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Flexible Inflation Targeting: Concepts and application in India

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Abstract

The paper analyses issues important in adapting flexible inflation targeting (FIT) to emerging markets. This sets the context in which the evolution of FIT in India and its performance record are analysed. The dominance of supply shocks implies flexibility and fiscal-monetary coordination are necessary. Coordination can reduce the output sacrifice of disinflation, even as it aids fiscal consolidation. Communication has a major role in guiding expectations towards the inflation target. Strict implementation of inflation targeting imposed a large output sacrifice in the early years, but reversal to flexible implementation, in line with the original agreement, succeeded in keeping inflation largely within announced tolerance bands with a good growth recovery. Forecasting has improved and errors in both directions indicate the absence of bias. While there were supportive events in the initial years, such as the 2014 crash in oil prices and softening of food price inflation, the regime has also survived adverse periods of pandemic related supply-chain snarls and rising oil prices. A long period of disinflation and output sacrifice need not be necessary to anchor inflation expectations when there is complementary supply-side action. Since policy has to respond if inflation persistently exceeds the tolerance band, this also contributes to anchoring inflation expectations.

1. Introduction

The brief period of Indian adoption of inflation targeting (IT) has seen a reversal from a strict to a flexible implementation. Flexibility is more in line with the original agreement between the Reserve Bank of India (RBI) and the government, that was for flexible inflation targeting (FIT)[1], and with the theoretical evolution of IT that has always emphasized growth as well as inflation (Svensson 2007). It is also more sensitive to and better suited for Indian conditions.

In a period of great global turbulence, India's IT regime did succeed first in reducing inflation and then keeping it largely within announced tolerance bands. In the initial years of FIT there were supportive events, such as the 2014 crash in oil prices and softening of food price inflation, but a large growth sacrifice was imposed. However, the regime has also survived adverse periods of rising oil prices, when flexibility aided good growth recovery.

The paper starts with a discussion of considerations that arise in adapting IT to emerging markets (EMs), including the working of the expectations channel. This sets the context in which the evolution of IT in India and its performance record is then analysed. Some key insights/learnings from this analysis are:

i.   The output sacrifice from disinflation can be very large in an EM, where underemployment is high and it is mainly supply shocks that drive inflation. The pass through of policy interest rates is well established, and the interest rate elasticity of aggregate demand is high. But thin financial markets can create distortions in the term structure of interest rates. A rise in risk premiums can raise longer-term interest rates.

ii.   If fiscal supply-side action moderates inflation, the monetary policy committee (MPC) can keep real interest rates below growth rates (r<g) and reduce their volatility, which allows faster job creation, catch-up growth and fiscal consolidation, while risk premiums remain low.

iii. The expectations channel works well, since more weight is given to official communication when information is thin and inflation is volatile. When uncertainty is high, data-based guidance works better than time-based guidance. Markets value predictability, but even data-based guidance can be adequately forward-looking when the policy reaction function is known. Communication must make the latter clear.

iv.   Money supply is endogenous in an IT regime. Financial deepening also makes it so. But some surplus in durable liquidity is required to absorb the multiple shocks the system experiences.

v.   In the initial years, implementation of IT was stricter than it needed to be and did not respond adequately to data that departed from guidance. As a result, real rates were too high. It has matured since into FIT, that has delivered good growth recoveries while keeping inflation largely within the tolerance band in very difficult times. Deviations of the real rate from equilibrium are lower.

vi.   Since demand affects core inflation, the policy rate impacts this type of inflation. Core inflation is also easier to forecast. But headline consumer inflation, which includes volatile food prices, more directly affects household welfare and expectations. The headline inflation forecast error has also reduced, however, contributing better towards guiding inflation expectations. In the initial years RBI inflation forecasts always exceeded actual inflation, which contributed to real interest rates being too high. In later periods forecast errors were in both directions, which indicates there was now no bias in estimation.

vii. The choice of headline over core inflation puts more responsibility on fiscal policy, which has relatively more effect on the supply-side. India's choice of headline consumer inflation as the target variable worked because it is dominated by food prices that government can affect. Volatile international commodity shocks, that have a large weight in wholesale prices, are less amenable to domestic policy. Improved monetary-fiscal coordination has contributed to better results.

viii. In an open economy, capping foreign inflows into debt as a small percentage of the domestic market gives more freedom to keep the interest rate in line with the domestic cycle, while two-way movement of foreign exchange reserves help prevent excess volatility of the exchange rate.

Global supply issues did affect Indian inflation, but FIT succeeded in keeping headline inflation within the tolerance band, even as growth recoveries were good and financial sector parameters improved. In January and in July 2021 there was a just-in-time fall in headline inflation, within the mandated 3 quarters, to the tolerance band.

Normally food is regarded as a volatile component; however, domestic policies affect food, and therefore consumer price index (CPI) headline. The volatility of the wholesale price index (WPI), which rose into double digits, was due to international oil prices. Pass through to CPI is mediated by taxes on fuel. Core inflation was persistent, but the largest component was transport. Core inflation was overall less susceptible to global supply chain distortions since the import share of consumption is low.

The objective of establishing IT and moderating financial market volatility was dominant in the early strict application of FIT, but growth fell as a result, which is also negative for financial markets. Volatility rose as asset quality worsened.

