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INDIAN PUBLIC POLICY REVIEW

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The Taper This Time

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Abstract

On November 3, 2021, the Federal Open Market Committee announced that it would reduce the scale of its asset purchases by \$15 billion a month starting immediately. Do emerging markets, such as India, need to prepare for a replay of the taper tantrum of 2013? We show that emerging markets, including India, have strengthened their external economic and financial positions since 2013. At the same time, fiscal deficits are much wider, and public debts are much heavier. As U.S. interest rates now begin moving up, servicing existing debts and preventing the debt-to-GDP ratio from rising still further will become more challenging. Either taxes have to be raised or public spending must be cut to generate additional revenues for debt servicing.

Keywords: Capital Flows, Emerging Markets, Monetary Policy, Tapering, India

JEL codes: F32, F41, F42, F62

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I Introduction

On November 3, 2021, the Federal Open Market Committee announced that it would reduce the scale of its asset purchases by \$15 billion a month starting immediately. Do emerging markets (EMs) in general, and India in particular, need to prepare for a replay of the taper tantrum of 2013?

Most observers of emerging markets have been sanguine to date. “Unlike in 2013, when the Fed signalled tightening during a period of still-uncertain global growth, the global economy is in a better position to accelerate today”.¹ “EM relies much less on external funding and portfolio inflows now compared with 2013.” “We are not going to see the same tantrum because emerging markets are better prepared than in the past in terms of monetary policy.” “The Fed and G7 central banks have learned from the past and they want to take the tantrum out of tapering. They are succeeding in doing so. Markets have been preparing for this for months.”²

But a few observers (e.g. Singh 2021) are less sanguine. The global growth environment may be less favourable than before COVID, what with supply-chain disruptions, high energy prices and a virus that refuses to disappear. EMs have experienced substantial portfolio capital outflows following the sharp but short period of inflows at the outset of the pandemic. Some (e.g. Colombia) have substantial current account deficits to finance. The Fed, it is said, has fallen behind the curve: reining in inflation will force it to raise interest rates earlier and faster than markets are expecting on the basis of its earlier communication (Lachman 2021). High debts leave emerging markets vulnerable to sharp shifts in borrowing costs when this interest rate increase occurs.

Here we attempt to have it both ways. We show that emerging markets, including India, have succeeded in strengthening their external economic and financial positions since 2013. They have reduced external vulnerabilities by limiting their current account deficits, real appreciation, dependence on portfolio capital inflows, and external financing needs.

At the same time, fiscal deficits are much wider, and public debts are much heavier. Historically, interest rates on government bonds in the United States and emerging markets, including India, move together. As U.S. interest rates now begin moving up, servicing existing debts and preventing the debt-to-GDP ratio from rising still further will become more challenging.

The earlier episode of turbulence precipitated by the Fed’s taper talk, in 2013, focused on exchange rates and the external accounts. The next one may instead focus on interest rates and the budgetary accounts. The earlier crisis played out in the short term, while the next one may take longer to unfold. But this last fact doesn’t make addressing it any less urgent.

II Previous Experience and Literature

Considerable research effort has been devoted to understanding the impact of the Federal Reserve Board Chair Bernanke’s unexpected announcement in May 2013 that the Fed might soon begin to reduce its security purchases. In Eichengreen and Gupta (2015) we constructed a composite index of financial pressure from observations on changes in exchange rates, reserves and stock market yields.

Looking across emerging markets, we found only limited evidence that observable macroeconomic fundamentals (the size of the budget deficit, public debt, foreign reserves, and the GDP growth rate in the prior period) explained cross country variations in the increase in pressure following Bernanke's announcement. Countries with smaller budget deficits, lower debts, more reserves and stronger growth rates in the immediately preceding period do not appear to have been rewarded with small falls in exchange rates, foreign reserves and stock prices starting that May. Exceptions were countries with more real exchange rate appreciation and widening current account deficits prior to Bernanke's announcement, rendering them more dependent on external finance. These variables appear to have turned around subsequently, with uncomfortable economic and financial consequences.

More important, however, was the size of countries' financial markets, measured by the stock of portfolio liabilities (as in Lane and Milesi-Ferretti 2012) and, alternatively, total external private financing (inflows of equity, bonds and loans in the preceding three years). This is consistent with the idea that investors seeking to adjust their portfolios tend to exit from positions in countries with relatively large financial markets, since they can then rebalance without significantly moving prices against themselves.

Aizenman, Binici and Hutchison (2016), focusing on the immediate response of financial variables to the taper announcement, similarly find little sign that stronger macroeconomic fundamentals translated into less deterioration in financial conditions. If anything, they find that emerging markets with relatively robust macroeconomic fundamentals saw a larger deterioration in financial conditions immediately following the announcement. An interpretation, consistent with Eichengreen and Gupta (2015), is that these countries were vulnerable because they had been on the receiving end of larger portfolio capital inflows in the preceding period – inflows that turned around subsequently.

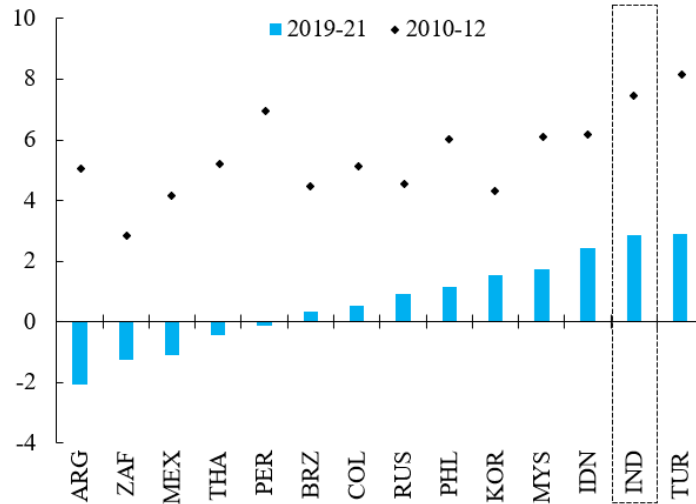
In contrast, Mishra et al. (2014), analysing short-run financial market reactions to the Fed's tapering announcements in 2013-14, do find evidence that emerging markets with stronger macroeconomic fundamentals experienced less deterioration in debt-market conditions, although they find no such evidence for equity markets. Ahmed, Couibaly and Zlate (2017), analyzing a cross-section of 35 emerging markets in the May-August 2013 period, find that financial conditions deteriorated more in EMs that experienced larger private capital inflows and greater real exchange rate appreciation in earlier years, consistent with the conclusions of Eichengreen and Gupta. In contrast with these earlier authors, however, they also conclude that there was a role for macroeconomic fundamentals in shaping the heterogeneous response of EM financial markets. Specifically, higher inflation, more rapidly growing bank credit and a lower stock of foreign exchange reserves in the preceding period translated into greater currency depreciation pressure.

To the extent to which there is a consensus in the literature, it points to the importance of prior financial conditions (capital inflows and real appreciation in the pre-taper period), financial market structure (the size of financial markets), and perhaps also select macroeconomic variables in helping to explain the differential impact of the taper announcement. In the next section, we, therefore, examine how these determinants have evolved in the eight years since the 2013 taper tantrum.

III Evolution of Conditions

We limit our attention here to 14 of the larger emerging markets. The main omission is China, for which comparable data for certain variables is lacking and which, for a variety of reasons, is a special case.

Figure 1: Real GDP growth rate, percent



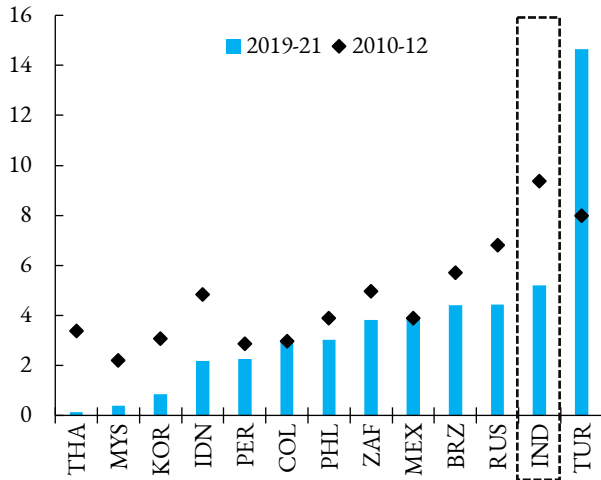
Source: IMF WEO April 2021

Note: 2010-12 reflects average over three years 2010, 2011, and 2012.

One of the observations cited in the second paragraph of our introduction is that the global economy “is in a better position to accelerate today.” Growth in emerging markets has of course been much slower in 2019-21 (Figure 1), reflecting the sharp COVID-related contraction in 2020. This difference from 2010-12, though evident across the board, is most apparent in Argentina and South Africa (where the COVID crisis was superimposed on already-existing fiscal and financial problems), in Mexico (where the government was reluctant to take fiscal measures to offset the economic contraction), and in Thailand (which depends on tourism for a significant fraction of GDP and was therefore hit especially hard by the COVID shutdown). But whether or not the shortfall in growth between 2010-12 and 2019-21 is an indication of scope for acceleration now is far from clear. On the one hand, lockdowns obviously depressed realized growth rates in 2020, creating scope for bouncing back now. On the other hand, the slow pace of vaccination in emerging markets, ongoing shipping and supply chain problems, chronic shortages of key inputs such as semiconductors, and shortfalls in human-capital accumulation may continue to slow growth going forward, globally but especially for emerging markets.

Inflation in emerging markets (Figure 2) has visibly declined between the two periods, with the exception of Turkey, where the central bank has been under pressure from the government to loosen monetary policy. If anything, inflation has been too low in certain Asian countries (Thailand, Malaysia, South Korea). For these countries, raising interest rates in response to kindred movements by the Fed might be uncomfortable insofar as it could reinforce a pre-existing problem of “lowflation.” Figure 3 confirms that policy rates have been lower in the recent episode than they were in 2010-12, with the sole exceptions of Turkey and Argentina, where inflation is a more serious problem now.

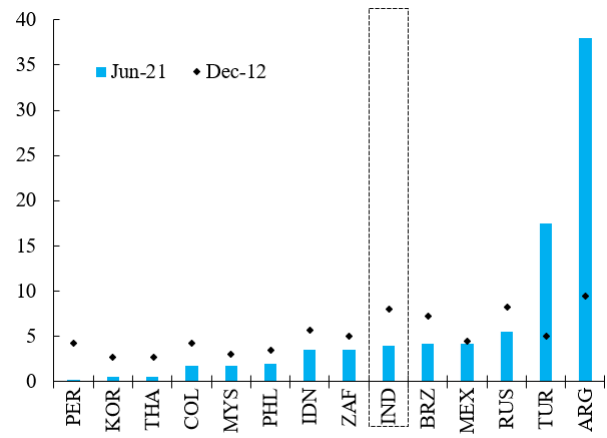
Figure 2: Consumer price inflation, percent, average year-on-year growth rate



Source: HAVER.

Note: 2021 data is for first eight months i.e., January-August 2021. Argentina has been excluded as its average consumer inflation rate during 2019-21 is 47.7 percent (as against 10.1 percent in 2010-12).

Figure 3: Policy rate, percent p.a.

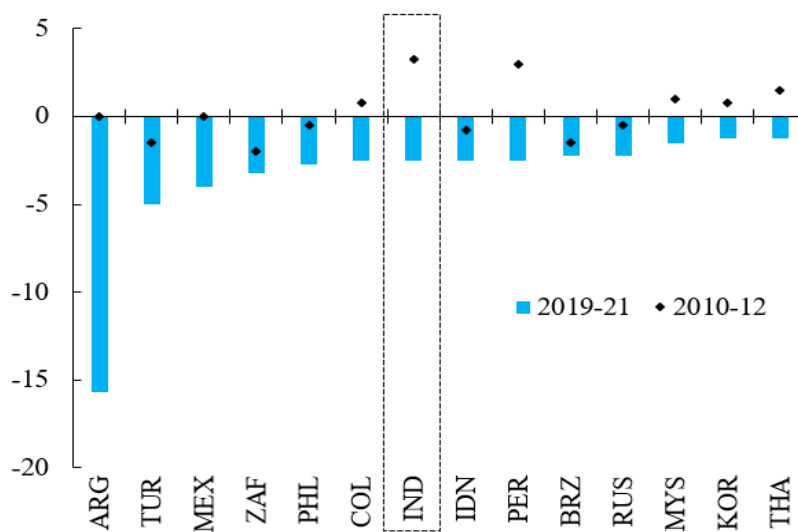


Source: International Financial Statistics, Reserve Bank of India

Note: Argentina has been excluded as its average consumer inflation rate during 2019-21 is 47.8 percent (as against 10.1 percent in 2010-12).

Figure 4 shows how central banks were able to cut their policy rates in response to the 2020 drop in output, something that they were generally not able to do in earlier periods of economic weakness and crisis. The recent policy response reflects the observation, mooted in the second paragraph of our introduction, that emerging markets now have stronger monetary policy frameworks. Central banks have greater anti-inflationary credibility, which allows them to exercise flexibility and cut rates in difficult times.

Figure 4: Change in policy rate, percentage points

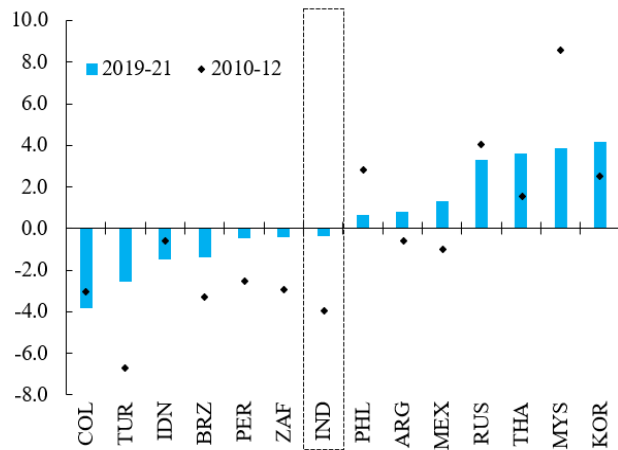


Source: International Financial Statistics, Reserve Bank of India

Note: 2019-21 change reflects the difference between June 2021 and January 2019 policy rates while 2010-12 reflects the difference between December 2012 and January 2010.

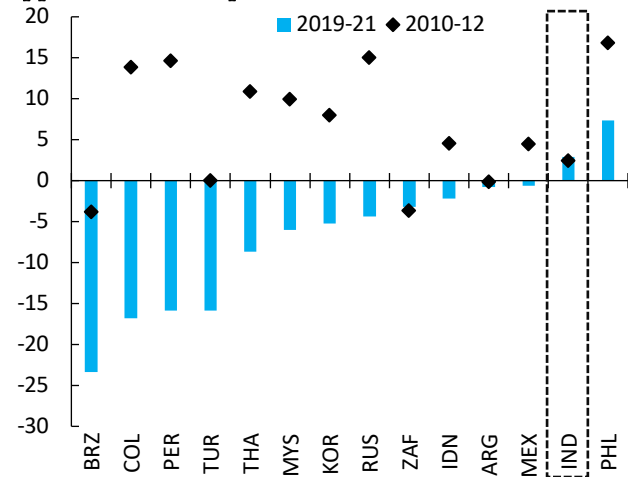
Current account balances as a share of GDP are also stronger now than in 2010-12 (Figure 5), though there are exceptions (Indonesia, Colombia and most prominently Malaysia, where the current account surplus was an extraordinary 9 percent of GDP in 2010-12, buoyed by strong prices for commodity exports). Overall, this is consistent with the observation that external positions have strengthened. Consistent with this, the real exchange rate appreciation has been limited or been avoided more successfully this time (Figure 6), the Philippines being the exception.³

Figure 5: Current account balance, percent of GDP



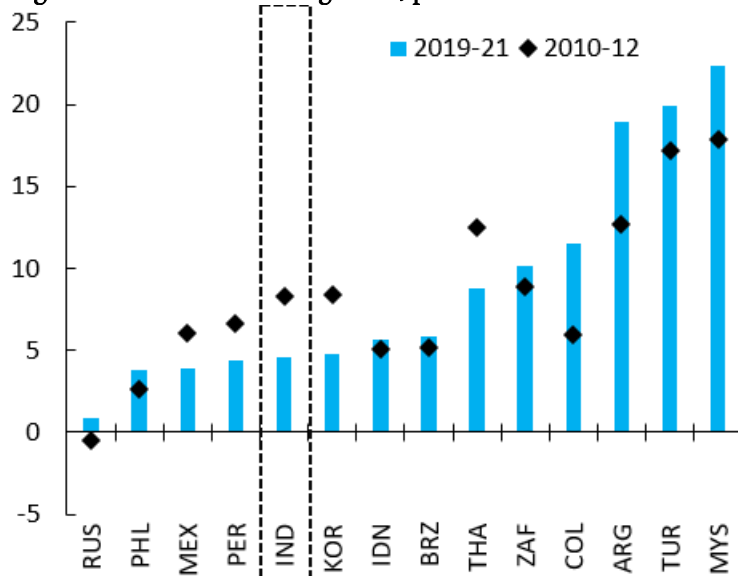
Source: IMF WEO April 2021
 Note: 2010-12 reflects average over three years 2010, 2011, and 2012.

Figure 6: Real effective exchange rate, Percent, (+) appreciation/(-) depreciation



Source: HAVER, Bruegel.
 Note: 2010-12 denotes percentage change in December 2012 REER over January 2010 REER, and 2019-21 denotes percentage change in August 2021 REER over January 2019 REER.

Figure 7: External financing needs, percent of GDP

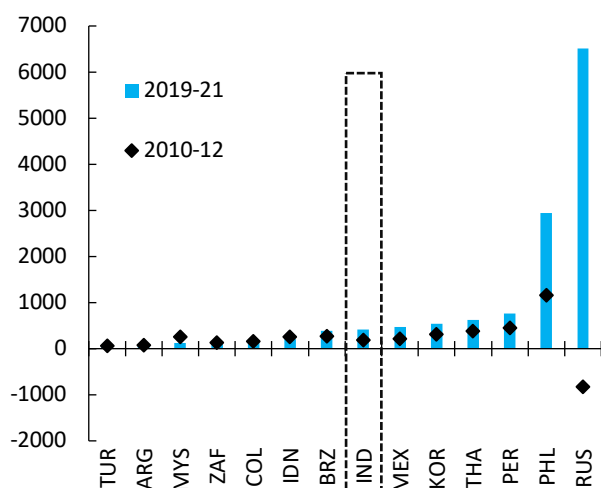


Source: IIF, HAVER.
 Note: External financing needs equals Short-term external debt plus current account deficit.

Figure 7 shows external financing needs (short-term external debt plus the current account deficit). Financing needs are highest – and significantly higher than in 2010-12 – in Colombia, Argentina, Turkey and Malaysia. Were U.S. interest rates to now rise faster than previously expected, these countries could find it difficult to attract foreign finance on the requisite scale, which is in the range of 10 to 20 percent of GDP.

Foreign reserves become a vital buffer when external financing turns scarce.⁴ Figures 8 and 9 show reserves relative to external financing needs, as just defined, with and without two outliers, Russia and the Philippines, where reserves are exceptionally large. They show that reserve adequacy has improved everywhere but in the anomalous case of Malaysia. They also flag Turkey and Argentina as two cases where reserves are inadequate to finance the current account plus maturing short-term external debt.

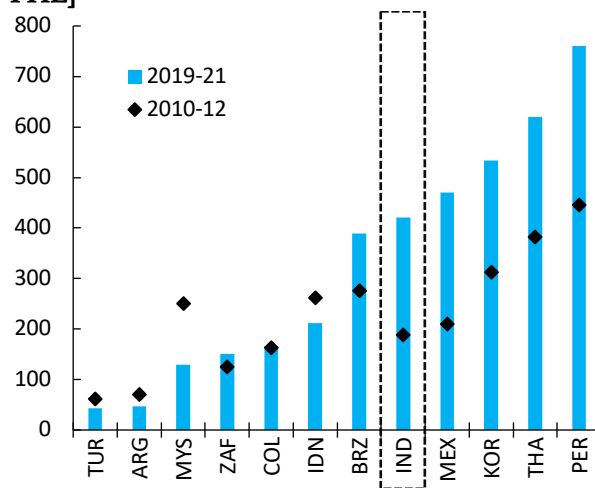
Figure 8: Reserve adequacy



Source: HAVER.

Note: Reserve adequacy = 100* Reserves/(short-term external debt plus the current account deficit).

Figure 9: Reserve adequacy [without outlier: RUS, PHL]



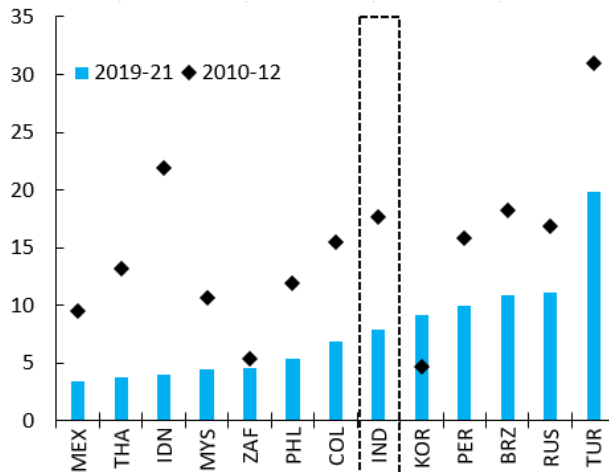
Source: HAVER.

Note: Reserve adequacy = 100* Reserves/(short-term external debt plus the current account deficit).

Turning to financial conditions, Figure 10 shows that credit growth is more subdued than in 2010-12 virtually across the board, the only exception being Korea, where credit growth in 2010-12 was anomalously low. The same is true of cumulative portfolio capital inflows (an important source of domestic credit growth): as a share of GDP, cumulative portfolio inflows are uniformly smaller in 2019-21 than 2010-12 (with the exception of Russia, Figure 11)⁵.

It follows that the debt situation paints a mixed picture, what with emerging market governments running larger budget deficits in response to COVID-19 but private credit growth remaining relatively subdued. General government debt as a share of GDP (Figure 12) is higher essentially everywhere, reflecting recourse to deficit spending during the COVID crisis (Figure 13).

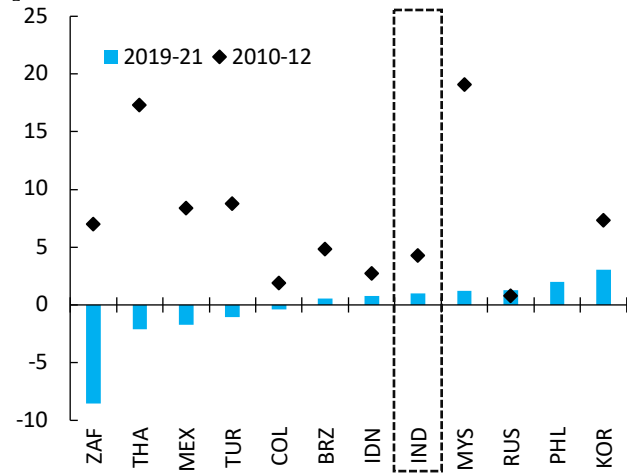
Figure 10: Private sector credit growth rate, percent



Source: HAVER.

Note: We report average of monthly year-on-year growth rates. For Argentina, we have year-on-year growth rates of quarterly credit levels.

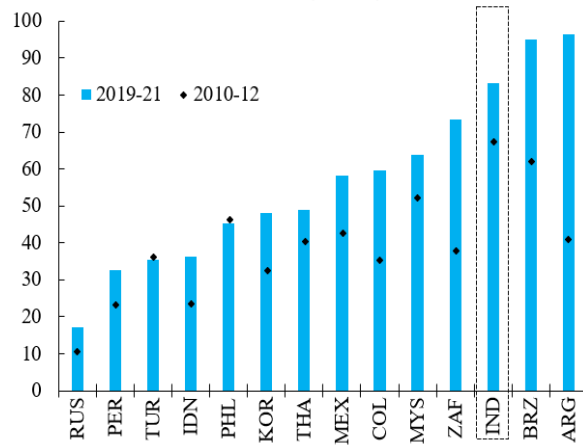
Figure 11: Cumulative portfolio inflows (net), percent of GDP



Source: IIF, IMF WEO April 2021.

Note: To express as percentage of GDP, cumulative portfolio flows over 2019-21 are divided by 2021 nominal GDP estimate by IMF April 2021 WEO while 2010-12 flows are expressed as a fraction of 2012 nominal GDP. The Philippines' data is not available for 2010-11.

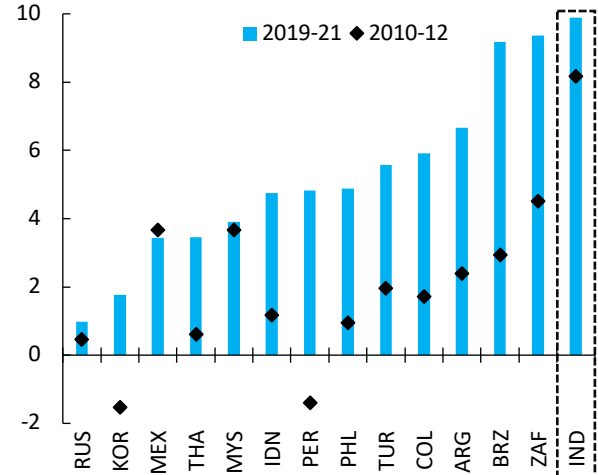
Figure 12: General government debt (gross), percent of GDP



Source: IMF WEO April 2021.

Note: 2010-12 reflects the average over three years 2010, 2011, and 2012.

