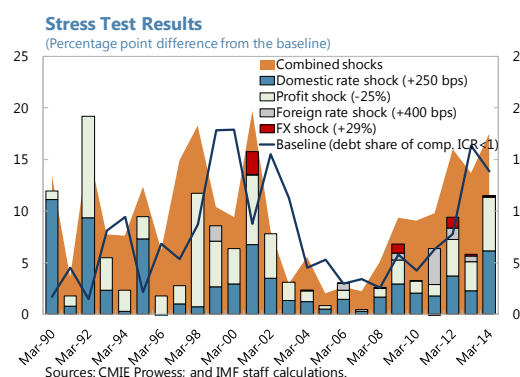
Sources: CMIE Prowess; IMF staff calculations.

of total debt owed by firms exhibiting an ICR below one were calculated for each of these five scenarios.<sup>4</sup> While the baseline share of firms with an ICR below one in 2013/14 is lower than in 2012/13, the 2013/14 stress tests point to increased adverse effects for the domestic rate shock and the combined shock.<sup>5</sup> This indicates that the recent low-growth environment, coupled with higher leverage, has made India's corporates more vulnerable to adverse shocks. In particular, under the combined shock (when all four variables are shocked simultaneously) the share of debt affected increases from 15 percent in 2008/09—the height of the GFC—to over 31 percent in 2013/14. This indicates that in a comparison between 2013/14 and 2008/09, there is the potential for a doubling of the share of vulnerable corporates under a severe stress scenario (as represented by the combined shock). Equally as important, the table shows that the increase in the share of affected debt over the baseline—at 17.5 percent in 2013/14—is the largest increase in vulnerability since 2007/08.

| India: Stress-Test Results on the Non-Financial Corporate Sector      |          |  |   |                             |                         |          |
|---|----------|--|---|-----------------------------|-------------------------|----------|
|   | Baseline | Domestic Interest Rate Shock<br>+250 bps | Foreign Interest Rate Shock<br>+400 bps | Profit Shock<br>-25 percent | FX Shock<br>+29 percent | Combined |
| Share of debt of companies with ICR <1 in total corporate sector debt |          |  |   |                             |                         |          |
| March 2008  | 2.58     | 4.24                                     | 2.59                                    | 3.44                        | 2.59                    | 7.71     |
| March 2009  | 5.77     | 8.68                                     | 6.46                                    | 8.10                        | 6.63                    | 15.14    |
| March 2010  | 4.24     | 6.29                                     | 4.25                                    | 5.40                        | 4.24                    | 13.34    |
| March 2011  | 6.34     | 8.14                                     | 9.81                                    | 7.43                        | 6.31                    | 16.15    |
| March 2012  | 7.81     | 11.54                                    | 8.95                                    | 11.30                       | 8.83                    | 23.82    |
| March 2013  | 16.32    | 18.58                                    | 16.92                                   | 19.14                       | 16.48                   | 30.03    |
| March 2014  | 13.85    | 20.01                                    | 13.98                                   | 19.02                       | 13.89                   | 31.37    |

Source: CMIE Prowess and IMF staff calculations

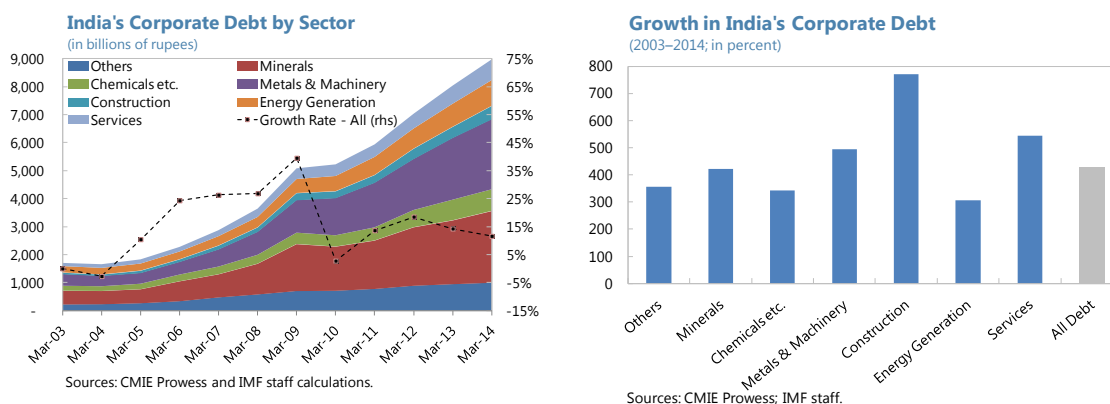
**8. Applying the same stress tests to the corporate data since FY 1988/89 suggests increased vulnerabilities of the firms in India's corporate sector.** Regarding the baseline, and the marginal effects of the domestic rate shock and the profit shock, the share of debt affected is the highest since 2002 (see text chart). In the case of the combined shock, the share of affected debt is at its highest level over the full sample period, meaning corporates' financial health is likely to deteriorate in the presence of a potential slowdown in economic activity or adverse shock to global liquidity.



<sup>4</sup> As in Lindner and Jung (2014), three of the four shocks are calibrated to the financial market developments during the summer of 2013, and to the change in profitability experienced in 2009. The shocks include: an increase in domestic interest rates by 250 basis points (bps); an increase in foreign interest rates by 400 bps; a decrease in operating profit by 25 percent; and a 29 percent depreciation of the rupee.

<sup>5</sup> The approach here follows Lindner and Jung (2014) and is based on Oura and Topalova (2009).

**9. Over the past decade, the sectoral composition of India's commercial debt has also changed.** Corporates in the manufacturing and construction sectors, plus the infrastructure sector, contributed notably to banks' NPAs.<sup>6</sup> Between 2002/03 and 2013/14 corporate debt increased by 428 percent for a sample of 762 firms; over the four years ending in FY 2008/09, it increased by more than 20 percent each year. The metals and machinery sector, as well as chemicals and related firms, have the highest share in total corporate debt. The construction, services, and metals and machinery sectors exhibited the fastest growth in corporate debt over the sample period.

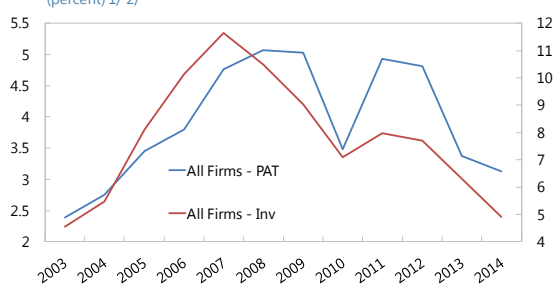


**10. The discussion of Indian corporates' performance in the post-GFC period often neglects profitability, despite profits representing the main objective of entrepreneurial activity.** In India's case, investment and profitability exhibit quite an amount of positive correlation. Considering our sample of 762 firms, we find that investment and profitability (lagged by one year) move together (text chart).<sup>7</sup> Drawing the same chart for the chemicals industry shows a similar picture. The correlations between lagged profitability and investment are positive for all nine sectors, as well as for the medians of all firms (see text table). The results of a panel data regression of investment on the debt-to-equity ratio, the lagged debt-to-equity ratio, and the lagged profit margin show a highly significant (and positive) effect of the lagged profit margin on investment (see also Anand and Tulin (2014) and Selected Issues Chapter IX).

<sup>6</sup> Infrastructure, textiles, engineering, metals and related products, chemicals, and mining, made up 36 percent of NPAs as of March 2014 (see Reserve Bank of India *Annual Report 2013/14*).

<sup>7</sup> The profit measure used is the median of after-tax margin, defined as profit after tax (PAT) over sales. Investment is the median of the year-over-year change in the capital stock divided by the capital stock one year prior.

**All Firms: PAT and Investment**  
(percent) 1/ 2/

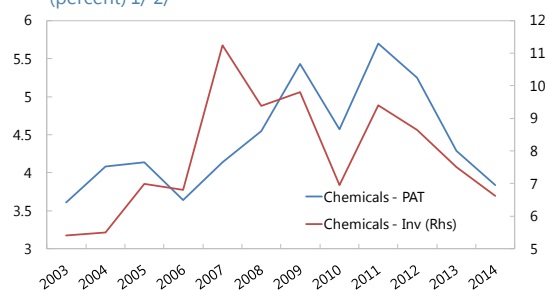


Sources: CMIE Prowess; IMF staff.

1/ PAT=Profit after Tax/Sales, lagged one Year.

2/ Investment= Change in Capital Stock/CapitalStock prior Year.

**Chemical Industry: PAT and Investment**  
(percent) 1/ 2/



Sources: CMIE Prowess; IMF staff.

1/ PAT=Profit after Tax/Sales, lagged one Year.

2/ Investment= Change in Capital Stock/Capital Stock prior Year.