The remainder of the paper is structured as follows: Section 2 adapts key IT concepts to EMs. Section 3 outlines the working of the expectations channel. Section 4 examines the evolution of inflation targeting in India, and its performance record, before Section 5 concludes by contrasting some perceptions with the reality of IT.

2. Implementing inflation targeting in emerging markets

The widely-adopted New Keynesian Economics (NKE) approach to monetary policy[2] is based on simple but forward-looking aggregate demand (AD) and aggregate supply (AS), which are derived

from rigorous optimisation by agents with foresight, but subject to constraints that can capture relevant features of an economy.

The simplest AD curve relates the output gap or excess demand inversely to the real interest rate, positively to expected future demand, and positively to a demand shock; the AS curve relates inflation positively to the output gap, to future expected inflation, and to a cost-push or supply shock. The output gap is defined as the gap between actual and potential output. Thus expectations, aggregate demand, as well as cost-push factors all affect inflation. The instrument that the central bank (CB) uses is the interest rate.

During effective growth transition and catch-up, structural unemployment becomes cyclical. More labour mobility implies output can increase without raising inflation. But inefficiencies and bottlenecks continue to push up costs. Continual supply-side reforms are required to reduce these costs. The AS curve becomes flatter but is subject to cost shocks that push it upwards, making it volatile. In such a structure, output is demand-determined, while supply-shocks predominantly affect inflation. The emerging market demand supply (EMDS) framework, reported below, models such a structure.

AS and AD curves derived in a basic dual-economy dynamic stochastic general equilibrium model, as well as econometric estimations surveyed in Goyal (2015), support an elastic supply subject to shocks. Goyal and Arora (2016) estimate the AS slope to be 0.13. Goyal and Kumar (2018) get a value of 0.1 for the elasticity of inflation to changes in marginal cost. Shifts in AD and AS are negatively correlated, so that a negative supply shock reduces demand. Goyal and Tripathi (2015) find that on estimating supply shocks correctly, the AS slope falls from 0.2 to 0.03. Wage-price expectations are one of the factors.

In such a structure, FIT can contribute to anchoring wage-price expectations. These are one of the factors that shift up the AS. Nominal appreciation, consistent with a competitive exchange rate, as well as fiscal policy actions, can also shift down the AS. Good coordination in such a structure requires policies to work together to shift the AS downwards because of the high output cost of a pro-cyclical demand squeeze. If productivity is rising and fiscal supply-side action is moderating inflation, monetary policy can keep real rates low, stimulating demand.

The NKE literature derives basic rules for monetary policy, which we adapt to our framework. First, consider those relevant under cost-push.

i. There is a short-run trade-off between inflation and output variability only under cost-push inflation, since an output sacrifice is then required to reduce inflation. Otherwise, if only current and future demand cause inflation, the central bank can adjust interest rates to set excess demand to zero and lower inflation with no cost in terms of output.

ii. When cost-push inflation is dominant, in order to minimize output sacrifice, optimal policy should aim to achieve an inflation target only over the medium-term. If price shocks are expected to be temporary, they can be seen through. Second-round pass-through of supply shocks reduces as inflation expectations get better anchored.

Since India is subject to frequent supply shocks and to chronic cost-push, its implementation of flexible inflation targeting with a tolerance band of + - 2% around the inflation target of 4%, and time of three quarters given to bring inflation back to the tolerance band after a deviation, is in line with the above principles. Average inflation is targeted. These features allow flexibility in responding to inflation in order to minimize output sacrifice, which is important to retain society's support (Mishkin, 1999).

RBI (2014, II.44) took the view that second-round effects and changes in inflation expectations were likely in response to shocks to food and fuel in view of their 57% share in headline CPI. This presumption called for a quick monetary policy response to the risk itself, in order to demonstrate commitment to the nominal anchor.

If AS is elastic, however, reducing demand will have a large output cost but little effect on inflation, making tightening less effective and therefore less credible. A demand shock is added to a supply shock. Households tend to have a stagflationary view, so they expect inflation to rise when growth falls (Coibon et al., 2022). Higher interest rates raise inflation expectations (Goyal and Parab, 2021a). Second-round effects occur only if supply shocks are high and sustained (Goyal and Parab, 2020). Moreover, in EMs, to the extent that communication has a greater impact and government supply-side action reduces inflation, the need for sharp monetary tightening reduces.

As agents' expectations get anchored, the need to impose output sacrifice reduces, since second round pass-through of supply shocks will not occur, moderating the need to tighten even under persistent or multiple supply shocks. This anchoring of expectations is a major rationale for inflation targeting. There is a gain from credible commitment to an inflation target, which serves to focus expectations when agents are forward-looking. Moreover, communication on a future target and inflation path can increase forward-looking behaviour over time.

iii. If inflation is within an acceptable zone and supply shocks are expected to be favourable, policy should ensure inflation is below the border of the zone and then let it fall with the supply-side improvements. If negative supply shocks are expected to persistently raise inflation above the upper limit, policy needs to tighten. This is 'inflation zone targeting'.

Under monetary-fiscal policy coordination, if appropriate supply-side action is reducing inflation, once inflation is expected to be within the tolerance band, the MPC can wait for beneficial shocks to bring it down further, thus maximising growth.