Figure 13: General government budget deficit, percent of GDP

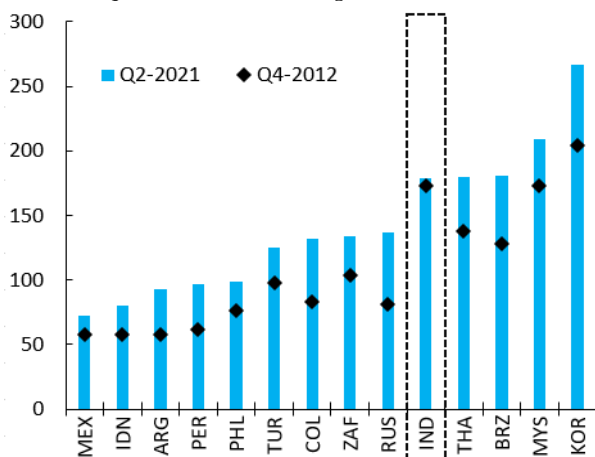


Source: IMF WEO April 2021.

Note: General government budget deficit is net borrowing (as mentioned in IMF WEO). A (-) ratio denotes net borrowings while a (+) ratio denotes net lending. 2021 are IMF WEO April 2021 estimates while for ARG, COL, MYS, PER, RUS, KOR estimates start after 2019. 2010-12 denotes average over 2010, 2011 and 2012 while 2019-21 is average over 2019, 2020 and 2021. ARG average is until 2020 as 2021 data is not available.

Total debt (including the household and non-financial corporate sectors as well as government) as a share of GDP is higher across the board (with one exception to which we will return, Figure 14). Total external debt (including households, government and non-financial firms) is also higher with a few exceptions (Figure 15).

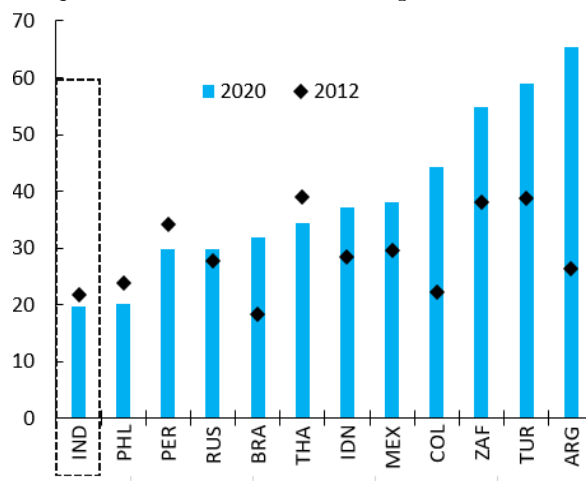
Figure 14: Total debt, percent of GDP



Source: IIF, HAVER.

Note: Total debt includes household, government, and corporation (non-financial) debt.

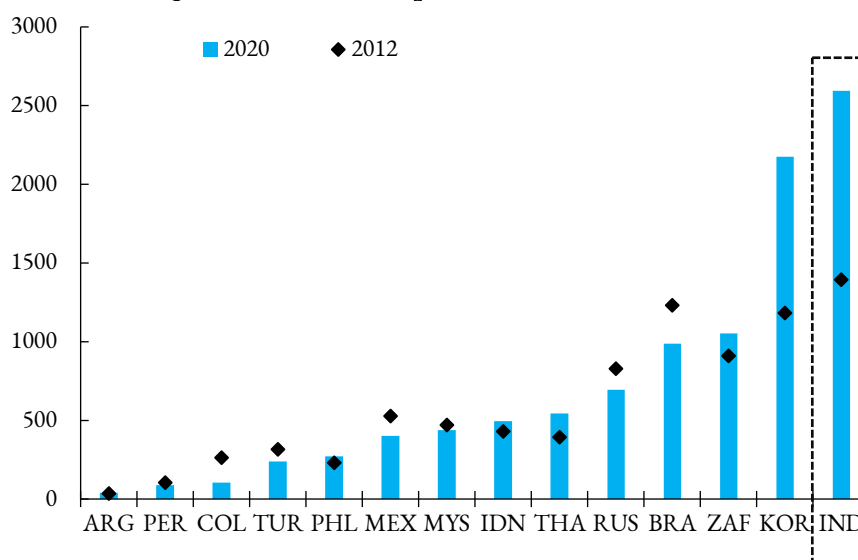
Figure 15: External debt stocks, percent of GNI



Source: WDI.

Given the emphasis in Eichengreen and Gupta (2015) on the size of financial markets as a source of vulnerability when international investors are rebalancing away from emerging markets, it is worth asking finally how financial market capitalization has evolved since 2010-12. Figure 16 shows that there have been relatively small changes in market capitalization measured in U.S. dollars, with the exception of India and South Korea, where market capitalization has increased quite significantly, making for increased vulnerability to normalization of U.S. monetary and financial conditions if our earlier story continues to hold.

Figure 16: Market capitalization, USD billions



Source: WDI

Note: For Argentina, we have data until 2019.

In sum, emerging markets as a class have made progress in strengthening their economies and financial systems in advance of another episode when the Federal Reserve and other central banks taper their asset purchases and raise interest rates. Most of the progress is on the external side. Current

account deficits are smaller, and real exchange rate appreciation raising fears of overvaluation has been less. Portfolio capital inflows and credit growth have been more subdued than in the past.

But not all entries are on the positive side of the ledger. External financing needs show no clear pattern – lower in some countries, higher in others. Nor are changes in reserve adequacy (reserves relative to external financing needs) uniformly positive; this is improved in roughly half our countries but unchanged or worse in the others. Turkey and Argentina are in the most delicate position, with two of the largest external financing needs going forward and inadequate foreign reserves.

Most obviously, the governments of emerging markets are exiting the COVID crisis more heavily indebted. An increasing fraction of this debt is denominated in domestic currencies, which is reassuring. But a significant fraction, in many national cases, is still sold to foreign investors (Eichengreen, El-Ganainy, Esteves and Mitchener 2021), who may seek to rebalance away from emerging markets as interest rates begin to rise in the U.S. and other advanced countries.

IV The Situation in India

In the preceding analysis, India is toward the middle or on the favourable end of the spectrum in terms of most indicators of emerging market financial vulnerability. The current account deficit is small. Real exchange rate appreciation has been limited. Cumulative portfolio inflows have been smaller relative to GDP than in 2010-12. External debt stocks are low by emerging market standards. External financing needs are limited and smaller relative to GDP than in 2010-12. Reserve cover is improved.

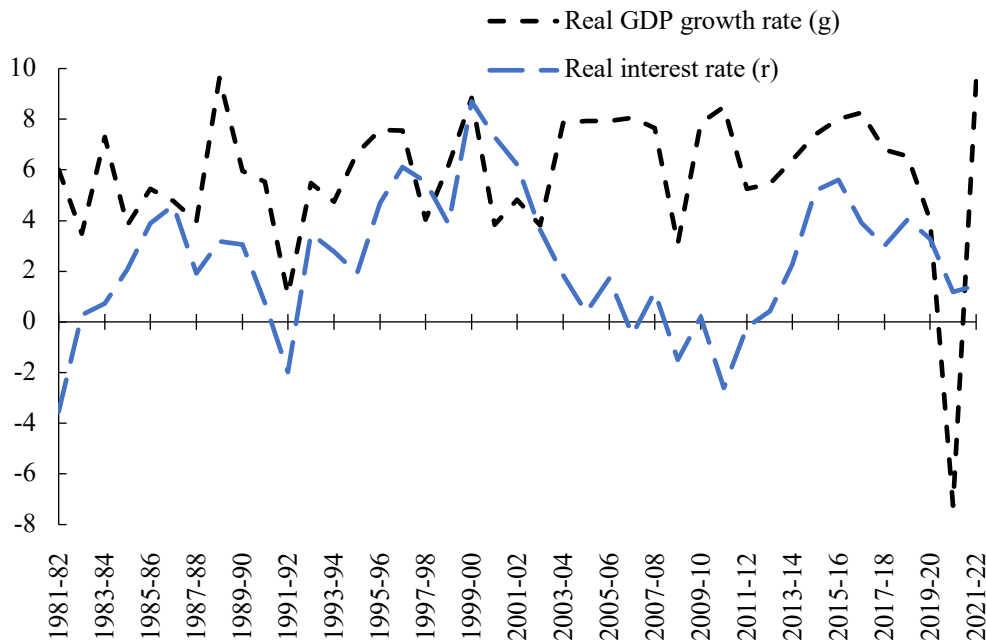
Where the country stands out is in fiscal stance. The general government debt and deficit as shares of GDP are high by international standards. The country's debt-to GDP-ratio in the last decade (averaging 68 percent) and fiscal deficit-to-GDP ratio (averaging at around 7 percent) are high among comparators. Tax revenues as a share of GDP have been stagnant or have risen only slowly. Tax effort so measured has been below the average of other countries at similar income levels; direct tax collection has been particularly low. Recurrent expenditure (committed, non-discretionary, or revenue expenditure) accounts for a majority of general government expenditure, while capital spending on infrastructure is only about 3.5 percent of GDP.

Even as the discussions have centred around the need for India's fiscal architecture to be put on a sustainable footing, COVID-19 has further widened the budget deficit and elevated the debt. These totalled 12.3 percent and 89.6 percent of GDP, respectively, in 2020-21, and are projected to moderate slightly to 10 percent and 86.6 percent, respectively, as GDP recovers this fiscal year.⁶ The general government primary deficit, net of interest payments, was 7.4 percent of GDP in 2020 and is estimated to be 5.7 percent in 2021 (IMF 2021).⁷

The good news is that debt and deficit ratios do not figure prominently in analyses of the 2013 taper tantrum.⁸ It is further reassuring that general government debt is held mainly at home and denominated in rupees. Earlier experience suggests that countries that relied on capital inflows, selling debt to foreigners, especially debt denominated in foreign currency, experienced difficulties when global interest rates rose. RBI (2021) estimates that external government debt as of 2021 is just 4 percent of GDP. (Compare Figure 12 above, which confirms that this is only a small share of total

government indebtedness.) More than three-quarters of this is external debt on government account under external assistance – concessional assistance from official creditors who are unlikely to cut and run

Figure 17: Interest-growth differential



Source: CEIC, MoSPI, RBI.

Note: Real interest rate is nominal interest rate less GDP deflator growth rate. Nominal interest rate is weighted average yield of central government securities. For 2020/21, we consider RBI's real GDP forecast and assume a 24-basis point increase in nominal yields (based on trends in yields of different tenors observed between April 2021 and July 2021).

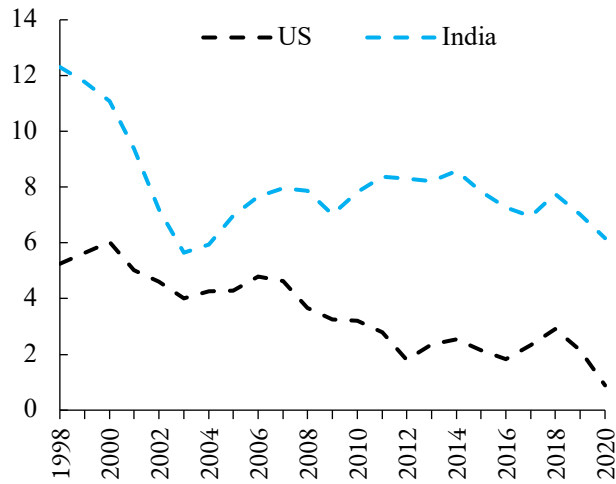
The bad news is that a debt-to-GDP ratio of 87 percent is high by the standards of emerging markets. Most economists would agree that it would be risky to let it go higher. Since the turn of the century, the real-growth-rate-real-interest rate differential has averaged around 5 percentage points. This means that India can run a primary deficit of 4.5 percent of GDP without seeing its debt/GDP ratio move higher.⁹ Compare the IMF estimate of 5.7 percent for 2021, noted above.

Moreover, GDP growth slowed significantly, to just 4 percent in 2019 – that is, already prior to the COVID crisis – from nearly twice that rate in the golden years 2014-16. IMF (2021) in its October 2021 Article IV consultation with India suggests that growth, after bouncing back from the COVID-19 recession at a roughly 9 percent rate in 2021/22 and 2022/23, will run at around 6 percent in the medium term, meaning between 2023/24 and 2026/27, roughly matching the 2017-18 average. If this is correct (and we hasten to emphasize that this is the IMF's forecast, not necessarily ours), then cutting the primary deficit below 4.5 percent of GDP may be required to stabilize the debt/GDP ratio.¹⁰

Similarly, if interest rates now go up owing to global factors, the real-interest-rate-real-growth-rate differential could turn even less favourable. Figures 18 and 19, and the accompanying Table 1, show that yields on the Indian government's 10-year securities co-move with US 10-year Treasury yields.¹¹ The elasticity with respect to U.S. rates approaches unity; this is true in both nominal and real terms.¹²

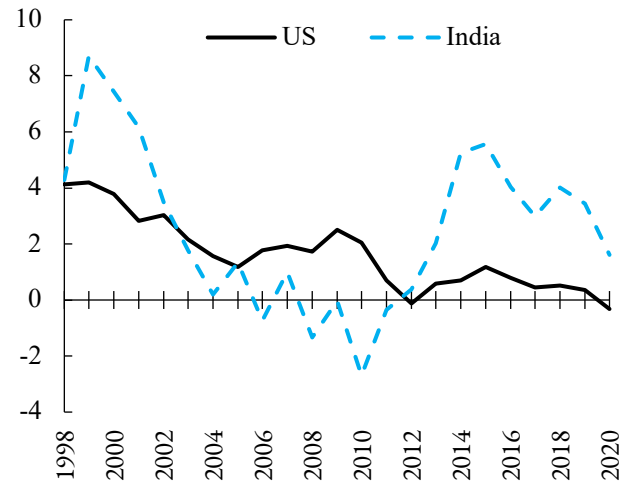
If U.S. yields are now going up, this suggests that even stronger steps will be needed to stabilize the debt/GDP ratio. With a growth rate of 6 percent and a real interest rate of 2 percent, the deficit would have to be cut to roughly 3.6 percent of GDP to stabilize the debt/GDP ratio.¹³

Figure 18: 10-year nominal government bond yield, percent per annum



Source: CEIC, IMF, RBI.

Figure 19: 10-year real government bond yield, percent per annum



Source: CEIC, IMF, RBI, WDI.

Note: Real yields are nominal yields less GDP deflator growth rate.

Table 1: Regression results

Dependent variable: India 10-year Government bond yield

	Nominal	Nominal adjusted for depreciation rate	Real
US 10-year Gov bond yield (nominal)	0.78*** (3.86)	0.93 (1.46)	
US 10-year Gov bond yield (real, GDP deflator based)			0.89** (2.76)
Constant	5.40*** (8.99)	1.53 (0.54)	1.12 (1.57)
Observations	24	24	24
Adjusted R ²	0.36	-0.01	0.15

Robust t statistics in parentheses

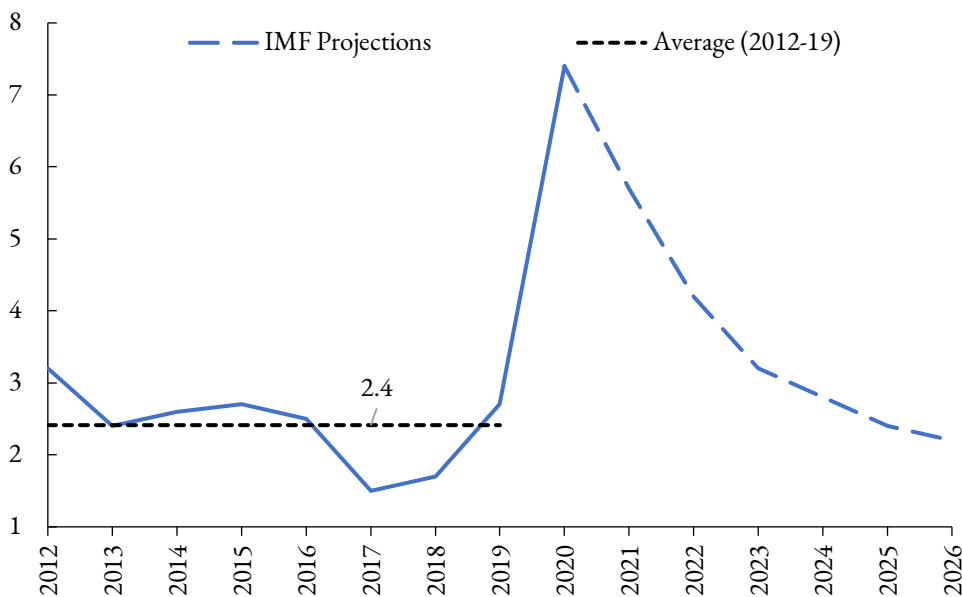
* p < 0.10, ** p < 0.05, *** p < 0.01

Note: Temporal coverage: 1997-2020 (annual). In column (2), we adjust nominal Indian government bond yields by subtracting annual depreciation rate. Depreciation rate is computed as annual percentage change in INR/USD exchange rate. We consider changes in end-of-period values of exchange rate.

With GDP projected to bounce back post-COVID, there is no immediate crisis of debt sustainability. If growth does, in fact, run at 8 percent in 2022 as lockdowns are relaxed and conditions normalize, the debt ratio will fall in the short run.

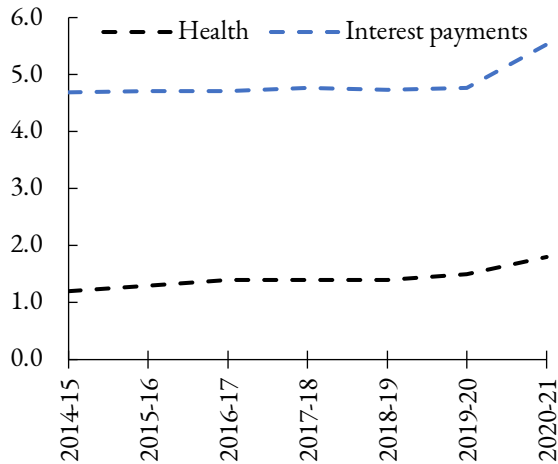
But there are reasons to worry about the medium term. The IMF in its *Fiscal Monitor* and latest Article IV consultation with India imagines that the primary deficit as a share of GDP will fall back to its lower 2012-2019 average of 2.4 percent by 2026. The question is how. Tax to GDP ratios generally do not increase rapidly or sharply in the short run.¹⁴ Thus, IMF (2021) projects general government revenue as a share of GDP as rising very slightly from 19.2 percent this year to 19.8 percent in 2022-26.

Figure 20: General government primary deficit, percent of GDP



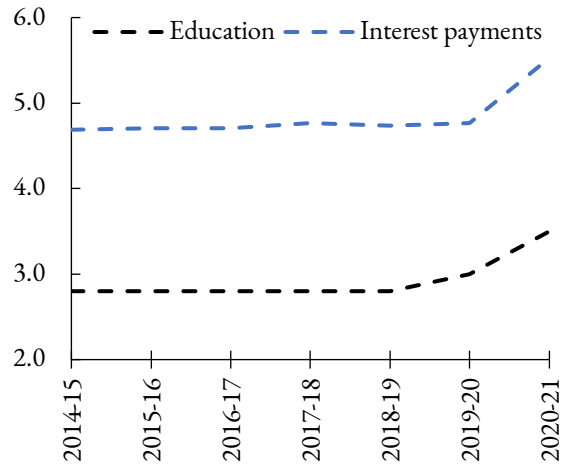
Source: IMF Staff estimates and projections (IMF fiscal monitor October 2021).

Figure 21: General government health expenditure, percent of GDP



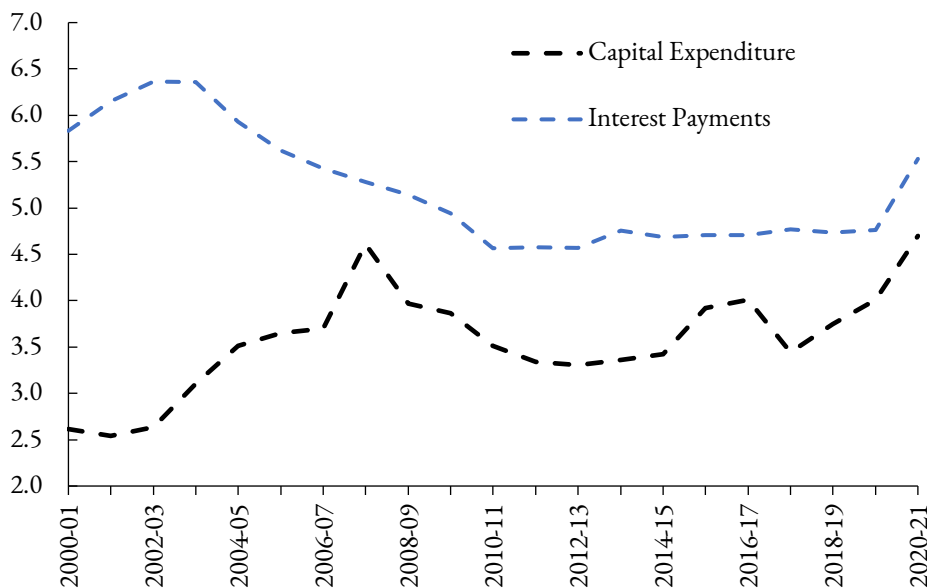
Source: Economic Survey 2020-21, MoSPI, RBI.
 Note: 2019-20 are revised estimates and 2020-21 are budgeted estimates. Ratios are based on GDP estimates for 2020-21 data released by MoSPI.

Figure 22: General government education expenditure, percent of GDP



Source: Economic Survey 2020-21, MoSPI, RBI.
 Note: 2019-20 are revised estimates and 2020-21 are budgeted estimates. Ratios are based on GDP estimates for 2020-21 data released by MoSPI.

Figure 23: General government capital expenditure, percent of GDP



Source: MoSPI, RBI.
 Note: 2019-20 are revised estimates and 2020-21 are budgeted estimates. Ratios are based on GDP estimates for 2020-21 data released by MoSPI.

It follows that making a dent in the deficit will require spending restraint. The IMF imagines that general government expenditure as a share of GDP will fall from 30.4 percent this year to 27.9 percent by 2026, basically returning it to pre-crisis levels. This is optimistic. Subsidies, some of which were raised during the pandemic, will have to be cut, which is easier said than done politically. The need for health expenditure will rise as a result of COVID-19 and its legacy. More spending will be required in order to make up for the loss of education and human capital formation due to school closures, or else potential growth will suffer. There is the ongoing need for public investment in infrastructure. These public services are all important inputs into economic growth, and demands for health and education services are likely to rise further as shares of GDP as India makes the transition from a low-

to a middle-income economy. When required to reduce public spending as a share of GDP, governments tend to reduce capital expenditure, which is counterproductive from the standpoint of economic growth. The IMF projects a fall in capital expenditure by the government as a share of GDP between now and 2026. Following this avenue would be a mistake.

This leaves the question of what to cut. Saying “cut food, fertilizer and fuel subsidies” (as the IMF is advising) is easy.¹⁵ Doing it is hard.

V Conclusion

Economic policymakers, it is said, are good at preventing the last crisis. In the current conjuncture, the last crisis is the taper tantrum of 2013, what with the U.S. Federal Reserve now again tapering its asset purchases and looking to raise interest rates. But since 2013 emerging markets as a class have taken significant steps to limit their vulnerability to those events. As we have shown, they have reduced external vulnerabilities by limiting their current account deficits, real appreciation, dependence on portfolio capital inflows and external financing needs. There are some worrisome exceptions – we have highlighted the cases of Turkey and Argentina – but this successful strengthening of external positions is widespread. We include India under this heading of “last crisis solved.”

But what about the next crisis? Where emerging markets are weaker is in terms of public-sector indebtedness. This is an unavoidable consequence of the COVID crisis and lockdown, but it is worrisome nonetheless. India falls under this heading, given its large deficits and debts by emerging-market standards. This does not imply an impending crisis, since growth should bounce back in the short run and because the debt is denominated in domestic currency and held heavily at home. But it points to even more formidable fiscal challenges going forward.

The post-COVID growth environment could be less favourable than in the halcyon days of 2014-16. Global supply chains have suffered disruptions, potentially causing the growth of global trade to slow. Human capital accumulation, imparted via schooling, has been interrupted. And the virus is still with us. Meanwhile, interest rates in the U.S. are poised to begin moving up, which will make for higher interest rates in India, as we have shown above. Even without these unfavourable growth and interest-rate developments, it would have been necessary to cut the government’s primary budget deficit to prevent the debt-to-GDP ratio from moving higher. With these developments, larger cuts will be required. With revenues as a share of GDP rising slowly at best, spending economies will be required. But cutting spending on health, education and infrastructure formation would be counterproductive from the standpoint of growth and hence from that of fiscal consolidation. This leaves reductions in, *inter alia*, food, fuel and fertilizer subsidies. Accomplishing this, clearly, is a challenging economic and political task.

What happens when public debt relative to the resources that the government is able to mobilize rises even higher? Either taxes have to be raised or public spending must be cut to generate additional revenues for debt service. If this proves politically impossible, governments have responded, historically, in two ways. When the debt is held externally, they restructure. When it is held internally, they inflate. You can draw your own conclusions.

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Notes

¹ Niziolek (2021).

² The last three quotations are from Meskin (2021) citing Luiz Peixoto of BNP Paribas, Elina Ribakova of the Institute of International Economics, and Simon Quijano-Evans of Gemcorp Capital, respectively.

³ India saw portfolio capital inflows rather than outflows in 2019-21 (as described below), which helps to explain the comparative strength of the real exchange rate in this period.

⁴ Official reserves relative to GDP are in fact little different than in 2010-12, except in Colombia, where they are higher and Malaysia and the Philippines, where they are lower. Lower reserves in the Philippines are consistent with the immediately preceding observation of greater real appreciation, while lower reserves in Malaysia are consistent with reversion of the current account balance to more normal levels.

⁵ India, in fact, saw portfolio capital inflows in 2019-21 when so many other emerging markets saw outflows. This reflected a sharp rebound in economic activity as the lockdown restrictions were lifted before the second wave hit, and strong corporate earnings. Equity prices too rose faster in India than in other emerging countries.

⁶ IMF WEO April 2021 estimates.

⁷ The distinction between the primary and overall budget deficits is important, given the government's unusually heavy debt.

⁸ The one exception is Mishra et al. (2014), who report one regression coefficient suggesting that countries with larger budget deficits saw more currency depreciation in reaction to 2013-14 tapering announcements.

