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July 2, 2018

Approved By
Asia and Pacific Department

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CONTENTS

SUMMARY

India has been one of the fastest-growing economies in the world in recent years, partly reflecting key structural reforms that have been implemented. Among these reforms are the inflation-targeting monetary policy framework, the Insolvency and Bankruptcy code, the goods and services tax (GST), and steps to liberalize foreign direct investment (FDI) flows and the ease of doing business. This background paper for the 2018 Article IV consultation with India explores possible further enhancements to the structural reforms, including to help reap the full benefits of India's potential demographic dividend over the next few decades.

The first chapter discusses potential trade-offs of simplifying the GST—a milestone reform in India's tax policy. While the GST unified and harmonized numerous indirect taxes, it has a complex structure, which could be simplified without sacrificing progressivity of the current GST and with potentially significant gains from lower compliance and administrative costs.

The second chapter analyzes states' finances, which have deteriorated in recent years. Traditionally, fiscal discipline has been imposed on states through central control over state borrowing and through states' self-adopted fiscal rules. Market discipline could be strengthened through reforms focusing in the near term on further liberalizing financial markets, improving the quality and timeliness of state fiscal data, ensuring sufficient fiscal flexibility for states to respond to fiscal shocks, and, over the medium term, on steps to strengthen no-bailout expectations.

The third chapter analyzes the structure and composition of FDI flows to India and factors underlying FDI flows across countries. FDI flows to India have increased significantly in recent years, partly benefiting from FDI liberalization and improved investor sentiment. Based on the empirical analysis, further investment liberalization, supply-side reforms, and infrastructure investment could help sustain FDI going forward.

The fourth chapter examines the nature, magnitude, and sources of resource misallocation across Indian states. As strict labor market regulations appear to be a major contributor to misallocation, further labor reforms will improve firm-level efficiency and productivity.

The final chapter takes stock of key issues in and identifies important reforms for India's agricultural sector. Including based on the analysis, sustained inclusive growth requires agricultural sector reforms, which should focus on reducing supply-side constraints, building more integrated markets, boosting productivity, and addressing market distortions.

GST: CONSIDERATIONS FOR A SIMPLER RATE STRUCTURE[1]

The goods and services tax (GST) is a milestone reform in India's tax policy, taking the important step of unifying and harmonizing numerous indirect taxes across all states of the federation and the central government. Yet, the GST has a complex structure with a relatively high number of rates (and exemptions), which could be simplified without sacrificing progressivity of the current GST and with potentially significant gains from lower compliance and administrative costs. A dual rate structure with a low standard rate and an additional higher rate on select items can be progressive and preserve revenue neutrality, while streamlining exemptions would further contribute to progressivity and reduce compliance and administrative costs.

A. Introduction

1. The introduction of the GST on July 1, 2017 was a critical and long-awaited reform to India's indirect tax system. The GST subsumed numerous existing taxes at the center and states, including central excises and state valued-added taxes (VATs), the central service tax, countervailing and additional duties, and numerous levies such as on entertainment and gambling. The implementation of the GST led to the key step of harmonizing indirect tax rates on goods and services that previously differed across different states and the center, and brought services into the state tax net (earlier services were taxed only by the center and excluded from the state VAT).

2. India's GST has a multiple rate structure, which is relatively rare among countries with a VAT. India belongs in a small group of (five) countries having four or more GST rates (four non-zero rates of 5 percent, 12 percent, 18 percent, and 28 percent; special low rates of 3 percent on gems and jewelry and 0.25 percent on rough diamonds; and a GST "cess" levied on demerit goods). In comparison, among 115 countries with VATs, 49 have a single rate, and 28 have two rates.[2]

3. The multiple rate structure in part reflects the demands of fitting multiple pre-GST tax rates on the same items. Rate fitment of items taxed differently under the previous excise and VAT regimes necessitated creation of in-between rates that would continue to yield revenue neutrality. For instance, a product taxed under a state VAT but zero-rated under excise taxes on the same good, say due to merit-good status, would need to be taxed at an intermediate rate under the new GST, to remain revenue-neutral.

[1] Prepared by Adil Mohommad.

[2] Source: World Bank India Development Update 2018.

4. The multiple rate structure and other features of India's GST environment could give rise to high compliance and administrative costs. In general, high costs may stem from factors highlighted below, some of which may be relevant in the Indian context:

- Legislative complexity (exclusions, exemptions, deductions, rate differences, frequency of changes, etc.);
- Procedural requirements (such as the need for supplementary documentation);
- Nature of the clientele—e.g., dealing with non-registrants; and
- Verification costs—especially under high informality as exists in India.

5. There is a broad consensus among economists that fewer rates and exemptions reduce these costs (Owens et al. (2011), OECD Observer (2011))**.** Overall tax compliance costs can be quite high, ranging between 2–10 percent of revenue yields, as high as 2½ percent of GDP (Barbone et al. (2012)). The evidence on VAT compliance costs varies widely across countries (and methodologies). While evidence on GST compliance costs in India are scanty, anecdotal evidence suggests that for large firms, the cost has increased from negligible shares to 0.2 percent of total costs (excluding switch-over costs which are estimated to be around the same level), though there are economies from switching to a simpler tax structure particularly for inter-state commerce. It is also taken as well established in the literature that compliance costs are regressive.[3] Another important benefit of a simpler rate structure is that it would reduce opportunities to lobby for lower rates among firms.

6. A simpler rate structure with fewer exemptions, however, would be less progressive. With the consumption basket of the rich taxed at higher rates than that of the poor, the GST as presently designed has an effective tax rate rising with household consumption. A revenue-neutral reduction in the number of rates would raise the effective rates for poorer households while reducing those for richer households. This is the key cost of moving to a simpler system.[4]

7. This chapter assesses the trade-offs in further simplifying India's GST. We will estimate the change in the incidence of the GST across household consumption quintiles if a revenue-neutral shift was made to a single rate or a single rate supplemented by a high rate on certain items (Section B). While compliance costs are in general significant for taxes, GST/VAT compliance and administration costs are harder to generalize due to high variation in the evidence and with only nascent experience with the GST in India. However, we note the broad consensus on the desirability of a simpler GST structure. We also address some concerns on the impact for informal/small firms

[3] "The regressivity of the compliance burden, especially for VATs, stems from the large diseconomies of scale involved in complying with tax requirements, together with the learning curve effect that militates strongly against small firms…" (Barbone et al. (2012)).

[4] That said, it is noteworthy that since its implementation the GST rate structure has been streamlined to an extent, with most of items being moved out of the top 28 percent bracket (which would reduce the progressivity of the tax).

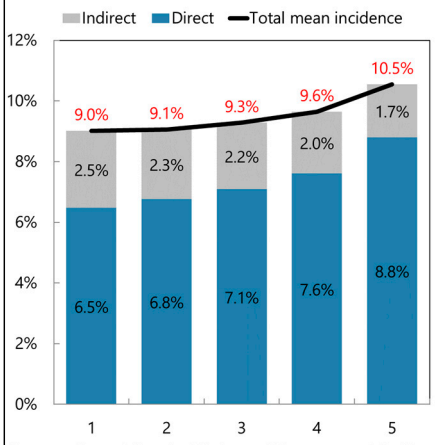
from moving to a single rate, and note caveats related to the analysis (Section C). A brief conclusion is offered in Section D. Data and methodological issues are addressed in the Appendix.

B. Incidence of the GST

"Can we have milk and Mercedes at the same rate?" – Prime Minister Modi.

8. The GST in its current design has a progressive incidence (Figure 1). The estimated total incidence includes both the *direct incidence* due to goods and services that are taxed and the *indirect incidence* that is due to the embedded input taxes on exempted goods (see Appendix for details). The estimated (average) effective GST rate on the lowest quintile of households by consumption expenditure, including both direct and indirect incidence, under the current GST rate structure (as of January 2018) is 9.0 percent. This rises only gradually to 9.6 percent for the fourth quintile and 10.5 percent for this topmost quintile.[5]

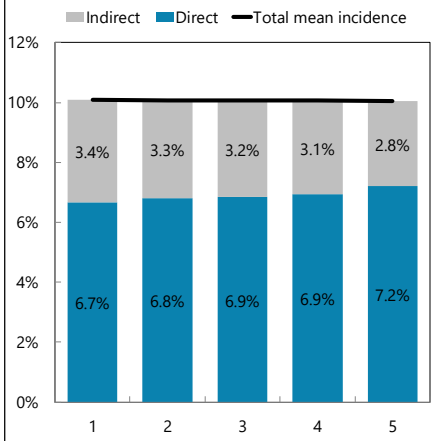
Figure 1. GST Incidence Under Current Structure
(By consumption quintile, in percent)



Sources: Central Board of Excise and Customs; and Staff estimates. Rate structure as of January 10, 2018. All own-sector input supplies are assumed to be partly taxed.

9. Due to embedded input tax costs, exemptions have a regressive effect. A key finding from this exercise is that the indirect incidence of the current GST disproportionately burdens poorer households, undoing the objective behind having exemptions. The lowest quintile faces an additional 2.5 percent effective GST rate since exempt goods production cannot avail of input-tax crediting (and input tax costs are thus likely passed on to the final consumer). This indirect incidence regressively diminishes with higher consumption due to the lower share of exempt goods in the consumption basket of higher quintiles, falling to 1.7 percent for the highest quintile.

Figure 2. GST Incidence Under Single Rate
(10% single rate and current exemptions; in percent)



Sources: Central Board of Excise and Customs; and Staff estimates. Rate structure as of January 10, 2018. All own-sector input supplies are assumed to be partly taxed. Note that this simulation raises 99.4% of the revenue raised under the current GST structure.

10. A revenue-neutral flat rate produces a flat GST incidence profile (Figure 2). In this exercise, a flat 10 percent GST rate (that produces about the same aggregate GST revenue on the given consumption profile), and the currently in-place set of exemptions, are simulated to generate the direct and indirect incidence profile. The direct incidence remains progressive, the difference across quintiles reflecting the difference in the weight

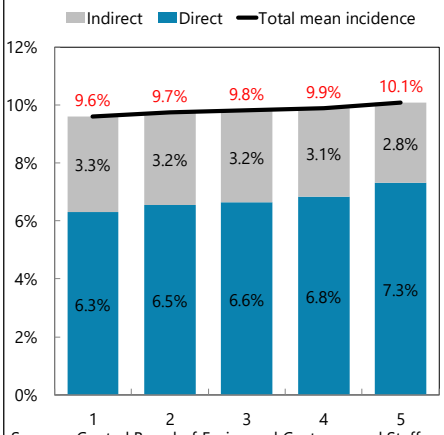
[5] Estimates of the incidence in this Section are based on household consumption expenditure survey data, which yields lower GST standard rates than have been estimated using other data sources. For instance, see Report on the Revenue Neutral Rate and Structure of Rates for the Goods and Services Tax (GST) (December 2015), which shows estimates ranging from 11.6 percent to 17.7 percent for the revenue neutral rate.

of exempt goods in consumption. However, the indirect incidence due to exempt goods erodes the difference completely, and the total incidence is 10 percent for all.

11. A single rate thus causes the effective GST rate to rise significantly for the lower quintiles and fall for the highest. Such a profile is likely to pose political feasibility constraints. Therefore, we consider an alternative simulation where a single rate is supplemented with an additional (higher) rate to target the consumption of the higher quintiles. This enables a standard rate lower than 10 percent, helping to reduce the effective rate paid by lower quintiles.

12. A dual rate GST would be able to deliver a progressive incidence at little additional cost to poorer households. A revenue-neutral combination of a 9 percent standard rate and a 25 percent high rate (applied to items that in the current GST are taxed at 28 percent), while retaining the current set of exemptions, is simulated (Figure 3). The resulting profile of total GST incidence reveals a modestly progressive incidence. The total incidence on the lowest quintile is 9.6 percent, rising gradually to 10.1 percent for the highest quintile. Note that as usual, with the existing set of exemptions in place, the indirect effect erodes progressivity.

Figure 3. GST Incidence Under Dual Rate
(9% single rate + 25% top rate and current exemptions; in percent)



Sources: Central Board of Excise and Customs; and Staff estimates. Rate structure as of January 10, 2018. All own-sector input supplies are assumed to be partly taxed. Note that this simulation raises 99.6% of the revenue raised under the current GST structure.