Anchoring Indian inflation expectations need not take long if communication is good and supply shocks are favourable, since these impact household inflation expectations. Provided communication makes these issues clear, flexibility to accommodate supply shocks and reduce output sacrifice need not adversely affect inflation anchoring. Transparency and open discussion is a pre-requisite to increase understanding about these issues and to co-opt the private sector.

Coibon et al. (2022) find US households pay little attention to monetary policy. Salient prices, such as that of gasoline, affect household expectations most. But in a hierarchical society with

relatively thin news, official communication has more impact, especially since inflation tends to be high and variable and is therefore the focus of attention (Goyal, 2016).

iv. Uncertainty requires interest rate smoothing. Many central banks that respond to output and inflation gaps also build in small steps in the policy rate. Forward-looking markets factor in future rise in policy rates. This complements policy as long as markets do not over-react. But small steps have to begin early, when the share of backward-looking behaviour is large, since policy then acts with long lags. Delays in introducing such measures can cause instability (Goyal and Tripathi, 2014).

There is a high degree of uncertainty attached to potential output. Small policy steps give time for the uncertainty to resolve, while reducing output sacrifice[3]. Goyal and Arora (2013) suggest using inflation to measure potential output in the Indian context. An indicator of growth having reached potential is core inflation sustained above some threshold due to second-round effects.

The repo rate has to exceed expected inflation by the equilibrium real interest rate. This is the natural real interest rate (NIR) plus any deviation from its steady state. NIR is defined as the equilibrium real rate, consistent with the target rate of inflation, when prices are fully flexible. The equilibrium real rate falls in a slowdown when the potential output is negative, and rises when it is positive, reflecting the impact of demand or supply shocks on potential output.

v. In response to excess demand, however, nominal interest rates should respond more than 'one-for-one' to expected inflation, since there is no output sacrifice in this case. A tough and credible policy today will decrease the output cost of lowering inflation tomorrow, but it will be credible only if it works. A tightening will reduce inflation effectively only if there is excess demand. If inflation is partially due to temporary supply shocks and partially due to excess demand, rates need to respond only to the latter part, as in the case of the US Fed exiting from post Covid-19 stimulus.

vi. Forward-looking policy rules have to be formulated in terms of forecasts of target variables. All central banks work with imperfect information, due to inadequate data. Lags in data availability and quality can be particularly large in an EM. Supply shocks are frequent in agriculture and typically food has a large share in headline consumer inflation. Forecasts of target variables may take time to become more accurate.

The concept of core inflation allows the first-round effects of volatile and difficult-to-forecast supply shocks to be excluded, and therefore may be a better target variable. But headline inflation affects a large part of consumption and therefore impacts household inflation expectations more.

vii. When forecasts are less reliable, as in many EMs, or in times of great uncertainty, data-based forward-guidance is preferable to time-based guidance. During a severe crisis, however, reassurance may be the dominant consideration.

Inflation targeting is a policy rule, but it allows considerable flexibility. It is actually constrained discretion, since it determines the interest rate as 'a predictable function of a few economic variables' (Allsop and Vines 2000, p.17). All underlying multiple indicators that affect outcomes

are used to derive a more focused signal. This signal gives inflation priority, although IT actually uses all relevant information. It is rule-like only in its predictability, that enforces forward-looking behaviour.

This allows impactful communication that guides markets and moderates overreaction (to which markets are subject). Alternative methods are less effective at this because of the sheer complexity inherent in macroeconomics. Predictability is often complemented by explicit forward guidance.

Based on their expectations of macroeconomic variables, advanced economy central banks often give time-based forward-guidance, e.g. that policy rates will not change for one year. But as long as the policy reaction is a predictable function of variables and of deviation from forecasts, even data-based changes offer forward guidance. When this is the case, private sector fast-moving variables such as asset prices help in policy implementation. If markets tend to over-react and deviate from equilibrium prices, however, it may be necessary to surprise them[4].

viii.   In an open economy, 'thin' EM markets imply that exchange and interest rates can be too volatile in response to fluctuations in capital flows driven by global shocks. Therefore, market intervention is required in addition to setting policy rates, in order to smooth volatility.

This implies foreign exchange intervention, open market operations (OMOs), and other liquidity operations that sterilize the impact of capital flows on durable liquidity. Reducing the volatility of real interest rates reduces that of growth and helps ensure that growth exceeds these rates. Under these conditions debt ratios come down.

Forward-looking FIT prevents the central bank from taking actions with undesirable long-term consequences. Transparent discussion educates the public about these long-term effects and, therefore, has political benefits. Understanding long-term consequences of choices made helps forego short-term opportunism and populism. Even so, the discretion to adjust to unforeseen circumstances helps avoid politically unacceptable short-term costs.

A medium -term inflation target range gives considerable leeway for short-run stabilization. The floor implies stimulus is required to raise inflation, if demand falls. Keeping a positive inflation target, rather than a price level, allows real wages to adjust even if nominal wages are rigid.

Independent experts in an MPC bring in continuity, shared responsibility, and help in handling complexity. Their different perspectives and areas of expertise aid in communicating, balancing trade-offs, and bringing in some democratic accountability. They represent voters with varied preferences, such as savers and investors; debtors and lenders; and markets, firms, and workers.

This is important as IT requires finding a balance between inflation and growth, short- and long-run considerations. Savers benefit from higher interest rates; borrowers, from lower ones, so equilibrium real rates can be a useful policy guide to avoid benefitting one set at the expense of the other.