⁹ This follows from the standard equation for debt dynamics: $\Delta b = d + (r - g)b$, where the change in the debt b is the sum of the primary budget deficit d and the existing debt multiplied by the difference in the real interest rate r and the real GDP growth rate g . With a value for $r-g$ of 5, as posited in the text, and value for b of 0.9, the product yields a value for d of 4.5 percent of GDP in a steady state.

¹⁰ Economic Survey 2020-21 argues that India's debt to GDP ratio is likely to remain stable even under the worst-case scenarios of high primary deficits, low real GDP growth rate, and high nominal interest rates. Chapter 2, "Does Growth Lead to Debt Sustainability? Yes, But Not Vice-Versa!", Volume 1, Economic Survey 2020-21, Ministry of Finance, Government of India.

¹¹ Kapur, John and Mitra (2018) find that, "an increase of 100 bps in the 1-year US Treasury bond yields pushes up domestic G-Sec yields by around 25-30 bps, with a somewhat higher impact on longer-maturity bonds, providing some evidence to the global financial cycle".

¹² If we deflate nominal yield using consumer prices, the co-movement is weaker, but this is likely to be driven by volatility in food prices with a heavy weight in the CPI.

¹³ Again, this follows from setting the left-hand side of the equation in fn. 9 to zero and inserting these parameters.

¹⁴ In addition, tax revenues, such as the privatization receipts, could be raised, although this is unlikely to finance a sustained reduction in the deficit as opposed to providing a one-time boost.

¹⁵ "On the expenditure side, food subsidies, grants to States, and capital expenditure are projected to decline relative to GDP." IMF (2021), p. 14.

Demonetization and Policy Credibility: Does India Pass Muster?

Renu Kohli

Abstract

This paper examines India's demonetization from the standpoint of policy credibility, employing the standard norms for assessing macroeconomic policies. The credibility appraisal constructs a narrative from contemporaneous economic records, computes the fiscal and quasi-fiscal bailout costs for mitigation, monetary costs of implementation, as well as effects upon the financial sector using public data and other empirical evidence. It considers counterfactual policy tools to examine if demonetization objectives could have been more effectively achieved at lesser costs. Based upon these comprehensive measures, the paper concludes that demonetization does not meet the established principles of credibility in the macroeconomic literature.

Keywords: Demonetization, Policy Credibility, macroeconomics policy, monetary policy, fiscal policy

JEL Classification: E51, E52, E58, E61, E65

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I Introduction

The scale and breadth of India's demonetization continues to attract universal attention and curiosity. The macroeconomic interactions of the shock monetary action – abrupt termination of the legal tender status of Rs. 500 and Rs. 1000 notes – are a fascinating study, not the least because of its novelty. A one-shot, surprise deployment of a single instrument – a monetary aggregate in this instance – to attain multiple and proximately fiscal objectives is unique in the macroeconomic annals. If it weren't for its wide-ranging objectives (black money believed hoarded in cash; counterfeit banknotes and the illicit financing of terrorism through fake notes; digitization and formalization appended subsequently), the closest analogy would be a sudden, sharp tightening of money supply to control high inflation. Understanding the impact of demonetization, which withdrew 86% of the monetary base (12% of GDP) suddenly, thus extends beyond the well-understood effects of liquidity withdrawal upon economic activity.

It is not surprising, in this light, that academic interest in different aspects of demonetization endures. The passage of time enables better insights, as more information becomes available. As a result, research studies examining different aspects of demonetization continue to appear in recent times. Briefly, the aggregate impacts of demonetization were researched in Chodorow-Reich *et al* (2018), focusing upon demand for cash to facilitate economic activities and for tax evasion; acknowledging measurement difficulties¹ and using a nightlights-based proxy for the real economy, they estimate the magnitude of peak output impact was a cumulative 2 percentage point contraction in employment and output, and in bank credit, in the demonetization quarter (2016Q4); comparable to a 200 basis point monetary policy tightening,² they conclude cash fulfils an essential role in facilitating economic activity in India, as opposed to the cashless limit of new-Keynesian models³.

Karmakar & Narayanan (2019) regard demonetization a 'purely exogenous macroeconomic shock' to household incomes and expenditures; they find the impact was transient, concentrated in December-2016, as higher borrowings enabled consumption-smoothing and assisted post-demonetization recovery of household finances⁴. Technology diffusion is examined by Crouzet *et al* and Aggarwal *et al* (both 2019); these studies find the large, temporary reduction of cash led to a persistent increase in the adoption of electronic payments, which mitigated the cash crunch, though with substantial state-dependence, viz., high adoption responses in areas with pre-existing strengths, with potential accentuation of the initial gaps. Lahiri (2020) evaluates the goal achievements along with costs and benefits of demonetization in a review. Subramaniam (2020) looks at the supply-side impact upon the informal sector using a difference-in-differences approach to study formal-informal channels, with data from two separate surveys (workers and informal enterprises) and a manufacturing census that are merged with quarterly financial statements of firms; the study finds that cash-intensive firms with relatively larger shares of informal inputs (labour or material) suffered greater declines in post-demonetization months, while casual workers were more likely to report being unemployed compared to organized farmers, industrial workers, white-collar employees, and businessmen.⁵

A dimension not examined so far is the policy credibility of India's demonetization: Is it a credible policy? Against its extraordinary scale, breadth and varied objectives, an evaluation from this

standpoint is a useful supplement to the above literature. This paper examines if demonetization passes the test of a credible policy. It evaluates the strategy, design, implementation, target attainment, and effectiveness of demonetization using standard norms for assessing credibility of macroeconomic policies. These include, *inter alia*, consistency, goal adherence, clear communication of targets and objectives, and policy costs. These are well known building blocks that burnish policy credibility, which itself is earned by demonstrated commitment and success.

A narrative approach is combined with publicly available data and other empirical evidence as methodology; the narrative is constructed from contemporaneous economic records, viz., announcements, statements, speeches, interviews and press reports. The narrative method allows one to relate the sequence of actions and announcements, and to benchmark these to usual yardsticks of assessing credibility of any policy. For a comprehensive appraisal from a policy credibility perspective, the costs incurred towards mitigation, implementation, and other macroeconomic burdens are considered; in particular, the paper computes *bailout* costs of fiscal and quasi-fiscal nature. Finally, it asks if the demonetization policy objectives could have been equally, or perhaps, better achieved through less-costly instruments, and whether it constitutes a lasting example for other countries to emulate.

This paper contributes to the literature on demonetization in the following ways. One, it complements existing research on demonetization from a different and unexplored perspective. Two, the sequential narrative serves as a valuable historical record of the demonetization-related actions and responses. Three, it provides a comprehensive assessment of costs that span fiscal, quasi-fiscal, monetary, and the financial sector. It differs from other research studies because of the distinction made between originally announced policy objectives from those appended later, viz., digitization, formalization, etc.) to underline credibility impact of goal-broadening; the detailed quantification of costs, which include those to counter the adverse economic fallout of demonetization, the intangible and opportunity costs, and the lagged, adverse consequences upon the financial sector.

Some important caveats are flagged at the outset. *Inter alia*, the short time period, limited information, and data are constraints; intangible and/or indirect costs or those observable as lagged build-ups over subsequent years (e.g., financial sector imbalances and risks), as well as the loss of freedom for macroeconomic policies are difficult to measure or explicitly ascribe, but mostly provable by reasoning and cross-reference. The paper is organized as follows. Section 2 examines policy credibility of demonetization with respect to targets, strategy, design and timing. Section 3 presents the bailout, implementation and other costs; Section 4 considers some counterfactual measures, and Section 5 concludes.

II Policy credibility

Demonetization has enhanced policy credibility in some countries. An immediate example preceding India's demonetization is of the Euro area. On May 4 2016, the 500-euro note was demonetized with the explicit objective of discouraging the facilitation of illicit activities.⁶ The Euro zone demonetization policy permitted it to remain legal tender until the end of 2018 in consideration of its widespread usage; the cancelled bill will always retain its value with unlimited period of exchange. The design and implementation of the Euro zone demonetization thus ensured that the

500-euro bill's payment and store of value functions are neither adversely affected nor disrupted. These features burnish the credibility of Euro zone's demonetization with regard to its objective, i.e., concerns and allegations of the cancelled bill's use by terrorists and criminals, and with its design and implementation, which provided abundant time and were cautious to avoid disruptions or cause disturbance. These testify to avoidance of a sudden monetary shock, and reflect sensitivity to the function and value of the bill to its genuine holders, as also to the status of the euro as an international currency. Such attributes serve to maintain or preserve public confidence, boosting credibility of the policy action.

How does the credibility of India's demonetization compare? In contrast to the Euro zone action, demonetization in India was sudden and unanticipated, a one-stroke cancellation of two bills in wide use (with 86% share in the monetary base); the exchange period of the invalidated notes was restricted to less than one quarter with replacement by two new bills - one of *identical* denomination (Rs 500) and another of higher value, Rs. 2000. The initial currency exchange amounts were severely restricted, per person and on a weekly basis; the limits were progressively eased with complete halt upon exchange in four months; and the replacement pace of the cancelled currency stretched to several quarters. Because of the surprise action, the central bank was unprepared to meet the extraordinary currency demand.⁷ In further contrast to the Euro zone demonetization, the policy objectives in the Indian instance were several, viz. to nullify black money hoarded in cash, tackle counterfeit banknotes, and prevent terrorism financing through fake notes.

These intrinsic design properties of demonetization were later explained by the need to ensure secrecy, necessary to achieve the desired objectives that would otherwise be vitiated by a prior, elaborate currency replacements at the banks and ATMs.⁸ Hence, the ensuing currency shortage, extensive disruption of payments, transactions, exchange and economic activities was inbuilt into the policy design and deliberate as the government confirmed. While this raises questions with regard to the strategy and design on one hand, on the other, it increases the weight upon goal achievement in assessing credibility.

The framework employed to assess policy credibility is that applicable for macroeconomic policies. In the standard monetary or fiscal policy framework, especially the former, credibility requires clear definition of objectives, the means or instruments for realizing these, and approximate time path of achievement. This may seem too rigid a structure for policy actions such as demonetization, which are one-off, not strictly comparable to macroeconomic policies; the propagation of the shock has diverse channels and is non-linear in nature, which limits understanding of agents' behaviour and second-round responses.

In addition, monetary and fiscal policies are able to provide precise targets whereas in demonetization actions, the targets are approximate (e.g., expected black money amounts) or not amenable to quantification (e.g., illicit activities, terrorism financing). Despite these dissimilarities, a loose application of this framework makes credibility assessment tractable by pinning down targets and eventual goals, evaluating the strategy, design and timing, and bringing them together on one platform. A further justification for using this framework was put forward by the Indian government, which argued that demonetization was part of fiscal or economic policy and therefore, not subject to judicial review.⁹

2.1 Targets, policy design and credibility

2.1.1 No target estimates announced, the ambiguity opening a curious, speculative gap

Demonetization was deployed to achieve three specific objectives: (i) nullify black money hoarded in cash, (ii) tackle counterfeit banknotes, and (iii) curb terrorism financing through fake notes. These objectives were announced on November 8, 2016 and specified in respective press releases of the government and the central bank.¹⁰ No other objectives such as formalization, digitization, and tax base expansion in the medium- to long-run were originally stated; these came in more than a month later.¹¹ This is additionally supported by communication records of the government and RBI, as Lahiri (2020: pp 59) notes on the basis of relevant minutes of the RBI's board meeting. It is arguable if expanding the scope of policy goals in accordance with evolving situation and results contribute to flexibility and adaptability of a policy action or reflects adversely upon its credibility. We reason below that it is the latter rather than the former.

Two, no estimate or expected amount of black money target was communicated; neither was there any disclosure of the extent of counterfeit or fake currency notes in circulation. Narrative records and policy design do indicate the clear expectation of fiscal gains from trapping black money. For instance, the quantitative caps and disclosure rules¹² of exchange/deposits of the cancelled notes aimed at deterrence and forced destruction of unaccountable cash by agents who would instead be subjected to audit and tax scrutiny if deposited at banks. The currency stock or 'black money' that remained outside the banking system as a result constituted the expected sovereign windfall after extinguishing the central bank's currency liabilities.

What was the anticipated fiscal boon? While there was no official 'black money' target, an expected sum of Rs. 4-5 trillion is quite easily established from widely reported submissions of the government to the Supreme Court^{13,14} in the week following the announcement (November 15, 2016). The attorney-general stated in this that the government "expects people to deposit Rs. 10-11 lakh crore in banks", while the remaining "Rs 4-5 lakh crore were being used in the northeast and J&K to fuel trouble in India. That will be neutralized." Thus Rs. 10-11 trillion out of the Rs. 15.4 trillion cancelled was expected back as bank deposits by the end of the exchange period (i.e. by December 30, 2016).

Such statements and reports about large fiscal gains lent credence to demonetization as an effective policy and engendered positive expectations despite no target being specified. Absence of a target also triggered abundant speculations about black money amounts that demonetization could fetch and what use the funds could be put to, setting in motion a virtuous expectations spiral about improved economic prospects in extensive media discussions. The third, most disturbing outcome of a missing 'black money' target was the ample scope this provided to manoeuvre, realign and expand originally announced objectives and secondary actions. These evolved fast, within a fortnight of the initial announcement, and in arbitrary correspondence with the volumes of returning deposits by the public. None of these helped policy credibility, as discussed below.

2.1.2 Design failure

Of the three specified objectives, those of blocking counterfeit currency and its use for terror funding were discredited within days of the announcement. News reports, anecdotal, and statistical

evidence support this conclusion, e.g., fake Rs. 2000 notes that were newly-launched in place of Rs. 1000 denomination were found with terrorists and other agents in different parts of the country within a fortnight of demonetization.¹⁵ This indicates quick adjustment/response by multiple actors, casting doubts over demonetization's efficacy, or that of its design.

Next, the 'black money' target also headed rapidly towards failure, as the public managed to subvert the implementation strategy and design by depositing the de-legalized notes at post offices and banks at a furious pace: Rs. 5.5 trillion or 36% of the cancelled currency stock (Rs. 15.4 trillion) was deposited in the first week (November 10-18), followed by 55% (Rs. 8.44 trillion) in the fortnight to November 27, 2016.¹⁶ The time span was significantly less than the time allowed for limited, permissible use of the cancelled tenders. It quickly became obvious that the invalidated currency that would return legally to the formal financial system was likely to exceed Rs. 10-11 trillion (subtracting the expected black money, Rs. 4-5 trillion) well before December 30, 2016, the deadline for exchange.

The public capably managed to circumvent, manoeuvre and manipulate rules in innumerable, unimaginable and unforeseen ways for legal deposits of cancelled notes. For example, there was a remarkable surge in new, no-frill bank accounts (*Jan Dhan*)¹⁷ opened in the period. Although this was offered as proof of a public shift from cash and therefore, a success of demonetization, it is notable the new accounts were a channel for both genuine and/or unaccounted currency deposits – because many of these, amongst others, have remained under investigation since.¹⁸ These responses indicate failure of the design and implementation framework, which was structured around fear and deterrence. On the metric of its design therefore, the credibility of demonetization stands considerably lowered because the faulty blueprint failed to anticipate counter-responses.

The above developments or failures also prompted rule modifications and a resort to regular fiscal policy measures as narrated next.

2.1.3 Policy strategy modified towards tax rules, shifted course

With the 'black money' target becoming visibly impossible to achieve, the strategy was reworked in less than three weeks from initial announcement. On November 24, 2016, this sought recourse to the taxation channel, using two methods: encourage 'black money holders' to disclose and come clean; and 'track' those who didn't. A voluntary disclosure scheme - *Taxation and Investment Regime for Pradhan Mantri Garib Kalyan Yojana, 2016* (PMGKY)¹⁹ - was introduced on November 28, 2016. The scheme opened a door for paying taxes on black money deposits with heavy penalties, guaranteed confidentiality, and immunity from prosecution. A simultaneous law was also passed, i.e., *Taxation Laws (Second Amendment) Bill, 2016*, which held out a threat: unaccountable cash deposits that neither matched tax returns nor revenue authorities' income assessment of the depositor were subject to prohibitive taxes.²⁰ In addition, citizens were encouraged to blow the whistle on 'black money' suspects.²¹

The shift in strategy – deployment of regular fiscal instruments – is a strong indicator that demonetization by itself was failing to achieve its 'black money' target. It is notable that the voluntary income disclosure scheme was the second such, close upon the heels of a preceding one,²² which had ended less than one quarter before demonetization. This corroborates demonetization's failure to accomplish its original objective to unearth black money. If tax amnesties and harsh penalties could help attain the 'black money' target, demonetization becomes unnecessary and superfluous; the

former are non-disruptive, and come with only administrative costs. The qualitative strategy shift undermines policy credibility. Further endorsement of failure comes from official statements, e.g., “...the expectation is that the entire money which is in circulation has to come to the banking channel so that we can trace the transactions and trace the entire money, who does it belong to and has tax been paid on it”.²³ This was a departure from the previously expected 4-5 trillion estimate that would not return back to the formal financial system.

2.2 Was the timing optimal?

Timing or appropriate economic context is critical to policy setting and plays a crucial role in determining its success with minimal sacrifice. Economic conditions are also material for framing the size and magnitude of macroeconomic policy response. This applies equally to demonetization, which was knowingly delivered as a surprise. It was also expected to have a non-linear impact, i.e., disproportionate burden of the currency withdrawal impact upon cash-intensive segments of the economy; for example, real estate, jewellery, and the broader informal economy where transaction demand for cash is high, while technological and educational drawbacks impede quick adaptation or flexible switch to electronic modes, compared to organized segments that are more empowered.

The government argued that demonetization was optimally timed,²⁴ but the evolving economic conditions suggest otherwise. GDP growth in the pre-demonetization quarter was measured at 7.1% in April-June 2016, representing a sequential loss of momentum from 7.9% growth in January-March 2016. Private consumer spending successively shed a respective 1.10 and 1.8 percentage points of its GDP share in these two quarters. In its October 2016 review, the RBI flagged the negative output gap and slowing business cycle; it noted the depressed construction, below-long-term-average use of industrial capacities, and financial stress in iron and steel, construction, textiles, and power, amongst other attributes of a slowing business cycle.²⁵ Overall, macroeconomic policies in 2016-17 were geared towards demand support before demonetization: fiscal policy had frontloaded public expenditure in the first half of the financial year 2016-17, while monetary policy eased 25 basis points in October 2016 with an accommodative stance. The divergence with macroeconomic policy settings against the assertion of ‘optimal timing’ questions credibility. It leaves little doubt about an ill-timed introduction, notwithstanding signs of cyclical slowing, especially consumer spending that forms more than half of Indian GDP.

2.3 Was the ‘black money’ target achieved?

A policy is deemed credible if successful in achieving its target. Is demonetization convincing on this measure?

Official information on the final amount of annulled currency returned to depository institutions was not released until August 30 2017, with publication of the RBI *Annual Report*. This showed 99% or Rs. 15.28 lakh crores of the annulled currency in circulation (Rs 15.44 lakh crores) returned to the formal financial system, formally proving demonetization’s failure to achieve the ‘black money’ target.

Credibility was adversely affected also because of the long gap in official disclosure, the last previous one being in December 2016²⁶ - which confirmed deposits of Rs. 12.44 trillion. The long interval was explained by the RBI as time required for reconciliation of “data on junked 500- and

1,000-rupee notes” with ‘physical cash’;²⁷ the central bank asserted the ‘final numbers’ would be divulged after June 30²⁸, the day of closure of all currency exchange windows. However, an eight-month break without official dissemination created abundant space for speculation and triggered numerous unofficial estimates, which reflects poorly upon credibility. For instance, in January 2017, *Bloomberg Quint*²⁹ estimated 97% of cancelled notes (Rs 15 trillion) were re-deposited, citing anonymous sources; estimates inferred from weekly monetary statistics³⁰ the same month; continuing to June 2017, when Rs. 17.95 trillion were assessed in circulation against Rs. 17.9 trillion on November 8, 2016 (Khullar, 2017).³¹ Before any official confirmation, it was commonly concluded and believed that all de-legalized bills had returned to the formal financial system and no black money had been recovered. This diminishes credibility of the policy action.

What was the ‘black money’ fetched by the tax amnesty scheme, PMGKY? This was a modest Rs. 49 billion from disclosures by 21,000 persons, according to quoted official sources.^{32,33} This was less than 0.5% of an expected Rs. 1 trillion, with officials admitting the response had ‘not been so good’...as ‘...people had tried to put their cash into different accounts...’ even before the scheme’s announcement and ‘...the (tax and penalty) rate’.³⁴ This is an admission of policy failure. When combined with numerous reports of the legal return of almost all the outlawed notes, the inevitable conclusion is that along with demonetization, even supplementary fiscal efforts (tax penalties and amnesties) failed to achieve the “Rs. 4-5 trillion” ‘black money’ target. The universal failure to achieve the policy objective is an indictment of demonetization’s credibility.

3. Bailouts, Implementation, & Other costs and damages

In the monetary policy literature, the ‘sacrifice ratio’ (output loss from aggregate demand contraction due to interest rate tightening) captures the associated cost of any policy action. The central bank gains credibility from demonstrating commitment to price stability and achieving this objective over time, even as some growth is sacrificed in the bargain. Demonetization could be considered analogous to this, viz., a reliable policy if it is able to retrieve targeted ‘black money’ with output and other costs as part of the trade-offs. However, the policy action failed in target achievement, while imposing universal burden upon the economy. Table 1 summarizes these costs. These are differentiated by their nature and attributions, e.g., costs to the public exchequer, monetary authority, financial intermediaries, and macroeconomic policies. The compilation, with detailed discussion below, endeavours to be as comprehensive as possible.

Fiscal costs

In December 2016, about two months after demonetization, a series of relief measures were announced. These ranged from budgetary grants, interest subsidies, credit guarantees and limit enhancements, top-up refinancing, incentive-linked reductions in tax liabilities, easy and targeted cheap loans (Table 1). The broad population segments covered were farmers, small businesses, senior citizens, women, and housing (rural and urban). Not all of these costs are quantifiable; while some are difficult to measure because of insufficient information, others are difficult to attribute directly to demonetization. However, a few can be computed from the final budget accounts of 2016-17,

supplemented by inferences based upon reasonable assumptions with respect to a few components. Using the relief measures from Table 1, Table 2 presents the direct and indirect fiscal costs of demonetization calculated from the actual budgetary expenditure in the year – this distinguishes between the original budgeted outlays in March 2016 and the final spending amounts, assuming the overshoot owes to demonetization relief in some components as explained. Column 4 shows this difference amongst the respective budgeted components.

Overall fiscal costs cumulate to Rs. 246.2 billion, with an expenditure increase of 12% relative to the initial outlay. Within this, spending components that can be cleanly linked to bailouts listed in Table 1 are classified as direct fiscal costs, under the assumption that the additional expenditure was incurred to offset privation caused by demonetization privation. These aggregate to Rs. 149 billion (1-4, top panel, Table 2); the largest increase (Rs 110 billion) is for the tribal development programme. Excess expenditure under MGNREGA, a countercyclical rural work programme (second panel, item 5) was Rs. 97 billion, or 25% above the budgeted amount; it is assumed the increased work demand under the programme arose from the reported job losses and deflationary effects upon farm prices and incomes (RBI, 2017a)³⁵ induced by demonetization. The bottommost panel reveals that although specified budgeted transfers increased 4%, spending on ‘other transfers’ component jumped 23%; again, it is assumed that ‘unspecified’ transfers relate to demonetization. Including transfers under central government sponsored welfare schemes, total welfare transfers in 2016-17 were 7% higher (Rs 196 billion) than the initial outlays.

There are further quasi-fiscal costs incurred by the monetary authority from sterilizing the excess liquidity created by large-scale currency deposits at the banks and which eventually devolve upon the government balance sheet. The bottom panel of Table 2 estimates the quasi-fiscal costs from interest payments on MSS bond issuances³⁶ for excess liquidity absorption at Rs. 110 billion over two years, 2016-18. Aggregate fiscal costs due to demonetization are estimated at Rs. 356.1 billion, or about 0.2% of GDP. The balance, i.e., revenue foregone from lower central bank profits is considered next.

Table 1: Bailout and Implementation Costs**I. Fiscal**

1. **Sterilization of excess liquidity created by currency deposited: Increased ceiling on market stabilization scheme (MSS bonds) for liquidity management to Rs. 6 trillion from Rs. 300 billion previously.**³⁷ Interest payments on these constitute quasi-fiscal costs through reduced surplus/profit transfers from central bank to the government.

2. **Bailouts**³⁸ - **Interest subsidies, Budgetary grants**

2.1 Farmers

- i. 60-day waiver on *rabi* loans from district cooperative banks
- ii. Rs. 200 billion contribution to NABARD Fund.

2.2 Small firms/businesses

- i. Doubling of underwriting limit for small firm loans (Rs 20 million), with extended coverage to NBFCs.
- ii. Credit limits enhanced to 25 per cent of turnover against previous 20 per cent.
- iii. Reduction in tax liability for firms with turnover up to Rs. 20 million – from 8% of income to 6% on digital transactions.

2.3 Women, senior citizens

- i. Doubled budgetary allocation of Rs. 2.44 trillion for PMMY³⁹ for MUDRA loans - Dalits, Tribals, Backward Classes and Women as chief beneficiaries.
- ii. Direct Rs. 6000 credit to bank accounts of pregnant women delivering at an institution, vaccinate child.
- iii. Senior citizens scheme - Fixed 8% interest on deposits upto Rs. 7.5 lakhs for 10 years, paid monthly.

2.4 Housing

Pradhan Mantri Awaas Yojana:

- i. Interest subsidy of respective 4 and 3% on loans \leq Rs. 9 and 12 lakhs;
- ii. 33% increase in number of homes to be built; *iii*) New category created in rural areas - 3% subsidy on loans upto Rs. 2 lakhs for fresh homes or extensions to old.

3. **Farm loan waivers: Rs. 909 billion (UP, Punjab Maharashtra)**

II. Quasi-fiscal costs of sterilizing excess liquidity

Surplus liquidity from excess reserves held by banks and absorbed by RBI via

1. Market stabilisation scheme (MSS bonds)
2. Reverse repo operations, and
3. Issuance of treasury and cash management bills.