13. Other adjustments to such a dual rate system would help increase progressivity. Note that adjustments to the dual rate system could also be made to enhance its progressivity, with more selective application of the higher rate to exclude the consumption of poorer households as much as possible, and adjusting the top rate higher as required. In addition to more selective application of the high rate, eliminating exemptions would improve the progressivity of the tax by eliminating the regressive indirect incidence.

C. Caveats

14. There are important caveats/complications to address in the foregoing analysis.

- The first relates to the possibility of under-reporting of consumption in the data used for this exercise, namely National Sample Survey's (NSS) Household Consumption Expenditure data.[6] Systematic under-reporting of expenditure on high valued items would yield a misleadingly low estimated progressivity under the current GST. However, this does not change the conclusion that a dual rate GST would still result in a progressive incidence, as even though the incidence on the rich would decline, it would likely be at a higher level than shown in the

[6] For debates regarding the appropriateness of NSS data for setting the poverty line, see Sundaram and Tendulkar (2001) for instance.

dual rate case, whereas it would be at a similar level for the poorer households assuming under-reporting of high valued consumption among these households is less prevalent.

- A second relates to the costs of a uniform rate structure on small businesses. The concern is that an increase in the effective GST payable by small businesses under a uniform rate would have negative employment and output effects as such firms would be forced to exit. However, the resources released by exiting firms would likely be absorbed by firms that are able to grow, absorb the costs of a uniform tax rate, and expand their market share.

- A final caveat relates to the treatment of firms outside the GST net. The analysis in Section B treats all household consumption as produced by firms in the GST net. In reality, only firms above a certain annual turnover threshold (INR 2 million or US$29,400) are required to register under the GST, and those with turnover between INR 2 million and INR 15 million (US$ 220,500) are required to pay a flat 1 percent tax but cannot charge the GST on sales nor avail of input tax credits. Thus, a potentially large number of small firms are excluded.[7] The impact of GST-exempt firms on the estimated incidence in Section B is difficult to sort out empirically in the absence of detailed data on exempt firms' supplies mapped to household consumption expenditure. However, we can sketch out some possibilities under different configurations of input consumption by exempt firms and the share of household consumption supplied by such firms:

    - *Case 1: Exempt firms purchase inputs and pay GST on them (on which they cannot claim tax credits due to exempt status).* In this case, the embedded tax costs will add to the indirect incidence of the consumer, qualitatively like the effect of exempt goods and services in the cases shown in Section B. The distribution of this additional indirect incidence would depend on the share of exempt firms' output in household consumption expenditure across quintiles, which is hard to assess in the absence of detailed data. However, if we assume that exempt firms supply predominantly to poorer households, it would imply that the GST at present is less progressive than estimated due to the indirect incidence falling disproportionately on poorer households.

    - *Case 2: Exempt firms have zero or minimal purchased inputs (an extreme assumption).* Assuming households have a non-zero share of purchases from exempt producers, then the incidence under the current GST would be lower than estimated in Section B, as there would be no indirect incidence due to uncredited input tax costs. And, under the flat rate/dual rate scenarios, the incidence will be (i) lower than estimated if the share of exempt firm supply in household consumption is unchanged (or increases) relative to current shares or (ii) higher than estimated if the share declines.

[7] According to the 2016 Economic Census of India, there are 58.5 million establishments in operation, of which 45.4 million are in non-agriculture (including the public sector). Currently 10.4 million firms are registered, of which 1.3 million are under the "composition scheme" (availing the flat tax but not the input tax credit).

D. Conclusions

15. Simplifying the GST is possible without imposing a significantly higher burden on the poor. For example, a dual rate structure with a low standard rate (and high rate on high-value consumption items) would still allow for progressivity, as would rationalizing exemptions by eliminating the regressive indirect incidence from unrefunded input tax costs.

16. There are likely significant benefits from lower costs of compliance and administration. The literature on VAT compliance costs shows that there is broad variation across countries; however, there is a consensus that compliance costs are regressive, and administrative costs increase with complexity. While evidence on India is nascent and remains to be assessed as experience with the GST is gained, anecdotal evidence from large firms indicates sizable increases in costs, which may be even more burdensome for smaller firms. Streamlined rates would also weaken incentives to lobby for lower rates.

17. These conclusions are broadly robust to the caveats. While data constraints preclude accurately assessing all the implications, the conclusions appear to hold under plausible cases.

Appendix I. Methodology

The main elements of the methodology are laid out below.

- The GST subsumes central taxes (*central excise*, *central service tax*, counter-vailing duty, special additional duty, and additional surcharges and cesses), and state taxes (*state VAT*, central sales tax (levied by states), luxury tax, entertainment tax, entry tax, advertisement tax, purchase tax, and lotteries and gambling taxes).
- With available information on the key pre-GST rates (in italics above), the pre-tax weight for goods and services in household consumption as reported in the NSS data (which is gross of pre-GST indirect taxes) is calculated. Item-wise GST rates are then mapped to these consumption weights, to calculate the effective GST rate for each household.
- The effective rate includes both a direct incidence (weighted sum of non-exempt goods and services' tax rates), and an indirect incidence (weighted sum of embedded input tax costs in exempt goods and services, which are not input-tax creditable, and thus are assumed to pass on fully to consumer prices, except for electricity and water).
- The indirect incidence is estimated using input-output information, applying Leontieff-inverse coefficients to weight the share of a given input good/service in the output of a given (exempt) good/service. Goods excluded from the GST (such as fuels) are also treated as an exempt good for this exercise.
- Revenue-neutral scenarios are then assessed on the same household consumption data by applying alternative tax (GST) rates on the goods and services, mapping as closely as possible to the items listed under the GST and the items recorded in household consumption expenditure.

Data

- Household consumption expenditure: NSS 66th Round Consumption Expenditure Survey (2011–12), with more 100,000 households covering nearly 350 goods and services.
- Rates of center and state taxes subsumed by GST, rates on GST: central and state government documents (World Bank), GST website.
- Input structure of the Indian economy: Input-Output Tables of the Indian Economy 2007/08.
- Concordance between rate schedules, consumption expenditure classification, and input structure classification: staff estimates.

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FISCAL DISCIPLINE IN INDIAN STATES: MARKET-BASED AND OTHER OPTIONS[1]

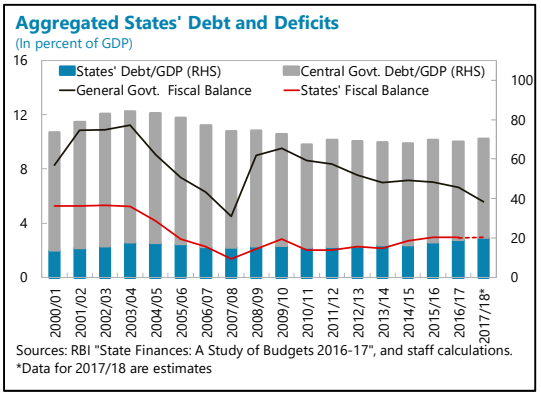
States' finances have deteriorated in recent years, and states are a key determinant of general government public finances. Traditionally fiscal discipline has been imposed on states through central control over state borrowing and states' self-adopted fiscal rules. Market-discipline in combination with fiscal rules can strengthen fiscal discipline; but is not found to be effective so far in Indian states despite predominantly market-based financing. To strengthen the role of market discipline, fiscal reforms should focus in the near term on further liberalizing financial markets, improving the quality and timeliness of state fiscal data, ensuring sufficient fiscal flexibility for states to respond to fiscal shocks, and, over the medium term, on steps to strengthen no-bailout expectations.

A. Introduction

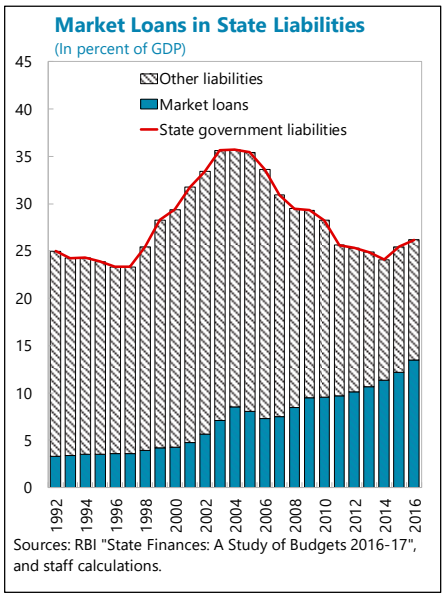
1. In the early-to-mid 2000s, all Indian states adopted fiscal rules, which helped improve their fiscal positions. Aggregate deficits of states declined following the adoption of the 3 percent of GDP fiscal deficit limit, from above 4 percent of GDP to 2 percent of GDP by FY2010/11.

2. Subsequently, fiscal discipline at the state level has deteriorated. Since FY2010/11, even as the central government has consolidated, the deficits of states have been on a rising trajectory, though states have largely adhered to the 3 percent of GDP deficit limit. The states' share of the general government deficit increased from 23 to 43 percent, as their expenditure share rose by about 10 percentage points and their revenue share by around 4 percentage points.

3. With high public debt, consolidation remains a key fiscal policy priority, including at the state level. With general government debt hovering around the 70 percent of GDP mark and the states' share estimated at just over 25 percent of GDP (FY2017/18 budget estimates), India has limited fiscal space and needs to consolidate to build buffers and lower public debt.[2] In this context, this chapter explores the options to enhance fiscal



Sources: RBI "State Finances: A Study of Budgets 2016-17", and staff calculations.
*Data for 2017/18 are estimates



Sources: RBI "State Finances: A Study of Budgets 2016-17", and staff calculations.

[1] Prepared by Adil Mohommad and Racha Moussa.

[2] About 140 basis points of increase in state debt to GDP over the last 2 years is explained by broad subscription by states to the UDAY scheme to fix state power sector financial problems, by taking over the debt of state electricity distribution companies to allow them to resume operations, in return for commitments to fix power sector problems.

discipline among states, particularly the role of market discipline—i.e., differentiation in states' borrowing costs depending on their fiscal health.

4. States' borrowing from the market has grown significantly over time. The share of states' liabilities to the market has risen from less than a fifth of outstanding liabilities in 1992 to more than half in FY2016/17. This would suggest a possibility that states could be subject to increased market discipline, supplementing the role played by states' fiscal rules and central control over state borrowing, in ensuring state fiscal discipline.

5. In this chapter, we assess whether market discipline has indeed emerged in India, and how it can be strengthened. In Section B we assess empirical evidence on the presence of market discipline using state-wise data on yields on debt, state fiscal indicators, and other characteristics. We also compare results with evidence on sub-national-level fiscal discipline and the role of the markets in other countries. In Section C we examine the conditions that help strengthen market discipline, drawing on the literature, and highlight the reforms that are important in the Indian context. Section D concludes.

B. Empirical Evidence on Market Discipline

6. Despite a growing share of market borrowing, state borrowing is perceived to be backed by central guarantees. Rangarajan and Prasad (2013) assess that among the main instruments of state borrowing, except for loans from banks and financial institutions as well as contingent liabilities, all other instruments (market and external borrowings) are perceived as implicitly guaranteed by the center, as the center permits states to borrow from the market and externally, and sets ceilings for states' loans and contingent liabilities.[3] This undermines market discipline as lenders have little incentive to distinguish among stronger and weaker states under a central guarantee.

7. The presence of guarantees reflects market development concerns. To encourage market lending to states and to grow the state debt market, the RBI acts as the guarantor for creditors by imposing stop-payments on state spending and having a first claim over state revenues to ensure that states meet their repayment obligations. These features strongly contribute to the perception—indeed reality—of state debt being backed by guarantees. The practice of bunching issuance of heterogenous states also contributes to less differentiation among states. That said, some differentiation is reportedly observed in the very recent data, particularly among some states such as Maharashtra, Tamil Nadu, and Telengana.