Despite the importance of the expectations channel in inflation targeting, it is not well understood. It is worthwhile going into its evolution and structure in some detail.

3. The expectations channel

3.1 Evolution of communication

A central banker was earlier expected to be a discreet master of the art of speaking and yet saying nothing, but a major task for the modern central bank is to guide market expectations. Blinder et. al (2008) in a comprehensive survey of the topic starts with two quotes that bring out the move to greater transparency over time.

'Central Banking ... thrives on a pervasive impression that [it]... is an esoteric art. Access to this art and its proper execution is confined to the initiated elite. The esoteric nature of the art is moreover revealed by an inherent impossibility to articulate its insights in explicit and intelligible words and sentences.' (Karl Brunner 1981, p. 5)

Communication was not important when the dominant perspective was that expectations are rational, so that only unanticipated money could affect real variables. It was then thought necessary not to give any guidance in order to surprise markets with policy changes.

By the new century, the NKE 'multiple equilibrium view' had come to dominate central bank practice. In this view: *'Successful monetary policy is not so much a matter of effective control of overnight interest rates ... as of affecting ... the evolution of market expectations... [Therefore,] transparency is valuable for the effective conduct of monetary policy... this view has become increasingly widespread among central bankers over the past decade.'* (Michael Woodford 2001, pp. 307 and 312)

The case for obfuscation was based on the theoretical presumption, linked to perfect markets that include all available information, so that only unanticipated money can affect outcomes. But perfect foresight or unique equilibrium necessary for perfect markets are only theoretical constructs. Instead, real world economies have four pervasive features: non-stationarity; learning; absence of unique rationally expected equilibrium; and the presence of asymmetric information[5].

In this view, central bank communications either create news or reduce noise – that is, give more information or increase predictability. Both are expected to raise the signal-to-noise ratio, reduce financial market volatility, and lead to better monetary policy outcomes. Central bank pronouncements influence market expectations and so move asset prices. They influence household inflation expectations and affect wage-setting.

Supportive empirical tests have shown that central banks are able to move interest rates with fewer sale or purchase interventions, thus improving the cost effectiveness of policy. The yield curve is found to predict policy changes under inflation targeting, implying greater predictability of central bank actions.

3.2 Transmission through expectations

The standard New Keynesian Phillips curve or aggregate supply equation below shows that expected inflation influences current inflation, π_t. Other arguments are one period ahead (t+1) expected inflation and the output gap (x_t), apart from random shocks (u_t).

$$\pi_t = \beta \pi^e_{t+1} + \lambda x_t + u_t$$

Equation 1 (a) shows how the policy rate may work its way through current inflation expectations (perceptions), term structure of interest, and expected wages, to affect expected and current inflation. Market expectations that affect the term structure, and business expectations that also affect wages and prices, differ from household expectations.

A flat AS (or low estimated value of λ) subject to shocks, will reduce the effectiveness of a repo rate change. The largest impact on inflation is from supply shocks and fiscal action influencing them. As expectations become well-anchored at the inflation target, the impact of supply shocks becomes more transient.

$$r_t \downarrow \rightarrow \pi^e_{t....t+s} \uparrow \rightarrow \pi_t, i_{t....t+s}, W^e_{t....t+s} \uparrow \rightarrow \pi^e_{t+1} \uparrow \qquad \text{1(a)}$$

$$\pi^{e,CB}_{t,...t+s} \uparrow \rightarrow \{\pi^e_{t....t+s}\} \uparrow \rightarrow \pi_t, i_{t....t+s}, W^e_{t....t+s} \uparrow \rightarrow \pi^e_{t+1} \uparrow \qquad \text{1(b)}$$

Where r_t is the policy interest rate (Repo rate for India), $\pi^e_{t,...t+s}$ is current inflation perceptions over the time period t...t+s, $i_{t....t+s}$ is interest rates and spreads over time period t...t+s, $W^e_{t....t+s}$ is wage expectations over time period t...t+s, π^e_{t+1} is one period ahead inflation expectations, $\pi^{e,CB}_{t.....t+s}$ is CB inflation projections, and π_t is current realized inflation (Goyal, 2016 and Goyal and Parab, 2021b).

The expectations channel makes tools other than the repo rate available to the central bank. There is the inflation target itself, inflation projections, and various types of guidance. Even though inflation is more volatile and forecasts in EMs are less reliable, there is evidence they have a larger impact (Goyal and Parab 2021a).

Equation 1 (b) shows the effect of the CB communicated inflation path. The policy rate can be changed if actual inflation deviates from the path.

4. Evaluating performance of inflation targeting in India

The RBI officially adopted FIT in February 2015[6], through a transition agreement with the government, although it had begun moving towards it after the RBI (2014) report on FIT. The target inflation rate chosen was CPI headline, at a time when it was the highest inflation rate, in double digits due to sustained high food inflation (Figure 1). A combined CPI had become available only in the early 2010s.