III. Burden upon monetary-exchange rate policies

1. **Loss of policy space:** Excess funds constrained RBI's ability to intervene in forex market to curb sharp rupee appreciation driven by excess capital inflows.
 2. **Exchange rate appreciation impact on output, inflation:** Cumulative, month-on-month, nominal and real (36- and 6-currency trade weights) appreciation of respective 5% and 4% (Feb-Mar 2017). Annual nominal and real appreciation of respective 12% (end-of-period), 29% (36-currencies) and 31% (6-currency trade weights).
-

IV. Financial sector costs and burden

1. **Small finance banks:** Marked deterioration in asset quality. Portfolio at risk (> 30) increased to 14% in 2016-17 from 0.4% in the previous two years. The abnormal increase attributable to lower recoveries, post-demonetization, as cash shortage adversely impacted incomes and livelihoods of low-income households (MFIN, *Annual Report*: pp 52).
 2. **Commercial banks**
 - a. Incremental cash reserve ratio (ICRR) of 100% on increase in net demand and time liabilities in Sept 16-Nov. 11, 2016 to drain excess liquidity (about Rs. 40 billion).
 - b. Opportunity costs of business foregone due to exclusive currency-exchange operations over a quarter;
 - c. Profitability impact from
 - reduced interest income due to steep halving of nonfood credit growth from 9.3 to 4.4% in October 2016-February 2017.
 - steady widening of deposit-credit growth gap
 - Increase in non-performing assets in subsequent years
 - Rapid acceleration in lending by NBFCs, Mudra loans, that fueled consumption and other imbalances
-

Source: Author's compilation from various sources

Table 2. Fiscal Costs, Direct & Indirect, 2016-17

	<i>In Rs. Billion</i>		<i>In per cent</i>	
	Budgeted I	Actual II	Change III=II-I	Change II/I
Direct				
1. Interest subsidy	155.2	178.9	23.7	15.2
2. Umbrella Programme for Development of 3. Scheduled Tribes	3209	3319	110.0	3.4
4. Pradhan Mantri Awas Yojna(PMAY)	200.8	209.5	8.8	4
5. Credit Support Programme	0.5	7.16	6.7	1332
Indirect^a				
6. MGNREGA	385	482.2	97.2	25.2
Total costs (Direct + Indirect, Column III)			246.2	12.1 <i>(avg excl. 4)</i>
Quasi-fiscal				
Interest costs of MSS bonds ^b	-	109.9	109.9	
Total fiscal & quasi-fiscal costs			356.1	
<i>in percent of GDP</i>			0.2	
Memo				
Total Transfers ^c <i>of which</i>	3770.2	3915.0	144.8	3.8
Centrally Sponsored Schemes ^d	2319.0	2413.0	94.0	4.1
other transfers	444.7	546.5	101.8	22.9
<i>CSS plus other transfers</i>	2763.7	2959.5	195.7	7.1

Notes:

- Not directly linked to announced bailout, but scaling-up represents increased unemployment transfers
- Distributed over FY17 (Rs 56.7 bn) & FY18 (Rs 53.3 bn)
- Sum of Centrally Sponsored Schemes, Finance Commission & other transfers.
- Further categorized as Core of the Core (items 2 & 3), Core (item 5) & Major schemes (item 4)

Sources: Statements 1 & 7, Budgets FY16-FY20

Monetary Costs

Table 3 calculates costs incurred by the central bank due to demonetization. The monetary costs are essentially quasi-fiscal in nature because they directly translate into reduction in public revenues (non-tax) from lower surplus profit transfers from the RBI. At Rs. 306.6 billion or 0.2% of GDP, these are conservative or lower bound estimates, as the RBI's balance sheet reports *net* interest income; this makes it impossible to disaggregate the income erosion due to currency appreciation in a year from the offsetting increases in coupon income due to higher rupee securities, i.e., Rs. 1.10 trillion of open market purchases in April 2016-June 2017. Overall surplus transfer to government declined 53.5% in 2016-17, a 50% fall relative to the three-year average, while expenditure increased 107.8%. A decomposition of the direct monetary costs, Rs. 225.5 billion, shows interest payments of Rs. 180.04 billion towards surplus liquidity absorption under reverse repo, attributable to higher interest

payments under the liquidity adjustment and marginal standing facility operations following withdrawal of *Specified Bank Notes* (RBI 2017b: pg. 201). Printing costs, Rs. 45.4 billion, are estimated as excess over the previous year. In addition, the central bank's income from foreign sources decreased 35.27% from rupee appreciation in 2016-17, while earnings on foreign currency assets slowed to 0.8% from 1.29% the previous year. These reductions are, however, difficult to source to demonetization, even though intervention abilities were visibly limited because foreign currency purchases would have either compounded domestic currency liquidity or added to quasi-fiscal costs from sterilization.

Table 3: Monetary Costs

	<i>Rs billion</i>	<i>in per cent</i>
Interest income loss, Reverse Repo, net	180 ^a	
Printing costs	45.4 ^b	
Total	225.5	
Surplus transferred to govt	306.6	
<i>Decline over 2015-16</i>	-352.2	53
<i>Decline over previous 3-yr average</i>	308.2	50
<i>in percent of GDP</i>		0.2

Notes:

a. Higher expenditure from surplus liquidity absorption

b. Increase over printing costs in 2015-16 (Rs 34.21 bn)

Source: RBI balance sheet, FY17, FY18 with author's calculations

Financial Sector

Demonetization imposed severe costs upon financial intermediaries, immediate and lagged. Yet only some of these can be directly tied to demonetization. For one, the depository institutions bore a disproportionate burden from the currency exchange, business foregone, and loan defaults. Two, they were also a primary channel for relief measures such as MUDRA loans and farm-loan waivers (Table 1, panel IV). Three, the resulting distortions and imbalances that developed with a lag possibly increased instability risk. Many of these effects are difficult to source to demonetization without specific data.

There has also been no official impact evaluation, barring the early assessment by the RBI that, in the case of banks, related to just two quarters. About six months after demonetization, the RBI examined the early balance sheet effects upon scheduled commercial banks, including the size and composition (RBI, March 2017a). In its brief, one-quarter analysis, the central bank calculated that net returns to banks were about 3.08 percent, based upon the aggregate net interest income (Rs 45 billion) from Rs. 6 trillion liquid asset investments in reverse repos and MSS securities. Incremental credit rose just 18.2% in the period – the preliminary assessment flagged the negative, short-term effects upon loan disbursements and repayments in the case of non-bank and micro-finance intermediaries, whose borrowers are predominantly cash-dependent. The central bank then stated it was too early to adjust the gains in interest income against costs to banks from managing currency

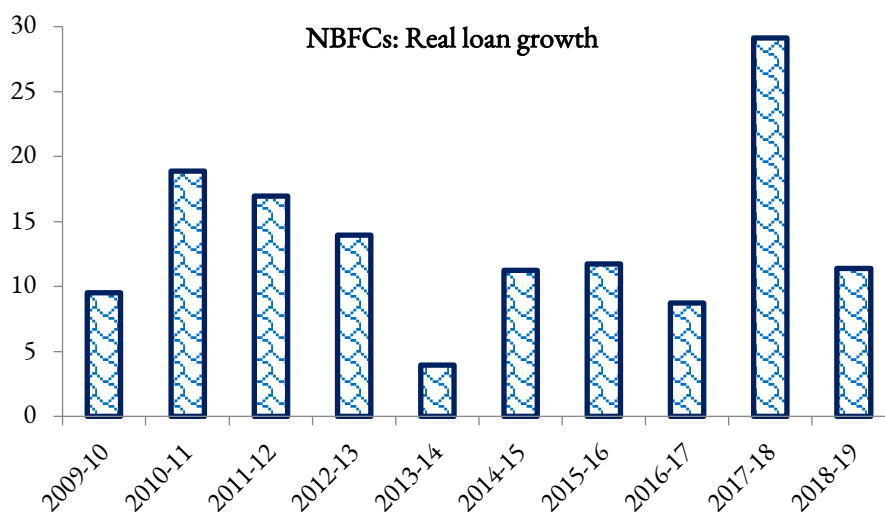
withdrawals and injections (e.g., re-calibrating ATM machines, staff overtime, security arrangements, fee reductions/waivers on digital payment modes, amongst others) as precise details were unavailable. However, no comprehensive cost-benefit evaluation followed; at least, no such evaluation was published thereafter. This is a conspicuous gap.

The above are glaring omissions for a policy action of demonetization’s scale and magnitude, which calls for a holistic appraisal towards better understanding for the future. A rigorous assessment of policy credibility with respect to the financial sector is thus impossible because nearly all the costs, distortions, and losses are hard to identify or link upfront with demonetization. However, it is possible to connect some of the dots, supported by aggregate evidence and sequential evolutions. This is the method employed here.

Table 4 presents key performance indicators of banks and nonbanks over four years. Noteworthy changes in their trend can be summarized as follows. One, there is a severe drop in bank credit growth of 2.5 percentage points, with corresponding acceleration in sovereign bond investments; this pattern lingered in the subsequent two years. Two, the exceptions to an overall decline in bank credit are the rapid growth of Mudra loans extended by banks, NBFCs and MFIs to micro-entrepreneurs and individuals, and from the banks to the NBFCs where a sharp acceleration – a 2.5 times increase – is observed in the following year.

Three, lending by the NBFCs ramped up remarkably; in real terms, this exceeded the decade historical levels (Chart 1). Its correspondence with scaling-up of bank loans to these entities is an indication that excess deposits piled-up at the banks from demonetization were diverted to the NBFCs. Over 2017-19, more than one-third of the NBFC credit growth was driven by retail loans, followed by commercial real estate. Industry share in NBFC credit fell after demonetization, with only the micro and small industry loans accelerating a respective 49% and 34% respectively in 2016-2018; this possibly also reflects the raised credit limits under the *Mudra* loan scheme as part of remedial measures (Table 1). Four, nonperforming loans (NPAs) of both banks and nonbanks increased in 2017-18; this is more pronounced for the public sector banks, where NPAs jumped relative to 2015-16. Five, there was a distinct and collective deterioration in the health of all financial intermediaries, where again the public banks fared worse with persistent fall in profitability.

Figure1: Real loan growth in NBFCs



Source: RBI, CSO with author’s calculations

Table 4. Financial Sector

Scheduled Commercial Banks (year-on-year change, in percent)				
	2015-16	2016-17	2017-18	2018-19
Aggregate deposits	9.3	15.3	6.1	9.3
Non-food credit	10.9	8.4	8.4	12.3
All industry	2.7	-1.9	0.7	6.9
Large	4.2	-1.7	0.8	8.2
Medium	-7.8	-8.7	-1.1	2.6
Micro & Small	-2.3	-0.5	0.9	0.7
NBFCs	13.2	10.9	26.9	29.2
MUDRA		31.9	40.6	26.8
Investment in Govt Bonds	5.4	15.5	9.5	4.0
Gross NPAs, % of gross advances	7.5	9.3	11.2	9.2
Public sector banks	9.3	11.7	14.6	11.6
Interest income	5.3	2.1	1.0	11.6
Net Interest income	7.0	5.5	7.5	16.7
Return on Assets (in percent)	0.40	0.35	-0.15	-0.09
Public sector banks	-0.07	-0.10	-0.84	-0.65
Return on Equity (in percent)	3.6	4.2	-2.8	-1.9
Public sector banks	-3.5	-2.0	-14.6	-11.4
CRAR (capital, % of risk weighted assets)	13.3	13.7	13.8	14.3
Public sector banks	11.8	12.1	11.7	12.2
NBFCs (consolidated, ND-SI)				
Loan growth	16.6	13.2	32.7	14.8
Gross NPAs, % of gross advances	4.5	6.1	5.3	6.1
CRAR (capital, % of risk weighted assets)	24.3	22.5	22.6	19.7
Leverage Ratio		2.9	3.1	3.2
Memo				
GDP growth, constant market prices, %	8.0	8.3	7.0	6.1
CPI Inflation, %	4.9	4.5	3.6	3.4
Interest rates, 10-yr yield, annual avg. %	7.7	7.0	6.9	7.7
Policy rate, eop, %				
Exchange rate				
Nominal, Rupee-Dollar, annual average	65.5	67.1	64.5	69.9
end of period	66.3	64.8	65.0	69.2
Real, 36-currency trade weighted REER	112	115	120	114
Foreign Currency Assets, USD billion	336	346	399	385

Note: Banks data includes Small Finance Banks.

Source: Reserve Bank of India, CSO, and author's calculations

Bank and nonbank credit growth movements and the drivers suggest a credit-fuelled boost to consumption after demonetization. For one, the initial GDP projections and estimates showed a drop in output; the RBI's assessment also attributed about 33 basis point decline to demonetization in March 2017. Two, Karmakar & Narayanan (2019) findings support this conjecture, viz., increased household leverage due to substantial increase in subsequent borrowings from various sources,

including money lenders and shops, to finance consumption; they observe that demonetization contributed to this ‘unintended consequence’. Three, at the aggregate level too, total household liabilities grew 22% in 2016-17 and further doubled the pace next year (57.5% in 2017-18) even as per capita income growth decelerated sharply to 5.8% from 6.9% (in 2016-17) in this period. Finally, gross fixed assets’ creation growth slowed at the same time, bolstering the conclusion of a credit-push to consumption to support growth.

In the same vein of sequential reasoning, the rapid NBFC credit growth can be linked to the subsequent build-up of imbalances, and risk-accumulation in the financial sector, although it is open to debate if all these can be attributed to demonetization aftershocks alone. The second panel of Table 4 shows non-bank credit growth accelerated even as NPAs were elevated and rising, with increasing leverage on the back of unsecured bank borrowings (56% and 108% growth in 2017-19), short-term market borrowings through inter-corporate loans (28% and 33% growth), and commercial papers. Longer duration loans were extended against these, creating large-scale asset-liability mismatches that succeeding developments exposed.

A key trigger for the latter was monetary policy reversal - the policy rate tightened 50 basis points in June-August 2018, while short-term market rates rose nearly 100 basis points in six months to September 2018. The interest rate shock hit the NBFCs, heavily reliant upon short-term debt, through rollover and funding pressures, resulting in adverse effects upon balance sheets and future intermediation. This triggered default of the largest non-bank entity, IL&FS, in September 2018, causing a severe liquidity squeeze and lending standstill in the nonbank system; the risks spilled over to the broader financial system, especially banks due to extensive interconnectedness, severely undermining confidence and inducing risk aversion (*Financial Stability Report*, RBI, December 2018). The contagion spread with further defaults and insolvencies (e.g., two large NBFCs with real estate exposures).

Acharya (2019) describes the sequence⁴⁰, additionally drawing attention to the fiscal dimension in this context: a rise in government borrowings is found to impact the ability and willingness of NBFCs to borrow long-term, with a 10% increase in the share of government debt is associated with a 1.7% fall in the share of long-term debt for NBFCs; financial stability risks therefore escalate because private entities are forced to rely more upon short-term paper as their access to long-term funds is crowded-out. Post-demonetization (late 2017), government borrowings were raised 30% over and above the pre-announced amounts; fiscal transfers rose 17% in 2017-18 after increasing 15% the previous year of demonetization, possibly to counter its contractionary impact and a fiscal cost. These interrelationships may have played a role in triggering the NBFC crisis.

Compelling as some of the above evidence and reasoning may be, it is important to flag that the Indian financial sector was already strained at the time of demonetization. Bank balance sheets were stressed, especially public ones, and the lending vacuum created by their retreat led to credit substitution by the non-banks before 2016-17. It was viewed positively then (e.g., see *Report of Trends and Progress in Banking in India*, RBI, December 2016, 2017). The central bank raised caution on unbridled NBFC-loan growth financed by short-term borrowings *after* the crisis erupted (*Report of Trends and Progress in Banking in India*, RBI, December 2018). Two, there was a strict asset quality review from 2015-16 for complete recognition of bank NPAs.

These caveats weigh against some incontrovertible evidence on the deleterious impact of demonetization. Besides the above, the MSME loan stress aggravated after 2016-17, a development undoubtedly mixed with differential impact of a new indirect taxation system (goods and service tax or GST) introduced in July 2017, close on the heels of demonetization. MSME loans were given, and continue to be covered with, regulatory relief from February 2019 to date (extended now because of COVID-19). *Mudra* loan scheme has often elicited caution and discomfort of the RBI⁴¹ on growing stress and contingent liability of the government due to underlying credit guarantee; bad assets are reportedly high and understated.⁴² Other weakening effects include the farm loan waivers and write-offs⁴³, though difficult to directly associate with demonetization except sequentially, e.g., Rs. 363.6 billion announced for the state of Uttar Pradesh (March 2017), Maharashtra (June 2017, Rs. 305 billion), Karnataka (June 2017, Rs. 500 billion), and Punjab (Rs. 100 billion, October 2017).

Risk-aversion, fear and under-confidence effects from interrelatedness across financial intermediaries⁴⁴ have persisted in the following years, with three successive bank failures in 2019-20⁴⁵, although these are difficult to ascribe wholly to demonetization. On balance, it is fair to conclude that demonetization no doubt exacerbated the existing stress and risks in the financial system, thus prolonging its repair and recovery, with adverse consequences for growth.

IV Could alternate policies achieve demonetization objectives, at lower costs?

Another yardstick to assess policy credibility is to pose a counterfactual. Could the demonetization objectives have been achieved by alternative policies, at lesser cost?

To answer this, one need look no further than the new tax rules and amnesty given soon after the demonetization announcement. Section 2.1.3 elaborated these, while 2.3 specified the meagre amounts fetched by the fiscal measures. Their deployment is proof that fiscal policy incentives perform better, including in determent of black money. It's important to distinguish these revenues, as they are not attributable to demonetization, and are misleadingly clubbed with overall collections in the period.

The next alternative policy measure, which followed in mid-2017, was the shift to an integrated, national sales tax system (GST). This was already cleared for implementation, and was widely anticipated to formalize a significant part of the informal economy, because firms were necessarily required to register and transact online for input tax credit claims in the planned structure. A key expected outcome of migration to the GST system was integration of previously unregulated/unregistered firms into the formal, organized setup as business dealings, invoicing, payments and transactions moved to the technology platform devised for these purposes. Improvements in income disclosures and tax compliance were important outcomes of GST introduction. These were also the objectives of demonetization! In the broader context of policy formulation and actions, demonetization seemed superfluous and unnecessary. This calls into question its credibility.

A third gauge is the series of post-demonetization steps taken by the Indian government to promote card and digital payments. *Inter alia*, these included the launch of *Aadhaar* and *UPI*(unified

payments interface) payment systems, *BHIM*,⁴⁶ etc. It is difficult to see how demonetization aligns with such measures for electronic and technology adoptions in payments and settlements. Moreover, these underline the low costs and absence of damages from such measures, compared to the scale and magnitude incurred by demonetization. Demonetization again seems inessential in comparison, challenging its credibility.

Finally, the role of tax administration is necessary to consider. This has the primary responsibility to collect taxes, check evasion, encourage and improve compliance, using publicly available and specifically gathered information and intelligence. An almost static tax-GDP ratio despite a decade of administrative reform and information technology adoption suggests the scope for greater tax efforts, identifying the true revenue potential, and increasing efficiency and compliance. There's little doubt that fundamental changes in processes, procedures, and methods would be the best policy substitute. Evidence from Indonesia shows that improving tax administration can be very effective, more than even raising tax rates⁴⁷. The case for using demonetization becomes more unconvincing when examined in the light of recommended overhaul of the structure, governance, functions of the revenue administration by the TARC,⁴⁸ which remains unimplemented to date.

V Conclusion

This paper evaluates demonetization from a policy credibility perspective. Based upon announcements, complementary, and supplementary actions, it appraises the strategy, design, and timing of demonetization. A sequenced narrative constructed from compiled news reports, official interviews, and statements is combined with statistical as well as secondary empirical evidence to establish the purpose of demonetization. The frequent changes to rules and directions, the shifting of goalposts, unspecified targets, and employment of fiscal policy tools in order to realize demonetization's main 'black money' target, are analysed to appraise policy credibility.

The paper also calculates the implementation, bailout, and other costs of demonetization policy to the extent possible with existing information; indirect costs are quantified or listed with supporting assumptions, linkages and identification of co-movements; and all costs are categorized as monetary, fiscal, quasi-fiscal, and those attributable to the financial sector. Through these diverse sources and the narrative method, the paper concludes that the failure to achieve objectives, poor design and strategy, and numerous inconsistencies contribute uniformly to undermine the policy credibility of demonetization.

Many significant costs and damages elude quantification; others may be imperfect because precise calculations or attributions are impeded by data and information constraints. The paper also excludes the burdens or restrictions that demonetization is likely to have imposed upon macroeconomic policies - monetary, fiscal, and exchange rate - that are also subject to other contemporaneous influences, limiting assignment to demonetization-induced constraints alone. Suffice it to mention that to an extent, this gap can be bridged by notable departures from usual behaviors or patterns concomitant with an aggregate shock (demonetization).

For instance, the cumulative 7% real exchange rate appreciation in two years (2016-18, Table 4, bottommost panel) can be seen in the light of restricted forex intervention capacity of the central bank

from overwhelming domestic liquidity pressures,⁴⁹ it is also buttressed by the RBI's explanation of extensive support from exchange rate management for the persistence of heavy rupee liquidity in November 2016.⁵⁰ Similarly, fiscal deterioration in the subsequent years may not be delinked, e.g., a remarkable rise in welfare spending (current transfers grew a respective 15% and 17% in 2017-18), expenditure was increasingly borrowing-financed with additional spending that was unrecorded/off-budget after 2016-17,⁵¹ crowding-out of the private sector,⁵² increase in public debt stock despite extensive monetary efforts to lower interest costs.⁵³ While macroeconomic policies and variables can depart from normal patterns for many reasons, it merits underlining these cannot be immune to an aggregate shock, which typically elicits response as much as it would impose constraints while leaving much to speculation.

On balance, taking note of all dimensions considered in the paper, the evidence and reasoning make it hard to avoid the conclusion that a policy cannot be deemed credible when it is poorly-designed, fails to achieve the stated targets, and incurs substantial costs while inflicting significant damage.

Several important questions arise here. Does India's demonetization serve as an example for other countries to emulate for realizing similar objectives? Is it a fool proof addition to the existing macroeconomic policy tools? Would other agencies, including international ones engaged in policy advice, advocate demonetization for any of the stated objectives, both initially announced as well as subsequently appended, of India's demonetization? Answers to such questions would be equally revealing as a test for the policy credibility of demonetization. Most are debatable and perhaps await clearer answers in the future.

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NOTES

¹ The notable coincident influences listed include the US election of Donald Trump; a 60% rise in global crude oil prices; improved monsoon rainfall in 2016-17; exchange rate uncertainty and volatility due to capital movements into Foreign Currency Non-Repatriable accounts; indirect tax system overhaul in July 2017; and the fact that early official GDP estimates omit much of the cash-dependent informal sector, which was most affected.

² Based upon median estimates of Ramey (2016) for US data (Chodorow-Reich et al, 2018: pg 39).

³ Money exclusively serves as unit of account while interest rates, set by monetary policy, determine outcomes; in fact, cash constrains monetary policy by providing a floor upon interest rates (Woodford, M. [2003] *Interest and Prices: Foundations of a Theory of Monetary Policy*. Princeton University Press).

⁴ By construction, the policy helped households with bank accounts in disposing of the demonetized cash. Primary sources of household borrowings were informal (money lenders, shops), pointing to the ‘unintended consequence’ of increasing leverage despite its transience.

⁵ A one standard deviation increase in cash usage, by either measure, translates to a 1.5 percentage point decline in labour share, and a 1.6 percentage point decline in materials share in value added.

⁶ ECB Press Release 4, May 2016.

⁷ See Lahiri (2020) for a detailed account.

⁸ The affidavit filed by government to the Supreme Court, November 24, 2016, stated “The gigantic dimensions and possibilities of compromising on secrecy were taken into consideration. If elaborate prior arrangement for distribution of new currency notes were made prior to the announcement of the scheme, the very objective of the scheme would have been defeated.” *The Hindu Business line*, November 24 2016. See <https://www.thehindubusinessline.com/economy/policy/demonetisation-to-eradicate-black-money-to-benefit-all-govt-to-sc/article9382728.ece#>.

⁹ Appearing for the Central Government, the Attorney General argued a judicial review of the demonetization scheme was “impermissible...the courts...cannot interfere with economic and fiscal policies of the Government”. “Demonetisation: Judicial review of fiscal policy impermissible, Centre tells SC” *Mint*, 10 Dec 2016. <https://www.livemint.com/Politics/ZubsSRJK8IX6y1bKs4gljM/Demonetisation-Judicial-review-of-fiscal-policy-impermissi.html>.

¹⁰ Prime Minister’s speech, November 8, 2016; “Notification no. 2652 dated November 8, 2016, *Government of India*; and RBI *Press Release*, November 08, 2016.

¹¹ Prime Minister’s interview, December 29, 2016 (<http://indiatoday.intoday.in/story/narendra-modi-black-money-demonetisation-opposition/1/845224.html>); Union Budget speech, *Minister of Finance*, February 2017.

¹² These were rules like maximum deposit of Rs. 2.5 lakhs per account, with income tax account details, etc.

¹³ <http://timesofindia.indiatimes.com/india/Supreme-Court-refuses-to-stay-ban-on-Rs-500-Rs-1000-notes/articleshow/55433955.cms>.

¹⁴ <http://www.firstpost.com/politics/supreme-court-refuses-to-stay-demonetisation-but-says-cant-have-surgical-strike-against-common-man-3106384.html>.

¹⁵ For example, “Jammu and Kashmir: Rs. 2,000 notes recovered from terrorists killed in Bandipora” *Indian Express Web Desk*, New Delhi, November 22, 2016; “Two Arrested in Punjab With Fake Rs. 2,000 Notes” IANS, News18.com, November 14, 2016; “Karnataka: Two days after new Rs. 2,000 note,

a ‘fake’” *Indian Express* Bengaluru, Nov 13, 2016; “First fake Rs. 2,000 note surfaces in Gujarat” *Times of India*, Nov 22, 2016; “Rs 2,000 fake currency notes seized near Hyderabad, 6 held” *Hindustan Times*, Nov 26, 2016; <http://www.hindustantimes.com/india-news/demonetisation-100-days-fake-currency-entering-india-through-bangladesh/story-YxbTDqzoM9jf2lBFo3B3oO.html>.