**Correlation of Lagged Median Profitability with Investments**  
(percent)

| Animal & Food | Mineral Products | Textiles & Leather Products | Chemicals, Plastic & Rubber | Metals & Machinery Production | Construction | Energy Generation | Services | Others | All  |
|---------------|------------------|-----------------------------|-----------------------------|-------------------------------|--------------|-------------------|----------|--------|------|
| 46.7          | 30.6             | 58.8                        | 60.1                        | 84.6                          | 38.9         | 37.9              | 41.6     | 76.6   | 77.3 |

Source: CMIE Prowess; IMF staff

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# CORPORATE LEVERAGE AND INVESTMENT IN INDIA<sup>1</sup>

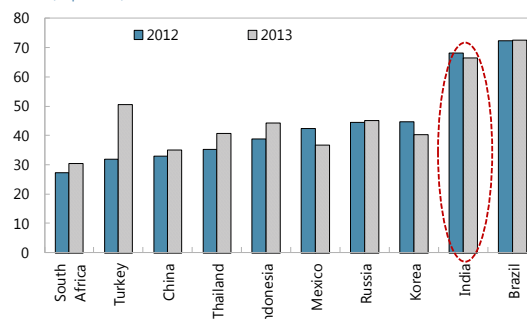
About one-third of the decline in India's corporate investment-to-GDP ratio since 2011/12 compared to the previous decade can be attributed to the build-up of corporate leverage. The corporate investment outlook will remain subdued in the near term, reflecting a weak investment pipeline and strains in corporate and financial balance sheets, which will take time to repair. Further measures to enhance the investment climate, alleviate supply side bottlenecks, and strengthen financial system buffers are needed.

**1. Corporate leverage in India has been rising, is at high levels compared to other countries, and is concentrated in key sectors.** The deterioration of corporate balance sheets in India has been concentrated in certain sectors, namely infrastructure, natural resource extraction, and construction. The share of debt of highly leveraged firms (firms with debt to equity ratios greater than two) has been increasing since the Global Financial Crisis, jumping from 21 percent in 2010/11 to 28 percent the following year, and then to 31 percent at the end of 2013/14. This raises the concern that the emergence of debt overhang in these sectors could hinder investment going forward.

**2. Investment in India has slowed in recent years,** with gross fixed capital formation growth averaging 11½ percent per year over the decade ending in 2011/12 but falling to less than ½ of one percent during 2012/13–2013/14, to a large extent due to a fall in corporate investments. The economic significance of the fall in corporate investment has been large, with corporate investment as a share of GDP falling from 12.8 percent to 9 percent between 2010 and 2012. Anand and Tulin (2014) find that standard macro-financial variables cannot fully explain the slowdown in investment at the aggregate level, and that heightened uncertainty and deteriorating business confidence have played a key role.

**3. High leverage has hindered corporate investments in India in recent years.** Economic theory

**Corporates: Median Debt to Equity**  
(In percent)



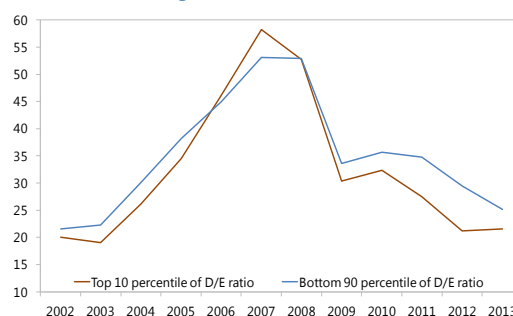
Sources: IMF, Corporate Vulnerability Utility.

**Corporate Fixed Investment**  
(as percent of GDP)



Source: Haver Analytics.

**Corporates: Average Investment for Highly Leveraged and Less Leveraged Firms** (In percent)



Sources: Prowess; and IMF staff calculations.

<sup>1</sup> Prepared by Sonali Das and Volodymyr Tulin.

postulates that debt overhang leads to underinvestment (Myers, 1977) and credit rationing (Stiglitz and Weiss, 1980). Indeed, in recent years India's most leveraged companies have had markedly lower investment rates when compared to their less-leveraged peers. To quantify the economic significance of leverage on investments, we estimate the econometric relationship between investment and leverage for Indian corporates. Given the increasing share of corporates with high leverage in recent years, and that investment has slowed more for highly-leveraged firms, estimation of threshold effects in the relationship between investment and leverage is also conducted.

**4. The analysis is based on a large and comprehensive sample of Indian companies and takes into account a range of corporate financial metrics.** The data is from the annual balance sheets of 4,537 non-financial firms from 2001/02 to 2013/14, taken from the Centre for the Monitoring of the Indian Economy (CMIE) Prowess database. The following equation is estimated:

$$Investment_{it} = \alpha + \beta Leverage_{i,t-1} + \delta X_{i,t-1} + \mu_i + \nu_t + \varepsilon_{it}$$

where *Investment* for firm *i* in year *t* is purchases of fixed assets (expenditure on plants, property, and equipment) in year *t* as a share of previous year's capital stock. *Leverage* is the debt to equity ratio, and *X* is a vector of control variables including:

- lagged investment
- the current ratio (current assets/current liabilities) as a measure of liquidity
- corporate profits, and
- the natural log of sales to control for firm size.

Period effects,  $\nu_t$ , to capture aggregate shocks, and firm-specific fixed effects,  $\mu_i$ , are included.

**5. The regression results confirm the expected negative impact of leverage on investment.** Specifically, a one percentage point increase in a company's leverage ratio leads to a 2½ percentage point decline in investment as a share of its capital stock. High leverage is often associated with higher debt service costs, which reduces space for companies to undertake fresh investments. The interest cover metric (ICR, the ratio of the earnings before interest and taxes to interest payments) of the Indian corporate sector's financial health has deteriorated

significantly over recent years (see Lindner and Jung 2014). Our econometric results confirm that a deterioration of ICR adversely affects investment. In particular, firms with a 1 percentage point better interest cover ratio have about 16 basis points higher investment to capital. Furthermore, these results are robust to GMM estimation methods, which account for the endogeneity of the lagged investment variable.

| Dependent variable: <i>Investment<sub>it</sub></i> |                      |                      |                      |                      |
|--|----------------------|----------------------|----------------------|----------------------|
|  | (1)                  | (2)                  | (3)                  | (4)                  |
| Investment (t-1)                                   | 0.062***<br>(0.011)  | 0.028**<br>(0.012)   | 0.072***<br>(0.012)  | 0.033**<br>(0.013)   |
| Debt/Equity (t-1)                                  | -2.610***<br>(0.287) | -2.363***<br>(0.283) |                      |                      |
| Interest Cover (t-1)                               |                      |                      | 0.290***<br>(0.030)  | 0.160***<br>(0.030)  |
| Current Ratio (t-1)                                |                      | 0.371*<br>(0.220)    |                      | -0.001<br>(0.198)    |
| Profit/K (t-1)                                     |                      | 0.090***<br>(0.008)  |                      | 0.112***<br>(0.011)  |
| log(Sales)   |                      | -0.975<br>(1.020)    |                      | -1.410<br>(1.043)    |
| Constant   | 25.136***<br>(1.021) | 23.747***<br>(2.972) | 19.033***<br>(0.940) | 21.479***<br>(2.949) |
| Observations                                       | 32,164               | 32,164               | 32,164               | 32,164               |
| <i>Rsquared</i>                                    | 0.040                | 0.057                | 0.049                | 0.065                |

Source: IMF staff estimates.  
Note: Standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



**6. The results also reveal a greater adverse impact of leverage on investment for highly-leveraged companies.** We investigate whether leverage above certain thresholds has a more detrimental effect on investment using three threshold leverage ratios: debt to equity ratios of one, two, and three. In each case, corporates with a leverage ratio over the threshold level have lower investment, on average, than firms with below-threshold leverage, and the relationship between leverage and investment is more negative for these firms. For example: (i) firms with a debt to equity ratio greater than two have 9 percent lower investment on average; and (ii) for a leverage ratio greater than two, a one percentage point increase in leverage is associated with investment that is an additional 0.5 percentage points lower.

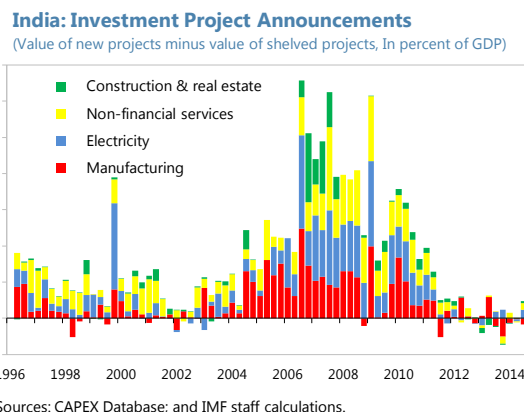
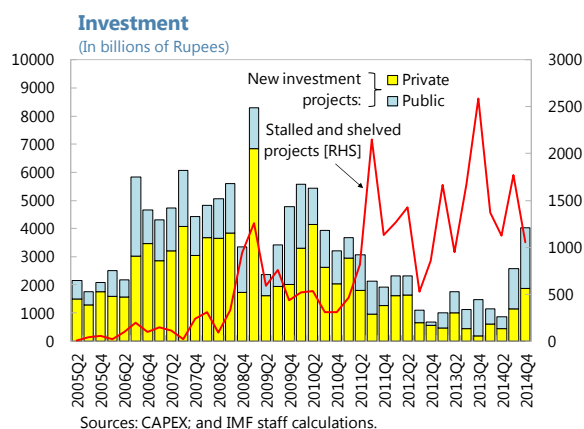
| Dependent variable: Investment <sub>t</sub><br>X=Leverage threshold dummy |                      |                      |                      |
|---|----------------------|----------------------|----------------------|
|   | (1)<br>X=1 if D/E>1  | (2)<br>X=1 if D/E>2  | (3)<br>X=1 if D/E>3  |
| X   | -8.042***<br>(1.033) | -9.373***<br>(1.139) | -6.128***<br>(1.475) |
| Debt/Equity (t-1)   | -1.850***<br>(0.401) | -1.518***<br>(0.408) | -1.829***<br>(0.395) |
| X * Debt/Equity (t-1)   | -0.254<br>(0.321)    | -0.525*<br>(0.312)   | -0.414*<br>(0.273)   |
| Constant  | 22.446***<br>(1.234) | 22.043***<br>(1.235) | 22.124***<br>(1.238) |
| F-test of same coefficient on high D/E                                    | 0.01                 | 0.09                 | 0.02                 |
| Observations  | 32,164               | 32,164               | 32,164               |
| <i>Rsquared</i>   | 0.063                | 0.063                | 0.061                |

Source: IMF staff estimates.  
Notes: Standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Lagged investment, current ratio, profit, log(sales) not shown.