Figure 1: Headline CPI, core CPI, and core WPI inflation
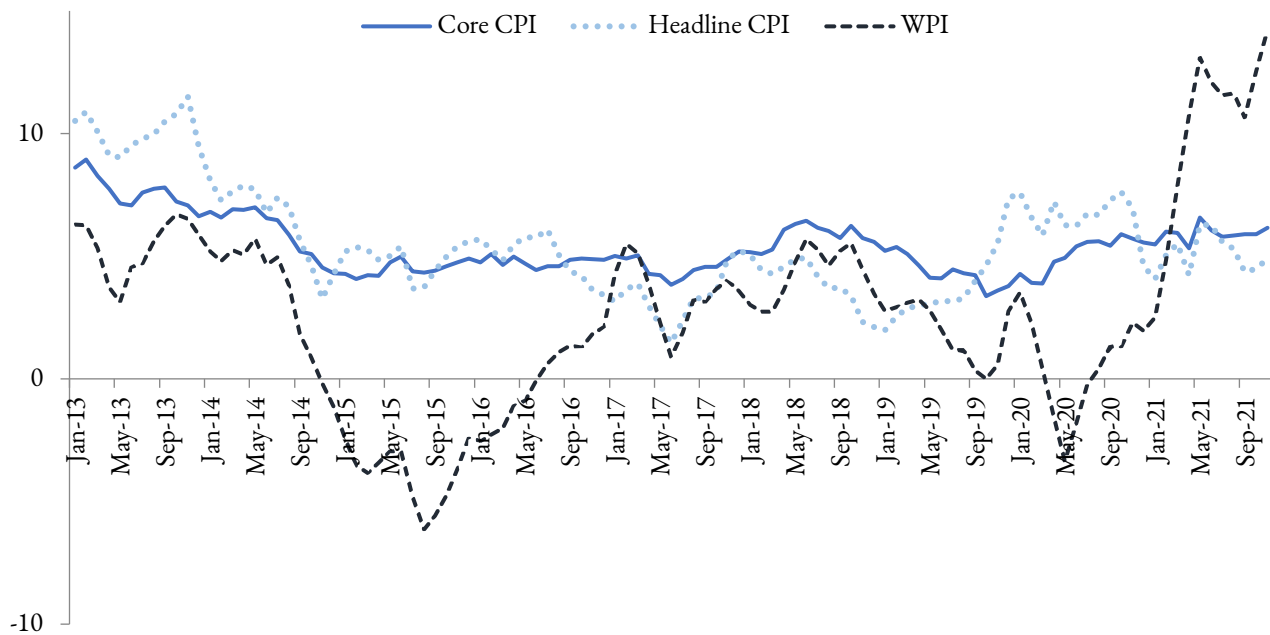
Sources: Calculated from RBI database

Figure 2: Real interest rate: Derived from headline and core CPI and core WPI inflation
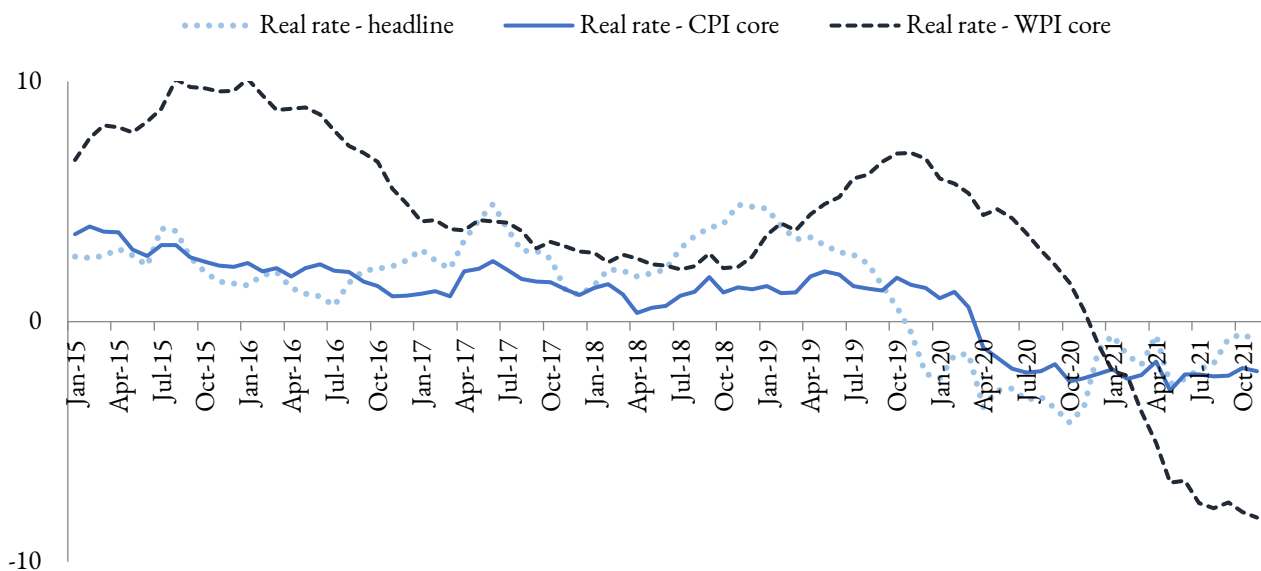
Prior to the FIT regime, the inflation rate the RBI used for communication was WPI although under the multiple indicator approach it tracked a number of CPI indices. At this time, WPI inflation was the lowest since food articles have a low share in it[7]. Crude oil prices have a larger share in WPI compared to CPI, making WPI more sensitive to shocks in these prices. With the switch to headline

CPI as the inflation target, the real interest rate swung from negative to sharply positive for all types of inflation.