¹⁶ RBI *Press Release*, 2016-2017/1349, Nov 28, 2016, RBI, Mumbai.

¹⁷ ‘Over 2-crore Jan Dhan accounts opened since Nov 8 demonetization move’, *The Hindustan Times*, November 20, 2016.

¹⁸ “With Covid restrictions gone, demonetization cash deposits back under the taxman’s scanner” https://economictimes.indiatimes.com/news/economy/policy/with-covid-restrictions-gone-demonetisation-cash-deposits-back-under-the-income-tax-scanner/articleshow/78267023.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst.

¹⁹ The effective tax rate upon declared income was 50 per cent, with 25 per cent to be invested for four years in the interest free government deposit scheme.

<http://pib.nic.in/newsite/PrintRelease.aspx?relid=154450>.

²⁰ Against the usual 30% flat rate, plus surcharge and cess, the rate was 60 per cent plus 25 per cent surcharge, i.e., 75 per cent, a further penalty of 7.5 per cent, taking overall incidence to 77.5 percent. *Ibid*.

²¹ An email id, blackmoneyinfo@incometax.gov.in was set up for this. See

<http://economictimes.indiatimes.com/news/economy/policy/government-announces-new-income-declaration-scheme-pm-garib-kalyan-yojana-stringent-penalties-prescribed/articleshow/56020146.cms>.

²² <http://indianexpress.com/article/business/economy/expect-all-demonetised-money-to-come-back-to-system-revenue-secretary-hasmukh-adhia-4414447/>.

²⁴ “...if India’s economy had been weak, this decision could not have been made. It was consciously taken when the economy was in good shape, as such a sharp correction could have been only be made then to fortify its foundations and give it a further boost”. It was also “...timed before GST to clean up the stock of black money before it came into force. GST and digital payments will thus be critical elements of the network of checks and balances...to curb future generation of black money” (Prime Minister, December 29, 2016, *Ibid*. footnote 6).

²⁵ Fourth Bi-monthly Monetary Policy Statement, 2016-17, *Resolution of the Monetary Policy Committee* (MPC), October 4, 2016.

²⁶ RBI *Press Release*, December 13, 2016.

²⁷ *Edited Transcript* of RBI’s 6th Bi-Monthly Post Policy Conference Call with Media, February 08, 2017, RBI.

²⁸ June 30 is the end of RBI’s financial year, with balance sheet transfers (surplus/profit) to the sovereign.

²⁹ “Indians Said to Deposit 97% of Notes Banned to Curb Graft”, *Bloomberg*, January 4, 2017.

<https://www.bloombergquint.com/markets/2017/01/04/india-said-to-get-97-banned-notes-in-setback-to-graft-crackdown>.

³⁰ “RBI’s own figures indicate return of 15 lakh cr of banned notes”, *IANS*, January 14, 2017. Available at http://www.business-standard.com/article/economy-policy/rbi-s-own-figures-indicate-return-of-15-lakh-cr-of-banned-notes-117011400304_1.html.

³¹ Sum of notes in circulation, total deposits of banks with RBI and under the market stabilization scheme).

³² <https://timesofindia.indiatimes.com/business/india-business/21000-people-disclose-rs-4900-crore-black-money-under-government-scheme-official/articleshow/60410568.cms>.

³³ <http://indianexpress.com/article/business/economy/pmgky-centre-collects-only-rs-2300-crore-as-tax-penalty-4601271/>.

³⁴ http://www.business-standard.com/article/economy-policy/only-rs-5-000-cr-unaccounted-income-was-declared-under-pmgky-hasमुख-adhia-117060200031_1.html.

³⁵ Food inflation declined sharply, about 240 bps between October 2016 and January 2017, reflecting the “...combined impact of record pulses production, large winter arrivals of vegetables and compression in demand due to demonetization. This was despite large unfavorable base effects.” (RBI, 2017a: pg 13). The central bank successively lowered its GDP growth projections - to 6.9% in February 2017, from 7.1% and 7.6% in preceding quarters, while its early assessment estimated the output impact of demonetization “...at about 33 bps for the full year 2016-17” (*ibid.*: pg. 10).

³⁶ The auctioned bills ranged from 21–63-day tenures aggregating to Rs. 5.25 trillion in 2016-17; Rs. 1 trillion of MSS bills of longer tenure (312-329) spilled over to the next financial year, 2017-18 (RBI, 2017a: pgs 18-19).

³⁷ “Market Stabilisation Scheme (MSS) – Revision of ceiling for 2016-17”, RBI Press Release, December 2, 2016.

³⁸ Announced at “PM’s address to the nation on the eve of New Year 2017” *Press Information Bureau*, Government of India, Prime Minister’s Office, 31-December-2016.

³⁹ *Pradhan Mantri Mudra Yojana*, for lending to Micro Units Development & Refinance Agency.

⁴⁰ “Rise in government borrowings might have triggered NBFC crisis, says Viral Acharya”, *Indian Express*, July 24, 2019.

⁴¹ RBI Governor (R. Rajan) was reported to have highlighted in his note to the *Estimates Committee* of Lok Sabha that loans under Mudra (and Kisan Credit Card) schemes needed closer scrutiny for potential credit risk, that the Credit Guarantee Scheme for MSME (CGTMSE) of SIDBI was a growing contingent liability, needed urgent examination (see <https://economictimes.indiatimes.com/industry/banking/finance/banking/performance-on-mudra-loans-psbs-vs-private-banks/articleshow/72862296.cms>). Subsequently, RBI Deputy Governor (M.K. Jain) raised caution on rising NPAs on these loans, urging banks for keener pre-loan screening of borrowers (<https://economictimes.indiatimes.com/industry/banking/finance/banking/rbi-red-flags-rising-mudra-bad-loans/articleshow/72238422.cms?from=mdr>). In November 2020, SBI reported gross NPAs of 20% in Mudra loan outstanding under the PMMY scheme (see <https://www.businesstoday.in/latest/economy-politics/story/20-of-sbi-mudra-loans-turn-npa-public-banks-pmmmy-bad-debt-rs-18836-crore-278306-2020-11-10>).

⁴² These loans are regularly reported to have high NPAs, inviting caution and discomfort of the RBI on growing stress and contingent liability of the government from the underlying credit guarantee. For example, see “Mudra loan disbursements & NPAs rise in tandem at PSBs over last 3 years”, *Indian Express*, September 17, 2020; “SBI’s Mudra NPAs at 15%, loan book stabilized, says Rajnish Kumar”, *Mint* 18 June 2020.

⁴³ A summary can be found at <https://pib.gov.in/PressReleasePage.aspx?PRID=1539828>.

⁴⁴ These risks and fragilities are well-documented, and regularly analyzed in successive *Financial Stability Reports* (RBI) from December 2018.

⁴⁵ Punjab and Maharashtra Cooperative Bank (a large cooperative bank), Yes Bank (third largest private sector bank), and Laxmi Vilas Bank (old private bank).

⁴⁶ A national task force was set up in March 2017 to examine the overall e-payments environment, covering temporary waiver of e-transaction charges to initiatives like *Aadhar* and *united payments interface* (UPI) systems, amongst others.

⁴⁷ Reorganisation of the tax administration structure in Indonesia that enabled greater interaction and information-sharing resulted in dramatic increase in revenues – equivalent to raising the marginal corporate tax rate on affected firms by about 23 percentage points at a tiny cost (under-1% of the increase in revenues). See “Tax Administration vs. Tax Rates: Evidence from Corporate Taxation in Indonesia”, M. Chatib Basri, Mayara Felix, Rema Hanna & Benjamin A. Olken, NBER *Working paper* 26150, August 2019.

⁴⁸ *Tax Administration Reforms Commission* (TARC) was constituted in 2013-14 to review the application of Tax Policies & Tax Laws in context of global best practices and recommend measure for reforms required in Tax Administration to enhance its effectiveness and efficiency. The status of TARC recommendations can be accessed at

https://dor.gov.in/sites/default/files/Status%20Of%20TARC%20Recommendations_0.pdf.

⁴⁹ The appreciation adversely impacted exports (IMF Country Report No. 17/54, February 2017: pg 21).

⁵⁰ The unwinding of concessional foreign exchange swaps contracted in 2013 helped “...avoid a sharp fall in the foreign exchange reserves” while the foreign currency sales “...also neutralised the impact on liquidity...” These...swaps were executed against foreign currency non-resident (bank) [FCNR(B)] deposits maturing from September 2016 onwards. Some...outflows also pertained to concessional swaps against overseas foreign currency borrowings (OFCBs) of banks... The Reserve Bank’s forward forex assets were consciously matched with the FCNR(B) and OFCB liabilities.” (para V.18, *Annual Report*, 2016-17, RBI, August 2017).

⁵¹ C&AG’s Audit Report No. 20 of 2018 on *Fiscal Responsibility and Budget Management Act, 2003*, and subsequent reports of presentation to *15th Finance Commission*, which estimated actual deficit at 5.85% of GDP in 2017-18, exceeding the official one by 2.49 percentage points (“CAG demonstrates how govt relies on off-budget resources to fund deficit”, *Economic Times*, July 25, 2019). Besides unpaid subsidy arrears, the outstanding liabilities of borrowings by public sector units (Power Finance Corporation, Indian Railway Finance Corporation, National Highway Authority of India) for government programmes, loans to beneficiaries of some government schemes, borrowings for bank recapitalization, amongst other expenditures.

⁵² See “Public Sector Borrowing, Private Savings and Crowding Out”, Appendix III, IMF *Country Report* No. 19/385, December 2019.

⁵³ The RBI increased recourse to short-term, cash management bills (CMBs) for absorbing surplus liquidity from demonetization, while restricting outstanding volumes of MSS bonds. See footnote 6, pg 17 (RBI, 2017a) “The amount of bills and securities issued for the purpose of MSS is matched by an equivalent cash balance held by the Government with the Reserve Bank, thus, having only a marginal impact on the revenue and fiscal deficits of the Government to the extent of interest payment on bills/securities outstanding under the MSS. The cash management bills (CMBs) issued under the MSS are non-standard discounted instruments, generally issued by the Government to meet the temporary mismatches in their cash flows. CMBs have the generic character of Treasury Bills but are issued for maturities of less than 91 days. Hence, they can be issued to absorb excess liquidity during the period of large surplus conditions, as has been the case after demonetisation.

Incidence of Corporate Income Tax: Estimates from Indian Manufacturing Firms

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Abstract

The purpose of this paper is to examine the incidence of corporate tax on capital and labour in Indian manufacturing sector. The paper employs ‘Seemingly Unrelated Regression Method’ with add-up restriction based on the work of Desai, Foley and Hines (2007). The study shows that, for the manufacturing sector in India for the period 2005-19, the corporate tax has a significant adverse impact on both wages paid to employees and profit after tax. Capital owners bear 96.3% of the tax burden and labours bear only 3.7%. The adverse effect on wages is slightly higher in public firms than in private firms. The relative tax burdens of labour and capital remained the same in the pre-2008 global economic crisis and post-crisis periods. The impact on both wages and profits increase with age and size of firms but decrease with leverage. These results will be useful to policymakers and other stakeholders to take appropriate strategies to design the corporate tax policy such that it is more redistributive, and not a burden for labour in manufacturing firms in India. The paper contributes to the scant empirical literature on corporate tax incidence.

Keywords: Corporate tax incidence, General equilibrium analysis, Indian manufacturing firms, Panel data, SUR estimation method

JEL Classification: H32, J30, H25, H22, C33

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I Introduction

Tax incidence analysis is important as it distinguishes between who is legally responsible for paying a tax and who ultimately bears the tax burden. As the corporate income tax (CIT) is an important direct tax, an understanding of who bears the burden of corporate income tax (CIT) is necessary for policy-makers and taxpayers alike. Harberger (1962) has initiated the theoretical debate on who bears the burden of CIT. Using a closed economy model, he has shown that capital bears the entire burden of the CIT in U.S. Several extensions of Harberger's closed economy model have emerged by allowing product differentiation (e.g., Gravelle and Kotlikoff, 1993) and several market imperfections (e.g., Atkinson and Stiglitz, 1980).

However, open economy models have produced different outcomes. For instance, Diamond and Mirrlees (1971) use a small open economy model and demonstrate that if capital is perfectly mobile, labour will bear the entire burden of the CIT. Revisiting the corporate tax incidence in an open economy framework, Harberger (1995) finds that the burden of CIT fully shifts to labour. Gravelle (2013), however, after reviewing open economy models argues that results of many of these studies cast some doubt on the conclusion that labour bears the all or bulk of the burden of CIT. Thus, there is no consensus among economists on who, theoretically, bears the burden of CIT.

Empirical literature on the topic is relatively new. Results from recent studies suggest that the corporate tax burden is borne at least to some extent by labour, though there is disagreement on the extent of the burden borne by labour (see Hassett and Mathur 2006, 2015; Desai, Foley, and Hines 2007; Arulampalam, Devereux, and Maffini 2012; and Ebrahimi and Vaillancourt 2016).

In India, the Central Government levies the CIT. As India's CIT rate was relatively high (the statutory rate peaked at 64.8% in 1989-90) as compared to many other nations, various committees including Kelkar Committee (2002) recommended reduction in the CIT rate. As a result, the rate has been reduced over the years. The CIT revenue (nominal) in India increased from Rs. 5,335 crores in 1990-91 to Rs. 35,696 crores in 2000-01, and further to Rs. 6,10,500 crores in 2019-20. Given the revenue significance of CIT and changes in its structure over the years in India, the central question is: who bears the burden of corporate tax in India-- capital owners or labourers? and by how much? In this study, an attempt is made to answer the question by estimating the relative burden of CIT shared by capital and labour in India, using the data from 10,676 manufacturing firms during 2005-2019.

This study extends the existing empirical works on this sparsely researched issue in the following ways. Following Lall (1967), which was based on a sample size of 257 Indian public limited manufacturing firms during 1956-1965, we analyse the incidence of CIT on capital and wages of manufacturing firms. While most other existing studies analyse the efficiency effect of CIT, this study analyses the relative burden of CIT shared by the labour and capital of Indian manufacturing firms based on the methodology proposed by Desai, Foley, and Hines (2007). Agarwal and Chakraborty (2017) also utilise this framework, using the data from 5666 listed corporate firms from all sectors in India during 2000-2015. The present study uses the latest data available for all (listed and non-listed) manufacturing firms in India.

As the global economic crisis of 2008 affected the growth rate and buoyancy of corporate income tax, which declined significantly during the post crisis period in India, this study analyses the incidence of CIT during the pre-crisis and post-crisis periods separately. The Indian experience may be useful as an example to understand the impact of global crisis on the incidence of CIT.

The rest of this Study proceeds as follows: Section 2 briefly reviews the literature on the study topic while Section 3 explains the empirical model, the data and estimation technique used in the study. Section 4 presents and discusses the empirical results, and the final Section 5 provides the summary and conclusion.

II Brief Review of Literature

The theoretical literatures in general follow an approach to specify a general equilibrium model of the (closed or open) economy, parameterize that model based on the estimates of key variables, and simulate the effect of a change in the CIT on prices, wages, profit/income, well-being etc. They use one of the two channels through which corporate tax can be passed on to labour: the indirect effect and the direct effect. The indirect models find that a hike in CIT rate will affect wages indirectly through its impact on capital and demand for labour (e.g., Harberger 1962). The direct models show that firms earn quasi rents due to imperfect competition and other market frictions.¹ Both firms (capital owners) and labourers bargain for these rents. The CIT will reduce the rents available for distribution which will lead directly to a reduction in wages (e.g., Arulampalam, Devereux, and Maffini 2007).

The Indirect Effect Models: The pioneering study by Harberger (1962) develops a two-sector general equilibrium model of the U.S economy. It assumes that the corporate sector is subject to CIT which has output as well as substitution effects, while the non-corporate sector is not. Due to the output effect, the CIT increases the cost of production, thereby reducing the production and increasing the output price. The substitution effect leads to distortion on the prices of factors of production, leading to substitution of lower-priced factors in place of higher-priced factors. The output effect leads to flight of capital and labour from corporate to non-corporate sector, and their price undergoes a change depending on the relative factor intensity of corporate and non-corporate sector. If the corporate sector is labor-intensive, the non-corporate cannot absorb all the labour, leading to low price of labour. The corporate sector can substitute labour in the place of capital. It leads to an increase in the price of labour in the corporate sector, and decrease in the price of the capital. Thus, capital bears the entire incidence of CIT. Several extensions of Harberger's closed economy model have emerged by allowing product differentiation and several market imperfections. However, Gravelle and Smetters (2006), Auerbach and Slemrod (1997) etc. criticize these closed economy models, mostly for their assumptions of fixed supply of capital and labour and complete mobility of factors of production.

Dimond and Mirrlees (1971) employed an open economy model in which the capital is mobile and the price of capital is fixed at the world rate of return. If the tax on capital income increases, capital will fly until its marginal productivity at home is driven up to the point at which the after-tax return to capital at home equals the world rate of return. This reduction in capital will decrease labour productivity, thereby the wages. Thus, the immobile labour bears the entire burden of the CIT.

Harberger (1995) also revisits the corporate tax incidence in an open economy framework and finds that labour bears more than 100% burden of tax (Kotlikoff and Summers 1987).² Developing a four-sector model, Harberger (2008) also shows that 130% of the tax falls on the labour.

Gravelle (2013) after reviewing the open economy models, particularly four important U.S studies - Grubert and Mutti (1985), Gravelle and Smetters (2006), Randolph (2006) and Harberger (2008), remarks that results of many of these studies cast some doubt on the conclusion that labour bears the all or bulk of the burden of CIT in an open economy setting, mainly due to their assumptions on degree of capital mobility, substitutability between domestic and foreign products, size of the economy, degree of substitutability of labour for capital and factor intensities. Reconciling these differences across models, she finds that for the U.S. the CIT burden shared between the capital and labour is 6:4.

Hasset and Mathur (2006) is one of the pioneering empirical studies on the impact of CIT on wages. Utilizing panel data covering 72 OECD countries during 1981 to 2002, it shows that a 1% increase in statutory CIT leads to about 0.95% decline in wages in the long run. However, this study is criticized for controlling the value added per worker, which is likely to be influenced by corporate tax (by affecting the capital). Re-estimating Hasset and Mathur (2006) model, Gravelle and Hungerford (2008) find that for every \$1 increase in corporate tax, wages fall by 22 to 26 cents. They argue that the findings of Hasset and Mathur (2006) are also sensitive to specification choices like the use of five-year average, inflation, and PPP adjustments. Later, Hasset and Mathur (2015) expand their previous study to include the spatial effect and finds that a 1% increase in statutory rate leads to 0.5% reduction in wages. Randolph (2006) finds that in the US, labour and capital bear the burden of the tax in the ratio of 73:27.

Using household survey data on wages for 30 countries during 1979 to 2002, Felix (2007) finds that a 1% increase in the marginal CIT rate leads to 0.7% decrease in wages. Utilizing the Current Population survey data during 1997 to 2005, covering 50 U.S states, Felix (2009) finds that wages decline in the range of 0.14% to 0.36% for a 1% increase in the marginal state corporate taxes. Carroll (2009) also studies the incidence using the data from 50 U.S. states during 1970 to 2007, and shows that a 1% increase in the CIT leads to 0.014% decline in real wages.

Nils ausdem Moore, Kasten, and Schmidt (2009), using the data from German, French, and UK firms and a difference-in-differences approach, show that wage rises with a fall in corporate tax. Bauer and Siemers (2017), using the regional level panel data for Germany, find that 65 to 93% of tax burden is shifted to labour. Using the spatial equilibrium model and variations in state corporate tax and apportionment rules of U.S state corporate tax, Serrato and Zidar (2016) estimate that firm owners bear roughly 40%, workers bear 30-35%, and landowners bear 25-30% of the incidence.

Ebrahimi and Vaillancourt (2016) use the Canadian household data from Statistics Canada's Labour Force Survey (LFS) from 1998 to 2013 and show that for a 1% increase in the CIT rate, real wages fall by 0.15 to 0.24%. Employing panel data of Canadian provinces during 1981 to 2014, McKenzie and Ferde (2017) also find that the CIT rate adversely affects the capital/labour ratio which in turn reduces wages. For every \$1 increase in CIT revenue due to an increase in the provincial CIT rate, the decline in aggregate wages ranges between C\$1.52 for Alberta to C\$3.85 for Prince Edward Island. Desai, Foley, and Hines (2007), using the data on foreign activities of U.S. multinational companies in 50 OECD countries during 1989 to 2004, and seemingly unrelated

regression (SUR) estimation method by imposing the restriction that the effect of tax on wage and capital adds up to unity, estimate that labour bears between 45% and 75% of the CIT burden.

In the Indian context, Lall (1967) using the data for 257 public limited manufacturing companies for the two five-year periods 1956 to 1960 and 1961 to 1965, shows that the burden seems to have fallen largely on labour and not on capital. Shome (1978) also shows that a part of corporate tax burden is shifted to labour (in 1971-72). However, following Desai, Foley, and Hines (2007) and using panel data on corporate firms listed on the BSE and NSE during 2000 to 2015, Agarwal and Chakraborty (2017) estimate that capital bears more burden of CIT in India than labour.

The Direct Effect Models: These models assume that firms earn quasi-rents due to imperfect competition, etc. Firms and labour unions bargain over these quasi-rents. The CIT will reduce these rents, which will directly affect wages. Felix and Hines (2009) show that the impact of an increase in CIT on wages is ambiguous, assuming that firms and unions bargain over the economic rent. On the one hand, a rise in the CIT rate lowers the rent available for distribution, which in turn leads to a reduction in wage. On the other hand, if the indirect effect of the tax on the competitive wage via the marginal productivity of labour increases the rent, this effect may offset the reduction. If the latter effect is small enough, then an increase in tax rate will lead to a reduction in union wage; if this effect is larger, the union's bargaining power will be stronger.

Riedel (2011) also identifies two opposite effects. She uses wage bargaining model in which the bargaining of a domestic subsidiary happens over the profits of the parent and as well as the subsidiary companies. She predicts that an increase in domestic country tax rate of subsidiary leads to higher wages, as wage is a deductible expenditure. It helps in reduction of tax without affecting the parent company's profit. The effect is opposite if tax is increased in the domicile country of the parent company. Arulampalam, Devereux and Maffini (2012) in their model show that the impact on an increase in the CIT rate on wages depends on workers' bargaining power.

A few empirical studies have emerged to examine the direct effect of CIT on wages. Felix and Hines (2009), using individual data from 2000 households across 50 U.S. states, find that high-tax states have lower union premiums than low-tax states, and that labour captures just over 50% of the lower tax rates. Arulampalam, Devereux, and Maffini (2007), using firm-level data of 55,000 European companies across 9 countries during the 1996-2003 period, estimate that labour bears nearly 100% of the CIT burden in the long run. However, Arulampalam, Devereux, and Maffini (2012) use firm-level data from 9 European nations during 1999-2003 and show that a \$1 increase in CIT would reduce wages by \$0.49.

aus dem Moore (2014) finds that, for France, a 1 Euro increase in the corporate tax lowers manufacturing wages by 0.66 Euro; in UK, it is 77 pence. Fuest, Peichl, and Siegloch (2015) estimate that for 1 euro increase in tax bill in Germany, wage bill comes down by 0.56 euro. However, Dwenger, Rattenhuber, and Steiner (2019) use industry- and regional-level wage data from Germany during 1998-2006 and find that a 1 Euro decrease in the corporate tax leads to an increase in the corporate wage bill by 0.19 to 0.29 Euro. Using industry-level data for the US during 1982, 1992, and 1997, Liu and Altshuler (2013) show that labour bears 40 to 80% of the corporate tax burden.

III Empirical Model, Data and Estimation

This study utilizes the empirical model of Desai, Foley, and Hines (2007) and derives wage and return-to-capital equations to be estimated. Consider a firm which produces output (Q) using capital (K) and labour (L) inputs and a production function denoted by $Q(K, L)$. Assume that the output price is normalized to unity and firm's capital investments do not depreciate and are financed with a combination of debt (D) and equity (E). Labour's wage is w ; debt holders receive a return of r ; and equity holders receive after corporate tax rate of return of ρ . Denoting the corporate tax rate by T , it is shown that:

$$\rho E \equiv [Q(K, L) - wL - rD] (1 - T) \quad (1)$$

Differentiating the equation (1) with respect to T produces:

$$\frac{d\rho}{dT} E + \frac{dw}{dT} L (1 - T) + \frac{dr}{dT} D (1 - T) = -[Q(K, L) - wL - rD] \quad (2)$$

First term on the left side of (2) is change in returns to equity holders, the second is the change in the after-tax labour cost and the third is the change in after tax borrowing costs. The right side is the effect of a tax change on after-tax profits. The equation (2) indicates that higher tax costs must be compensated by a wage reduction or capital returns, i.e., some factor inputs must bear the burden of tax. As output prices are normalized to one, they do not change for change in CIT. In an open economy, this assumption rules out effects that arise from inter-sectoral re-allocation of resources or changing terms of trade between countries. But in a single-sector closed economy, this represents a normalization of inputs.