**7. The drag on investment by highly-leveraged companies will remain in the near term.**

About 15 percent of the firms in the sample have leverage ratios greater than two, while the remaining 85 percent of firms have an average leverage ratio of 0.6. Highly-leveraged corporates may need to focus on deleveraging before taking advantage of future investment opportunities. Some corporates are likely already credit constrained due to high leverage, which in turn continues to put pressure on the health of the financial system, in particular on the balance sheets of public sector banks (PSBs). This will further affect bank risk taking as well as the ability of the banking system to finance economic recovery (see also Selected Issues Chapter VIII).

**8. The investment outlook remains subdued.** Investment project announcements have shown weakness over the last couple of years, due to supply-side bottlenecks and policy uncertainty. Notwithstanding recent improvement in new project announcements, actual investment will take time to pick up, reflecting muted new private corporate undertakings of the last few years. As well, durable solutions to underlying supply bottlenecks (e.g. power sector and natural resource allocation) are needed to ensure viability of future investment. For firms that have become highly leveraged and the banks involved, further progress on working out stressed corporate debt is needed to ensure that the banking system has sufficient resources to provide credit commensurate with economic recovery. Enhancing PSBs' loss absorbing buffers, specifically by raising their capital positions, would also help.



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# FINANCIAL INCLUSION AND ACCESS IN INDIA: ANALYSIS USING A STRUCTURAL MODEL<sup>1</sup>

*Greater financial inclusion and enhanced access to credit have been longstanding policy objectives in India. Concerted policy efforts have been made towards these objectives, such as increasing access to the formal financial system by the agricultural sector and small and medium-size enterprises. This chapter examines India's efforts at financial inclusion and related outcomes, and then analyzes the effect of greater financial access on macroeconomic indicators, such as GDP growth, as well as inequality and financial stability using a micro-founded general equilibrium model.*

**1. While India scores well on creating an enabling environment for financial inclusion, outcomes lag peer countries.** On the household side, survey data indicate that only 35 percent of adults have bank accounts (compared with 60 percent average for BRICs). Furthermore, there is considerable variation across the population, as people in rural areas, women and low-income individuals are even less likely to be part of the formal financial system. Furthermore, despite increasing financial deepening (measured by the credit-to-GDP ratio), access to credit has improved mostly for relatively large firms, indicating that smaller firms face constraints in accessing finance. As a result, potential entrepreneurs do not have access to working capital and investment funding at reasonable rates, dragging down growth. Despite having the Priority Sector Lending program in place to channel resources to SMEs (as well as agriculture), ninety percent of small firms do not have access to bank services (Mor Committee, 2014). Tackling financial exclusion, as well as addressing inequality more broadly, has been an important policy priority in India for many years (Box 1). This chapter focuses on firms' access to finance, given the absence of detailed financial data at the household level, and models different constraints and the impact of removing them on growth and inequality.

## Model Description and Data

**2. Obstacles to financial inclusion in emerging market and developing countries vary and can be grouped into three broad categories:**

- **Access barriers.** These typically reflect high documentation requirements by banks for opening, maintaining, and closing accounts, and for loan applications. Also they reflect various forms of immeasurable rationing, including red tape and the need for informal guarantors as connections to access finance. These obstacles increase the cost of participation in the financial system.
- **Obstacles to depth.** The amount firms can borrow is generally determined by collateral requirements, which depend on the state of creditors' rights, information disclosure requirements, and contract enforcement procedures, among others.

<sup>1</sup> Prepared by Era Dabla-Norris, Sonali Jain-Chandra, D. Filiz Unsal and Eva Van Leemput.

- **Intermediation efficiency.** This is generally associated with the state of competition and the degree of asymmetric information facing financial institutions, and is reflected in interest spreads and banks' overhead costs.

**3. The analysis of financial access by firms along these three dimensions is based on the micro-founded general equilibrium model developed by Dabla-Norris et al (2015).** This overlapping generations model features heterogeneous agents who are distinguished from each other by wealth and talent, and who choose in each period whether to become an entrepreneur or to work for a wage. In equilibrium, only talented agents with a certain level of wealth choose to be entrepreneurs, while the untalented and those who are talented but wealth-constrained choose to be workers. There are two states of world, or "financial regimes," one with credit and one with savings only. Individuals in the savings regime can save but cannot borrow. Participation in the savings regime is free, but (following Greenwood and Jovanovic (1990) and Townsend and Ueda (2006)) to borrow, i.e. to move into the finance regime, individuals must pay a participation cost whose size is one of the determinants of financial inclusion. Once in the credit regime individuals may obtain credit but its size is constrained due to limited commitment (i.e. poor contract enforceability) which leads to the need to post collateral as Evans and Jovanovic (1989). Thus collateral is another determinant of financial inclusion affecting financial sector depth. Finally, because of asymmetric information between banks and borrowers, higher interest rates are charged on borrowing to account for costly monitoring of highly leveraged firms following Townsend (1979). Because more productive and poorer agents are more likely to be highly leveraged the higher intermediation cost would be another source of inefficiency and financial exclusion.

**4. The model provides a framework for examining the linkages between financial inclusion, output, and inequality.** In the model, greater financial inclusion affects output and inequality (as measured by the Gini coefficient) mainly through two channels. First, it allows for a more efficient allocation of funds among entrepreneurs, thereby increasing aggregate output. This occurs as funds are channeled to talented entrepreneurs, increasing their output disproportionately more than that of less-talented ones. Second, more efficient financial contracts limit waste from financial frictions (e.g., the credit participation and monitoring costs) leading to higher GDP. If increased output is achieved through the reallocation of funds to more talented, higher-income entrepreneurs, income inequality can rise in theory. In fact, different dimensions of financial inclusion can result in different distributional consequences. Financial inclusion through lower credit participation costs can crowd-in relatively untalented individuals, and thereby benefit the poor, while wealthy individuals can lose somewhat as a result of higher interest rates and wages.

**5. In the baseline, the model is calibrated to Indian data to analyze financial access.** Firm-level data for 2005 from the World Bank Enterprise Survey are used, in addition to standard macroeconomic and financial variables (saving rate, NPL ratio, and interest rate spread). The parameters are estimated by matching the simulated moments to actual data. The gross savings rate is matched to estimate the bequest rate,  $\omega$ ; the average value of collateral is used to calibrate the degree of financial friction stemming from limited commitment,  $\lambda$ ; while the financial participation cost,  $\psi$ , intermediation cost,  $\chi$ , recovery rate,  $\eta$ , probability of failure,  $p$ , and the parameter governing the talent distribution,  $\rho$ ,

are jointly estimated to match the moments of the percentage of entrepreneurs with credit, NPLs as a percent of total loans, interest rate spread, and the employment share distribution (using four brackets of employment shares—top 5%, 10%, 20%, and 40%).

## Results

**6. We conduct policy experiments to identify the most binding constraint to financial inclusion and access in India and study the macroeconomic effects of removing these frictions.** In the first experiment, we simulate policy-induced changes in financial access and analyze their effects. The simulations are performed for both 2005 and 2009 to shed some light on the dynamic aspects of financial inclusion. Three simulations include: (i) reducing the financial participation cost,  $\psi$ , (ii) relaxing borrowing constraints in the form of collateral requirements,  $\lambda$ , and (iii) increasing intermediation efficiency,  $\chi$ .<sup>2</sup> Figures 1–3 present the simulation results. In the second experiment, the impact of priority sector lending (PSL) on output and inequality is quantitatively assessed through a counterfactual policy evaluation.