Figure 2 graphs real interest rates, obtained by subtracting inflation from the one-year Treasury Bill rate[8], for CPI headline, CPI core, and WPI core[9] respectively. Industry was already in a slowdown and real product interest rates relevant for it, derived from WPI core, touched double digits in 2015-16, aggravating the slowdown.

The RBI had announced a path for gradual reduction of inflation, and – despite WPI inflation coming down sharply in 2014 as oil prices crashed – did not cut interest rates commensurately[10]. CPI inflation also came down gradually with help from falling food price inflation. As policy rates were still not brought down adequately, even with inflation at the target, real interest rates in terms of the target headline CPI reached a peak of 4.85 in November 2018 (Table 1). The equilibrium real rate, because of the continuing industrial slowdown was negative at that time.

Goyal and Arora (2016), who include structural features such as a dual labour market, estimate India's natural interest rate to be negative in slowdowns and positive in booms. The IMF's (2017 pp. 15-16) estimate of India's equilibrium real rate was 1.25 to 1.75%.

Table 1: Average real rates

	CPI Headline	CPI core	WPI core
January 2014-December 2018	2.5	2.1	5.6
January 2019-November 2021	-0.6	-0.6	1.2
Annual averages			
2013	-1.7	0.7	5.7
2014	2.2	2.6	5.2
2015	2.7	3.1	8.7
2018	3.0	1.2	2.5
2019	2.2	1.6	5.5
2020	-2.8	-1.2	3.4
2021	-1.4	-2.2	-5.9

Source: Calculated from RBI database.

Another reason for the overshooting was the consistent overestimation of expected inflation in this period. Policymakers themselves were sceptical about the possibility of inflation moderating. Table 2 shows the large positive deviation of expected from realized headline inflation, which was more for the RBI than for professional forecasters (SPF). This meant that while policy rates were kept higher, ex-post real interest rates turned out to be even higher than targeted since actual inflation was below projections. The guidance provided by the projected inflation path was also undercut[11].

Reassuring financial markets seemed to be a dominant concern for implementing FIT strictly, but markets cannot deliver independent of the real sector. Low, predictable inflation was regarded as a

pre-requisite for the corporate bond market to develop. But corporate investment and borrowing collapsed as growth fell.

Finally, in 2019, in response to the slowdown, and with a new governor, policy rates began to be cut. High-frequency data showed signs of recovery in early 2020, before Covid-19 struck. Real rates became negative in the pandemic period. Even so, despite a rise in inflation driven by global commodity price shocks and supply chain bottlenecks, inflation had not exceeded the tolerance band for more than the 3 quarters at the time of writing. This would have required an explanation from the MPC. Between Covid-19 waves, growth recovery was strong, surprising on the upside.

Table 2: Deviations of projections from headline CPI

	SPF 3 month	RBI 3 month	SPF 1 year	RBI 1 Year
Averages				
Mar 2014 – Jan 2019	0.50	0.69	0.81	0.93
Mar 2019-20	-0.08	-0.40	-0.34	-0.49
Nov 2020-21	-0.17	-0.10	-0.29	-0.54
Value For				
Sep-21	0.35	1.25	0.70	1.05
Nov-21	0.62	0.02	0.26	-0.11
Jan-22	-0.44	-0.68	-0.91	-0.61
Mar-22	-1.15	-0.95	-1.46	-1.55

Source: Calculated form RBI database

Despite a once in a hundred years pandemic, the FIT framework held, showing it was possible to restrain inflation yet encourage growth. The framework also showed signs of maturing. Deviations of forecasts from realized headline narrowed, and although the average deviation was now negative, there were periods of positive deviation also, such as September 2021. If there is no bias forecasts should sometimes over-predict and sometimes under-predict actual inflation. Even monthly deviations, however, became negative after the unexpected shocks of the Ukraine war. In November 2021, RBI's deviations were even below the average of professional forecasters. Real rates became less negative in 2021 than they were in 2020, as inflation fell.

This time, oil and supply chain shocks made WPI inflation the highest, such that real product interest rates (using core WPI) were more negative. This benefited firms, while the headline real rates relevant for consumers were less negative, reducing the erosion of real savings. The volatility of the target headline CPI inflation, impacted more by domestic supply factors, was much below that of WPI, which faced more international shocks. WPI volatility created large but transient base effects[12]. It was feasible to moderate the CPI through domestic supply-side policies including tax cuts.

Growth also suffered through the 2010s decade because liquidity was kept in deficit, in the belief that pass-through of interest rates is better under such conditions. This was the practice in major AEs prior to the global financial crisis. But in an EM, it is difficult to predict liquidity requirements because of large shocks due to foreign inflows, changes in currency demand, and in government cash balances. Shortages sometimes became excessive, such as when there was no lender of last resort for a major systemic NBFC in trouble. Moreover, AEs themselves had moved to surplus liquidity conditions under quantitative easing.

Reversal of tight monetary-financial conditions, especially after Covid-19, reduced liquidity hoarding and restarted payments through the economy. Rebalancing of excess liquidity, created in the first year of the pandemic, started early in 2021. In a FIT regime the liquidity adjustment facility (LAF) makes money supply endogenous. Excess durable liquidity is absorbed in the remunerated reverse repo. But only banks can access the LAF in India, and some cooperative banks prefer to access it through commercial banks. This and other market microstructure issues led to short rates falling below reverse repo rates.