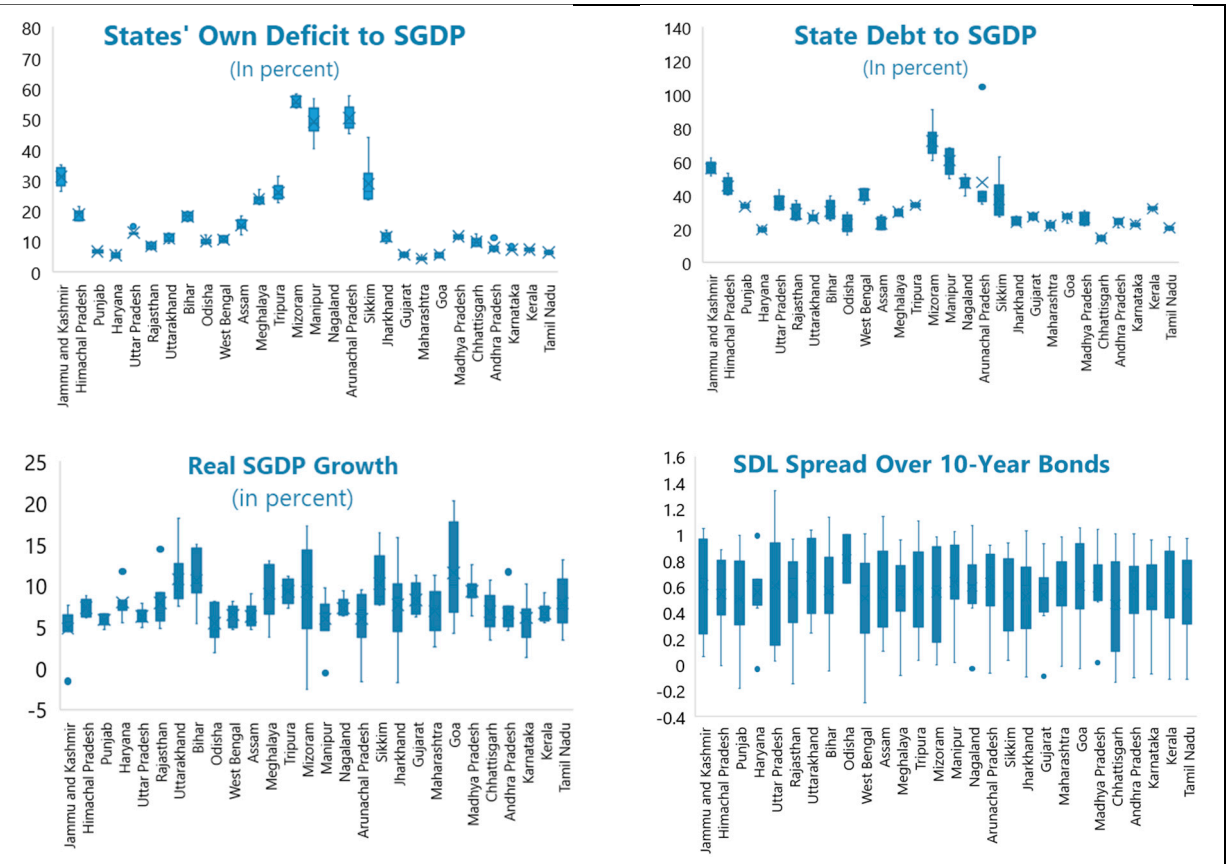
8. To empirically assess the presence of market discipline, we estimate a model following Sola and Palomba (2015):

$$spread_{it} = \alpha_i + \beta_1 growth_{it} + \beta_2 own\ fiscal\ balance_{it} + \beta_4 debt_{it} + \beta_5 liquidity_t + \beta_6 EMBI\ index_t + \varepsilon_{it}$$

[3] Though the authors list borrowing against small savings and provident funds as not perceived to have a guarantee, the authorities view these instruments as also perceived to be backed by guarantees.

Where $spread$ is the weighted-average state bond (SDL) yield minus the yield on ten-year central government bonds in state i and year t. A state's $own\ fiscal\ balance$ is in percent of state GDP (SGDP) and is calculated as the difference between expenditures (excluding expenditures on central schemes and centrally-sponsored schemes) and own tax and non-tax revenues. $liquidity$ is calculated as the call money rate minus the midpoint of the repo and reverse repo rate, and is thus an indicator of liquidity in aggregate. A positive value denotes tight liquidity conditions. The EMBI index measures the value of bonds in emerging markets and proxies for global market conditions. Data are collected from the Centre for Monitoring Indian Economy (CMIE) and CEIC Data. The data for SDL yields are from the secondary market and cover 2010 to 2017 for 28 states. Due to lags in availability of state data, we cover 2015 for all states and 2016 for more timely states.

9. State fundamentals vary widely, yet spreads have remained relatively narrow across the time examined for all states. Even among non-special category states, in the time covered by the analysis, the interquartile range for growth varies from 3 percent to 17 percent. The state deficit to GDP ranges from 4 percent to 13 percent. The state debt to GDP ranges from 18 percent to 35 percent. Meanwhile, the range in spreads is at most 100 basis points and exhibits a tighter range for non-special category states.



Sources: CMIE States of India Database, Reserve Bank of India, and IMF staff calculations.

10. Econometric estimates suggest that state fiscal fundamentals do not explain spreads. State fundamentals are not significant and explain only 5 percent of the variation in spreads. Estimates adding liquidity conditions and global returns on bonds increases the explanatory power to 70 percent of the variation in spreads with both variables significant at the 1 percent level. This fundamental finding is robust to various models including those with dummy variables for political alignment with the center, early adoption of fiscal rules, and higher-than-average reliance on transfers.[4] Excluding special category states (mostly smaller states in mountainous regions) does not impact the baseline results. These results also conform with previous findings that show that fiscal variables do not drive differences in SDL yields (Bose et al. (2011), Saggar et al. (2017)).

Table1: Baseline 1/

	Dependent variable: Spread						
State real growth	0.00	0.00	-0.01	-0.01		0.00	0.00
	(0.58)	(0.79)	(2.10)*	(1.99)*		(0.77)	(0.57)
State debt-to-SGDP	0.00	0.00	-0.01	-0.01		0.00	
	(0.13)	(0.60)	(2.26)*	(2.48)*		(1.13)	
State own deficit-to-SGDP	0.00	0.00	0.01	0.01			0.00
	(0.39)	(0.01)	(1.48)	(1.76)			(0.76)
EMBI index	0.01	0.00			0.00	0.01	0.01
	(17.10)**	(11.14)**			(14.18)**	(18.63)**	(17.63)**
Liquidity	0.21		-0.11		0.40	0.20	0.21
	(3.50)**		-1.06		(6.41)**	(3.46)**	(3.52)**
Constant	-3.41	-1.55	0.89	0.74	-2.62	-3.43	-3.39
	(13.15)**	(7.27)**	(7.83)**	(9.84)**	(11.12)**	(14.54)**	(14.22)**
Adjusted R2	0.70	0.46	0.05	0.04	0.54	0.71	0.70
N	139	162	139	162	187	151	139

Source: IMF Staff Estimates.

1/ The dependent variable is the state development bond yield less the yield on a ten-year central government bond, in percent. State real growth is the growth rate in state real GDP, in percent. State debt-to-GDP is the state's outstanding liability to state's GDP, in percent. Own deficit-to-GDP is expenditure less grants for centrally sponsored schemes and central plan schemes less state's own tax and non-tax revenue, in percent. EMBI index is indexed at 100 on Dec. 31, 1993. Liquidity is the difference between the midpoint of the repo and reverse-repo rate and the weighted average call money rate, in percent. * p<0.05; ** p<0.01

11. The broader literature covering other countries, however, does find evidence of market discipline. The evidence largely relates to advanced economies, but serves to illustrate the importance of key elements that support market-based fiscal discipline among sub-national governments (SNGs). The empirical design of these studies is broadly similar to the one presented above, with direct relationships between SNG spreads and fiscal fundamentals (deficits and debt,

[4] Results are available upon request.

typically), and specifications that include interactions with other fiscal institutions such as fiscal rules and credible commitments precluding bailouts of SNGs by the national governments. Briefly:

- Direct effects are found between SNG yield spreads and fiscal fundamentals for the United States (e.g., Poterba and Reuben (2001)), Canada (Booth et al. (2007)), Germany (Schuknecht et al. (2009)), Australia (Sola and Palomba (2015)), and Switzerland (Feld et al. (2017)). The broad findings are that SNGs with higher debt and deficits, typically face higher spreads.

- Evidence of interaction between fiscal institutions (such as expenditure/debt/revenue rules) and fiscal fundamentals, and SNG spreads is found primarily for the United States (Bayoumi et al. (1995), Poterba and Reuben (2001), and Johnson and Kriz (2005)), for the Euro Area (Iara and Wolff (2010)), and for Switzerland (Feld et al. (2017)). For instance, evidence for the United States shows that in the face of fiscal shocks, states with prudent fiscal rules (constraining expenditure and/or debt) face smaller increases in spreads as compared to states with revenue limits, which constrain the state's capacity to respond to a fiscal shock.[5] In Switzerland, the evidence shows that tight fiscal rules tend to reduce the effect of debt on spreads. Moreover, following a credible commitment to no bailout of municipalities by their cantons, cantons' spreads narrowed.

C. Strengthening Market Discipline in India

12. The international evidence indicates conditions that enable market discipline to function well. For instance, the appropriate fiscal institutions, ability to respond to shocks, and weakening bailout expectations emerge as important enabling conditions for market discipline. Indeed, the literature has identified four conditions that are helpful (Lane (1993) and Ter-Minassian (2007)):

- **Free and open financial markets**. One of the key policy recommendations for India (e.g., in the Financial Stability Assessment Program (FSAP) concluded in 2017[6]) that would help to liberalize financial markets including for state debt is to continue to lower the statutory liquidity ratio (SLR) requirement. As the FSAP notes, past reductions in SLR have helped improve bond market liquidity, and this would strengthen the foundations for enhanced market discipline.

- **Timely and adequate data on SNGs**. Indian states can make substantial improvements to the quality, coverage, and timeliness of state-fiscal data. At present there are significant lags in the publication of state accounts, and information on the wider state public sector is

[5] Bayoumi et al. (1995) show debt levels increase borrowing costs, but in the presence of fiscal rules (which limit debt), borrowing costs are lower. Poterba and Rueben (2001) show states with strong anti-deficit rules, debt limits, and expenditure limits experience relatively smaller increases in spreads from deficit shocks, compared to states lacking such rules or having revenue limits. Johnson and Kriz (2005) show expenditure limits, stricter balanced budget rules, and restrictions on state debt issuance are indirectly associated with lower interest costs because they lead to higher credit ratings. On the other hand, revenue limits directly raise interest costs.

[6] IMF Country Report No. 17/390.

lacking. A good example of high frequency and detailed SNG data is Brazil, where SNG fiscal data on deficits and debt are available at quarterly frequency and disaggregated below the SNG level.

- **Flexibility to respond to market signals**. With the adoption of the goods and services tax (GST), states can no longer set indirect tax rates independently and can only act through consensus in the GST Council which includes all states and the center. Direct taxes are solely levied by the center. This may have reduced states' revenue autonomy relative to the pre-GST regime. In terms of spending autonomy, OECD (2017) notes that spending autonomy for Indian states is relatively high among 13 other federations, although behind Canada and the United States. Some of the concerns of the loss of revenue-raising capacity due to the GST would be addressed by a buoyant GST, thus relieving revenue constraints, though in general the evidence suggests that revenue flexibility supports market discipline.

- **Strengthening no-bailout expectations**. There is room to constrain no-bailout expectations in India. At present, the center approving or setting limits on state borrowing is seen as ultimately guaranteeing repayment. Moreover, there have been regular debt reschedulings, waivers of interest and principal, and implicit subsidies to states (Bahl et al. (2005) and Singh (2006)) that are tantamount to providing bailouts to states. Moving forward, adoption of explicit bailout frameworks (with bail-in features for creditors) would help to strengthen market discipline, by making fiscal imprudence costly for states and giving creditors incentives to discriminate across states based on their fiscal health. It would also impart more transparency to state and center fiscal relations.

- Spain provides an example of an ex-post bailout framework that combines tough sanctions for SNGs that miss fiscal targets, including potential loss of budgetary powers, while providing financial assistance and requiring SNGs to submit restructuring plans. Korea has an early warning system for local government finances, whereby timely data are used to flag risks to local government finances, and the SNGs must submit a deficit management plan, face central intervention, and have debt issuance suspended (OECD 2016).