### Reducing Participation Cost

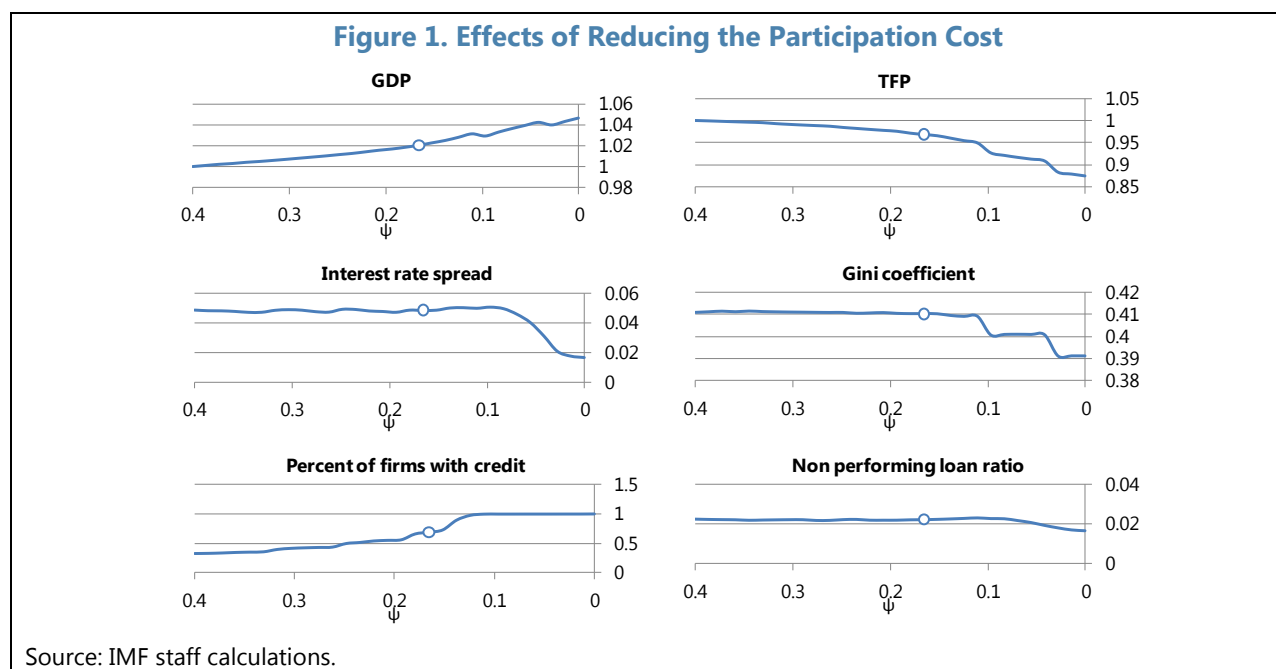
**7. The impact on GDP of a decline in the financial participation cost,  $\psi$ , from its current level (0.2) to the best possible value (0) is favorable** (Figure 1). A decrease in the participation cost increases GDP through its positive effect on investment. First, a lower  $\psi$  enables more firms to have access to credit, leading to more capital invested in production. Second, fewer funds are wasted in unproductive contract negotiation, allowing more capital for investment. However, average factor productivity (AFP) declines as the participation cost, which is fixed, has a higher weight in the income of small firms (which are less productive). As these previously excluded firms enter the financial sector they push down the economy-wide AFP.

**8. The interest rate spread and NPL ratio are very stable when financial participation cost is high, but they eventually decrease as  $\psi$  approaches zero.** This is because a decrease in  $\psi$  has two countervailing effects on interest rates in the model. First, it has a wealth effect—entrepreneurs become richer (as they need to pay less to get credit), and tend to deleverage, which results in a lower average interest rate spread and NPL ratio. Second, a smaller  $\psi$  enables some severely wealth-constrained workers to become entrepreneurs. These entrepreneurs choose a very high leverage ratio, driving the average interest rate spread up. Since the borrowing constraints are tight (high  $\lambda$ ) in India, the first effect dominates the second effect.

**9. As financial inclusion increases, income inequality decreases.** A decrease in  $\psi$  is disproportionately more beneficial for constrained workers and entrepreneurs without credit. With lower

<sup>2</sup> These examples are illustrative, as the calibration for the financial inclusion process is chosen arbitrarily. It may well be possible to increase  $\lambda$  beyond 3 in a shorter period of time compared to that necessary to achieve other changes, with greater positive effects on the Gini coefficient. Moreover, as many reforms are implemented on various fronts contemporaneously they are likely to affect the frictions in unison with additive effects.

$\psi$ , relatively poorer individuals earn a higher income (also there is an increase in the percent of firms with credit), and the Gini coefficient decreases.



### Relaxing Collateral Constraints

**10. Relaxing borrowing constraints by varying  $\lambda$  from its current level of 2.2 to 3 has a large positive effect** (Figure 2).<sup>3</sup> The increase in aggregate GDP is greater than in the participation costs simulation. This is due to India's high savings rate—the decline in the collateral requirements unlocks financial resources, leading to a significant increase in GDP. Indeed, this suggests that credit constraints are one of the major obstacles to financial development in India. As  $\lambda$  declines, AFP increases, implying more efficient resource allocation across firms.<sup>4</sup>

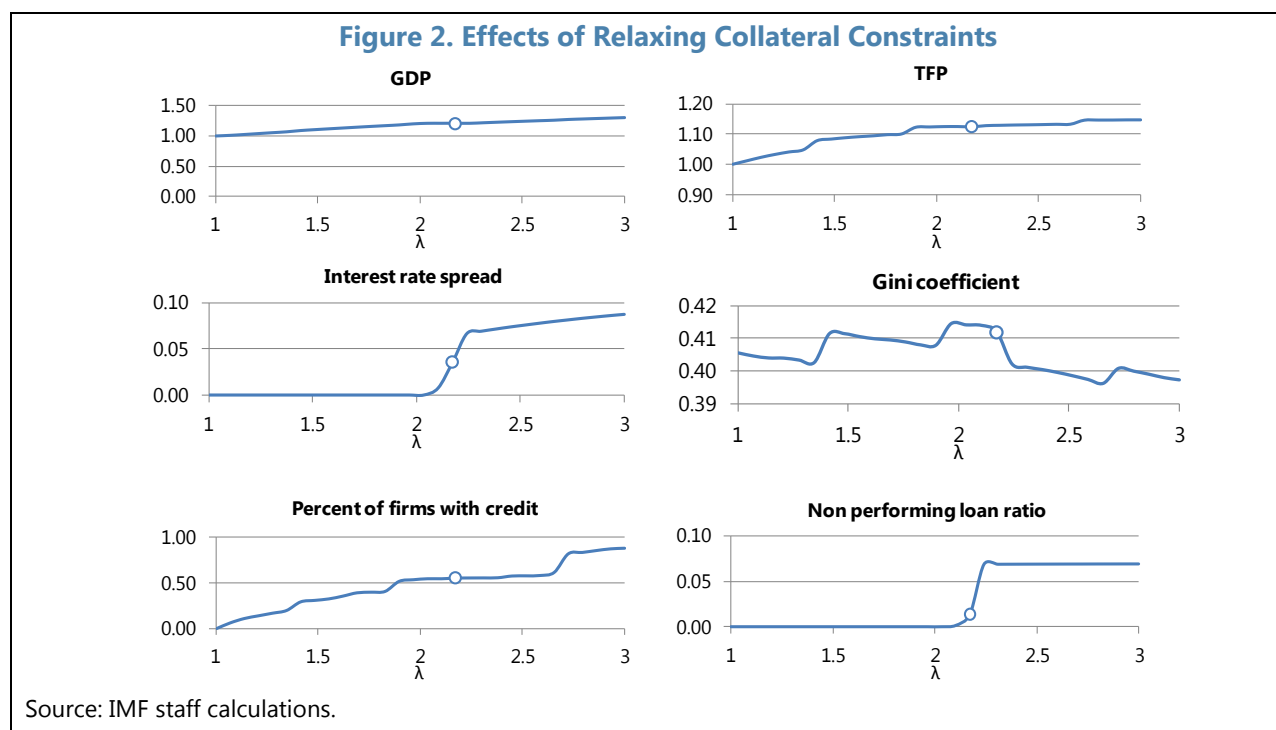
**11. The interest rate spread and NPLs increase with higher  $\lambda$ .** As  $\lambda$  increases above a threshold, agents leverage more, the share of non-performing loans and the interest rate spread start increasing. This occurs as a relaxation of collateral constraints opens the door for small new entrants who tend to be more leveraged.

**12. Relaxing collateral constraints first pushes up inequality and then decreases it, consistent with the Kuznets' hypothesis.** When  $\lambda$  increases from low levels, talented entrepreneurs leverage more and increase their profits, driving up the Gini coefficient. However, as  $\lambda$  becomes larger, the sharp

<sup>3</sup> A value of 3 for  $\lambda$  represents the level of collateral as percent of loan observed on average in advanced economies

<sup>4</sup> A relaxation of borrowing constraints benefits talented entrepreneurs more as it is profitable for them to operate at a larger scale than untalented entrepreneurs. With higher  $\lambda$ , all entrepreneurs borrow more, but, on average, untalented ones do not borrow as much.

increase in the interest rate shrinks entrepreneurs' profits, leading to a lower Gini coefficient. The stage in which India is now (i.e. its current value of  $\lambda$ ) suggests that inequality should be declining with more relaxed collateral constraints.