Suppose that capital investments are financed with a fraction θ of debt and $(1 - \theta)$ of equity. Then the equation (1) becomes:

$$\rho(1 - \theta)K \equiv [Q(K, L) - wL - r\theta K](1 - T) \quad (3)$$

Suppose that investors are indifferent between receiving certainty-equivalent returns in the form of bond interest and equity returns. Then $\rho = r$. Differentiating the equation (3) with respect to T gives:

$$\frac{d\rho}{dT} (1 - \theta)K + \frac{dw}{dT} L (1 - T) = -[Q(K, L) - wL - r\theta K] \quad (4)$$

If $\theta \cong 0$ in an extreme case and investments are financed entirely with equity, the equation (4) becomes:

$$\frac{dr}{dT} K + \frac{dw}{dT} L (1 - T) = -[Q(K, L) - wL] \quad (5)$$

The equation (5) clearly indicates that both labour and capital bear the incidence of corporation tax. Under these conditions, using the equation (3) the equation (5) becomes:

$$\frac{1}{r} \frac{dr}{dT} rK + \frac{1}{w} \frac{dw}{dT} Lw (1 - T) = -\frac{rK}{(1-T)} \quad (6)$$

Rearranging the terms, the equation (6) becomes:

$$\frac{1}{r} \frac{dr}{dT} + \frac{1}{w} \frac{dw}{dT} \frac{Lw}{rK} (1 - T) = -\frac{1}{(1-T)} \quad (7)$$

Let the labour share of output as, $s \equiv \frac{wL}{Q}$. It follows that $\frac{Lw(1-T)}{rK} = \frac{Lw}{Q-Lw} = \frac{s}{1-s}$. By also applying that $\frac{dr}{dT} = -\frac{dr}{d(1-T)}$ and $\frac{dw}{dT} = -\frac{dw}{d(1-T)}$, the equation (7) becomes:

$$\frac{(1-T)}{r} \frac{dr}{d(1-T)} + \frac{(1-T)}{w} \frac{dw}{d(1-T)} \frac{s}{(1-s)} = 1 \quad (8)$$

In order to estimate a framework to assess the impact of corporate income tax on wages and capital, the following two equations are used. Let X denote a vector of attributes determining wages other than corporate tax rate and defines* $\equiv \frac{(1-s)}{s}$. Then the traditional framework for estimating wages can be framed as:

$$\ln w = \beta X + \eta_1 \cdot s^* \ln(1 - T) + \varepsilon \quad (9)$$

where $\eta_1 = \frac{(1-T)}{w} \frac{dw}{d(1-T)} \frac{s}{(1-s)}$. This is the second half of the left-hand side of equation (8). Similarly, a parallel framework for estimating interest rates can be framed as:

$$\ln \rho = \beta' X' + \eta_2 \ln(1 - T) + \varepsilon' \quad (10)$$

where $\eta_2 = \frac{(1-T)}{\rho} \frac{d\rho}{d(1-T)}$ (as $r=\rho$). This is the first half of the left-hand side of equation (8). The relationship shown in the equation (8) carries empirical implications for the estimated relationships of the equations (9) and (10). These two equations are not independent, but instead must satisfy an adding up restriction: $\eta_1 + \eta_2 = 1$. This adds the coefficients of wages and returns to capital to one and measures the relative burden of the corporate tax on wages and capital. Therefore, this cross-equation restriction must be employed when jointly estimating the equations (9) and (10). To see how they indicate the respective shares, note that $(1 - s) = \frac{Q-wL}{Q} = \frac{rK}{Q}$ and so:

$$(1 - s) \frac{dr}{d \ln(1-T)} \frac{1}{r} = \frac{K}{Q} \frac{dr}{d \ln(1-T)} \quad (11)$$

Similarly, $s = \frac{wL}{Q}$, so

$$s \frac{dw}{d \ln(1-T)} \frac{1}{w} = \frac{L}{Q} \frac{dw}{d \ln(1-T)} \quad (12)$$

The equations (11) and (12) directly lead to:

$$\frac{\eta_1}{\eta_2} = \frac{\frac{s}{(1-s)d \ln(1-T)} \frac{dr}{r}}{\frac{dr}{d \ln(1-T)} \frac{1}{r}} = \frac{L \left[\frac{dw}{d \ln(1-T)} \right]}{K \left[\frac{dr}{d \ln(1-T)} \right]} \quad (13)$$

From the equation (13), the effect of change in tax rate on returns to labour is given by $L \left[\frac{dw}{d\ln(1-T)} \right]$, and the effect of change in tax rate on returns to capital is given by $K \left[\frac{dr}{d\ln(1-T)} \right]$. Hence the right side of (13) is simply the ratio of the burdens borne by labour and capital, respectively, to a small change in tax. This ratio equals the ratio of the two estimated coefficients, η_1 and η_2 .

Equations (9) and (10) can be estimated jointly, using the panel data methodology with imposition of adding up restriction, $\eta_1 + \eta_2 = 1$ (i.e., relative burden of the corporate tax on wages and capital adding up to 1) and firm-level data. As there is greater possibility for errors in these equations to be correlated, due to firm-specific characteristics that affect wages and capital, the Seemingly Unrelated Regression (SUR) estimation method can be used to capture the efficiency due to correlation of errors in these equations. Due to non-availability of per employee wage data, the study uses total compensation paid to employees as wage variable, following Agarwal and Chakraborty (2017). Since interest is not considered as factor income, only the return to equity, which is measured in terms of real profit after tax, is considered as returns to capital. The firm-specific effective CIT rate, which is the ratio of CIT paid by the firm to profit before tax, is used.

As per the Pecking Order Theory of capital structure (Myers and Majluf 1984) leverage and profitability have an inverse relationship. The empirical studies like Booth et al. (2001) also confirm this inverse relationship. Hence, the LEVERAGE (leverage ratio) is used as one of the determinants in returns to capital equation. The other X variables considered are SIZE (log of Real Sales), AGE (log of age of firm), R&D (Research & Development Expenses Ratio in percent) and ES (Export Sale Ratio in percent). Further, in order to check whether the relative burdens of labour and capital vary in different types of firms or not, three dummy variables representing private firms, public firms, and foreign firms are allowed to interact with the tax variable. Finally, separate (split sample) analyses are done for the periods before the global financial crisis (2005-2008) and after (2009-2019), because post-crisis the growth and buoyancy of CIT in India started decreasing.

The study uses the firm-level data drawn from the Centre for Monitoring Indian Economy Prowess database during 2005 to 2019. It provides the accounting information for about 17,000 manufacturing firms operating in India. But for every year the data for some firms are not available due to irregular reporting, new entry of firm, missing data problem etc. (this is the reason why the study does not attempt the dynamic panel estimation methods). Further, the study includes only firms having net sales value above zero. The use of natural log of main variable tax rate and other control variables led to loss of some more observations. The data is also cleaned for outliers using Mahalanobis distance method. As a result, the final data set used in the study is an unbalanced panel, having 10,676 firms, and 69,706 total observations used. Table 1 provides the descriptive statistics of the study variables.

Table 1 Means and Standard Deviations of the Study Variables.

Variable	Definition	Full Sample (2005-2019)	Pre-Crisis (2005- 2008)	Post Crisis (2009- 2019)
Ln(Wages)	Natural log of Real Compensation to Employees (in Rs. million)	3.922 (1.762)	3.717 (1.755)	3.983 (1.76)
Ln(PAT)	Natural log of Profit After Tax (in Rs. million)	3.328 (2.236)	3.174 (2.195)	3.374 (2.245)
Ln(1- τ)	Natural Log of (1-tax Rate)	-0.258 (0.151)	-0.212 (0.161)	-.272 (.145)
$((1-s)/s*\ln(1-\tau))$	Ratio of share of wage in total output to share ratio of others in total output multiplied by natural log of (1-tax Rate)	-9.036 (16.429)	-7.069 (14.927)	-9.623 (16.807)
Leverage Ratio	Leverage Ratio	0.317 (0.202)	0.34 (0.2)	0.311 (0.202)
Size	Natural Log of Sales (in Rs. million)	6.901 (1.688)	6.587 (1.651)	6.994 (1.688)
ES	Export Sale Ratio (%)	13.322 (52.741)	13.825 (24.602)	13.172 (58.574)
R&D	Research and Development expenses Ratio (%)	0.212 (1.146)	0.181 (0.998)	0.222 (1.187)
AGE	Log of Age in years	2.996 (0.717)	2.92 (0.75)	3.019 (0.705)
PRIVATE	Dummy Variable=1 for private ltd firm and 0 otherwise	0.317 (0.465)	0.17 (.375)	0.361 (0.48)
PUBLIC	Dummy Variable=1 for public ltd firm and 0 otherwise	0.683 (.465)	0.83 (0.375)	0.639 (0.48)
FOREIGN	Dummy Variable=1 for foreign firm and 0 otherwise	0 (.008)	0 (0)	0 (0.01)
N	No of Observations	69706	16019	53,687

Standard deviations in parentheses.

IV Empirical Results

(1) Full Sample Results: Table 2 presents the joint estimation results of wage and capital return equations (10) and (11) for Indian manufacturing firms during 2005-2019 using SUR estimation method, with add-up restriction in equation (12). As explained above, these equations are not separate regressions but instead, components of a single regression. Column (1) shows the results of the two equations including only respective tax variable and no other control variable. Column (2) includes all control variables along with tax variable while Column (3) replaces the respective tax variable with three of its interaction with public firm dummy, private firm dummy, and foreign firm dummy, in order to capture the relative share of labour and capital in the total tax burden in public, private, and foreign firms.

The main variable of interest is the effect of respective tax variable on wages ($((1-s)/s \cdot \ln(1-\text{Tax rate}))$) and returns to capital ($\ln(1-\text{Tax Rate})$). It is noted that the impact of tax on wages and capital return should be negative. But in this study the tax variable used is log form of one minus corporate income tax, and therefore the expected sign of tax should be positive. In all columns, as expected, the coefficient associated with this variable and its interaction with public, private, and foreign dummies is positive and statistically significant at 1% level of significance, except its interaction with foreign dummy in wage equation in Column (3). These results provide a strong support for the theoretical prediction that the burden of corporation income tax is shared between labour and capital owners of manufacturing firms in India during 2005-2019.

The estimated parameter (η_1) of tax variable in the ln-wage equation in Column (1) is 0.0256, implying that higher tax rates are associated with lower wages, and the labour bears only 2.56% of the corporate tax incidence. The estimated coefficient η_2 is 0.9744, indicating the negative impact of tax on profit after tax, and the capital bears the remaining 97.44% of tax burden. In Column (2) after controlling for other determinants of wages and return on equity, the estimated coefficients of η_1 and η_2 are 0.037 and 0.963. These results suggest that labour bears 3.7% and capital bears the remaining 96.3% of tax incidence.

In Column (3) of Table 2, coefficients of tax interacting with public, private, and foreign dummies are 0.039, 0.034, and 0.024 respectively in wage equation, and coefficients of tax interacting with public, private, and foreign dummies are 0.961, 0.966 and 0.976 respectively in return on equity equation. These results suggest that the adverse impact of tax on wages is slightly higher in public firms than in private firms. In the case of foreign firms, the tax coefficient is not significant, indicating that the impact of tax on wage of foreign firms is negligible.³ The impact of tax on return on equity is higher in foreign firms than in private firms and the impact in private firms is higher than the public firms. Results also indicate that in public firms, the labour bears 3.9%, and the capital bears 96.1% of tax incidence. In private firms, the respective tax burden shares are 3.4% and 96.6% and in foreign firms, the respective shares are 2.4% and 97.6%.

As expected, all four control variables- the export sales ratio, R&D expenses ratio, age, and size -- have positive and statistically significant coefficients in both wage and return on equity equations in both Columns (2) and (3). These results suggest that wages and returns to equity are higher for larger and/or older firms, and for firms with higher export sales ratio and/or R&D expenses ratio. On average, a 1% increase in size leads to about 0.9% increase in wage and about 1.1% increase in return on equity. A 1% increase in firm's age leads to about 0.3% increase in wage and 0.09% increase in return on equity. The leverage variable has a negative and statistically significant coefficient in return on equity equation in both Columns (2) and (3) of Table 2. This result indicates that a 1% increase in the leverage ratio leads to about 0.63% decline in the returns to capital. These results are in conformity with the Pecking Order theory of capital structure.

Table 2 SUR Estimation Results of Corporate Tax Incidence Equations for Indian Manufacturing firms (2005-2019)

Dependent Variable /Independent Variables	(1)		(2)		(3)	
	Ln(wage)	Ln(PAT)	Ln(wage)	Ln(PAT)	Ln(wage)	Ln(PAT)
$((1-s)/s \cdot \ln(1-\text{Tax rate}))$	0.0256*** (0.000)		0.037*** (0.000)			
Ln(1-Tax Rate)		0.9744*** (0.000)		0.963*** (0.000)		
$((1-s)/s \cdot \ln(1-\text{Tax rate}))$ * PUBLIC					0.039*** (0.000)	
Ln(1-Tax Rate)*PUBLIC						0.961*** (0.000)
$((1-s)/s \cdot \ln(1-\text{Tax rate}))$ * PRIVATE					0.034*** (0.000)	
Ln(1-Tax Rate)*PRIVATE						0.966*** (0.000)
$((1-s)/s \cdot \ln(1-\text{Tax Rate}))$ * FOREIGN					0.024* (0.096)	
Ln(1-Tax Rate)* FOREIGN ES						0.976* (0.096)
R&D			0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
SIZE			0.078*** (0.002)	0.107*** (0.004)	.078*** (0.002)	0.107*** (0.004)
AGE			0.877*** (0.002)	1.056*** (0.003)	0.878*** (0.002)	1.056*** (0.003)
Leverage ratio			0.305*** (0.004)	0.089*** (0.007)	0.308*** (0.004)	0.089*** (0.007)
Constant				-1.910** (0.023)		-1.908** (0.023)
				-2.736** (0.015)		-3.412** (0.027)
R. Sqr.	0.0713	-0.0144	0.8415	0.7149	0.8420	0.7149
No of Observations	69706	69706	69706	69706	69706	69706

p-values are in the parentheses.

*** p<.01, ** p<.05, * p<.1

(2) Pre-Global Economic Crisis Period Results: Table 3 depicts the SUR estimation results of wage and return on equity equations for Indian manufacturing firms during pre-global economic crisis periods (2005-08). Column (1) includes all control variables along with tax variable, while Column (2) replaces the respective tax variable in wage and capital return equations with its interaction with public firm, private firm, and foreign firm dummies. The estimated coefficients of tax and its interaction with ownership dummies in both wage and capital equations are positive and statistically significant at the 1% level, indicating that the tax had an adverse impact on wages and capital in all (public, private, and foreign) firms during the pre-crisis period. These results suggest that (i) in all firms' case, labour's share in total tax burden was 3.7% and capital's share was 96.3%; (ii) in public firms, the tax incidence on labour was 3.8% and on capital was 96.2%; and (iii) in private firms, the tax incidence was shared between labour and capital at 3.4%: 96.6%. As expected, all four control variables-- export sales ratio, R&D expenses ratio, age and size -- have positive and significant effects on wages and on capital returns in both Columns (1) and (2). As expected, leverage has a negative and significant effect on capital.

(3) Post-global Economic Crisis Results: Table 3 depicts the SUR estimation results during post-global economic crisis period (2009-2019). The estimated parameters of tax and its interaction with ownership dummies in both wage and capital equations are positive and statistically significant at the 1% level. While the results are more or less similar to that of the pre-crisis period, the magnitude of tax parameters relating to public, private, and foreign firms slightly vary. The relative share of labour of public firms marginally increased to 3.9% as against 3.8% during pre-crisis period and that of private firms increased to 3.5% instead of 3.4% during pre-crisis period. In case of foreign firms, the share of labour was 3.2% as against 2.4% in the full sample, and the share of capital was 96.8% as against 97.6% in the full sample. All coefficients of control variables have expected signs and are significant in both columns (1) and (2). The magnitudes of coefficients of almost all variables (except age and leverage) are more or less the same as in pre-crisis period. For age, the magnitude of the parameter declined to 0.27 in labour equation from 0.43 in pre-crisis period and the magnitude of the parameter declined to 0.09 in capital equation from 0.105 in pre-crisis period. The coefficient value of leverage changed from -1.2 during pre-crisis period to -2.1 during the post crisis period.

Table 3: SUR Estimation Results of Corporate Income Tax Incidence Equations for Indian Manufacturing firms: 2005-2008 and 2009-2019

Variables	Pre-Crisis (2005-2008)				Post-Crisis (2009-19)			
	(1)		(2)		(3)		(4)	
	Ln (wage)	Ln (PAT)	Ln (wage)	Ln (PAT)	Ln (wage)	Ln (PAT)	Ln (wage)	Ln (PAT)
Constant	-2.928 (0.031)	-3.557 (0.056)	-2.930 (0.015)	-3.557 (0.056)	-2.676 (0.0160)	-3.423 (0.031)	-2.692 (0.016)	-3.423 (0.031)
$((1-s)/s \cdot \ln(1-\text{Tax rate}))$	0.037 (0.000)	-	-	-	0.0371 (0.000)	-	-	-
Ln (1-Tax Rate)	-	0.963 (0.000)	-	-	-	0.963 (0.000)	-	-
$((1-s)/s \cdot \ln(1-\text{Tax rate}) \cdot \text{PUBLIC})$	-	-	0.038 (0.000)	-	-	-	0.039 (0.000)	-
Ln (1-Tax Rate) * PUBLIC	-	-	-	0.962 (0.000)	-	-	-	0.961 (0.000)
$((1-s)/s \cdot \ln(1-\text{Tax rate}) \cdot \text{PRIVATE})$	-	-	0.034 (0.001)	-	-	-	0.035 (0.001)	-
Ln (1-Tax Rate) * PRIVATE	-	-	-	0.966 (0.000)	-	-	-	0.965 (0.000)
$((1-s)/s \cdot \ln(1-\text{Tax rate}) \cdot \text{FOREIGN})$	-	-	-	-	-	-	0.032 (0.093)	-
Ln (1-Tax Rate) * FOREIGN	-	-	-	-	-	-	-	0.968 (0.093)
ES	0.002 (0.000)	0.003 (0.000)	0.002 (0.000)	0.003 (0.000)	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)
R&D	0.095 (0.004)	0.117 (0.010)	0.095 (0.006)	0.117 (0.010)	0.074 (0.003)	0.103 (0.004)	0.074 (0.002)	0.103 (0.004)
SIZE	0.852 (0.004)	1.060 (0.006)	0.853 (0.002)	1.0619 (0.006)	0.885 (0.002)	1.061 (0.004)	0.886 (0.002)	1.061 (0.003)
AGE	0.427 (0.008)	0.105 (0.013)	0.427 (0.008)	0.105 (0.013)	0.266 (0.004)	0.090 (0.007)	0.269 (0.004)	0.090 (0.007)
LEVERAGE	-	-1.225 (0.049)	-	-1.224 (0.049)	-	-2.141 (0.025)	-	-2.140 (0.025)
R. Square	0.8146	0.6834	0.8148	0.6834	0.8500	0.7279	0.8500	0.7279
No. of observations	16,019				53,687			

p-values are in parentheses.

V Concluding Remarks

This Study has attempted to estimate the relative burden of corporate income tax borne by capital and labour during 2005 to 2019, using firm-level data of manufacturing sector in India. Following Desai, Foley, and Hines (2007), the wage and profit after tax equations are specified and estimated jointly using the SUR estimation method with add-up restriction. The empirical results provide a strong support for the theoretical predictions that corporate income tax has an adverse impact on both wages paid to employees and profit after tax, and the burden of CIT is shared between labour and capital owners of manufacturing firms in India during 2005-2019.

These results suggest that capital bears 96.3% of the corporation tax burden and labour bears the remaining 3.7%. These results are consistent with Agarwal and Chakraborty (2017), which estimated that labour bears only about 1% and capital bears about 99% burden during 2000-2015 in the case of firms listed in stock exchanges. However, the results of the current study are in contradiction with Lall (1967), who showed that labour shared most of the corporate tax in India during 1956 to 1960 and 1961 to 1965, and Shome (1978), who also showed that a part of corporate tax burden was shifted to labour in 1971-72.

Results also indicate that adverse effect of tax on wages is slightly higher in public firms than in private firms and the impact on return on equity is higher in foreign firms than in private and public firms. The relative shares of labour and capital (3.7% and 96.3%) have remained the same in the pre- and post-crisis periods. However, the estimated tax burden for labour in public firms in the pre-crisis period (3.8%) was slightly lower than that in the post-crisis period (3.9%). In private firms as well, the labour share (3.4%) in the pre-crisis period was slightly less than that in the post-crisis period (3.5%). In the post-crisis period, the labour incidence increased to 3.2% as against 2.4% in the full-sample period for foreign firms. We hope that these findings are useful to researchers, policymakers, and other stakeholders to design the corporate income tax in India such that its incidence falls entirely on capital owners.

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Notes

¹ Surplus earning of a factor over its transfer earning is called quasi rent. Here, it refers to excessive profit.

² This means that a 100 rupees of tax collected leads to more than 100 rupees reduction or loss in wage to the labour (ie., wage comes down by more than 100 rupees). It refers to the dead weight loss.

³ One reason could be that foreign firms in the total sample constitute only 0.0001 percent.

The New Bioweapons Peril: A case to revisit the Biological Weapons Convention

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Abstract

There is no evidence to suggest that SARS-CoV-2 was a biological agent. However, the ensuing pandemic has driven home the potential dangers of weaponised biological material, especially pathogens. Heightening the concerns about bioweapons is the growing ubiquity of gene editing tools like the CRISPR-Cas-9 system that enable both state and non-state actors to produce biological agents for various purposes. While these dangers are being recognised, this paper goes beyond highlighting the peril, to examining the drivers and constraints on bioweapons use, the ways in which bioweapons may be employed, and the trade-offs involved in mounting such attacks. Furthermore, the paper proposes concrete steps that can be taken in a renewed Biological Weapons Convention (BWC) to reduce the risk of bioweapons attacks. Earlier attempts at strengthening the treaty have focused on increasing verification. However, this has failed because states seek to protect their biotech industries from espionage and harassment. Instead of focusing on traditional verification, this paper proposes the creation of a scientific board under the BWC, that will monitor sensitive emerging technologies in the field, set standards for safety and reporting, and create an epidemiological database. To help deter attacks, it recommends ways to improve the response to disease outbreaks and impose penalties on perpetrators.

Keywords: SARS-Cov-2, Biological Weapons Convention, CRISPR, Arms Control, Bioterrorism

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Pathogens pose an unprecedented danger to humankind. It has taken a devastating pandemic to demonstrate the threat that pathogens pose to lives, societies, and economies around the world. The heated debate about the origins of SARS-CoV-2 and allegations of ‘gain of function’ research may serve to draw attention to the dangers that biological agents can pose. While the origin of SARS-CoV-2 remains mired in debate, the suspicions that it may have been artificially modified highlights how technological developments like gene editing potentially create new avenues for the use of biological agents.

Even amidst the pandemic and the months leading up to the outbreak of SARS-CoV-2 in December 2019, there was a steady stream of incidents involving biological agents.

The first category of incidents involved non-state actors. In the United States in September 2020, letters containing Ricin, a lethal biotoxin were sent to the White House and law enforcement agencies in the state of Texas (Benner 2020). A year earlier, in October 2019, Indonesian police recovered 310 grams of rosary pea seeds, the main ingredient in the lethal biotoxin Abrin, during a raid of a cell of the terrorist outfit Jamaah Ansharud Daulah (Arianti 2019). In another incident involving Ricin, in 2018, German police in Cologne arrested a Tunisian man for trying to build a biological weapon using the biotoxin (The Local 2018). These incidents have two things in common: one, the attackers used biotoxins and not communicable pathogens, and two, the attackers’ plans were foiled. If neither of those holds true in a future incident, the outcomes could be very different.

The second category of incidents is laboratory accidents. In September 2019, there was an explosion at a facility in Russia that was storing biological agents including smallpox (Roth 2019). A month earlier, Fort Detrick, the top US biodefence laboratory, halted its work on dangerous pathogens over safety concerns (Wyatt 2019).

These lab incidents highlight the challenge of ensuring high safety standards needed to conduct research on pathogens. They also suggest that labs with less-than-perfect safety records could be vulnerable to leaks involving human malice. The incidents are not just limited to accidents within laboratories: in an unrelated incident, a lone shooter critically wounded two before driving to Fort Detrick. The shooter was stopped by lethal force after driving 800 metres inside the base (Cramer, Diaz and Murphy 2021).

Finally, there are incidents or developments involving emerging technologies that could be weaponised in the future. For instance, in 2018, researchers flagged the ‘Insect Allies’ programme run by the US Defense Advanced Research Projections Agency (DARPA). The programme sought to use insects to disseminate desired chromosome modifications to agricultural crops. However, the researchers warned that the programme could be “widely perceived as an effort to develop biological agents for hostile purposes” (Reeves et al 2018, 35-37).

Similarly, in 2011 virologists genetically engineered an H5N1 influenza strain that was easily transmissible among ferrets, which respond to flu in a manner similar to humans. By one of the researcher’s own admission, it was “probably one of the most dangerous viruses you can make” (Enserink 2011).

Others have sought to reconstruct once-prevalent viruses. In 2002, researchers claimed they had synthetically created the entire polio virus (Naik 2019) and around the same time, scientists at the

Centers for Disease Control and Prevention recreated the virus that caused the 1918-19 influenza pandemic. (CDC 2019)

None of this is to suggest that such research should not be conducted or that all such research is equally dangerous. It is simply meant to highlight the small but non-negligible risk that this sort of work carries from the perspectives of both accidents and from malice.

I The Resurgent Bioweapons Threat

The attempts at bioterrorism, the emergence of new biotech capabilities, and the increase in security competition between states, all illustrate how new technological and political contexts have increased the salience of the bioweapons threat.

These threats are likely to grow as technological developments lower the barriers to developing biological weapons. For example, gene editing tools like CRISPR (clustered regularly interspaced short palindromic repeats), reduce the costs and time required to edit genomes and modify pathogens. Present international agreements are ill-equipped to deal with these new challenges.

In the decades following the Second World War, states formally agreed to abstain from using biowarfare. Under the Biological Weapons Convention (BWC), which entered into force in 1975, 182 states pledged not to use bioweapons, (a re-affirmation of the 1925 Geneva Protocol) and also committed themselves to destroying their existing stockpiles to prevent proliferation of the technology.