- An alternative to an explicit bailout framework would be an insolvency framework, which would involve debt restructuring and less typically asset sales in the context of SNGs, though this option is likely less relevant in the Indian context.

13. Reforms could initially focus on improving data quality and further liberalizing financial markets. This would help to strengthen the ability of the market to discriminate across states and improve the market for state debt. Over the medium term, strengthening the no-bailout expectation could proceed with the adoption of an explicit bailout framework. Even without bail-in features, such a framework would still help achieve the primary objective of maintaining prudent fiscal policies at the state level. To that extent, stronger fiscal rules would also strengthen both the primary objective and enable market discipline. It is also possible to introduce differentiation in borrowing costs using differentiated risk-weights, though such a mechanism would (i) require high

quality state fiscal and other data—a condition that also strengthens market discipline, and (ii) may be problematic from a political perspective as the regulator would become the focal point for states borrowing costs.

14. Several measures introduced recently by the RBI should help increase yield-differentiation across states. These measures include:

- Shifting to weekly from fortnightly auctions so that issuance sizes are smaller and evened out to increase SDL liquidity (October 2017);
- Changing SDL valuation in banks' portfolios from a flat mark up of 25 basis points over the center's government securities' yield to differential valuation based on secondary market or auction prices (June 2018);
- Lowering margin requirements for rated SDLs (starting August 2018) by 1 percent compared with other SDLs to encourage states to obtain public ratings; and
- Increasing transparency of state finances, including through publication of monthly data with a month's lag on (i) financial accommodation availed by State Governments under various facilities, (ii) investments (both starting November 2017), and (iii) market borrowings (starting June 2018).

D. Conclusions

15. Market discipline may be a useful channel to maintain prudent state finances. While at present there is little evidence of its effectiveness in India, the international evidence shows it can be effective, particularly when complemented by strong fiscal rules and commitments to no bailout. There are relatively low-hanging reforms that would boost market discipline, focusing on strengthening data quality and timely availability among states, and continuing to liberalize financial markets. While the introduction of GST may have de-jure reduced revenue autonomy at the state level, a buoyant and productive GST would prevent potential revenue constraints on state governments; though Indian states appear to have a relatively high degree of revenue and expenditure autonomy overall compared to other federations. Finally, weakening the perception of central bailouts could credibly be achieved by adopting an explicit bailout framework (including with bail-in features) that imposes costly adjustment on states (and creditors), strengthening the foundations for prudent management of state finances.

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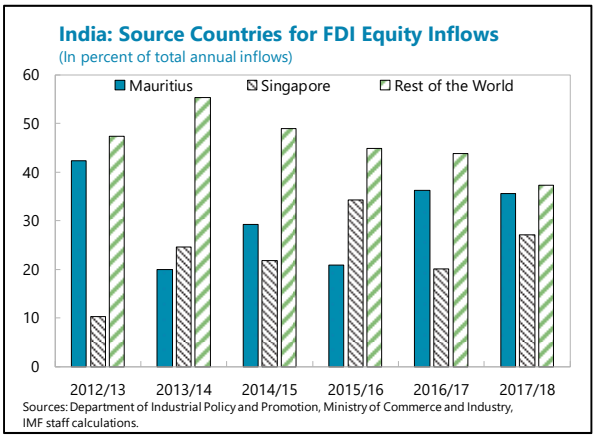
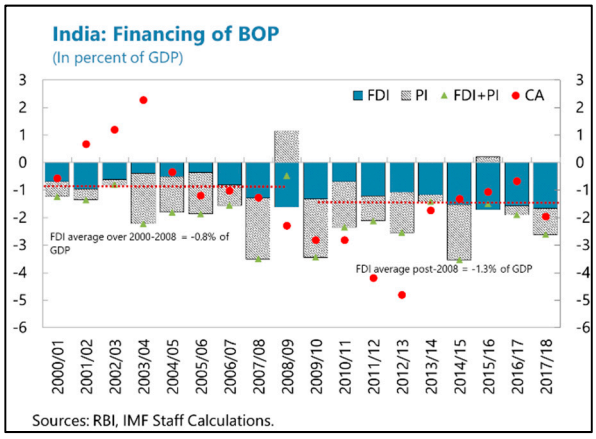
RISING FDI: SOME CONSIDERATIONS[1]

This chapter analyzes the structure and composition of foreign direct investment (FDI) flows to India and factors underlying FDI flows across countries. FDI inflows to India have increased significantly in recent years, partly benefiting from FDI liberalization and improved investor sentiment. Empirical analysis highlights the importance of capital account openness and infrastructure in attracting FDI. Going forward, further investment liberalization, supply-side reforms, and infrastructure investment could help sustain FDI.

1. FDI is positively associated with economic development and integration. FDI can enhance domestic investment and job creation. It also brings with it foreign technology and management skills that boost productivity. Moreover, it supports stability, as "cold" FDI flows are more stable sources of external financing than "hot" portfolio flows. Nevertheless, attracting and reaping the benefits of FDI will largely depend on national policies and business operating environments in host countries.

2. This study attempts to provide a deeper understanding of FDI flows to India as well as factors underlying FDI flows across countries. First, it presents the key trends (including sectoral and regional composition) and analyzes macroeconomic linkages of FDI. The data are from the Department of Industrial Policy and Promotions (DIPP) and the Reserve Bank of India (RBI), complemented by cross-country and bilateral FDI flows from UNCTAD and OECD. Second, it analyzes structural shifts in the flows and discusses drivers of the key changes. To this end, it covers the main legislative changes related to FDI in India and key partner countries. Third, it examines the determinants of FDI flows across emerging economies. Drawing on this empirical analysis, it discusses policy recommendations and key reforms (including other structural and institutional reforms) that matter to attract FDI.





3. FDI flows to India have increased significantly in recent years (Figure 1)**.** In FY2016/17, gross FDI flows to India reached a record high of US$60billion. Net FDI flows have grown from an average of about 0.8 percent of GDP before the global financial crisis (GFC) to 1.3 percent post-GFC,

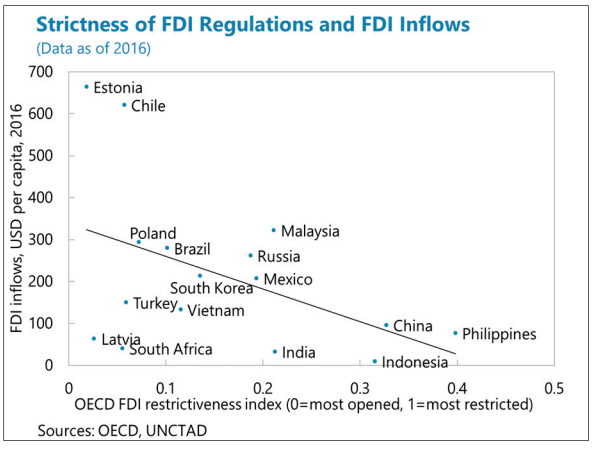
[1] Prepared by Svitlana Maslova and Piyaporn Sodsriwiboon.

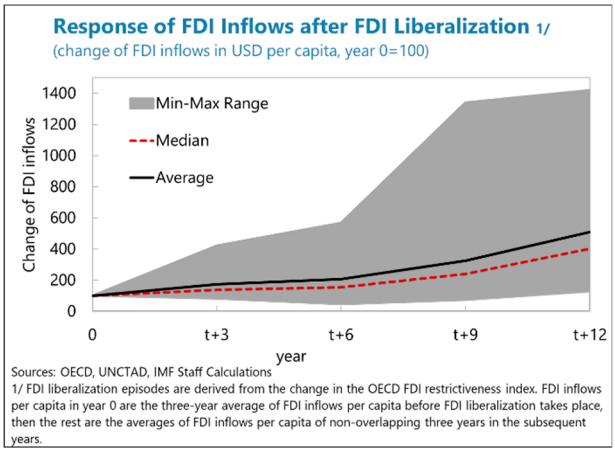
thus lifting India's FDI flows as a share of GDP to be in line with emerging market peers. India's FDI inflows have also become more important as a source of external financing, with net FDI flows covering about two-thirds of the current account deficit. Most FDI flows to India—60 percent of the total—continue to originate from Singapore and Mauritius, although these may partly be transitory points from the main source countries to facilitate FDI and doing business in India as well as tax efficiency.

4. Increased FDI flows to India appear to strengthen macroeconomic linkages of FDI activities. The bulk of FDI inflows is mostly for greenfield investments and likely adds to capital accumulation over time (see Figure 1). The sales of foreign subsidiary companies in India also contribute to sectoral output, particularly manufacturing. Most foreign firms appear to focus on India's domestic market, with the exception of those in IT services which are more export-oriented. Cross-state FDI and exports suggest FDI may be associated with exports (Figure 2); nevertheless, formal analysis is needed to assess the casual relationship.[2]

FDI Policy Reform

5. The surge of FDI flows to India appears to be concurrent with FDI policy reforms since 2014 that resulted in a permanent regime change to allow freer flows. Caps on foreign investments in many sectors have largely been relaxed, and most FDI inflows can now enter under the automatic route (IMF (2017a), (2017b)). More recently, FDI in financial services, retail, civil aviation, and manufacturing, as well as FDI in holding companies in pharmaceutical, power exchange, and construction were further liberalized. The Foreign Investment Promotion Board—a ministerial panel responsible for coordinating and approving foreign investment—has been abolished, thus helping streamline and expedite FDI approval by individual ministries. Efforts have also been made to facilitate FDI, such as the introduction of standard operating procedures and the reduction of competent authorities.

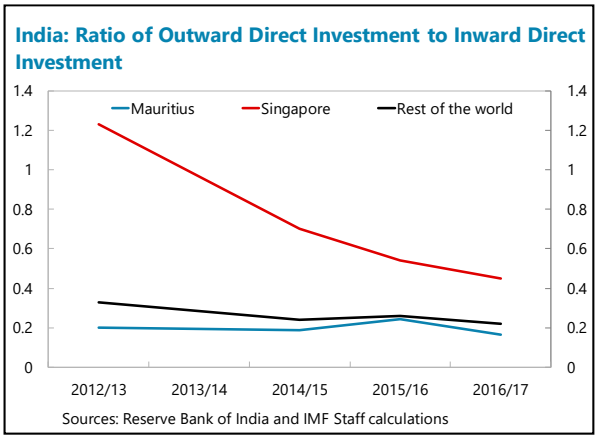




[2] Formal analysis to identify this relationship is not performed, due to data limitations. The Government of India has been working to improve state-level FDI and exports statistics.

6. Country experiences suggest FDI liberalization could help attract FDI flows. A number of countries have liberalized their capital account and been successful in mobilizing inward FDI (Box 1). Countries with less restrictions on FDI inflows (based on the OECD's FDI restrictiveness index[3]) are associated with higher FDI inflows and vice versa (above text figure, left). In addition, an event analysis across 22 FDI liberalization episodes of 18 emerging economies from 1997 to 2016 indicates that FDI responds positively to FDI liberalization, with median FDI inflows per capita increasing by about 50 percent and average FDI inflows per capita nearly doubling in the six years after FDI liberalization (text figure, right).[4]

7. Nevertheless, changes in international taxation could temporarily give a boost to FDI flows to India. The India-Mauritius tax treaty was amended in May 2016, with a capital gains tax payable on shares acquired on or after April 1, 2017 with a two-year transition period.[5] Similar changes in the India-Singapore treaty were agreed in December 2016.[6] Changes in the tax treaties may incentivize investors to conduct operations during the transition period to benefit from the low tax rate. Share of inflows from Mauritius in the total flows surged during FY2016/17 and FY2017/18, compared to previous years.[7] On the other hand, FDI flows from Singapore were relatively modest compared to the past. And FDI outflows from India to Singapore exceeded inflows before FY2013/14, but have reversed in later years.



[3] The FDI Regulatory Restrictiveness Index (FDI Index) measures statutory restrictions on FDI in 68 countries, including all OECD and G20 countries, and covers 22 sectors. The statutory restrictions cover the following areas: (i) foreign equity limitations; (ii) discriminatory screening or approval mechanisms; (iii) restrictions on the employment of foreigners as key personnel, and (iv) other operational restrictions (e.g., on branching, capital repatriation, or land ownership by foreign-owned enterprises). See http://www.oecd.org/investment/fdiindex.htm for further information. Source: OECD Stat.