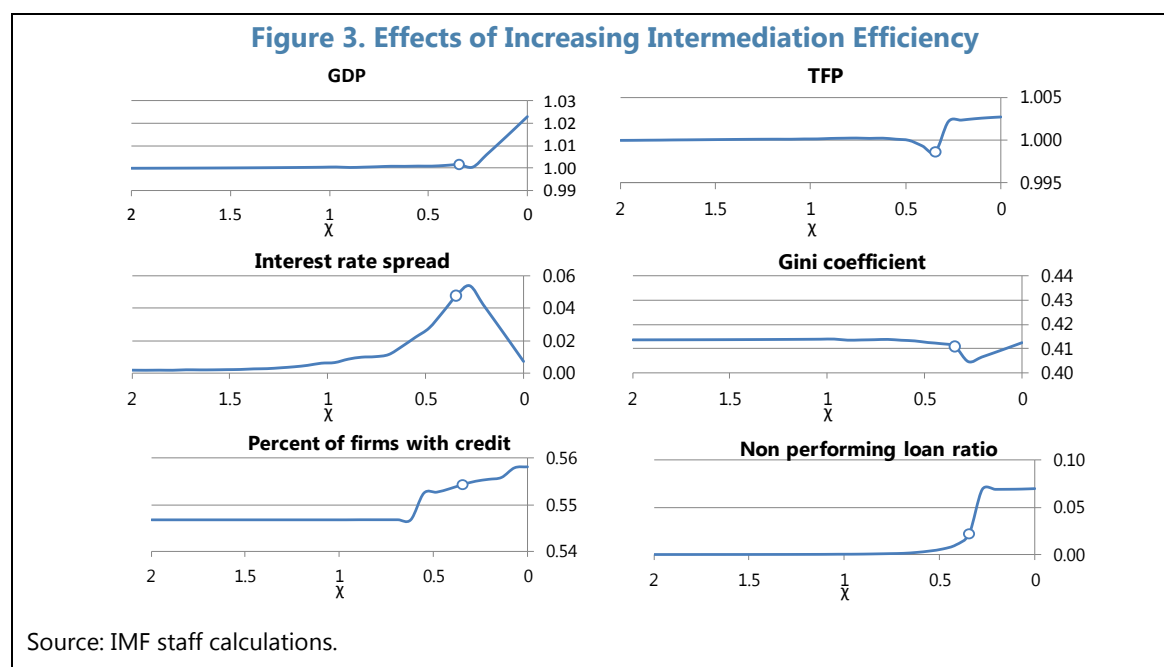
### Increasing Intermediation Efficiency

**13. In Figure 3, the financial intermediation cost,  $\chi$ , is reduced** (from its current level of 0.35 to 0). When  $\chi$  decreases, lending rates decline, output increases but less so compared to the case where  $\lambda$  is lowered. At higher levels of  $\chi$ , better intermediation efficiency only benefits the highly-leveraged firms which are few in number (due to the presence of high participation costs and tight borrowing constraints). As  $\chi$  decreases further TFP increases because the lower intermediation cost facilitates the allocation of capital to more efficient entrepreneurs.

**14. The interest rate spread increases initially for lower levels of  $\chi$  and decreases sharply as  $\chi$  approaches zero, displaying an inverted V shape.** Two opposing forces are in operation here. First, the decline in the cost of borrowing due to a more efficient intermediation induces enterprises to leverage more, pushing up NPLs. This also increases the endogenous interest rate spread. Second, the decline in  $\chi$  decreases the interest spread directly through its effect on lending rates. The Gini coefficient increases as  $\chi$  is reduced. This occurs as more efficient intermediation disproportionately benefits a small number of highly leveraged firms who are already in the financial system and have higher incomes. In fact, the percent of firms with credit remain unchanged.

**15. These simulations enable the identification of the most binding financial constraint.** Table 1 shows a comparison of changes in GDP, AFP and the Gini coefficient when financial inclusion is increased along different dimensions. The main finding is that relaxing constraints on collateral appears

to offer the greatest benefits in terms of Indian output and productivity. Yet, the effect on inequality is lower compared to the case when the participation cost is reduced. In fact, entrepreneurs who are already included in the financial system benefit more from the reduction in collateral requirements and less so from a reduction in the fixed participation cost which is a relatively lower share of their income. The latter, however, benefits potential new entrepreneurs more which in turn leads to decreasing inequality. Nevertheless, the “poor” may still be better off in absolute terms (albeit not relative to the “rich”) under the lower collateral requirements scenario. Not surprisingly, increasing intermediation efficiency does not boost GDP significantly, as it only benefits small number of highly leveraged firms.



**Table 1. Comparative Statistics, 2005 versus 2009**

|            | Part. Cost $\psi$ |      |                      | Borr. Constr. $\lambda$ |      |                      | Intermed. Cost $X$ |      |                      |
|------------|-------------------|------|----------------------|-------------------------|------|----------------------|--------------------|------|----------------------|
|            | GDP               | Gini | Average Productivity | GDP                     | Gini | Average Productivity | GDP                | Gini | Average Productivity |
| India 2005 | 3.9               | -4.8 | -12.0                | 8.5                     | -2.7 | 3.1                  | 1.6                | 0.3  | 0.4                  |
| India 2009 | 2.8               | -4.7 | -9.8                 | 7.4                     | -3.6 | 2.0                  | 2.2                | 0.4  | 0.4                  |

Source: IMF staff calculations.

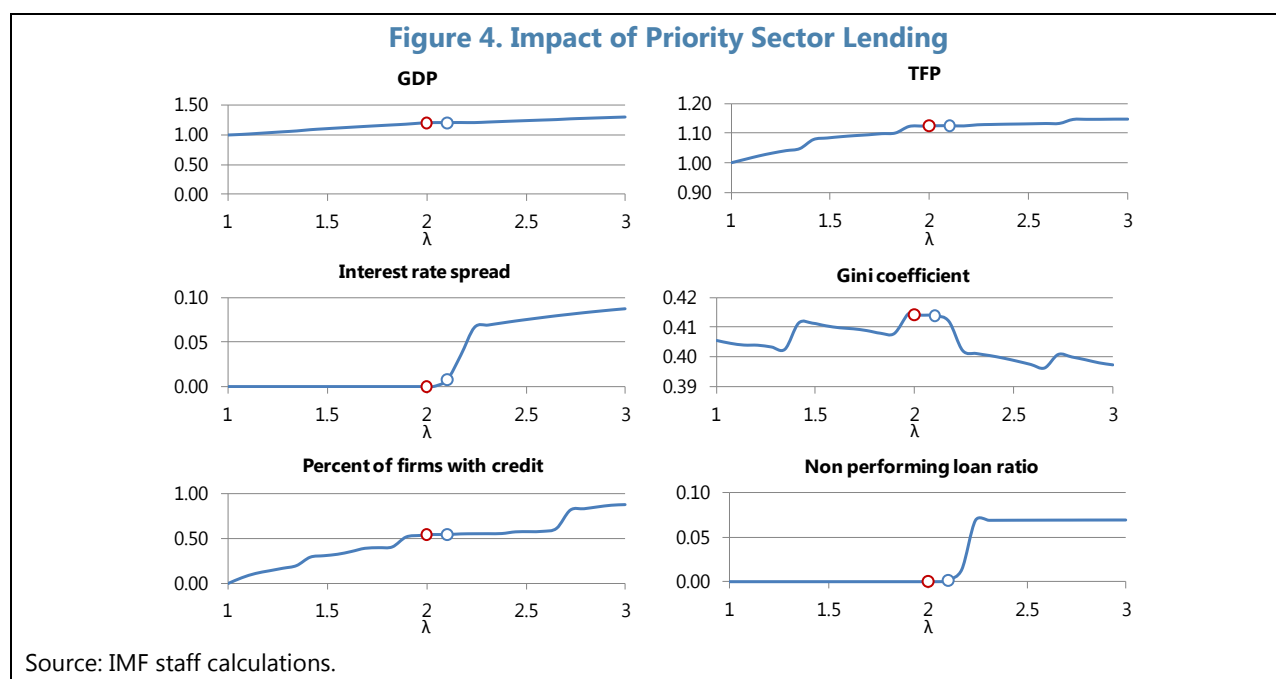
### Priority Sector Lending Viewed Through the Lens of the Model

**16. The model is next used to perform counterfactual policy analysis to evaluate priority sector lending (PSL) in India.** Specifically, the model is calibrated with no PSL by changing the collateral constraint (decrease  $\lambda$  to about 2 from its current value 2.2) such that the credit is reduced by



about 20 percent, holding other parameters fixed.<sup>5</sup> In Figure 4, red dots represent the “no PSL” scenario, and the blue dots represent a regime with PSL.

**17. PSL has had a large impact on financial inclusion by boosting enterprises’ access to credit, but has led to a slight increase in NPLs.** As more firms have borrowed from financial institutions or have increased their borrowing, they have invested more, increasing output and productivity in India. The impact on inequality has been also favorable. However, a side effect of the policy has been increasing spreads and NPLs in line with the discussion above. Low NPLs are not necessarily welcome as they may be a reflection of limited lending. The entry of new entrepreneurs could however still point to the need for close monitoring of NPLs and possibly consideration of mitigating macroprudential measures.



## Conclusions

**18. Different financial inclusion strategies have varied effects on the macroeconomy, inequality and financial stability, and there are tradeoffs among these aspects.** The impact of relaxing collateral constraints on output and productivity is the largest, but decreasing participation costs is the most effective in reducing income inequality in India. At this stage, increasing intermediation efficiency does not appear to lead to a particularly strong effect as collateral constraints and participation costs are more binding financial sector frictions in the case of India. Greater intermediation efficiency would be enjoyed only (or disproportionately more) by entrepreneurs that are already included in the financial system, and would not have a sizeable impact on inequality.