Financial deepening also makes money endogenous as it creates near-money substitutes, but this has further to go in India. Even so, broad money[13] and credit growth remained in low single digits through 2020 and 2021, despite surplus durable liquidity, indicating that aggregate demand was low and money creation was not excessive.

Since unemployment and excess capacity was large, and the fiscal stimulus was restrained, it was necessary to sustain demand, not to reduce it. While the policy rate was not at its lower bound of zero, reducing it further was constrained by inflation.

Guidance on policy objectives, on the inflation path — that it was a temporary spike driven mostly by international shocks and that its domestic pass-through could be limited by fiscal supply-side action, including tax cuts — all played a role in restraining inflation expectations before the Ukraine war.

Guidance was time-dependent (stating that it would continue into the next year) only through the first wave, and then became state-dependent as recovery started. In the early years of FIT, an accommodative stance was defined in terms of repo rate changes: the repo could either fall or stay the same. In a neutral stance, it could stay the same or move in either direction. It could rise only under a tight stance.

After the steep pandemic-induced cut in 2020, however, even as rates began to rise, the stance was actually accommodative as the repo rate was below the neutral rate. Liquidity rebalancing was consistent with an accommodative stance. Because of the difficulty in precisely estimating a neutral rate, it was decided to define the stance in terms of the LAF. Stance would be accommodative if liquidity was such that the call money rate was at the reverse repo, neutral if at repo, tight if above the repo.

4.1 Anchoring of expectations

How has the expectations channel worked in this brief period? Markets pay attention to RBI views and guidance and it affects bond spreads. More than the type of inflation, it is the transparency and predictability of an IT regime that is of value to them. The credibility and success of the CB in containing inflation is important for this. Stable inflation lowers country risk premium and cost of borrowing in an open economy. However, analysts and markets tend to be more risk averse and over-react in uncertain times, and this raises spreads and government security yields.

Household and SPF expectations are naïve (backward-looking), but show the influence of RBI communications (Goyal and Parab, 2021a). In most countries, household expectations normally substantially exceed realized inflation (Coibon et. al. 2022, Goyal and Parab 2021a). Goyal and Parab (2021a), however, find evidence that in the long-run as household inflation expectations converge to an equilibrium level, core inflation has the largest effect on them[14], although as yet household inflation expectations do not affect other variables. There is also evidence that expectations converge faster in an IT regime and for an EM (Goyal and Parab, 2020). In time, this should lead to the long-term inflation target becoming well internalized, affecting wage-price setting, rental contracts and market rates and spreads.

4.2 Issues of measurement

With the focus on inflation under FIT, the measure of inflation should be reliable. It is necessary to update the basket and weights frequently, as well as the number and quality of goods. Combined rural-urban headline CPI, which is used as the inflation target, has not been updated beyond the base of 2012.

In 10 years, the weight and variety of goods in the consumption basket is likely to have changed. The share of food inflation in the consumption basket falls with development. Given measurement issues, in a country of India's spread and diversity, it is better to work with average rather than point inflation. Features such as targeting average inflation, the 3 quarters available to achieve the target, and the tolerance band of plus or minus two around the target contribute to flexibility in the Indian IT regime.

Another issue worth considering is the choice between core and headline CPI as the inflation target. Core inflation is a derived concept. While there are many ways of deriving it, the simplest is an exclusion measure that leaves out volatile commodity price components, so that prices of goods and services are left. Aggregate demand and therefore monetary policy affects these prices.

In the early years of inflation targeting, many countries had core inflation as a target[15], as it was regarded as better to focus on what a central bank can affect. Now, headline inflation is the target in most countries, as confidence in the ability of the inflation target to impact inflation expectations has increased. It is necessary, however, to suit country context and experience. The target can change as required.

Normally, a volatile headline reverts to a more stable core. In India, early research found persistently high headline above a threshold affects core[16]. Causality reversed in early 2010s as food inflation fell (Goyal and Parab, 2020). Goyal and Parab (2021a) find core inflation dominates household expectations in the long-run.

Correct forecasts contribute to anchoring expectations, and these can be more accurate for core. Stable forecasts may reduce volatility in expectations. Moreover, Goyal and Parab (2021a) find the repo has insignificant or perverse effects on household headline inflation expectations. Repo affects demand for industrial goods and services, which dominate core inflation. This traditional transmission channel may work better under a core inflation target.

But equity and consumer welfare considerations support targeting headline CPI, which is the cost of the average consumption basket. In the Indian context, with a large number of supply shocks and bottlenecks, the selection of headline CPI as the target places more responsibility on government to resolve supply-side issues. Moreover, the food items dominating headline CPI are more amenable to government action, such as the choice of agricultural support prices. Therefore monetary-fiscal coordination is required.

4.3 Monetary-fiscal coordination

After Covid-19 raised their debt levels, AEs began to emphasize monetary-fiscal coordination to help finance government borrowing and spending. In India there were additional justifications for this earlier also, given the structure of AD and AS. Monetary transmission to output is effective, while higher government debt and interest payment burden limit fiscal demand stimulus.