[4] FDI liberalization episodes are defined as the year when the FDI restrictiveness index declines by more than one standard deviation. FDI inflows in the year zero are the average of FDI inflows per capita three years before FDI liberalization takes place, and those for post-liberalization years are the non-overlapping three-year averages of FDI inflows per capita of subsequent years.

[5] The India-Mauritius tax treaty previously provided a capital gains tax exemption for Mauritian tax residents that own shares in Indian companies. With the 2016 amendments, Mauritian investors who acquire their shares on or after April 1, 2017 would pay a capital gains tax at a rate equal to 50 or 100 percent of the applicable rate in India, depending on whether they dispose of the shares before or after March 31, 2019, respectively.

[6] Prior to the amendments, a tax on capital gains from shares' sales was paid based on investors' residence. Afterwards, a capital gain tax from sales of shares bought on or after April 1, 2017 would be paid in the country where a company is a tax-resident at a rate equal to 50 or 100 percent of the applicable rate, depending on whether shares are sold before or after March 31, 2019, respectively.

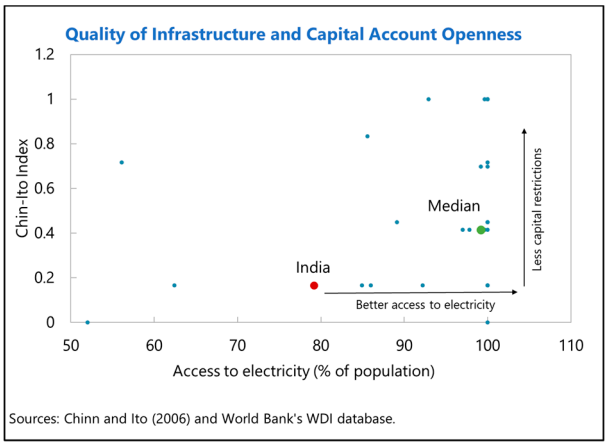
[7] The FY2017/18 data are up to December 2017.

Empirical Analysis

8. An empirical analysis examines the determinants of FDI inflows across emerging markets and developing economies. An unbalanced cross-country panel regression with fixed effects is estimated. The sample includes 27 emerging markets and developing economies during 2000-2016. In line with the literature, explanatory variables (equation below, vector X; i is country and t is year) include income level, trade and capital account openness, tax burden, demographics, infrastructure, and the quality of institutions. Annual data from the IMF's World Economic Outlook (WEO), the World Bank's Development Indicators (WDI), and UNCTAD database are used.

$$FDI_{it} = \alpha + \sum_{j=1}^{n} \beta_j X_{jit} + \varepsilon_{it}$$

9. The results indicate that economic policies and structural reforms play an important role in supporting FDI inflows. Foreign investors tend to choose a certain investment location based on several motives such as market-seeking and resource-seeking, which need to be complemented by supportive business environments as well as hard and soft infrastructure. Table 1 presents the regression results. The main findings for FDI inflows are as follows (focusing on the statistically significant relationships), which are in line with previous studies (e.g., Campos and Kinoshita (2003, 2008), Blonigen (2005), RBI (2012), Walsh and Yu (2010)).



- Higher per capita income, lower inflation (proxy for a stable macroeconomic environment), and better access to electricity (proxy for infrastructure quality) are positively correlated with FDI.
- A more open capital account (measured by the Chin-Ito index) is positively correlated with FDI.
- Institutional quality as indicated by government effectiveness and quality of governance also matter.

10. India's FDI performance could be enhanced through implementing sound economic policies and further supply-side reforms. India's infrastructure quality and capital account openness remains well below the median in the sample. Based on the empirical evidence, bringing infrastructure and capital flow liberalization to the median level in the sample would lead to an increase in FDI inflows of 1.1 and 1.9 percent of GDP, respectively. That said, the benefits could be smaller, as there have been some improvements in these indicators since the year of data availability.

Policy Recommendations

11. Sustaining reform momentum to facilitate investment liberalization, improve quality of institutions, and ease doing business would be beneficial for attracting FDI inflows. Liberalizing capital flows could ease operations of foreign investors. Reliable quality infrastructure could reduce costs of production and transportation, thus increasing corporates' profits and the attractiveness for investment. In addition, supply-side reforms, including strengthening enforcement of contracts and easing doing business, would facilitate business operations of both domestic and foreign investors.

Box 1. Country Experiences with FDI Liberalization

Several countries have been successful in mobilizing inward FDI, which has played an important role in their economic development and export success. Country experiences suggest FDI liberalization is most effective when embedded in a broader reform agenda alongside economic development, an improved investment climate, and strengthened institutional capacity. In addition, reform should be a gradual and continuous process to help reap the benefits of further openness while minimizing potential disruptions.

South Korea. FDI liberalization started in the early 1980s, with the opening of many business categories to foreign investment, significantly lowering the minimum investment level, as well as relaxing government controls on FDI. In the early 1990s, FDI liberalization continued with further easing FDI regulations, expanding the number and range of sectors open to FDI, reducing corporate taxation for FDI firms, relaxing regulations on foreign ownership of land, simplifying approval procedures, and increasing efforts to promote inward FDI. The Foreign Investment Promotion Act enacted in 1998 further eased regulations and restrictions on foreign investment and streamlined administrative procedures, while expanding the range of tax incentives. InvestKorea was established in the early 2000s to facilitate FDI.

Malaysia. Malaysia first relaxed its foreign investment restrictions in the 1980s, providing exemptions for exporters and pioneer industries from equity rules that required the Foreign Investment Committee (FIC) to screen incoming investments and from a cap of 30 percent for foreign equity. In 2003, such exemptions were extended to companies located in the Multimedia Super Corridor and almost all manufacturing sectors. The most important step toward FDI liberalization was the abolishment of the FIC in 2009, and thus the removal of the FIC Guidelines governing foreign equity limits. At present, restrictions on foreign investment in many services are retained, but further liberalization targeting services sectors is taking place.

Brazil. The change to the investment regime took place in the 1990s, as the FDI registration process and costs of entry were simplified and a system to promote investments and the transfer of technology was set up. In 2002, Investe Brasil was established to promote investments particularly in infrastructure, tourism, and agribusiness, as well as to provide information on investment regulations and incentives. A privatization program and regulatory reforms to foster competition also played a role.

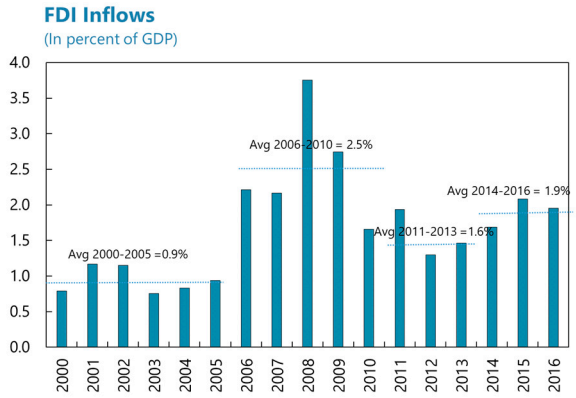
China. China has taken a gradual approach to FDI liberalization, where liberalizing FDI has continued to be part of five-year plans for economic and social development since the Open Door Policy. In the 1980s and 1990s, China experimented with opening foreign investment in selected coastal cities and in special economic zones and industrial parks with a focus on attracting export-oriented manufacturing FDI. In the 2000s, China made a radical commitment to services liberalization in its accession to the WTO. China is now quite open to FDI in almost all manufacturing and most service industries, except for finance and telecommunications.

Indonesia. Indonesia liberalized its investment regime through many rounds of reforms beginning in the mid-1980s. The Asian financial crisis led to substantial liberalization, particularly in the banking sector and for acquisitions of local firms. Indonesia has no general approval process for investment that might discriminate against foreign investors; however, foreign equity restrictions in many sectors, particularly in services, remain. At the same time, political and economic reforms as well as institutional building have complemented the FDI liberalization process, providing macroeconomic stability, policy certainty, and an improved investment climate.

Source: OECD's Investment Policy Reviews for countries listed above.

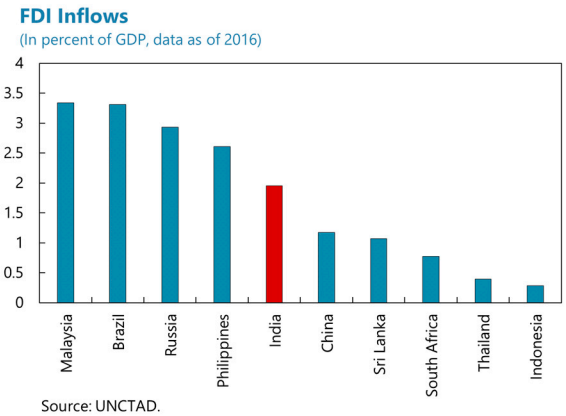
Figure 1: India: FDI Flows and Macroeconomic Linkages of FDI Flows

FDI inflows have increased in recent years.



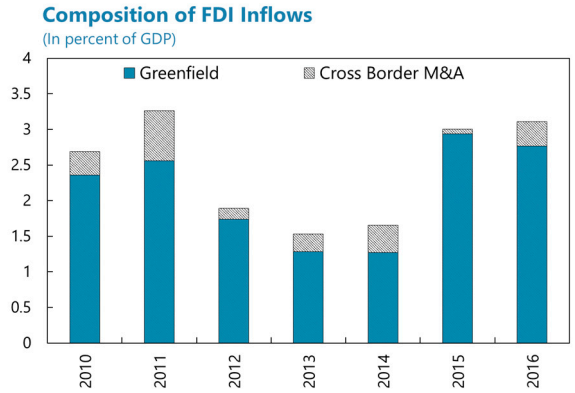
Source: UNCTAD.

FDI inflows to India are comparable to emerging market peers.



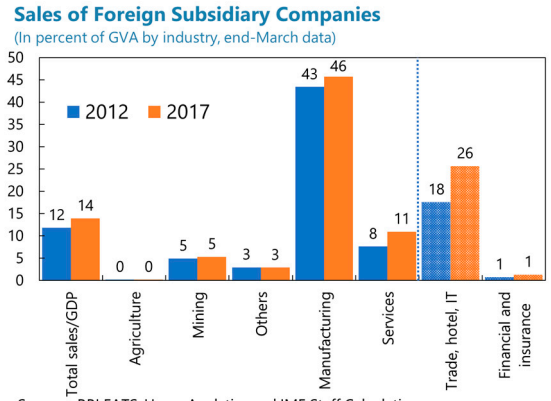
Source: UNCTAD.

The bulk of greenfield FDI contributes to investment.



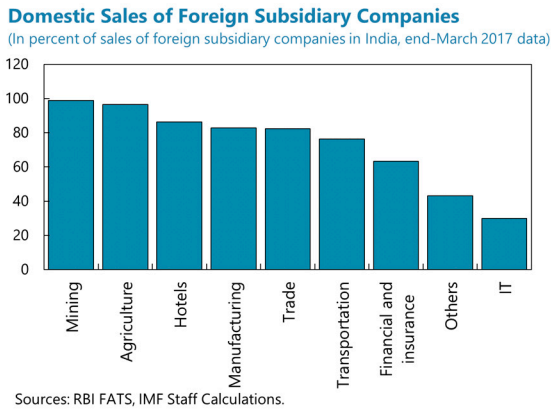
Sources: UNCTAD, and IMF staff calculations.

FDI activities significantly contribute to domestic output.



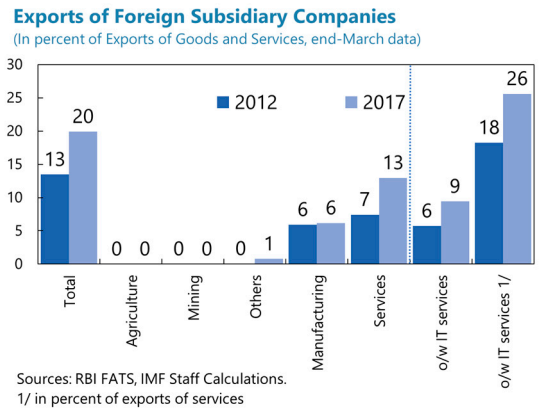
Sources: RBI FATS, Haver Analytics and IMF Staff Calculations.