This did not mean all states actually shut down their bioweapons programmes. While many states have been accused of maintaining bioweapons programmes, the most compelling evidence comes from the Soviet Union, which ran the world's largest bioweapons programme since 1972. This included both legitimate research into biodefence – for example, working on vaccines against potential enemy bioweapons – as well as stockpiling pathogens in contravention of the BWC. (Leitenberg, Zilinskas 2012) In 1979, a leak of anthrax at a bioweapons facility in the town of Sverdlovsk led to at least 60 deaths, in an incident covered up by Soviet authorities. (Hoffman 2011, 1-6)

At least one state is believed to have actually used bioweapons: the now-extinct white minority regime in Rhodesia (present Zimbabwe) is thought to have used anthrax against local cattle, which eventually infected some humans as well. (Cross 2017)

There have also been occasional incidents triggered by non-state actors. The Japanese cult Aum Shinrikyo unsuccessfully tried to use bioweapons before turning to Sarin gas. (Bleek 2011) Members of the Rajneeshee group in the United States used Salmonella to inflict disease in citizens of Oregon. (Homeland Security Digital Library n.d.) In 2001, letters containing anthrax were sent to several prominent citizens in the US, killing five and leaving another 17 ill. (Cross 2019)

What's common to these incidents is that they were generally contained. That may not always be the case. In the 2016 Worldwide Threat Assessment of the US Intelligence Community, Director of National Intelligence, James Clapper observed that the proliferation of affordable genome editing tools meant that their "deliberate or unintentional misuse might lead to far-reaching economic and national security implications." (Clapper 2016, 9) In November 2018, Wilton Park, an executive

agency of the UK's Foreign Office, reported findings based on interactions with 42 senior policy leaders and scientific and technical experts. More than three-fourth of the participants agreed that advances in biotechnology had lowered barriers to acquire bioweapons and could facilitate the production of more selective and controllable bioweapons that could challenge the current taboo against their use. (Wilton Park 2018)

Gene editing technologies, such as Zinc Finger Nucleases, Transcription Activator-like Effector Nucleases, and CRISPR change two fundamental characteristics associated with bioweapons. One, instead of being unpredictable and unreliable, advances in scientific knowledge could transform biological agents into reliable and targetable weapons, especially for states.

Two, the spread of scientific knowledge could tempt both states and non-state actors to experiment with bioweapons. For non-state actors, this option could prove especially attractive if international controls on conventional light weapons and explosives become stricter.

Finally, in addition to the bioweapons themselves, there are the means of delivery. Small, remotely piloted aircraft like drones offer attackers the means to mount 'stand-off' attacks and effectively spread aerosolised pathogens. Besides specific technologies, there's also the fact of greater global travel and exchange. International passenger traffic has increased from about 200 million passengers in 1980 to 1.9 billion passengers in 2019, just before the pandemic. (International Energy Agency n.d.) Since some biological agents are easy to smuggle or can be carried on human hosts, this presents an important vector through which biological weapons attacks can be mounted.

II The Lures and Pitfalls of Biological Weapons

Both states and non-state actors could use biological weapons. How they use them depends on their incentives. For states, we postulate three broad considerations: attributability, effectiveness, and downsides.

Attribution: The challenge of attribution is generally referred to in the context of either terrorist or cyber attacks.

A study of state-backed terrorism by Keir Lieber and Daryl Press examined 18,328 terrorist attacks from 1998 to 2008 and found that the perpetrators were identified 42 percent of the time. (Lieber and Press 2013, 89) Furthermore, they examined attacks against NATO states, Australia, Japan, and Israel during the period that killed 10 or more people and found that attribution was made in 36 out of 37 cases. (Lieber and Press 2013, 90) Given that attribution was most likely when both state capacity and fatalities were high, they conclude that states are unlikely to sponsor nuclear terrorism against a major power given the likelihood of attribution and subsequent retaliation. (Lieber and Press 2013, 103-104)

There persists a robust debate about what constitutes attribution in the cyber. (Rid and Buchanan 2015) Thomas Rid and Ben Buchanan argue that "Matching an offender to an offence is an exercise in minimising uncertainty". (Rid and Buchanan 2015, 4) This probabilistic conclusion is reached by building a composite picture using information and insights gleaned at both the technical and political levels. While there are no reliable statistics available on successful attribution of cyber attacks,

Rid and Buchanan offer an important insight into how attribution can occur beyond the forensic level.

What are the implications for a state considering the use of biological agents? There are factors that make it easier for a target state to successfully attribute a bioweapons attack. Unlike with an explosive attack, there is typically no physical destruction involved. This means evidence such as CCTV footage and eyewitness statements could potentially help investigators trace the origins of a bioweapons attack.

On the other hand, depending on the pathogen used, lag time could complicate efforts to track down a plausible patient zero. This is especially so if attackers release biological agents at multiple locations, as a redundancy measure or to complicate contact tracing. Depending on the pathogen used, it may take the target state some time to recognise the possibility that it was attacked, if such a determination is made at all.

Further, it is difficult to attribute the origin of a bioweapon which is biologically close to a naturally occurring pathogen. This is best demonstrated by the controversy surrounding the origin of SARS-CoV-2. Attribution is also likely to be complicated in the near future because of rising antimicrobial resistance. It may be impossible to determine if pathogens that are resistant to vaccines and treatments are natural mutations or have been artificially modified.

However, even with these ambiguities, the attacking state runs several other risks that could lead to attribution. Prior intelligence could help the target state intercept the attacking state's human agents along with the biological agents in their possession. Biological agents could be intercepted during routine stops at airports. Remotely piloted vehicles spraying aerosolised agents could be brought down or crash due to malfunctions.

Since we have no proven cases of a transnational attack using biological agents (not counting biotoxins) since 1945, there is no empirical evidence available to gauge the risks that an attacking state runs. This uncertainty, combined with normative factors may explain why states have hesitated to use bioweapons.

Effectiveness: Biological agents do not generally make for effective tactical weapons. Given lag times, uncertainty about the speed of spread, and the perils of blowback, they cannot be timed effectively as with conventional military operations. One possible exception to this is infecting the crews of enemy naval vessels prior to the onset of a crisis or conflict. However, the difficulties in actually carrying out such an attack are considerable.

Bioweapons could be potentially far more effective as strategic weapons, meant to disrupt economies and societies, sap morale, and divert resources from other priorities. The potential for ambiguity about the causes or origins of an outbreak are an added incentive.

However, for bioweapons to have strategic effect, they must be able to cause the intended damage reliably. For this to happen, the bioweapon must be effective at both causing the intended disease and spreading it.

While creating effective pathogens has been made easier by the availability of gene editing tools, this efficacy may have to be mediated by the need to ensure effective spread. For example, a

communicable pathogen directed at humans will spread more easily if those infected can remain asymptomatic for a period of time and yet transmit the disease to others.

Attackers may also need to make trade-offs between lethality and effective spread. A less-lethal or non-lethal communicable disease may spread more easily, while a deadly disease in which patients show distinct symptoms, may be more easily contained.

This creates dilemmas for both state and non-state actors. States may be content to achieve economic disruption in an adversary (less-lethal diseases may also be more difficult to trace and attribute). However, a state using less-lethal but highly communicable pathogens risks blowback on its own citizens or the citizens of friendly states.

For non-state actors seeking to create a mass casualty event, lethality is paramount, but effective spread of the disease may require multiple attacks or aerosolised release. The sole non-state actor known to have attempted aerosolized release was Aum Shirnikyo, which failed at the task of creating an aerosolised version of anthrax. (Danzig and Hosford 2012) On the other hand, open air tests carried out by the Soviet Union using the smallpox virus were highly effective, and even resulted in multiple unintended deaths. (Leitenberg and Zilinskas 2012, 121-134)

Future attackers will also benefit from new technologies that make dispersion of a pathogen easier. Small-sized remotely piloted vehicles may be effective at this role. The ability of such vehicles to be launched from anywhere and evade detection makes them attractive to both state and non-state actors. While the payload on small RPVs will be low, it is possible for attackers to mount multiple attacks on different locations to ensure the spread of a pathogen. RPVs could be used in heavily populated urban centres, which increases the likelihood of both disease spread and the detection of the RPVs. Such vehicles could also be used more discreetly to attack crops and livestock. Attacks of this nature would likely be favoured by states that want to disrupt an enemy's economy.

Downsides: Any actor deploying bioweapons must take into account the risks involved. This risk is a product of the likelihood of successful attribution and the impact of such attribution on the power or the survival of the attacker.

For non-state actors with an apocalyptic bent, attribution may be desirable. Such organisations may either embrace their own extinction as a necessary step to achieve higher goals, or place trust in their decentralised structure to limit damage. Overground non-state actors may choose to risk mounting less-lethal attacks as well. They can seek to limit damage using a combination of misinformation (alleging government conspiracies or claiming that the other side attacked first) and plausible deniability (attributing the attacks to 'rogue elements' or 'lone wolves' within the organisation that have since been purged).

Non-state actors seeking to create an independent state of their own may be less likely to carry out bioweapons attacks. Research shows that such organisations often portray themselves as following the laws of armed combat and international law more generally. To achieve their war aim, separatists often "signal their capacity and willingness to be good citizens of the international community to which they seek admission." (Fazal 2017, 71) This means they have fewer incentives to mount biological attacks.

The first state to mount a significant bioweapons attack must bear the risk of suffering high costs. Any use of bioweapons (other than targeted use of biotoxins) would be a major violation of norms

established for nearly a century and other states could seek to punish the attacking state in an attempt to re-establish these norms.

However, states are capable of gradually weakening the norms associated with bioweapons. This is most likely to happen through low-grade, perhaps non-lethal attacks, that are difficult to attribute. The ubiquity of conspiracy theories and misinformation, as well as the habit of states to blame adversaries for natural phenomena, foster an environment in which states can get away with a minor bioweapons attack. If such attacks are nevertheless followed by a series of mutual retaliations, norms against the use of bioweapons could weaken considerably.

III How Biological Weapons Could be Used

Table 1: Motivations for bioweapons use

	STATE	NON-STATE ACTORS
Reasons to develop biological weapons	<ul style="list-style-type: none"> ○ Targeted weapons that can be used for limited strategic effect ○ No need for stockpile, fairly easy to recreate ○ Difficult to track 	<ul style="list-style-type: none"> ○ Lower cost of development ○ Relative ease of procurement ○ Justified by occurrence of diseases in religious texts ○ Can create fear in target populace ○ Difficult to track
Reasons not to develop biological weapons	<ul style="list-style-type: none"> ○ Reputational, economic, and military costs incurred if successful attribution is made ○ Other weapons may be more effective or suitable to the state’s requirements 	<ul style="list-style-type: none"> ○ Maintain reputation, avoid international isolation if successful attribution is made
Kind of biological weapons	<ul style="list-style-type: none"> ○ State actors would focus on developing bioweapons that are difficult to attribute and can used to achieve limited political goals 	<ul style="list-style-type: none"> ○ Non-state actors are likely to focus on developing bioweapons that maximise casualties

We envision five scenarios in which new-age bioweapons could be used.

One, states could use non-communicable pathogens as assassination tools. In 1978, Bulgaria’s secret service killed the dissident Georgi Markov in London with the bio-toxin Ricin (Nehring 2017). Russian assassins have allegedly used radioactive isotopes and nerve agents in more recent attacks. However, biotoxins that are difficult to treat but do not risk wider infection provide another alternative in the future (Groll 2018).

Two, non-state actors will seek to produce and deploy biological weapons. Religious cults in particular seem to have an affinity for such weapons – as the attacks by Aum Shinrikyo and

Rajneeshee attest. For apocalyptic terrorists, bioweapons are attractive not only because they are a relatively easy way to inflict mass death but because diseases carry with them the connotations of divine retribution.

Three, states or warring factions may choose to deploy bioweapons during civil wars and insurgencies. Repressive states may use biological agents against inconvenient minorities or even populations under mass incarceration (while inoculating their own personnel). Indeed, bioweapons may be used in a manner depressingly familiar through history: against besieged cities. In 1346, the Mongols infamously catapulted diseased corpses into the fortified city of Caffa (modern Feodosia in Crimea), infecting the city's defenders with the Black Death (Riedel 2004).

If the more recent sieges of Aleppo and Ghouta in Syria are any indication of how future civil wars will unfold, besiegers will have powerful incentives to engage in biological warfare. Cities under siege will be short of the medical supplies and personnel needed to properly diagnose and treat illnesses. The circumstances of a civil war will also preclude investigation into the perpetrators. For example, during the Syrian civil war, inspection teams from the Organisation for the Prohibition of Chemical Weapons (OPCW) and the World Health Organization (WHO) came under fire from small arms and mortars (Bidwell and Bhatt 2016, 8-9). The inspectors were also limited in their mandate to simply determining whether or not an attack had occurred; they could not work to determine which party had carried out attacks (Bidwell and Bhatt 2016). In the event of a biological attack in similar circumstances, investigators may not have the remit to identify a patient zero or have access to detailed health records. While investigators may be able to obtain samples of a pathogen, this may not provide enough information to identify the attacker.

Four, states may mount calibrated 'less-lethal' attacks on other states that limit escalatory options. We can imagine a designer pathogen unleashed on US military bases in the Middle East or North-East Asia. Such an attack may cause few or no fatalities but could create enough disruption to seriously hamper any planned military operations or exercises.

States can also mount less-lethal attacks against farms and livestock of an adversary to create economic and social disruption. Such attacks may directly kill no humans and may be impossible to attribute, while causing panic, creating pretexts for other states to impose trade restrictions on agricultural goods from the target state, and causing economic loss. There is even a precedent for such attacks in Rhodesia's use of anthrax to target both rebels and their livestock. Evidence for the Rhodesian bioweapons programme remains murky even today and has become clearer only decades after the conflict (Cross 2017).

Less-lethal attacks of this kind pose a deterrence problem for states without bioweapons. In 1970, US President Richard Nixon rationalised his decision to give up bioweapons by saying "If somebody uses germs on us, we'll nuke 'em" (Safire 1995). India's nuclear no-first-use nuclear doctrine similarly makes an exception for "major" biological and chemical weapons attacks (Ministry of External Affairs 2003). However, the nuclear option isn't credible against lower order attacks. This is especially so if the attacking state is itself a nuclear power that also wields a panoply of other conventional and chemical weapons as well, as North Korea does. In such circumstances the target states would have to take recourse to non-kinetic measures like sanctions or cyber-attacks. Any effective multilateral sanctions regime against a state using bioweapons presumes strong norms against their use. If these

norms were to be diluted, such less lethal biowarfare aimed at economies could become as common as present-day cyberattacks.

Five and finally, states or regimes facing imminent extinction at the hands of internal or external enemies may choose to unleash all the deadly pathogens in their arsenal, with potentially devastating consequences.

IV The Need to Revisit the BWC

Despite the expanding threats, bioweapons have not been accorded the serious attention bestowed on nuclear or chemical weapons. This is quite obvious from a comparison of the composition of the BWC with its equivalent treaty – the Chemical Weapons Convention (CWC). The CWC headquartered in The Hague has approximately 500 employees. On the other hand, the BWC Implementation Support Unit consists of only three people.

The absence of a verification instrument is a recurring criticism of the BWC. It has been long recognised that lack of verification renders the treaty toothless and ineffective. The CWC, on the other hand has a verification mechanism that allows international inspectors to scrutinise chemical plants of interest, based on a pre-agreed classification of chemicals recommended by CWC's scientific advisory board (Tucker n.d.).

The case for a similar inspection mode for bioweapons has been actively challenged. There are significant differences between the dual-purpose uses of chemicals and biological entities. For one, biological agents that can feed into bioweapons or for peaceful purposes may be difficult to differentiate. Bioweapons may also be required in smaller quantities than chemical weapons, since they contain the unique characteristics of self-proliferation in the host/outside environment. Thus, while chemical facilities can be easily inspected on the basis of quantities of hazardous chemicals they store, biological facilities cannot be assessed using the same metric.

Despite these challenges, the BWC member states have previously attempted to devise a verification protocol. The latest of these attempts was the convening of an ad-hoc committee known as the VEREX group in 1991 by the Third Review Conference. Even in the backdrop of this attempt, US Ambassador Ronald Lehman, Director of the Arms Control and Disarmament Agency, stated that:

“The BTWC could not be verified effectively because biological production facilities are dual-use and lack distinctive “signatures”;

A negotiated regime could not be sufficiently intrusive to detect clandestine facilities, generating false confidence that a country was in compliance when in fact it was not; and highly intrusive inspections by multinational teams could expose both government and commercial facilities to foreign espionage. In particular, the loss of valuable trade secrets could weaken the competitive edge of the US biotechnology and pharmaceutical industries” (Office of Technology Assessment 1991, 74).

This was not surprising – the US had always maintained that a bioweapons treaty was non-verifiable (Foreign Relations of the United States 1951). This was, however, in opposition to other

countries. In 1999, the European Union reiterated its demand to establish a verification regime (Roberts 2003, 30).

After much deliberation the VEREX group suggested 21 confidence-building measures to strengthen the implementation of the BWC including mandatory declaration of facilities, random transparency checks and investigations into suspect sites. However, after years of debate, in 2001 this verification mechanism was found to be unacceptable to the US, which believed its benefits did not outweigh its risks. Reasons for American obduracy included the uncertainty of differentiating and identifying a bioweapon from a naturally occurring agent, especially in the absence of any overt traits like gene manipulation and the risks to biodefence preparations and the dual purpose nature of biological agents (Roberts 2003, 30-31). This last reason is of particular importance to the US which has a prolific biotechnology industry, supported by research and development companies. There is considerable fear that the provisions of BWC can be misused for espionage by foreign entities on original research being carried out in these research units. As a consequence, there has been no serious attempt to revive the need for a verification protocol; however, recently Chinese Ambassador for Disarmament Affairs Li Song called for the relaunching of the verification protocol negotiations (CGTN 2021).

Even the voluntary confidence-building measures which require member parties to voluntarily exchange information on vaccine production plants, biodefence programs, and unusual disease outbreaks have seen little active participation. From 1987 to 1995, only 70 of the then 139 member states of the BWC submitted data declarations, and only 11 took part in all rounds of the information exchange (Tucker 2002).

While the absence of any significant state-driven biowarfare incident may have led to this neglect, the arrival of new dual-use technologies such as synthetic biology and genome editing have exposed gaps in the international regulatory architecture that need to be filled to prevent the proliferation of bioweapons.

Given these changes, the BWC is likely going to be insufficient to prevent the proliferation of bioweapons. The convention is structured around states and there is scant provision to tackle the threat of non-state actors indulging in biowarfare. Furthermore, the failure of signatories to arrive at a verification mechanism has rendered it toothless. Notably, Israel has not signed the convention and so their bioweapons status is open to speculation.

The convention itself is underfunded. Much of the 2018 December Review Conference was devoted to finalising a mechanism to continue funding the meagre implementation support unit. However, higher funding alone will not overcome the shortcomings of the BWC. Fewer than 15% of participants in the Wilton Park study felt greater resources alone would be sufficient to address the risks posed by high consequence bioweapons.

It is thus necessary not only to strengthen the BWC but to reimagine it to adapt to the expanded theatre of bioweapon use. It is important to recognise the possibility of non-state actors abusing biological agents as weapons of mass destruction. A non-state actor aiming to cause maximum damage using limited resources could produce an imperfectly engineered or manipulated biological entity that is nevertheless capable of having catastrophic effects. In this sense, containing the spread of the biological agent in the territory of one state-party and subsequently placing liability of response on

one state-party might be insufficient. Instead, a global approach to curtailing and responding to the threat of biowarfare is more prudent.

V A New Biological Weapons Treaty:

We propose a renewed treaty between state parties that is represented by scientific and diplomatic personnel from signatory parties. The current treaty only has diplomatic representation, but lacks the scientific board that is a feature of the Chemical Weapons Convention (CWC). The overarching mandate for the treaty would remain the prevention of a biological weapons attack. There are three steps in biowarfare that need to be addressed. First, reducing the proliferation of agents and associated weaponisation technologies. Second, detecting and swiftly containing a biological outbreak. Third, the identifying biological outbreak as a bioweapons attack and the perpetrating party and institutionalising a sanctioning structure.

The Scientific Board

Unlike the CWC, the current BWC does not have a permanent scientific board that can keep itself apprised of technology changes and thus recommend operational standards for using the various technologies. It is, therefore, crucial that any new treaty have an established scientific board which periodically reports on any incidents and threats associated with emerging technologies. The board should consist of scientists and clinicians from the signatory countries as well as representatives from the World Health Organisation (WHO) and Global Health Security Agenda (GHSA). The scientific board should have the powers to invite representatives from other governmental and non-governmental organisations to investigate outbreak events or leakage incidents in signatory and non-signatory countries.

Categorisation of Emerging Technologies and Applications

In addition to periodic reporting, the scientific board could also establish and maintain an updated list of sensitive technology applications and agents, based on their amenability to manipulation, ease of use, and possible threat to human and environmental health. For example, gene editing is the underlying technology in both somatic gene editing and gene drive studies. However, the use of a malicious gene drive can cause much greater damage than the malicious use of somatic gene editing. Thus, a prioritisation of technologies would help create regulations to accordingly govern them.

Access to healthcare and general standard of living of citizens should also be considered when prioritising disease-causing agents. Diseases which may be considered relatively harmless in places such as the US, may wreak havoc in other parts of the world which have weak primary healthcare networks. For example, much of the dialogue in the US is centered around a potential outbreak of Ebola or anthrax on US soil; but in case of India, a simple outbreak of pandemic flu or vaccine-resistant measles could be disastrous.

The two categorisations based on risks of technology and agent would help arrive at a risk index for the use of a particular combination technology and an agent. It is important to note that a

particular technology or agent by itself might not be harmful, but the application of the technology on a specific agent might yield a hazardous product. It is therefore prudent to assess hazard levels based on the final product, not on the technology of agent by itself. For example, the use of gene editing in the flu virus could result in a potentially dangerous pathogen. However, the simple maintenance of *E. coli* in routine culture is unlikely to pose any hazard, as long as appropriate biosafety measures are followed. Thus, the risk index, and associated precautionary measures, will be higher for gene editing in flu as compared with maintenance of *E. coli* cultures. The comprehensive list of technologies and agents – categorised by their risk level – would help individual countries decide on countermeasures to prevent their proliferation and respond to any incident.

The Common Minimum Programme

To prevent proliferation of technologies that may be abused for weaponisation, the Scientific Board could agree to a common minimum program that prescribes practices for laboratories using those techniques/agents.

These practices could include courses on ethics, material management practices, personal protection practices and safe disposal practices. Further, institutions should be encouraged to maintain a management unit to ensure that these practices are followed and mechanisms put in place for reporting any non-compliance. The recent incidents in the US and Russia at facilities housing biological agents reveal the inability of existing measures to curb leakages and highlights the need for implementing a more stringent programme. The lab leak theory of SARS-CoV-2 also hinges on the research on a pathogen being carried out in a less-equipped laboratory facility.

A key concern of established accreditation standards such as Good Lab Practices (GLP) or International Organization for Standardization (ISO) is the high cost associated with their implementation. This increases barriers for their adoption and discourages smaller organisations including startups and small businesses in lower income countries from adopting them. The degree of standards and compliance required to be followed by institutions could be tiered according to scale and risk index of the operation. For example, research on gene drives which could be potentially misused to transfer malicious cargo across large swathes of a target population should be subject to more scrutiny than normal somatic gene editing.

The common minimum program should address the least number of regulations laboratories need to set up to use the various technologies. Individual countries could then supplement the list based on their internal requirements.

Creating an Epidemiologic Database

Numerous infections – both existing and emerging – currently remain unidentified. Further, pathogens keep on evolving and it is difficult to establish if a new pathogen has arisen from a natural event or as a result of human deliberation. Thus, it is important to track pathogen evolution and geographic location as an aid to understand how diseases spread and if a certain event may be a result of intentional human intervention. In consultation with WHO and GHSA, this treaty should form a database of disease patterns across geographies and communities. The treaty could also take measures to set up a repository of naturally found pathogens and document genetic changes found in

them over time. Such a database could be used to analyse changes in pathogens and determine if any intentional changes have been made.

Advances in scientific understanding of genetics could also create the ability to develop targeted bioweapons. These might be used to covertly attack individuals or ethnic groups who share a genetic identity. Whether the use of bioweapons for strategically targeting individuals should fall under the remit of the BWC or any new treaty remains debatable. But the use of bioweapons for targeting ethnic populations should be considered on par with their use as weapons of mass destruction. State or non-state actors that mount such attacks can also be subject to the UN's 1948 Genocide Convention.

To mitigate the dangers of such weapons being developed, an international database would help establish patterns of normal and unusual disease outbreaks. Any significant changes in pattern (say affecting more than 1000 individuals over a period of 3 months) could be referred to the alliance for a healthcare response.

Universal Healthcare Response

However, even the strictest regulation will not guarantee the non-proliferation of biological weapons. Thus early detection and containment of biological attacks are of paramount importance. In this regard, strengthening the GHSA to work in complement with the BWC would help countries set up and achieve healthcare targets. For example, countries could agree on a standard time to detect an unusual infectious outbreak – say 72 hours. Countries could then work together, to set up the infrastructure and technology required to achieve this standard, taking into account the constraints of funding and terrain of the host country. Technology transfers, particularly for point-of-care diagnostics which can detect outbreaks quickly, should be prioritised under the alliance, even if this upsets some pharmaceutical companies.

The treaty could facilitate alliances between member countries to work together on relevant problems – for example a subgroup of Australia, Bangladesh, India and Malaysia could work on healthcare responses to the Nipah outbreak. This subgroup could work on improved diagnostics, vaccines and management of Nipah through student exchange, technology and knowledge transfer. Finally, the alliance could also work towards setting up precautionary measures and response guidelines for civilian use in case of a biological outbreak.

Sanctions and Penalties

Currently, there are no outlined penalties for developing bioweapons or for not adhering to established biosafety standards. The new treaty should outline these in the context of state and non-state use of bioweapons. It must also devote serious consideration to the dangers of non-state actors using bioweapons and the challenge of crafting an effective global response to such an event. Currently, the BWC holds states responsible for any bioterrorism activity in their territories. It does not, however, contain a mechanism for a coordinated transnational approach to this threat. Non-state actor-led bioterrorism is a global threat and needs to be addressed as such. Holding individual states responsible would be ineffective in resolving this issue. Thus, instead of drawing state-parties into a treaty wherein they are individually responsible for biological attacks in their own territories, a stronger alliance of countries who want to fight the threat of biological weapons is warranted.