<sup>5</sup> Using past policy changes to PSL in 2000, a number of papers (Banerjee and Duflo (2014), and Kapoor, Ranjan, Raychaudhuri (2012)) estimate that the impact of PSL on credit is about 20 percent. The impact of PSL on lending costs or access are estimated to be negligible, therefore we focus here on collateral constraints.

**19. Priority sector lending appears to be effective in boosting financial inclusion and benefiting the poor, but there are some unintended side effects.** The impact of the policy on output, productivity and inequality has been favorable and significant. In that sense, relatively poor individuals have benefited the most from PSL. However, the impact on financial stability may need to be closely monitored.

#### **Box 1. India's Efforts to Enhance Financial Inclusion**

India has traditionally placed considerable emphasis on financial inclusion, and many different initiatives have been tried over the years. The government has invested much effort and resources into reducing constraints to access to financial services for small and medium-sized enterprises as well as low-income households. These include:

- Expanding the access by universal basic bank coverage. In 2005, the RBI advised banks to make available basic bank accounts which were no-frills accounts with low minimum balances- services include deposit taking and cash withdrawal and receipt/credit of money through electronic payment channels or checks. In 2006, the RBI- with the objective of ensuring greater financial inclusion- enabled banks to use the services of NGOs and other organization as intermediaries in providing financial services through use of "Business Facilitator and Business Correspondent Model".
- More recently, in April 2014, new bank licenses were granted (to two financial institutions) by including financial inclusion as one of the criteria. Also in order to promote inclusion among low income households, Know Your Customer (KYC) norms were simplified.
- The RBI issued draft regulations on payments banks (2014). Payments banks will provide a limited range of products (accept deposits, facilitate remittances), and will have a widespread network of access points to remote areas (own branches/business correspondents).
- The authorities announced the Prime Minister's Jan Dhan Yojana (2014). Pillars include universal access to banking facilities with at least one account for every household, and include insurance cover, and RuPay Debit card. The authorities eventually plan to channel government benefits using the Direct Benefits Transfer scheme. As of mid-January 2015, around 115 million accounts have been opened under this scheme.

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# INDIA'S PROGRESS ON ACHIEVING THE MILLENNIUM DEVELOPMENT GOALS<sup>1</sup>

*As the development community turns to the post-2015 agenda and forms a set of Sustainable Development Goals (SDGs), we assess India's present performance on achieving the Millennium Development Goals (MDGs). India appears to be on track to meet one-and-a-half, likely miss three-and-a-half, and partially meet three of the eight goals by the end-2015 target date. Overall progress has been mixed, but India has made important strides on the key target of poverty reduction.*

**1. With one year remaining before the end-2015 target date for the achievement of the Millennium Development Goals (MDGs), India is on track to meet one-and-a-half, will likely miss three-and-a-half, and likely partially meet three of the eight goals.** The MDGs were established in 2000, with the then-189 United Nations member states and many international organizations committing to achieving the targets by December 31, 2015. The eight goals are to: (1) eradicate extreme poverty and hunger; (2) achieve universal primary education; (3) promote gender equality and empower women; (4) reduce child mortality; (5) improve maternal health; (6) combat HIV/AIDS, malaria, and other diseases; (7) ensure environmental sustainability; which includes access to safe drinking water and sanitation; and (8) develop a global partnership for development, which includes affordable access to essential drugs and availability of new technology. There are 21 targets that correspond to the eight goals, and the guidelines suggest the use of over 50 indicators to measure progress on the targets. Data gaps exist for many countries, however, which prevent the use of all indicators. India has adapted the MDG framework, by focusing on 12 of the 21 targets and using 35 of the over 50 indicators available to track progress.

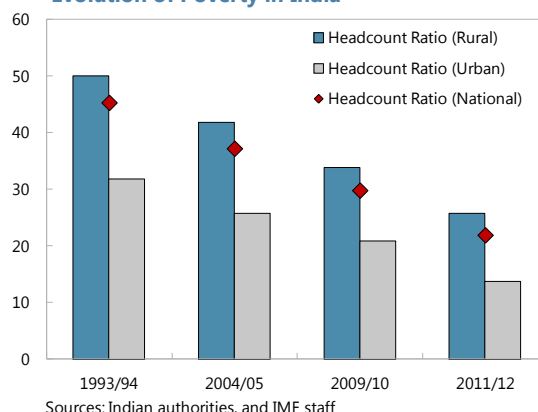
| Goal                              | Ministry of Statistics and Programme Implementation  |
|-----------------------------------|--|
|                                   | Summary of Progress  |
| Poverty and hunger                | On-track for poverty, slow or almost off-track for hunger  |
| Universal primary education       | On-track   |
| Gender equality                   | On-track   |
| Child mortality                   | Moderately on-track due to the sharp decline in recent years   |
| Maternal health                   | Slow or off-track  |
| HIV/AIDS, malaria, other diseases | On-track for HIV, moderately on-track for Malaria and TB   |
| Environmental sustainability      | On-track for water but slow for sanitation; moderately on-track for 'integrate principle of sustainable development into country policies and reverse the loss of environmental resources'; pattern not statistically discernible for 'by 2020, to have achieved improvement in the lives of at least 100 million slum dwellers' |
| Development partnership           | On-track for 'make available the benefits of new technologies, especially ICT'   |

Source: Millennium Development Goals India Country Report 2014, Social Statistics Division, Ministry of Statistics and Programme Implementation, Government of India.

<sup>1</sup> Prepared by Sonali Das.

**2. Poverty and hunger.** *Poverty:* The target of halving the proportion of population in poverty between 1990 and 2015 has been met. The share of people below the national poverty line decreased from 45.3 percent in 1993 to 21.9 percent in 2011, and the share of people living on less than \$1.25 (PPP) a day fell from 49.4 percent in 1993 to 24.7 percent in 2011. However, the share of the poorest quintile in national consumption has not seen much improvement, increasing slightly from 9.6 percent in 1993/94 to 9.8 percent in 2009/10 in rural areas, and decreasing slightly from 8 percent to 7.1 percent in that time period in urban areas. *Hunger:* The percentage of undernourished people has fallen from 25.5 percent of the population in 1991 to 17 percent in 2012, leaving the target of halving the proportion of people suffering from hunger by 2015 unlikely to be met.

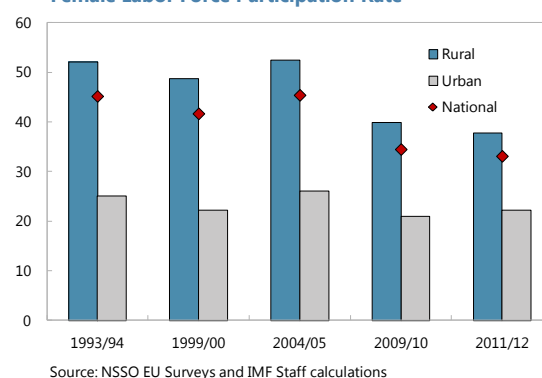
Evolution of Poverty in India



**3. Universal primary education.** This target has been met according to the adjusted net enrollment in primary school measure, which was 99 percent in 2007. Similarly, the primary school completion rate has improved steadily, up from 70 percent in 1999 to 96 percent in 2011. Youth literacy improved from 62 percent in 1991 to reach 81 percent by 2006.

**4. Gender equality.** The target of eliminating gender disparity in primary education was met in 2008, but has yet to be met in secondary or tertiary education. Female literacy was lower than male literacy, at 74 and 88 percent, respectively, among youth in 2006. The share of females in wage employment in the non-agricultural sector is estimated at 19 percent for 2011/12, and the proportion of seats in parliament held by women has increased from 5 percent in 1990 to a still low 11 percent in 2013. Although not a formal indicator in the assessment framework, female labor force participation is low and has been declining over time (see also Selected Issues Chapter XII on female labor force participation).

Female Labor Force Participation Rate

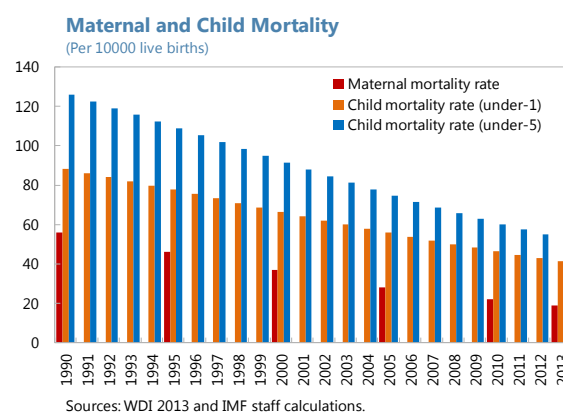


**5. Child mortality.** Despite rapid recent progress, India will likely miss its target of reducing the under-five mortality rate to 42 per thousand births (one third the 1990 level) by 2015. The under-five mortality rate has declined dramatically from 126 per thousand in 1990 to 53 in 2013. The infant (under-one) mortality rate has fallen by almost half and is at 42 per thousand in 2013, yet is also likely to miss the target of 27 by 2015.