Foreign companies have largely focused on the domestic market.



Sources: RBI FATS, IMF Staff Calculations.

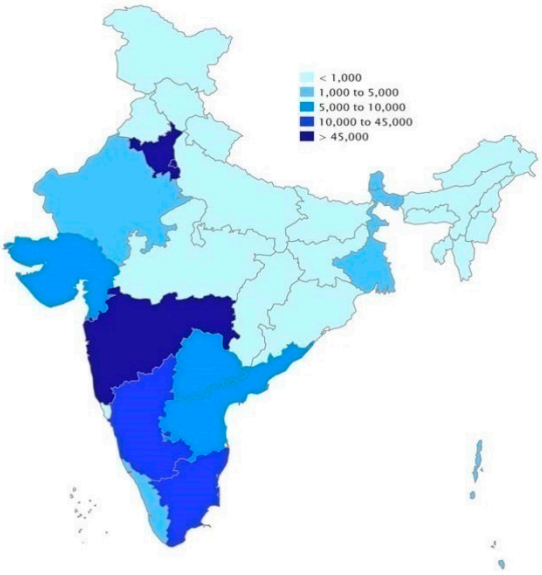
IT services and some manufacturing activities are more export-oriented.



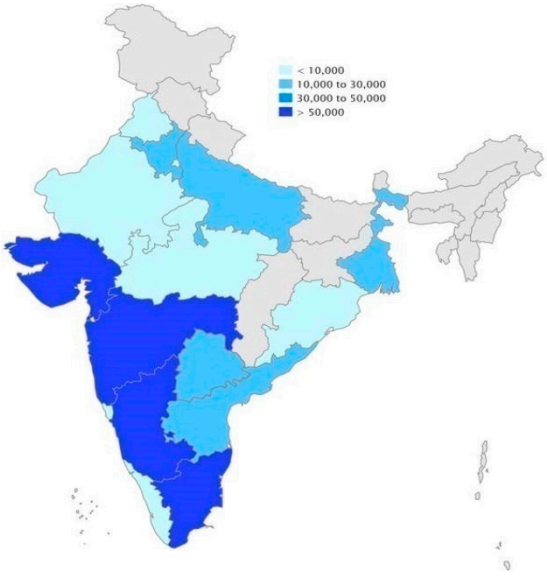
Sources: RBI FATS, IMF Staff Calculations.
1/ in percent of exports of services

Figure 2. India: FDI and Exports by States

FDI Inflows to States (USD Million) 1/



Exports of Goods and Services by States (USD Million) 2/



Sources: Department of Industrial Policy and Promotion (DIPP), Economic Survey of India 2017/18, IMF Staff Calculations.

1/ FDI inflows include only equity capital component, cumulative from April 2011 to September 2017. State classfication follows 9 state categoies as in DIPP documentation http://dipp.nic.in/sites/default/files/FDI_FactSheet_Updated_September2017.pdf. Group 1 includes Maharashtra, Dadra & Nagar Haveli, and Daman & Diu; Group 2 includes New Delhi and Haryana; Group 3 includes Tamil Nadu and Pondicherry; Group 4 includes West Bengal, Sikkim, and Andaman & Nicobar Islands; Group 5 includes Chandigarh, Punjab, and Himachal Pradesh; Group 6 includes Madhya Pradesh and Chhattisgarh; Group 7 includes Kerala and Lakshadweep; Group 8 includes Uttar Pradesh and Uttaranchal; and Group 9 includes Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura. Since DIPP does not have the breakdown of state-by-state FDI inflows, the map chart highlights the same color for all states in the same group. In addition, the state/regional level data on FDI flows may not reflect the final recipients of FDI, as in many cases, FDI flows may enter in some states and be distributed to other states.

2/ Economic Survey of India 2017/18, World Economic Outlook, IMF.

The state-wise exports of goods and services are calculated from the shares of state-wise exports of goods and services from the Economic Survey of India 2017/18, and country-level exports of goods and services data are from IMF's WEO data. Gray area indicates states for which data are not available.

Table 1: Determinants of FDI Inflows to Emerging Markets and Developing Economies 1/

	Dependent variable: FDI inflows					
	Full dataset			Post-2009		
	(1)	(2)	(3)	(4)	(5)	(6)
GDP per capita	0.03	0.04	0.25	0.52***	0.39***	0.32**
	[0.09]	[0.13]	[0.12]	[0.10]	[0.09]	[0.12]
Trade openness	-0.03	-0.16	-0.19	-0.06	-0.17	-0.19
	[0.11]	[0.12]	[0.11]	[0.19]	[0.20]	[0.21]
Tax revenue	-0.20	-0.30	-0.28	0.07	0.03	0.14
	[0.16]	[0.20]	[0.19]	[0.26]	[0.26]	[0.25]
Chin-Ito	0.46***	0.44**	0.53***	1.09***	0.77**	1.05***
	[0.13]	[0.15]	[0.15]	[0.14]	[0.20]	[0.15]
Age-dependency ratio	0.01	0.03*	0.03**	-0.02	-0.01	-0.01
	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]
Access to electricity	0.03***	0.02**	0.02***	-0.01	-0.01	-0.01
	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]
Government effectiveness			0.30**			0.48***
			[0.11]			[0.11]
Quality of governance		0.35***			0.37**	
		[0.11]			[0.10]	
CPI inflation			-0.03***			-0.01
			[0.01]			[0.01]
Constant	-2.07***	-0.41	-0.04	-2.76**	-1.09	-0.59
	[0.68]	[1.17]	[0.97]	[1.06]	[1.28]	[1.48]
Adjusted R^2	0.42	0.34	0.35	0.44	0.47	0.48
Number of observations	409	324	322	132	132	131

Source: IMF Staff Estimates.

1/ Regression results are based on OLS estimates. Standard errors are shown in the bracket. *, **, *** indicate significance level at 10, 5 and 1 percent, respectively. The sample includes 27 emerging markets and developing economies: Argentina, Bangladesh, Brazil, Bulgaria, Cambodia, Chile, China, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Mongolia, Myanmar, Nepal, Peru, Philippines, Poland, Romania, Russia, South Africa, Sri Lanka, Thailand, Turkey, Uruguay, and Vietnam. Data are annual from 2000 to 2016.

Table 1: Determinants of FDI Inflows to Emerging Markets and Developing Economies (concluded)

Variable lists for regression:

- FDI inflows in percent of GDP (log) is from the UNCTAD database;
- GDP per capita in US$ (log) is from the WDI database;
- Tax revenue in percent of GDP (log), CPI inflation in percent, trade openness as the sum of exports and imports in percent of GDP (log) are calculated from the WEO database;
- Chin-Ito is a capital control index from http://web.pdx.edu/~ito/Chinn-Ito_website.htm;
- Age-dependency ratio is the ratio of older dependents—people older than 64—to the working-age population—those ages 15-64. Data are shown as the proportion of dependents per 100 working-age population and are from the WDI database.
- Access to electricity is the percentage of population with access to electricity from the WDI database.
- Government effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies and is from the Worldwide Governance Indicators (produced by Daniel Kaufmann (Natural Resource Governance Institute and Brookings Institution) and Aart Kraay (World Bank)). There is some degree of uncertainty around point estimates used in the estimation. See http://www.govindicators.org for more information.
- Quality of governance is proxied by the regulatory quality indicator of Worldwide Governance Indicators (produced by Daniel Kaufmann (Natural Resource Governance Institute and Brookings Institution) and Aart Kraay (World Bank)) which captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. There is some degree of uncertainty around point estimates used in the estimation. See http://www.govindicators.org for more information.

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RESOURCE MISALLOCATION AND THE ROLE OF LABOR MARKET REFORM[1]

This chapter analyzes the nature, magnitude, and sources of resource misallocation. It finds the magnitude is relatively large and unevenly-distributed across Indian states. Strict labor market regulations appear to be a major contributor to misallocation. Further labor reforms will therefore improve firm-level efficiency and productivity and help reap the full benefits of the demographic dividend.

1. There is a growing consensus that aggregate productivity is the most important factor in determining income per capita and living standards. Low productivity growth can be a consequence of slow progress in adopting frontier technologies and best practices or the lack of efficiency in allocating productive resources. Institutional features and government policies can have important effects on aggregate productivity and efficiency, as they determine firms' decision making on production, investment, and the allocation of their limited resources.

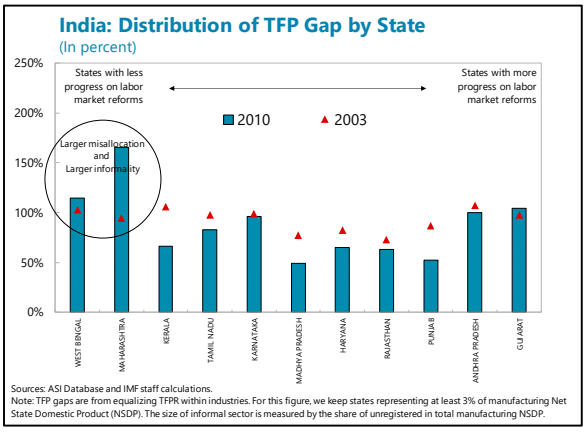
2. Some policies may deter factors of production from being allocated for their best use, so-called *misallocation*, while hindering overall economic performance at the macro level. Examples of such policies include rules and regulations that prevent free entry, impose limits on firm size—directly or indirectly—or impose heavy burdens on the allocation of factors of production and the distribution of goods and services. Reducing resource misallocation by addressing these distortionary policies would raise aggregate productivity, allowing higher output with the same amount of capital and labor, and the same firm-level technology.

Empirical Analysis

3. Staff analysis identifies the degree of resource misallocation in India based on the Hsieh and Klenow (2009) methodology. That methodology uses a standard model of monopolistic competition with heterogeneous firms to illustrate the effect of resource misallocation on aggregate productivity, and firm-specific distortions can be measured by the firm's total factor revenue productivity (TFPR). Assuming that firms use a Cobb-Douglas production technology and firms' productivity is jointly lognormally distributed, there is no misallocation if the distribution of TFPR is symmetric. Hence, three measures of misallocation are derived, based on the characteristics of the lognormal distribution: (i) *median-to-mean ratio of TFPR* (equal to 1 if no misallocation), (ii) *variance of TFPR* (larger variation of TFPR reduces productivity), and (iii) *TFP gap* (measuring the distance between "efficient" and "observed" output). The analysis uses firm-level balance sheet data from India's Annual Survey of Industries (ASI) for FY2003/04, FY2006/07, FY2008/09, and FY2010/11.

[1] Prepared by Adil Mohommad and Piyaporn Sodsriwiboon, based on Sandoz, C., A. Mohommad, and P. Sodsriwiboon (2018).

4. Resource misallocation in India appears to be large and unevenly-distributed across Indian states. The magnitude of misallocation in India is relatively large compared to the United States but appears comparable to other emerging economies (Chatterjee (2011) and Misch and Saborowski (2018)).[2] Overtime, the misallocation in India appears stable in the early 2000s, but declines gradually between 2008 and 2010. Across Indian states, the heterogeneity of state-level misallocation of resources is sizeable (Text Figure).