However, enforcing penalties is difficult in the absence of mandatory verification. This has been most ably demonstrated by the COVID-19 experience, where a thorough investigation into possible laboratory origins of the Sars-CoV-2 have been negated by the lack of activation of BWC or UNSC. A mandatory verification mechanism combined with a sanctions regime may have led to the early identification and rectification of any possible compromised standards at the Wuhan Institute of Virology. In the absence of mandatory verification, sanctions and penalties may become limited to overt bioweapons such as biotoxins and genetically manipulated biological entities.

VI Conclusion

The theatre for bioweapons use may no longer be limited to states carrying out mass attacks. Instead, the range of threats has dramatically widened to include use in assassinations, civil wars, targeting ethnic groups, and mass-casualty attacks by non-state actors.

Advances in biotechnology and improved access to scientific knowledge may make bioweapons a feasible option for both states and non-state actors. The BWC is ill-equipped to deal with these threats. A new bioweapons treaty is required to address concerns arising from these new threats. This new treaty would require adequate funding and a scientific advisory board tasked with evaluating emerging technologies. The treaty also needs to take a more proactive role in documenting natural/suspicious outbreaks and use an evidence-based approach to assess outbreaks.

It often takes crises or tragic events to prompt the world's states into taking coordinated action. However, to wait for such an incident to occur to take biological weapons seriously would be a folly. A single incident could threaten the whole world and would not be containable by any sarcophagus. Hence, there is an urgent need to develop clear ways to tackle both the proliferation and fallout of bioweapons. Furthermore, the healthcare standards and infrastructure that need to be set up will not only help ward off biological attacks but will have salutary effects on our ability to prevent and contain natural epidemics that impact the health of the whole world.

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The Indian Judiciary and Civil Society

Review article on “Justice for the Judge: An Autobiography” by Ranjan Gogoi

Madhav Godbole*

Justice Ranjan Gogoi’s book “Justice for the Judge: An Autobiography” (Rupa, New Delhi, 2021 (pp. 249+xiii) is a fascinating read. It raises a number of thought-provoking issues, which call for serious introspection by society at large. The reception of Justice Gogoi’s book has been along expected lines, showing how highly polarized is not only the polity but also the media.

Most Powerful Judiciary

India’s judiciary is acclaimed to be among the world’s most powerful; surprisingly, then, Gogoi considers it ‘*the weakest of the three branches of government*’. (p. 102) In fact, the Indian judiciary has emerged as the third (and at times the only) House of Parliament. To cite just two decisions in this regard: enunciation of the concept of the basic structure of the Constitution, and mandating major electoral reforms. With its activist role in the public interest litigation, it is often seen as running the government. Unlike in several other countries, it has not shied away from addressing even purely political issues. It is the only judiciary in the world where Supreme Court judges appoint judges of the higher judiciary.

Conventional Adversaries

Inevitable, the judiciary faces a number of adversaries. The prime adversary has been the executive, as seen from the time of the Emergency. Prime Minister Indira Gandhi wanted to bring the judiciary fully under the control of the executive by, among other actions, transfers of high court judges and even supersessions of Supreme Court judges for appointment as the Chief Justice of India.

It was always recognized that the judiciary faced as much danger from within as from outside sources.¹ Justice Gogoi has written: ‘*Some of my colleagues, while putting up a façade of support and sympathy which I did not seek, actually worked against me behind my back.*’ (p. 142) He has also lamented: *I wish there was more camaraderie and brotherhood amongst the judges.* (p. 207)

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Emergence of civil society as adversary

Civil society is considered to be a strong ally of the judiciary. But, for the first time, Justice Gogoi has brought out how an articulate and active section of the civil society can undermine the authority and the credibility of the higher judiciary by a persistent crusade, with the silent majority of the civil society remaining disinterested as if the issues are of no concern to it. Its effect is magnified by fake news, motivated and deliberate misreporting, and part-reporting of facts. As a result, the integrity of the institution comes to be questioned in public perception.

Justice Gogoi has quoted a number of instances in support of this contention. He has lamented: 'Of late, ...it has become a convenient slogan that is being used very selectively by a group of activist lawyers and academics to judge the judges. This development, in my opinion, does not augur well for the institution.' (p. 115) Gogoi has written: 'Report cards are prepared at the end of the tenure of judge. The message is clear: a good report will come at a cost; if you are not prepared to confirm to a particular way of thinking and act accordingly, you will earn the dubious reputation of having compromised and surrendered the independence of the judiciary.' (p. 116) He has brought out that 'sealed cover procedure' had been in vogue in the Supreme Court for a long time but he was criticized for innovating it. (p. 121) Justice Gogoi has also explained that the in-house procedure laid down to inquire into allegations or complaints against the high court and Supreme Court judges was well-established and clearly provided that advocates were not to be permitted etc. In total disregard, unjustified criticism was made against him in the case of allegations of sexual misconduct levelled against him. (pp. 132-140)

The very title of his autobiography, *Justice for the Judge*, says it all. (pp. 142-3) Throughout his chief justiceship, there was a tirade against him. He has brought out how an inquiry by Justice A.K. Patnaik, a retired judge of the Supreme Court, had held that "*the existence of a conspiracy [against Gogoi] cannot be completely ruled out*" but he was not able to obtain various records including electronic records of WhatsApp, telegram, etc. The Director of Intelligence Bureau had told Justice Patnaik that the conspiracy could have been hatched due to tough decisions taken by the Chief Justice in the case relating to the National Register of Citizens, and tough decisions taken in some administrative matters. (p. 153) The report was considered by a three-member bench and the matter was closed as "*two years having passed and the possibility of recovery of electronic records at this distance of time is remote, ...no useful purpose will be served by continuing these proceedings.*"

Justice Gogoi has referred to a number of highly controversial cases in which the Supreme Court's decisions have been questioned. But, he has rightly emphasized that these were decisions of division benches.

A reference may be made to the warning Justice Gogoi has sounded: 'I think the time has come for the right-thinking majority to speak up. They can no longer enjoy the comfort of the non-confrontationist approach, staying clear of issues and being content that they have been spared the unfortunate. For, if unchecked, tomorrow the monster may devour them too.' (p. 150)

Ramjanmabhoomi-Babri Masjid case

As it has been said, Supreme Court's decision is final not necessarily because it is correct but because there is no appeal over it! All decisions of the apex court must be looked at and accepted in this light.

A case in point is the Supreme Court decision in the Ramjanmabhoomi-Babri Masjid case. I have been highly critical of this decision and have brought out my reservations in a number of articles on the subject, including in a recent review of Salman Khurshid's book, *Sunrise Over Ayodhya*ⁱⁱ. But, it is a unanimous judgment of five judges. The process of decision-making brought out in Gogoi's book shows that each of the five judges had independently arrived at the same conclusion and, as a result, a unanimous judgment, without ascribing authorship to anyone of them, was delivered.ⁱⁱⁱ Significantly, Gogoi has made no mention of the addenda to the judgment emphasizing the importance of '*faith and belief*', quite contrary to the emphasis in the main judgment on evidence adduced by the parties. It is unfair to ascribe any motives to anyone. Justice Gogoi deserves credit for disposal of the Ramjanmabhoomi-Babri case, in spite of all odds, and bringing a closure to this long festering, highly contentious, communally divisive and charged dispute.

National Register of Citizens case

A considerable part of the book is devoted to the National Register of Citizens (NRC) case. The Assam agitation, from 1979 to 1985, was ostensibly a movement with three demands—detection, deletion (from the voters' lists) and deportation of foreigners. (p. 157) Apart from the Assam Accord signed on 15 August 1985, there was also the tripartite meeting between prime minister Manmohan Singh, chief minister of Assam, Tarun Gogoi, and the All Assam Students' Union in 2005, when a decision was taken to update the NRC. However, it was only half-heartedly implemented in 2010. Thus, whatever may be their present stance, the Congress Party and the United Progressive Alliance (UPA) government had given commitments in this behalf which had remained unfulfilled.

Finally, the Supreme Court had to step in in May 2013 to bring a finality. This shows once again the failure of the political parties, leaving such contentious issues to be settled by the apex court. This is hardly anything to be proud about for Indian democracy. Justice Gogoi is highly critical of the media, and particularly social media, regarding the manner in which the final report of NRC has been commented upon. (p. 175)

The question whether there should be a nationwide register of citizens is still open and needs to be debated widely and dispassionately. In doing so, it will have to be noted that the procedure for such a register will not have to be the same as for the Assam NRC, as the latter was dictated by the provisions of the Assam Accord.

Judicial Reforms

Mention must be made of a disappointing aspect of the book. Though intermittent references have been made to the imperative need for judicial reforms, there is no focused discussion on the subject. Gogoi does "*not believe in Lok Adalats as a viable and judicious means of dispute resolution except in petty criminal cases...*" (p. 59). He bemoans the fact that in the Union Budget only about 0.2 - 0.4% of the

allocation is for the judiciary and “shockingly, the average allocation of funds for the judiciary in the state budgets is again a negligible percentage of the total allocation.” (pp. 60-61)

Two statements in Gogoi’s book are particularly striking. First: ‘Though numerically the pendency of cases is very high in each court, my understanding of the situation is that a large number of the pending cases can easily be put in the category of ‘non-essential’, ‘not contested’ or ‘infructuous’ matters. The truly contested cases or cases of substance would be perhaps not more than one-third of the total pending cases...One-third of the above pendency is still a considerable number.’ (p. 62) If this is so, I do not know why such an exercise of categorization has not been done by the Supreme Court so far.

In the third Ramnath Goenka Memorial Lecture, Justice Gogoi had mentioned that the judiciary in the country needed a thorough shakeup, a revolution and not mere reforms. (p. 104) He has not elaborated on what steps he took as the CJI in this direction. As a result, it remains mere rhetoric.

The other statement is equally disconcerting: ‘After interacting with the members of the political branch on this issue [tenure of high court and Supreme Court judges], most informally, the impression I gather is that, by and large, the thinking is that Supreme Court judges should not have long tenures and the CJI [chief justice of India], in particular, should not remain in office for more than a year.’ (p. 64) This is shocking, to put it mildly, and will be the surest way of weakening the judiciary which has been assigned such an important role in India’s Constitution. The present revolving-door policy, as seen from the very short tenures of most CJIs, is hardly conducive to dealing with the challenges facing the judiciary.

Experience has shown that the future of Indian democracy will be greatly dependent on effective counter-check on the actions of the executive and even Parliament, to be exercised by the judiciary. As I had urged in my book, *The Judiciary and Governance in India* (2008), the question of tenure of the CJI needs to be debated nationally.^{iv} Looking to the experience of arbitrary decision-making in selection of CJIs in 1973 and 1977, the criterion of seniority should continue to be supreme, but with the proviso that the person to be appointed as CJI must have minimum two years’ service left for retirement.

As brought out in my latest book, *India - A Federal Union of States: Fault Lines, Challenges and Opportunities* (2021), constitutional cases are being relegated to the back-burner, with appellate work swamping the Supreme Court. There is, therefore, need to create a separate Division of Constitutional Court consisting of nine full-time judges. If Justice Gogoi had dealt with this matter in the book, it would have helped immensely in taking the discussion further.

Successive chief justices of India have expressed concerns about judicial reforms while in office and after retirement. One of them, Justice T.S. Thakur, had even shed tears about it publicly. I had invited attention to the gravity of the subject in at least two of my articles, one in the *Economic and Political Weekly*^v and the other in *First Post*.^{vi}

Divine Force?

It was on 13 September 2018, coinciding with Ganesh Chaturthi, that “*the warrant signed by the President of India appointing me as the CJI was brought to my residence*”, Gogoi has written. (p. 110)

The arguments in the Ayodhya case commenced on 6 August 2019, were heard for 40 days, and concluded on 16 October. Justice Gogoi was due to retire on 17 November.

Justice Gogoi has written: ‘Suddenly, without my knowledge, the [Ayodhya] case got listed on 4 January 2019. At that time, I had not even constituted the Bench that would hear it. Also, my assessment of the state of readiness of the case for hearing was yet to be completed. Neither the Secretary General nor any of the registrars could explain how the case got listed without my knowledge and permission.’ (p. 183) He continues: ‘...But the way things progressed and ended convinced me that there was a divine force which made the conclusion of the case, regardless of the way the judgment went, possible.’ (p. 190) This is further borne out by another fact. “A somewhat unusual feature of the three-month hearing was that no judge on the Bench availed of casual leave even for a day. No judge on the Bench suffered even from a common cold or fever that kept him away from the hearing. Equally inexplicable was another occurrence. One of the judges told me that he might have to take leave for a few days as a close relative was seriously ill and, in the ICU [intensive care unit] of a hospital. I told him that he might not require to do so as his relative would recover. This was in order to console and comfort him. The judge did not take any leave, and I too did not ask about his relative as presumably he had recovered.” (p. 190)

As compared to the other constitutional cases, this was a unanimous judgment of five judges, with “authorship undisclosed”. Thus, drew to a close “*one of the most protracted and fiercely contested cases.*” (p. 193)

In this background, I am reminded of the Bharatiya Janata Party’s white paper, *Ayodhya and the Ram Temple Movement*, which had us believe that ‘the idol of Ram has appeared on the night of 22nd and 23rd December 1949, inside the main building [of the Babri Masjid], which had remained locked since 1934.’ (para 3.1, p. 23)

In the extracts of the Liberhan Commission report compiled by A. G. Noorani (*Destruction of the Babri Masjid: A National Dishonour*, Tulika Books, 2014), the author refers to the autobiography of the District Judge of Faizabad, K. M. Pandey, who passed the orders to open the locks on the gates of the mosque. In it, he narrates the visit of a monkey to his home, then to the courtroom and then back to his house before, during and after the pronouncement of his judgment. The monkey, he said, did no harm. He made an attempt to convey that the monkey inspired or directed him to pass a judicial order in an appeal against the order declining postponement of the date by the subordinate judicial officer, that too on the application by a non-party to the suit. (Noorani 2014, p. 162)^{vii}

Some corrections

It is stated by the author: “*Article 370 of the Constitution which conferred a special status on the then state of Jammu and Kashmir was revoked*”. (p. 125) (Emphasis added.) As has been held by the Supreme Court itself, this Article was meant to extend, in consultation with the state government, the remaining provisions of the Constitution of India to J&K, as the President may deem fit. Further, if the Article was meant to grant special status, it would not have been a ‘temporary’ provision. There would also not have been an enabling provision in Article 370 (3) for President of India to declare that “this article shall cease to be operative or shall be operative only with such exceptions and modifications and from such date as he may specify.”

It is stated that after the entire mosque was brought down by a horde of kar sevaks, “This sparked communal violence in the country as well as in neighbouring Pakistan and Bangladesh, and led to the **fall** of the elected government in Uttar Pradesh.” (p. 180) (Emphasis added) The Uttar Pradesh government did not fall but was dismissed by the President of India.

Actions which could have increased credibility

Justice Gogoi has accepted that, in retrospect, two of his decisions—presiding over the bench which held preliminary hearing in a complaint of sexual harassment against him, and accepting the nomination to the Rajya Sabha-- were wrong.

In the same category is Justice Gogoi’s participation in the press conference on 12 January 2018, which attracted considerable attention nationally and internationally, and at which actions of the then CJI, Dipak Misra, were publicly criticized by four Supreme Court judges. This was unprecedented and brought down the image of the judiciary. Surprisingly, Justice Gogoi sees nothing wrong in it and has stated, “I believe till today that, given the circumstance, it was the right thing to do...” (p. 101)

Equally difficult is his statement that “*despite the judiciary being the weakest of the three branches of government, it was the least dangerous for civil liberties*”. (p. 102) (emphasis added). Citizens look to the judiciary as a guardian of their rights and liberties. It will be a travesty if it takes credit for being the least dangerous for civil liberties.

In sum

Justice Gogoi’s book raises a number of troubling questions. Should the civil society not have a right to scrutinize and comment on the work of the judiciary? What is wrong in preparing report cards on the work of the judges, when such cards are also being prepared to assess the work of the legislators? Should the ‘in-house’ procedure for inquiries in respect of complaints and allegations against judges, which is shrouded so much in secrecy, be reviewed? Should the roster system be made more open? As in the cases of other institutions, there must be public accountability and transparency in the functioning of the judiciary. Should the system of judges appointing judges be continued?

It was shocking to see that the then government was so demoralized that it did not question the decision of the Supreme Court on the subject by filing a revision application. The same was true when the Supreme Court struck down the National Judicial Accountability Act. The time has come to reopen these issues and arrive at a workable compromise, which will address the concerns of the people at large as also the judiciary.

In this light, Justice Gogoi’s book must be read widely by all sections of society. The ‘silent majority’ about which Justice Gogoi has repeatedly talked of despairingly has to wake up and join the debate which is of such vital concern for India’s democracy.

Notes

ⁱ Madhav Godbole, *The Judiciary and Governance in India*, Rupa, New Delhi, 2008, pp.445-50.

ⁱⁱ *Shadows of Babri*, The Citizen, January 10, 2022.

<https://www.thecitizen.in/index.php/en/NewsDetail/index/4/21322/Shadows-of-Babri>

ⁱⁱⁱ Nilanjan Mukhopadhyay in his book, *The Demolition and the Verdict: Ayodhya and the Project to Reconfigure India* (2021) has stated: ...legal eagles, adept at decoding writing styles of judges fathomed that this [judgment] was penned by Justice D.Y. Chandrachud, Additionally, the judgment carried an addenda written by Justice Ashok Bhushan. (p. 226)

^{iv} Madhav Godbole, Op. cit., pp. 512-20.

^v Madhav Godbole, Report of constitution review commission: some reflections, *EPW*, 28 September 2002.

^{vi} Madhav Godbole, Narendra Modi's legacy should be bringing down the arrears of court cases in India, *First Post*, 16 January 2017.

^{vii} Madhav Godbole, *The Babri Masjid Ram Mandir Dilemma: An Acid Test for India's Constitution*, Konark Publishers, New Delhi, 2019, pp. 1-2.

Discussion

Casual Analysis of Unreliable Data for Strategising Child Development – D Narayana

This has reference to the paper titled [Securing the Future: Strategizing Child Development in Karnataka in the Aftermath of COVID-19](#) (Vol. 2, No. 6) by Arnab Mukherji in the latest issue of your esteemed journal. I wish to point out a few infirmities in arguments and reliability of the data, as also errors in presentation.

1. Re: Karnataka's Economy around the pandemic

Figure 3 presents the data on unemployment rate from September 2019 to September 2021. Except for April-June 2020, the unemployment rates post the first Covid wave are comparable to those in 2019-20. This is surprising. Leaving the national lockdown in April-June 2020 aside, the perception is that Karnataka suffered more during the second wave. But the CPHS data does not reflect it. Google/ Apple mobility data shows that the situation was worse in Karnataka during the second wave, with foot falls in work places, retail and recreation, and transit points all falling drastically. This makes the CPHS data suspect. There is hardly a mention of the reliability of the data, or at least limitations of the data, especially when there is a debate going on about the reliability of the data (See Dreze, Pais and Rawal, Salil Sanyal, and others).

2. Re: Public Expenditure in Karnataka

The researcher writes, “there is some evidence that expenditure compression has taken place”, then goes on to use the Budget Estimates, Revenue Expenditure, Capital Expenditure and Total Expenditure for 2019-20 and 2020-21, and actual receipts and expenditure during **April – December** of the two financial years. We have the Revised Estimates for the whole of 2020-21 and up to October 2021 of FY 2021-22 available on the CAG website.

I present the data here:

- Revenue Expenditure in 2020-21 is Rs 173086 crore (Rs 179776 crore BE) compared to Rs 165292 crore (Rs 181605 crore BE) in FY 2019-20. It is an increase of 4.72%.
- Capital Expenditure in FY 2020-21 is Rs 48510 crore (Rs 46512 crore BE) and Rs 42962 crore (Rs 42584 crore BE) in 2019-20. It is an increase of 12.91%.
- Total Expenditure too is Rs 218927 crore (Rs 226288 crore BE) in 2020-21 compared to Rs 202821 crore (Rs 224190 crore BE) in FY 2019-20. It is higher by 7.94% in 2020-21.

So, where is the expenditure compression in 2020-21?

Also, the remark “a large amount of this was committed expenditures such as interest payments, pensions, wages, and salaries, which could not be compressed” implies that essential expenditure on health and social support has been compressed. Interest payments and pension for FY 2020-21 are 87.56% and 85.26% of the BE respectively, whereas the total revenue expenditure is 103.21% of BE. Hence, that remark too is not supported by data.

3. Re: Household Narratives

The researcher says, “data from Karnataka from wave 16 – 21 (i.e., from January 2019 to December 2020) of the CPHS” has been used to “understand how incomes and expenditure have changed at the household level”. And “Table 3 presents quarterly estimates for income and expenditure for the last two quarters of the financial years 2017-18, 2018-19 and 2019-20 and for the first month of 2020-21”. That should be seven entries. In Table 3, however, there are only six entries, with the first month of 2020-21 missing. Yet the researcher draws the inference that “Table 3 shows that household budgets have been affected by COVID-19 – incomes declined by 14% in the January-March 2020 cohort, and further reduced by 38% in April 2020”. The numbers in the Table show that incomes increased by 26% in the January-March 2020 quarter compared to the previous quarter, and by 48% compared to the previous year. So, where is the reduction? Further, how do you assess the impact of COVID-19 without providing data for the period?

4. Re: Defining Priority Areas

The analysis of this section is based on Table 8 (not Table 1 as shown on page 50). The researcher draws inferences based on change between 2015-16 and 2019-20 in the selected indicators such as wasting, stunting etc., of children. If we go by the ‘falling behind’ computed by the researcher, then Bagalkot, Koppal, and Yadgir, for example are the best performers and Chikkamagaluru, Dakshina Kannada, and Kodagu are the worst performers.

However, consider the “% Stunted” figures in 2019-20: the levels are between 25.1% and 30.4% in the latter group of districts, compared to over 48% in the former group. Similar is the picture with regard to underweight, where the latter group reports levels below 27% while the former group has levels above 45%. So, if we go by the levels achieved, then the latter group of districts are the best performers. This highlights the importance of considering levels as well as change.

There is a related issue of data reliability here too. Take an indicator such as “% women 15-49 years who report BMI below normal”. Chikkamagaluru, Dakshina Kannada, and Kodagu report levels between 12% and 14.2%, compared to the levels between 17% and 26% in Bagalkot, Koppal, and Yadgir. The gains of the former group are also phenomenal. But severe child wasting in the former ranges between 9.3% to 15.7%, compared to 3.8% to 7.2% in the latter. It is hard to believe that in districts where the women are so well fed the children are allowed to go ‘waste’. It looks like the small sample size and estimation at the district level of NFHS is doing something well beyond our understanding. Before using the data, do we not have a responsibility to say something about their reliability, or at least to flag these issues of concern?

5. Errors in Presentation

Refer to Table 3. Source of the table is not shown. Notes to the Table mentions COV (coefficient of variation), but the Table has only Gini and not COV. The same problem gets repeated in Table 4. The Table shows data bifurcated by educational level. I am not sure column numbers and headings tally as regards income, expenditure, and residuals. Table number on page 46 and page 50 are wrong; they should have been 7 and 8 instead of 1 and 2. There are many more such examples one could find.

Response by Arnab Mukherji

This is with reference to the comments from Dr. D. Narayana on the paper titled “Securing the Future: Strategizing Child Development in Karnataka in the Aftermath of COVID-19”.

Thank you for a careful read and for the comments on data and other related issues. This helps emphasize some of the points highlighted and I'd like to respond to some of them specifically, and others more generally.

1. The paper was written at a point in time when COVID-19 Wave 1 had peaked, but Wave 2 wasn't on the horizon, i.e. around November 2020. At that time, neither was the microdata from CMIE available to capture the April–June 2020 quarter and nor was the fiscal data ready beyond the Budget Estimates (B.E.). Further, the contemporaneous public expenditure data, also taken also from the CAG website, shows that by December in FY2019-20 71% of total revenues had been received, whereas it was merely 59% in FY2020-21. The analysis presented is thus based on what would be seen as the impacts associated with very early exposure. Writing the paper 6 months down the road would of course imply availability of newer data, data patterns, and different inferences.
2. The CMIE data for Wave 21, labelled as March 2020 in Table 3, is for the period January – March 2020. The CMIE data essentially captures the shock that starts with the COVID-19 crisis building up and ending in the complete lockdown of the economy by the 3rd week of March 2020. This shock extended into the subsequent financial year, but this 2–3-week exposure is all that we capture in the paper. The key insight of the paper is that this initial exposure is sufficient to generate a very significant increase in inequality in some socio-economic groups – for example, if we look at households where all members are illiterate (see Table 4), we see that inequality rises to 0.414 from 0.364 from the preceding quarter and from 0.368 from a year ago – these are very large changes. In this sense, the household shock we capture is simply the tip of the exposure, and this alone has very large economic impacts on specific sub-groups as listed in Table 4.
3. NFHS 5 data is meant to be representative at the district level and as such, there should be no difficulty estimating univariate statistics such as mean, standard deviation, or the Gini Coefficient. This is widely used as such in a similar fashion, for example, see <https://geographicinsights.iq.harvard.edu/nfhs-tracker> from which I quote “... *the NFHS (NFHS-4) has been the only data representative of the district level for India*”; this is also true for NFHS 5. Thus, the deficits observed are real and quite worrisome, as the comments from Dr. Narayana implicitly capture. Further, surely the fact that the rank ordering of districts on levels is different from the rank ordering of districts while measuring changes isn't surprising. Districts with the largest absolute declines need attention and investigation into processes and mechanisms that led to such declines in children's nutritional status. That fact that districts that have historically been best performers have also lost much of their gains based on datasets meant to be representative of the population should be troubling.
4. Thank you for pointing out the errors in the labelling of the table and errors in internal referencing within the paper. All inconvenience to the reader in this regard is regretted.

The primary purpose of this piece is to present a framework for prioritizing districts for intervention in the context of children's nutritional status. As our exposure and understanding of COVID19 and its economic shock changes, both the underlying data and inference will change. Hopefully, this prioritization schema to identify districts for intervention will remain useful.

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