**6. Maternal health.** India will likely miss the target of reducing the Maternal Mortality Ratio (MMR) from an estimated 437 per 100,000 live births in 1990 to 109 by 2015 (one quarter the 1990 level), although the pace of decline has increased in recent years. MMR was 190 per 100,000 live

births in 2013. The share of births attended by skilled personnel was 76 percent in 2009, suggesting the goal of universal coverage will likely not be achieved.

**7. The final three goals are difficult to assess,** due to both lack of data availability and sub-targets without clear indicators. In environmental sustainability, the target of halving the proportion of households without access to safe drinking water sources from its 1990 level has been met, but access to sanitation facilities is still low, at 53 percent of households in 2011. In partnership for development, the number of telephones per 100 persons has increased rapidly from 9 in 2005 to 73.5 in 2013, and internet users are at 15 percent of the population in 2013.



**8. Overall, the data indicate that India is on track to meet one-and-a-half, will likely miss three-and-a-half, and will likely partially meet three of the eight goals by the end-2015 target date.** While progress has been mixed, India has made important strides on the key target of poverty reduction (see Anand and Tulin 2014), on providing people with access to improved water, and on expanding access to information and communication technology. Even though India will likely not meet the goal of reducing child mortality to one third the 1990 level, it will come close since the decline in the rate has accelerated in recent years. Despite the progress made, alleviating hunger, overcoming gender inequality, bolstering maternal health, and improved sanitation continue to be areas of outstanding concern.

## References

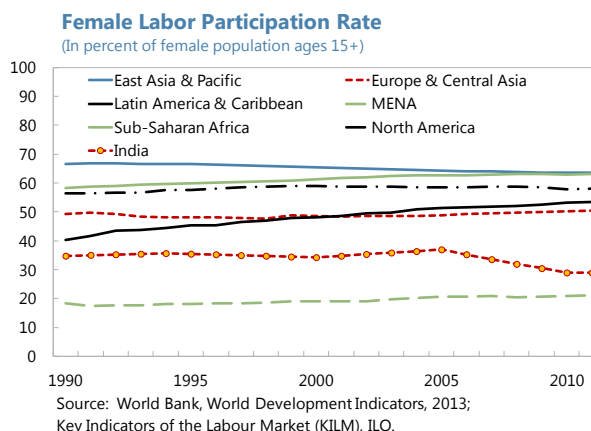
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# HOLDING UP HALF THE SKY: ANALYSIS OF FEMALE LABOR FORCE PARTICIPATION IN INDIA<sup>1</sup>

*India stands out among G-20 peers as having one of the lowest rates of female labor force participation. A growing literature shows that boosting labor force participation of women leads to significant economic gains. This chapter finds that a number of policy initiatives can be used to tackle low female economic participation, including increased labor market flexibility, higher investment in infrastructure, and enhanced social spending.*

**1. While women's economic participation is in itself an important social and development goal, it is also crucial for growth.** Various studies have highlighted how lower female labor force participation or weak entrepreneurial activity drags down economic growth. The World Economic Forum's 2014 Global Gender Gap Report finds a positive correlation between gender equality and per capita GDP, the level of competitiveness as well as human development indicators. Indeed, drawing more women into the labor force, along with other important structural reforms to create more jobs, could be a source of future growth in India as it aims to reap the "demographic dividend" from its large and youthful labor force. This chapter benchmarks India relative to other countries on female labor force participation. In addition, it uses individual-level survey data to examine participation choices and the key drivers of female participation in the labor force. The chapter also examines policy levers, including at the state level, which can be used to boost female labor force participation.

**2. India has one of the lowest female labor force participation (FLFP) rates when compared with emerging market and developing countries.** India's FLFP rate is around 29 percent (of the female population aged 15 years and above) at the national level (with significant differences across Indian states) —a level much below that of other emerging market peers. FLFP rates have been falling in India, in contrast to most other developing countries and emerging market economies (text chart). As well, the gender gaps in participation (between males and females) are the second highest among G-20 economies, at 52 percent (with only Saudi Arabia having a larger gender participation gap).



<sup>1</sup> Prepared by Sonali Das, Sonali Jain-Chandra, and Naresh Kumar, based on a forthcoming IMF Working Paper.

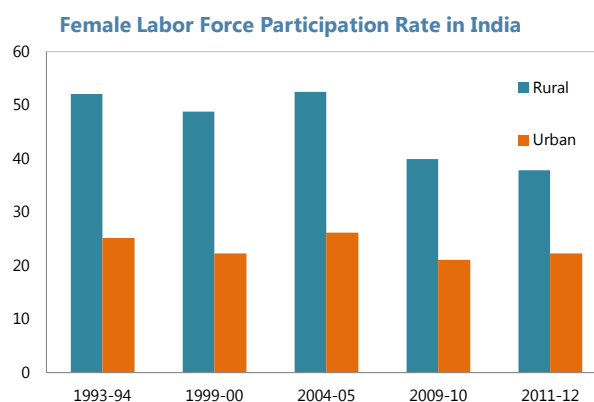
**3. There is a growing literature on the determinants of FLFP as well as the economic implications of low female participation** (summarized in IMF 2013). This literature highlights that gender gaps in labor force participation (FLFP), entrepreneurial activity, or education impedes economic growth (e.g. Cuberes and Teignier, 2014; Esteve-Volart, 2004, and Klasen and Lamanna 2008 among others). Cuberes and Teigner (2012) simulate an occupational choice model that imposes several frictions on female economic participation and their wages, and show that gender gaps in entrepreneurship and in labor force participation significantly reduce income per capita. For India, they find that income per worker is reduced by 26 percent. A number of recent empirical papers have examined low and declining female labor force participation in India. Klasen and Pieters (2012) find that for urban Indian women, participation in the workforce at lower education levels is dictated by economic necessity, and only for highly educated women there is a pull factor to enter the workforce. Esteve-Volart (2004) uses panel data on Indian states to show that the ratio of female to male workers (and managers) is positively correlated with growth and living standards. Finally, OECD (2014) finds that female economic participation (which includes labor force participation and participation in entrepreneurial activities) in India remain low and that raising FLFP through selected policies could boost economic growth by around 1½–2½ percent per annum.

### Stylized Facts on Female Labor Force Participation

**4. Household data from five rounds of the National Sample Survey Organization's (NSSO) Employment and Unemployment Survey is used in the analysis.** The surveys cover the years 1993/1994, 1999/2000, 2004/2005, 2009/2010, and 2011/2012. The estimation of determinants of labor force participation presented in this chapter focuses on the most recent round of the survey, 2011/2012, and females aged 18 to 60.

**5. The following stylized facts emerge from the household survey data:**

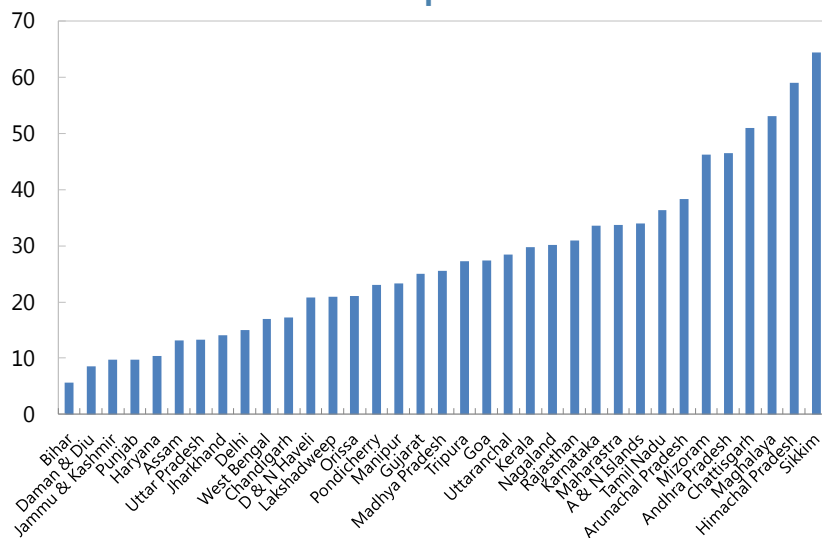
- *Female labor force participation rates vary widely between urban and rural areas.* Labor force participation of women in rural areas is much higher than women in urban areas. Over time, the gap between urban and rural areas has narrowed slightly, with most of the change being driven by the fall in participation rates in rural areas.
- *There is also considerable diversity in female labor force participation rates across Indian states*, with states in the South and East of India generally displaying higher participation rates than those in North India.



Source: NSS Employment and Unemployment Surveys and IMF staff calculations.



### Female Labor Force Participation Across States



Source: NSS Employment and Unemployment Surveys and IMF staff calculations.

- There is also a growing gap between male and female labor force participation rates. These are particularly pronounced in urban areas, where they are wider, at around 60 percentage points. In rural areas, participation gaps between males and females were around 45 percentage points.

#### Urban: Labor Force Participation Rate



Source: NSS Employment and Unemployment Surveys and IMF staff calculations.

#### Rural: Labor Force Participation Rate



Source: NSS Employment and Unemployment Surveys and IMF staff calculations.

- There is a U-shaped relationship between education and labor force participation rates of women. With increasing education, labor force participation rates first start to decline and then pick up among highly-educated women, who experience the pull factor of higher-paying white collar jobs.