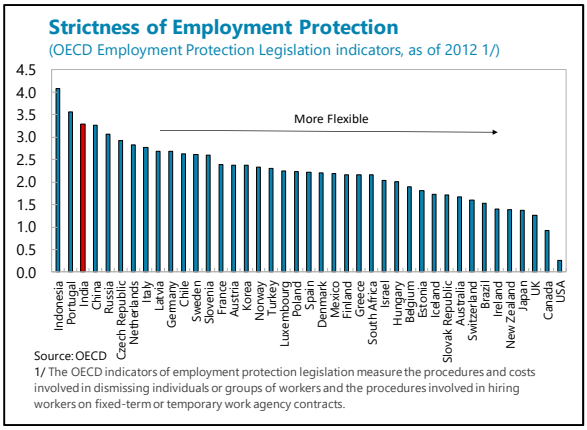
5. Regression analysis aims at identifying potential drivers of the distribution of firm-level distortions. The baseline regression utilizes the derived measures of misallocation and identifies the nature, magnitude, and sources of misallocation. Regressions take the form:

$$Misallocation_{sjt} = \beta_0 + \beta_1 Labor\ reform_s + \beta_2 Credit\ per\ capita_{st} + \beta_3 PMR_s + \beta_4 Informality_{st} +$$
$$+\beta_z Z_{sjt} + \varphi_t + \varphi_s + \varepsilon_{ikt} \qquad (1)$$

The dependent variables are the three measures of misallocation for Indian states by state (s), sector (j) at the three-digit level, and year (t). The "labor reform" index is from OECD's Dougherty (2008), which was computed in 2007 and time (or sector) invariant. The index is scaled from zero to one, and an Indian state with a higher index is more advanced in labor market reforms at the time of the study. The product market reform ("PMR") index is provided by OECD's Conway and Herd (2009), computed in 2006, and again time invariant. A higher index means the regulatory environment is more supportive of competition. Credit availability is proxied by "credit per capita" from the States of India database of the Center for Monitoring Indian Economy (CMIE). "Informality" is proxied by the size of the unregistered net state domestic product. Other controls (vector Z in the equation above) include electricity shortage as derived from the share of firms that declared that electricity is an obstacle, use of cell phone, and road density as road per state area. Data are from the World Bank's enterprise survey and the CMIE. The baseline regression results are presented in Table 1.

[2] For cross-country comparison of misallocation, a few caveats are that misallocation in Hsieh and Klenow (2009) is measured by TFP dispersion and is sensitive to data outliers by definition and that the firm-level industry survey may not be comparable across countries. The cross-country results may partially be subject to measurement errors as described in Nishida et al (2016). Nevertheless, this study focuses on the extent of misallocation across Indian states and the impact of cross-state labor reforms. Given also that the ASI survey is similarly designed across Indian states for each year, the main conclusions of this study are not likely be affected.

6. Strict labor market regulations and lack of capital availability appear to largely contribute to misallocation in India. India's labor market regulations remain tight (text chart[3]), and may contribute to large misallocation across Indian states. Based on empirical evidence, implementing labor market reforms is associated with a reduction of misallocation and distortions of the most productive firms. Furthermore, improved credit availability would likely help alleviate misallocation in states that are credit constrained. Specifically, states like West Bengal, Chhattisgarh, and Kerala that made fewer labor market reforms in the 1990s and early 2000s, leading to relatively more rigid labor markets in the 2000s, tend to have more constraints on highly-productive firms' abilities to grow and reach their optimal size. In particular, highly-productive firms appear to be penalized by labor market inflexibility, and many of them appear to be too small to benefit from economies of scale, thus holding back aggregate productivity growth and economic development.



7. Large informality in the Indian economy may be related to tight labor regulations. The link between labor market regulations and informality is complex. Tight labor regulations may constrain firms from expanding in size and gain economies of scale. Some firms may set up a number of smaller and/or potentially unregistered firms to avoid the labor regulations. The interaction between labor reform index and informality dummy[4] is added to the baseline regression to empirically identify the link between labor market regulation and informality on misallocation. In addition, "external dependence[5]" defined at the three-digit level from Rajan and Zingales (1998) as in Bas and Berthou (2012) is included to identify an exogenous effect of financial development on firms' growth and capital accumulation based on the financial vulnerability of each industry. Other controls to address issues with omitted variables bias, measurement error, and sample selection are also added. Table 2 presents the regression results.

$$TFP\ gap_{sjt} = \beta_0 + \beta_1\ Labor\ reform_s + \beta_2\ Credit\ per\ Capita_{st} + \beta_3\ PMR_s + ..$$

$$+\beta_4\ Labor\ reform_s * Informality_{st}\ (d) + \beta_5\ Credit\ per\ Capita_{st} * External\ dependence +$$

[3] The assessment is based on the OECD employment protection legislation indicators, which have been compiled using the OECD's own reading of statutory laws, collective bargaining agreements and case law, as well as contributions from officials from OECD member countries and advice from country experts. See http://www.oecd.org/els/emp/oecdindicatorsofemploymentprotection.htm for more information.

[4] To test this relationship, a dummy variable equaled to 1 if the share of unregistered net state domestic product in manufacturing is above the median.

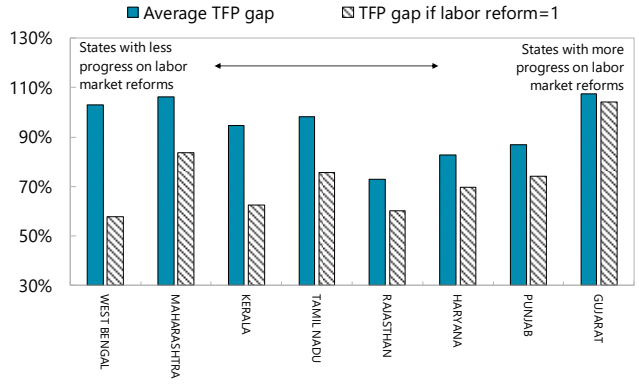
[5] As in Bas and Berthou (2012), the measure of external dependence is interacted with "credit per capita" as the measure of financial development across Indian states. Since the external dependence measure varies across industries and is constructed with U.S. data, it is independent of the characteristics of states in India. The interaction term is, therefore, expected to be unrelated to state characteristics and unaffected by future firm growth and capital investments.

$$+\beta_6\, Informality_{st}\,(d) + \beta_z\, Z_{st} + \varphi_t + \varphi_s + \varepsilon_{ikt} \qquad (2)$$

The results suggest labor market reforms significantly reduce misallocation or the TFP gap only in states with high informality, where relative distortions on large firms shrink in states with high informality as labor markets become more flexible. In addition, credit per capita appears to increase the TFP gap but not in sectors that are highly dependent on external financing. An explanation may be that misallocation increases because small firms are financially constrained and do not reach their optimal size. Therefore, improving credit availability tends to help ease financing constraints to firms, particularly for those that rely more on the use of external finance, thus reducing distortions and supporting firm growth and capital investments.

8. Scenario analysis suggests labor market reforms would help reduce productivity losses. The scenario analysis focuses on the potential gains from the reallocation resulting from labor reforms, particularly in states with high informality. The impact of labor reforms is calibrated by calculating the impact of shifting an Indian state to the same level of the best performer (index=1) from the estimated coefficients from Equation 3 in Table 1. The results show the TFP gap can be significantly reduced, with West Bengal and Kerala likely being the top gainers (Text Figure). These findings suggest that removing structural rigidities in labor would reduce distortions and contribute to productivity gains and higher long-term growth.

India: Distribution of TFP Gap in States with High Informality
(In percent)



Source: IMF Staff Estimates.

Policy Recommendations

9. An important policy priority is therefore to modernize labor regulations to help improve labor market flexibility and increase formal employment. Labor laws in India remain numerous, outdated, and restrictive, including at the sub-national level. Reforms to the Industrial Disputes Act of 1947 and restrictive clauses under the Factories Act of 1948 are key to enhance labor market flexibility and allow firms to expand and reach economies of scale. Labor laws, which currently number around 250 including both the center and states, need to be streamlined and reduced. Labor market reforms will also help reap the full benefits of the demographic dividend and economies of scale from the new national goods and services tax.

Table 1. India: Misallocation and Labor Market Reforms 1/

	Dependent Variables		
	(1)	(2)	(3)
	Median TFPR	Variance TFPR	TFP gap
Labor reform	-0.296***	-0.179***	-0.206*
	(0.073)	(0.059)	(0.117)
Credit per capita	-0.039**	0.049***	0.077**
	(0.019)	(0.014)	(0.031)
PMR	-0.059**	-0.055***	-0.039
	(0.026)	(0.019)	(0.039)
Informality	0.034**	-0.038***	-0.076***
	(0.015)	(0.011)	(0.023)
Number of firms	-0.006	-0.006	0.200***
	(0.018)	(0.012)	(0.027)
Rail density	0.046**	-0.104***	-0.085***
	(0.019)	(0.013)	(0.031)
Observations	1,154	1,154	1,154
R-squared	0.180	0.534	0.214

Source: IMF Staff Estimates.

1/ Credit per capita, the number of firms, rail density, and unregistered net state domestic product as a proxy for informality are in logs. The constant term is not reported. The dependent variable is the median of log total factor revenue productivity (TFPR) in column (1), the variance of log TFPR in column (2), and the TFP gap in column (3). Variables are defined by state, sector at the three-digit level and year. All columns include industry and year fixed effects. Robust standard errors are in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Table 2. India: TFP Gap, Labor Market Reforms, and Informality 1/

	Dependent variable is TFP gap		
	(1)	(2)	(3)
Labor reform	-0.037	0.113	0.123
	(0.180)	(0.184)	(0.219)
Credit per capita	0.069**	0.127***	0.124***
	(0.028)	(0.033)	(0.041)
PMR			0.007
			(0.069)
Credit per capita * External dependence (Median)	-0.070**	-0.074**	-0.074**
	(0.033)	(0.033)	(0.033)
Labor reform * Informality (Median)	-0.550**	-0.850***	-0.878**
	(0.266)	(0.291)	(0.405)
Informality (Median)	0.416*	0.649***	0.672**
	(0.217)	(0.238)	(0.334)
Number of firms	0.154***	0.193***	0.194***
	(0.025)	(0.028)	(0.028)
Rail density	-0.107***	-0.166***	-0.166***
	(0.037)	(0.044)	(0.044)
Road density		0.006	0.006
		(0.012)	(0.013)
% Firms using cell phones		-0.048	-0.050
		(0.195)	(0.195)
% Firms for which electricity is an obstacle		0.114	0.107
		(0.102)	(0.122)
Installed electricity capacity: share of India's total		-1.683***	-1.680***
		(0.530)	(0.532)
Observations	1,154	1,154	1,154
R-squared	0.213	0.223	0.223

Source: IMF Staff Estimates.

1/ Credit per capita, the number of firms, rail density, and unregistered net state domestic product as a proxy for informality are in logs. The constant term is not reported. Variables are defined by state, sector at the three-digit level and year. All columns include industry and year fixed effects. Robust standard errors are in parentheses and *** p<0.01,** p<0.05, * p<0.1.

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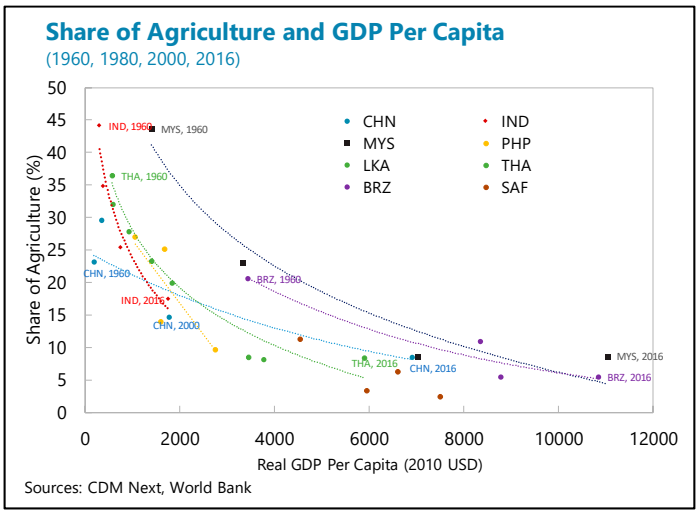
AGRICULTURE: KEY ISSUES AND REFORMS[1]

This chapter takes stock of key issues in and identifies important reforms for India's agricultural sector. It highlights long-term structural bottlenecks, including low agricultural productivity, large distortions particularly those induced by government interventions, and marketing issues. Sustained inclusive growth requires agricultural sector reforms, which should focus on reducing supply-side constraints, building more integrated markets, boosting productivity, and addressing market distortions.

1. Agriculture is the backbone of the Indian economy. The agricultural sector contributes around a fifth of GDP and provides employment for about half of the labor force, and farm income is a key determinant of rural consumption. Given the sheer size of food's weight (almost half) in the consumer price basket, changes in agricultural prices have a major impact on consumer prices.

2. India's economic transformation has progressed steadily. Country experiences suggest economic development is associated with the transition from agriculture to higher value-added sectors such as manufacturing or services. Over time, the share of agricultural sector declines and the number of agricultural workers falls. Nevertheless, such modernization must occur alongside increased agricultural productivity growth, while ensuring adequate farm incomes and food security (Subramanian (2018)).