#### Urban Female Labor Force Participation



Source: NSS Employment and Unemployment Surveys and IMF staff calculations.

## Empirical Methodology and Results

### 6. The following questions are analyzed:

- What are the determinants of female labor force participation in India's urban and rural areas?
- Have states with less stringent labor market regulations seen higher job creation and greater female participation?
- How do these factors affect whether employment occurs in the formal or informal sector?

**7. A two stage estimation procedure is used.** In the first stage, an individual's expected wages are estimated as follows:

$$w_i = \theta_1 + \theta_2 Z_i + \eta_i \rightarrow E(w) = \hat{w}$$

where  $w$  is the log of daily wages and  $Z$  is a vector of individual and household characteristics variables including: age and age squared, dummy variables representing literacy, levels of educational attainment, marriage, children aged 0 to 4, and 5 to 16, and whether the individual lives a rural or urban area. In the main specification, the probability of being in the labor force is then estimated as follows:

$$\Pr\{L_i = 1\} = \alpha + \beta_1 \hat{w}_i + \beta_2 EPL + \beta_3 X_i + \nu_s + \varepsilon_i$$

where  $L_i = 1$  if individual  $i$  is in the labor force,  $\hat{w}$  is the log of daily wages, EPL is the employment legislation index discussed below, and  $X$  is a vector of individual and household characteristics variables including:

- Age, dummy variable representing whether the individual is married, or has children
- Dummy variables representing literacy, and levels of educational attainment
- Monthly household expenditure to capture the income level of the household
- State-dummies to control for unexplained differences in labor force participation across states

We estimate weighted logit models to ensure the estimates represent the population, unlike previous studies using the NSS Employment and Unemployment surveys. Standard errors are clustered at household level. Other specifications focus on employed individuals only, to study the factors that increase the probability that an individual is employed in the formal sector instead of the informal sector.

**8. It has been widely noted that relatively inflexible labor markets have weighed on employment generation in India.** There is considerable cross-state heterogeneity in labor market rigidities. Accordingly, we use a state-level index to gauge the flexibility of Indian labor markets. This index is the OECD's Employment Protection Legislation (EPL), which is based on a survey of labor market regulations. It counts amendments to regulations that are expected to increase labor market

flexibility. This includes amendments to the Industrial Disputes Act (IDA),<sup>2</sup> the Factories Act, the Shops Act, and the Contract Labor Act. For example, with respect to the IDA, the index would take a higher value for Indian states that: require a shorter amount of time to give notice to fire; have made amendments allowing certain exemptions to the Act, that have lowered the threshold size of the firm to which chapter VB applies; exclude the complete cessation of a certain function from the definition of retrenchment; have instituted a time limit for raising disputes; or have instituted other amendments to the procedures for layoffs, retrenchment, and closure that should ease planning for firms. The EPL index also captures differences in the ease of complying with regulation (e.g. rules on dealing with inspectors, registers, filing of returns). As in Dougherty (2009), we scale the index, which takes values from 14 to 28, by its maximum value, thus ending with a variable that ranges from 0.5 to one.

## 9. The main regression results are as follows:

- The *baseline regressions* (Table 1) show the impact of individual characteristics on the probability of being in the labor force. This probability rises when a woman is highly educated, but falls with rising number of children and marriage. Expected wages have a significant positive effect on the probability of being in the labor force. Rising households incomes have a dampening effect on participation.
- *More flexible labor markets are associated with higher female participation in the labor force.* The coefficient of 3.25 (Table 1) implies that the probability of being in labor force increases by about 13.8 percentage points when EPL increases from 0.5 to 1 (and all other variables are at their means).
- *The chance of being employed in a formal job, as opposed to in the informal sector, also increases in more flexible labor markets.* When categorizing labor as formal both by the location of employment and by whether an individual has an employment contract (Table 2), the results indicate a higher likelihood of being formally employed in states with higher EPL.
- *Poor infrastructure has a dampening effect on female labor force participation.* Women in states with greater access to roads are more likely to be in the labor force (Table 3).
- *Higher social spending (as a share of net state domestic product (NSDP)) is associated with greater female labor force participation* (Table 3).

**10. In sum, there is a large gap in the labor force participation rates of men and women in India.** This gap should be addressed to fully harness India's demographic dividend. A number of policy initiatives can be used to address this gap. These include increased labor market flexibility (which could lead to the creation of more formal jobs), allowing more women (many of whom are

<sup>2</sup> Chapter VB of the Act requires firms employing 100 or more workers to obtain government permission for layoffs, retrenchments and closures (as of 1984).

employed in the informal sector) to be employed in the formal sector. Investment in infrastructure to improve connectivity would also help foster higher female participation. As well, higher social spending, including investment in education, can boost female labor force participation.

**Table 1. Determinants of Female Labor Force Participation**

**Dependent variable = 1 if in labor force**

|                          | All                  | Urban                | Rural                | All                  | Urban                | Rural                |
|--------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Predicted wage           | 0.138*<br>(0.073)    | 0.740***<br>(0.142)  | 0.466***<br>(0.100)  | 0.258**<br>(0.104)   | 0.976***<br>(0.229)  | 0.827***<br>(0.140)  |
| EPL                      |                      |                      |                      | 3.250***<br>(0.183)  | 0.180<br>(0.505)     | 3.700***<br>(0.209)  |
| Married                  | -0.499***<br>(0.037) | -0.899***<br>(0.058) | -0.471***<br>(0.049) | -0.399***<br>(0.062) | -0.977***<br>(0.101) | -0.368***<br>(0.080) |
| Children                 | -0.200***<br>(0.036) | -0.135***<br>(0.052) | -0.158***<br>(0.047) | 0.009<br>(0.052)     | -0.000<br>(0.080)    | 0.139**<br>(0.067)   |
| Illiterate               | -1.180***<br>(0.066) | -1.109***<br>(0.111) | -1.335***<br>(0.084) | -1.395***<br>(0.106) | -1.337***<br>(0.175) | -1.562***<br>(0.137) |
| Some Education           | 0.725***<br>(0.061)  | 0.713***<br>(0.097)  | 0.887***<br>(0.080)  | 0.604***<br>(0.099)  | 0.713***<br>(0.159)  | 0.770***<br>(0.127)  |
| Post-secondary education | 1.070***<br>(0.079)  | 0.906***<br>(0.127)  | 0.727***<br>(0.113)  | 1.083***<br>(0.120)  | 0.923***<br>(0.200)  | 0.617***<br>(0.166)  |
| Household expenditure    | -0.115***<br>(0.031) | -0.180***<br>(0.044) | 0.064<br>(0.040)     | -0.377***<br>(0.051) | -0.378***<br>(0.077) | -0.224***<br>(0.064) |
| Constant                 | -0.133<br>(0.340)    | -2.759***<br>(0.652) | -2.806***<br>(0.492) | 0.054<br>(0.539)     | -1.767<br>(1.144)    | -4.067***<br>(0.782) |
| Observations             | 133,940              | 52,914               | 81,026               | 69,844               | 25,632               | 44,212               |

Source: IMF staff estimates.

Note: Robust standard errors in parentheses, clustered at household level, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. All specifications include state dummies.

**Table 2. Formal and Informal Employment**

|                          | <b>Dependent variable = 1 if<br/>employed in formal<br/>sector, = 0 if employed in<br/>informal sector. 1/</b> | <b>Dependent variable = 1 if<br/>employed with contract,<br/>= 0 if employed without<br/>contract.</b> |
|--------------------------|--|--|
| EPL                      | 1.243***<br>(0.298)  | 3.108***<br>(0.566)  |
| Predicted wage           | 5.225***<br>(0.219)  | 1.765***<br>(0.357)  |
| Married                  | -1.036***<br>(0.086)   | -0.057<br>(0.214)  |
| Children                 | 0.174**<br>(0.083)   | -0.042<br>(0.230)  |
| Illiterate               | -2.449***<br>(0.203)   | 0.452<br>(0.494)   |
| Some education           | 1.523***<br>(0.167)  | 0.074<br>(0.316)   |
| Post-secondary education | -1.142***<br>(0.176)   | -0.587*<br>(0.343)   |
| Household expenditure    | -0.804***<br>(0.084)   | 0.414**<br>(0.191)   |
| Constant                 | -20.713***<br>(1.124)  | -15.161***<br>(1.902)  |
| Observations             | 59,125   | 4,995  |

Source: IMF staff estimates.

Robust standard errors in parentheses, clustered at household level. \*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1. All specifications include state dummies. 1/ Categorized as informal or formal based on location of work.

**Table 3. Infrastructure and Social Spending**

| <b>Dependent variable = 1 if in labor force</b> |                     |                  |                     |
|---|---------------------|------------------|---------------------|
| log(Road)                                       | 0.191***<br>(0.030) |                  |                     |
| Access to drinking water                        |                     | 0.002<br>(0.001) |                     |
| Social spending/NSDP                            |                     |                  | 0.022***<br>(0.003) |
| Observations                                    | 107,579             | 124,726          | 116,083             |

Source: IMF staff estimates.

Note: Robust standard errors in parentheses, clustered at household level, \*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1. NSDP is net state domestic product. All specifications include individual and household control variables, log(NSDP), and predicted wages.

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