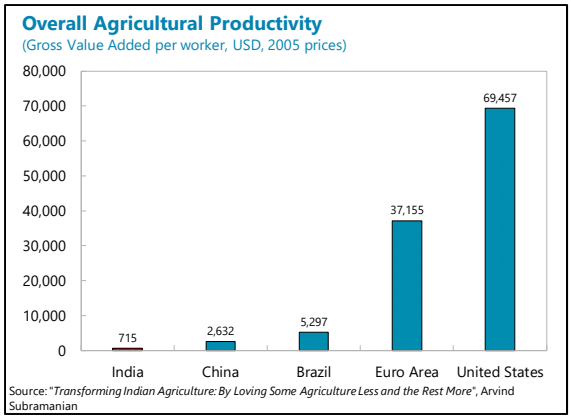
Sources: CDM Next, World Bank

3. Agricultural sector policy reforms continue to be a priority. The Government of India (GOI) has called for doubling farmers' incomes by 2022 as one of its top priorities. Recent agricultural policy initiatives are crucial to reducing production risk and improving the competitiveness of agricultural markets. These initiatives are, for instance, the assured irrigation initiative under the *Pradhan Mantri Krishi Sinchayee Yojana* launched in July 2015, the comprehensive crop insurance scheme *Pradhan Mantri Fasal Bima Yojana* launched in February 2016, the common electronic trading platform for a National Agriculture Market (e-NAM) launched in April 2016, and Gramin Agricultural Markets (GrAMs) launched in 2018, as well as the adoption of Model Agricultural Produce and Livestock Marketing Act (Model Act) of 2017 to facilitate private sector investment in the agricultural sector and make agricultural marketing and distribution more flexible.

[1] Prepared by Racha Moussa and Piyaporn Sodsriwiboon.

4. This study attempts to take stock of key issues and identify reform areas. The chapter highlights long-term structural bottlenecks in the agricultural sector, including low agricultural productivity, large distortions particularly those induced by government interventions, and marketing issues. It empirically analyzes the determinants of agricultural production and yield across Indian states and examines the role of structural measures, the effectiveness of government spending on agricultural sector, and the implications of price intervention. Based on the findings, it discusses policy recommendations.

5. Long-standing issues are related to low agricultural productivity. India's agricultural labor productivity is less than a third of that of China and only about one percent of that of the frontier—the United States (Subramanian (2018)). Insufficient agricultural infrastructure including irrigation systems and cold storage leads to significant production risk, waste, and losses to farmers. Fractured land holding makes it difficult to gain economies of scale. Land-leasing regulations remain tight, hindering an expansion into larger-scale agricultural business.



6. The old agricultural support framework leads to large distortions. It involves three main policy interventions— input subsidies, minimum support prices (MSPs), and the Public Distribution System (PDS).[2] This framework has created significant distortions; however, political obstacles deterred efforts to move forward with reforms (Fan et al, 2007). The issues are, for instance:

- Agricultural subsidies continue to weigh on the government budget, crowd out productive spending, and be often poorly administered, although significant progress has been made to streamline various subsidies in recent years.

- Past MSP hikes for rice and wheat, combined with the government's massive cereal stockpiling, resulted in production distortions, sharp swings in stocks, and episodes of high food inflation (IMF, 2017). The MSP has been implemented to ensure remunerative prices to farmers, but paradoxically, as farmers may not be aware of the MSP, its benefits may not reach them (Chatterjee and Kapur (2016)). Historically, substantial increases in the MSP were generally followed by rising inflation in key crops, fueling inflationary pressures. The FY2018/19 Budget announced that the MSP has been declared for all Rabi crops at least 1.5 times of the cost of production and the MSP for the unannounced Kharif crops will also be fixed in a similar manner. Nevertheless, the implementation remains unclear.

[2] The PDS has evolved as a system for management of scarcity and for distribution of food grains at affordable prices. It largely governs the procurement of India's main agricultural commodities namely wheat, rice, sugar, and pulses, among others, and distributes to targeted poor households.

- Weaknesses in the PDS manifest large leakages and operating inefficiencies (IMF, 2016). Significant leakages—subsidized grains not reaching poor households—are estimated from 40 to 60 percent and may be much higher in some states. The operating costs of the Food Corporation of India (FCI)—the central government's entity responsible for procurement, storage, transportation, and bulk allocation of food grains to the State Governments—are high, with the FCI's costs of acquiring, storing, and distributing food grains approximately 40 to 50 percent more than the procurement prices.

7. Problems in agricultural marketing are being addressed. Marketing is governed by the Essential Commodities Act and the state-level Agricultural Produce Marketing Committee (APMC) Acts, which empower the central and state governments to regulate and control production, distribution, marketing, and pricing of commodities identified as essential for consumers. The intention of the APMC Acts was to ensure that farmers were offered fair prices in a transparent manner. Nevertheless, this has turned rural agricultural markets (mandis) into local monopsonies by restricting free entry, causing lack of competition and transparency, and discouraging investments by the private sector, resulting severe governance challenges (Chatterjee and Kapur (2016)). While empirical evidence on agricultural price convergence suggest retail prices converge across India, price variation at APMC mandis across India persists over time.[3] To date, several initiatives have taken off to address problems in agricultural marketing, although it may take some time to resolve some implementation issues including to fully automate and improve internet infrastructure, as well as increase training and capacity (Aggarwal et al, (2017)). The 2017 Model Act should also help improve efficiency and transparency.

Empirical Analysis

8. The analysis estimates an agricultural production function as in Lin (1992), using cross-state data (Tables 1-2). The main inputs are land, labor, capital as proxied by credit to the agriculture sector, and fertilizer. Various policy variables are included to examine their impacts on production.

$$\ln(Y_{it}) = \beta_1 + \beta_2 \ln(labor_{it}) + \beta_3 (land_{it}) + \beta_4 \ln(fertilizer_{it}) + \beta_5 \ln(credit_{it}) + \cdots + \beta_k X_{it} + \varepsilon_{it}$$

Production (Y_{it}) is measured as the production of major crops including food grain, rice, pulses, sugarcane, cereals, and wheat weighted by the share of area cropped, with i being an index for states. X_{it} is a K-dimensional policy vector which includes the government's capital expenditure, infrastructure spending, and MSP, among others, with coefficients indexed $k = 1, \ldots\ldots, K$. Data are annual spanning from 1980 to 2016 and covering 23 states, from Centre for Monitoring Indian

[3] IMF (2018) applies panel unit root tests to examine whether retail prices have converged over time. It uses monthly data for 15 crops by city from 2010 to 2016. Preliminary results suggest that the law of one price holds for various crops. On the other hand, Chatterjee and Kapur (2016) analyze the spatial variation in wholesale prices of the principal cereal crops (rice and wheat) in all APMC mandis across India and within each state. It finds spatial variations in real prices of agricultural commodities are large and persist through time.

Economy (CMIE) and CEIC database. The panel is unbalanced. The model was also estimated for the weighted yield, replacing weighted production. Conclusions are broadly unchanged.[4]

9. Infrastructure spending is found to be strongly associated with the improvement of agricultural production and yield. Labor, land, fertilizer, and credit explain nearly 70 percent of the variation in production. Broad infrastructure development, as proxied by capital expenditure, appears to be positively correlated with production. Specific efforts at structural improvements in agriculture, for example improving food storage and irrigation, are also significant and help improve explanatory power. Spending on food storage impacts production with the same magnitude as credit. Land that is irrigated is associated with an increase of production by about 25 percent. Higher MSPs contribute to higher quantities produced. This impact comes with market distortions as highlighted previously and could add to inflation and fiscal costs.[5]

Policy Recommendations

10. Sustained inclusive growth requires agricultural sector reforms. In line with recommendations by NITI Aayog and in the Economic Survey 2018, the strategy should focus on raising productivity, reducing production risk, and fostering more competitive agricultural markets. This study highlights the importance of reducing supply-side constraints, building more integrated markets, boosting productivity, and addressing market distortions. Possible policy actions include:

- Recent policy initiatives such as the assured irrigation system, the introduction of e-NAM, and the development of GrAM are welcome and, despite gradual implementation, promise to reduce production risk, increase competitiveness, and improve transparency in state markets.
- To further reduce vulnerability, there is also the need to continue to address long-term structural bottlenecks, including in irrigation and other infrastructure.
- Boosting agricultural productivity requires more efficient use of inputs, improved agricultural technology, research and development, and education.
- As MSPs could skew farmers' production decisions, add to inflation, and enlarge the fiscal burden, their use (backed by assured procurement) should only be temporary and limited to correcting market failures.
- To address distortions, more needs to be done to revamp government procurement processes and the PDS, including to restructure the role of the FCI via outsourcing of cereal procurement and stocking operations and check leakages in the PDS.
- Various agricultural subsidies are being streamlined especially through direct benefit transfers, and should be further reduced going forward.

[4] The model estimated without land retained a high explanatory power.

[5] Regressions that include MSP cover rice, pulses, cereal, and wheat.

Table 1: India: Regression Results for Agricultural Production and Yield 1/

	Dependent variable: weighted production							Dependent variable: weighted yield		
	All products			of which: MSP products				All products		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Labor	0.29	0.33	0.12	0.03	0.43	0.35	0.10	0.50	0.55	0.32
	(3.56)**	(3.27)**	(1.43)	(0.29)	(2.75)**	(2.33)*	(0.71)	(6.28)**	(5.44)**	(3.53)**
Land	0.86	0.93	0.82	0.65	1.71	1.74	1.71			
	(11.49)**	(11.75)**	(11.58)**	(7.82)**	(13.33)**	(13.31)**	(12.58)**			
Fertilizer	0.13	0.13	0.22	0.13	-0.03	-0.04	0.00	0.07	0.08	0.16
	(5.44)**	(4.29)**	(6.15)**	(4.73)**	(0.62)	(0.80)	(0.07)	(2.94)**	(2.56)*	(4.36)**
Agriculture Credit	0.12	0.04	0.05	0.12	0.04	0.04	0.01	0.14	0.05	0.07
	(14.57)**	(2.32)*	(5.37)**	(11.75)**	(1.65)	(1.33)	(0.22)	(16.10)**	(2.84)**	(6.17)**
Capex Development		0.09				0.01			0.08	
		(4.64)**				(0.60)			(4.02)**	
MSP					0.15	0.13	0.20			
					(2.44)*	(2.05)*	(3.93)**			
Revenue Expenditure Water		0.00				-0.04			0.01	
		(0.27)				(2.14)*			(0.63)	
Revenue Expenditure Food Storage		0.04				0.03			0.03	
		(5.51)**				(2.58)*			(4.60)**	
Net Irrigation			0.25				0.23			0.24
			(4.58)**				(3.19)**			(4.05)**
Rainfall Deviation			-0.01				-0.01			-0.01
			(2.32)*				(1.93)			(1.79)
Constant	0.35	-1.13	1.05	6.26	-6.68	-5.49	-3.82	-2.21	-3.29	-1.73
	(0.26)	(0.69)	(0.82)	(4.04)**	(2.63)**	(2.20)*	(1.66)	(1.77)	(2.03)*	(1.35)
Adjusted R2	0.68	0.70	0.72	0.58	0.57	0.61	0.69	0.67	0.67	0.67
Number of observations	705	482	409	723	325	254	237	705	482	409

Source: IMF Staff Estimates.

1/ All variables are in logs. The dependent variable is the weighted average production of food grains, rice, pulses, sugarcane, cereals, and wheat by share of area sown in columns (1)–(3), the weighted average production of rice, pulses, cereals, and wheat by share of area sown in columns (4)–(7), the weighted average yield of food grains, rice, pulses, sugarcane, cereals, and wheat by share of area sown in columns (8)–(10). Labor is the sum of agricultural laborers and cultivators in rural areas. Land is the sum of the area sown for the crops in the dependent variable. Fertilizer is total consumption of fertilizer in kg. Agricultural credit is the total outstanding agricultural credit in all scheduled commercial banks. Capex development and revenue expenditure on water and food storage are nominal values from state government finances. MSP is the weighted average by area sown for the crops considered. Net irrigation is the total area irrigated in hectares. Rainfall deviation is the percent deviation from average rainfall. All columns include state fixed effects. Standard errors are in parentheses. * p<0.05; ** p<0.01

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