Fiscal deficits cannot expand beyond a point; however, reforms to improve the supply-side and a higher share of public investment are feasible. Monetary-fiscal coordination that suits Indian conditions is for this fiscal supply-side action while monetary policy sustains demand at non-inflationary levels.

If continuing improvement in supply conditions reduces costs of doing business and inflation then monetary policy can keep real interest rates (r) below growth rates (g). This is the snowball effect that reduces debt ratios automatically over time, as the denominator rises. It was used to justify more government borrowing in AEs for Covid-19 stimulus and protection spending. Using this effect is particularly important for EMs where governments face higher borrowing costs and a large budgetary share of interest payments.

High growth implies this r < g often holds in EMs, but high volatility in growth and in real interest rates limits its benefits. Therefore, large domestic policy shocks have to be avoided, and countercyclical macroeconomic policy has to smooth shocks. Indian policy has the degrees of freedom to do so.

The above arguments imply, in the Indian context, flexible rules combined with delegation to a conservative fiscal authority and a pro-growth central bank would give the best outcomes (Goyal, 2018). Coordination does not imply loss of central bank autonomy, since keeping policy rates low is

conditional on government supply-side action to reduce inflation. Moreover, the government is itself committed to low inflation since it is important for votes.

Supply-side action requires restraining the quantity but improving the quality of government spending. The Covid-19 period has seen a transition to such spending. Since 2014, the government has aimed to raise agricultural productivity and moderate food prices, which is a major reason for the lower volatility of CPI headline, and for CPI inflation being below WPI unlike in the early 2010s.

CPI headline is more amenable to domestic policy actions. The Centre's cut in fuel taxes on 4th November 2022 was followed by many states. It had a large impact on household inflation expectations. These had shot up in early November but fell by the end of the month. While household expectations are backward looking, firms are more forward-looking and their inflation expectations also moderated, enabling the MPC to continue with its accommodative stance.

Another example of post-Covid-19 coordination is the use of credit warranties, which reduced banks' fear of lending, even as lower policy rates raised demand. Using the financial sector to deliver stimulus reduced current public sector borrowing requirement and private sector crowding-out.

RBI (2021, pp. 24) estimated average inflation to be around 4% in the IT period up to 2020. It rose under Covid-19 supply shocks, but these are not likely to last. Estimating equilibrium inflation from the AS gave a value of 5% over 2010s (Goyal and Tripathi, 2015). This should come down, over time, to the inflation target of 4%. Monetary-fiscal coordination, however, makes it feasible to reach the target with minimal output sacrifice through the practice of inflation zone targeting.

5. Conclusion

Since the regime is relatively new, there are many misunderstandings about inflation targeting and especially how it works in an EM like India.

Some interpret it as requiring a hawkish focus only on inflation. IT itself evolved, however, with a shift from the monetarist view that markets are perfect and money affects only inflation, to recognizing the possibility of multiple equilibria. Policy has a role to play in coordinating a better outcome with less underutilization of resources. While the communication is more on inflation, it is the outcome of a complex process involving many variables being taken into account. FIT is also concerned about growth and financial stability.

There is a perception that this approach is in response to past inflation, since it was introduced after a high-inflation period. In fact, it is about fighting future inflation, by anchoring inflation expectations. For this, in addition to the target, accurate inflation forecasts are important. IT is intrinsically forward-looking.

A credible regime change implies the future can be different from the past. A long period of disinflation and output sacrifice need not be necessary to anchor inflation expectations with complementary supply-side action. A key difference is the MPC now has to respond if inflation persistently exceeds the tolerance band. This belief can in itself contribute to anchoring inflation

expectations. The major instrument now is the repo rate, but it is not the only instrument. The target, stance and guidance through future growth and inflation paths all play a role.

In an EM with many market imperfections, action on liquidity has to complement changes in the repo rate. Since only banks can borrow short-term liquidity from the RBI, both the informal sector and modern markets are underserved at present. Money markets and the liquidity adjustment facility have to continue to develop, so that the call rate stays within a narrowing corridor.

The dominance of supply shocks and bottlenecks in an EM implies coordination with the government is essential. Good coordination can reduce the output sacrifice of dis-inflation, even as it aids fiscal consolidation.

References

Allsop, C. and D. Vines. 2000. "The assessment: Macroeconomic policy." *Oxford Review of Economic Policy* 16(4): 1-32.
https://academic.oup.com/oxrep/article-abstract/16/4/1/417121?redirectedFrom=fulltext

Bernanke, B.S. and F. Mishkin. 1997. "Inflation targeting: A new framework for monetary policy?" *Journal of Economic Perspectives* 11(2): 97-116.
https://www.aeaweb.org/articles?id=10.1257/jep.11.2.97

Blinder, A. S., M. Ehrmann, M. Fratzscher, J. D. Haan, and D. J. Jansen. 2008. "Central Bank Communication and Monetary Policy: A Survey of Theory and Evidence." *Journal of Economic Literature* 46(4): 910-945. http://www.nber.org/papers/w13932.pdf?newwindow=1

Clarida, R., J. Gali, and M. Gertler. 1999. "The science of Monetary Policy: A New Keynesian Perspective." *Journal of Economic Literature* 37(4): 1661-707.
https://www.aeaweb.org/articles?id=10.1257/jel.37.4.1661

Coibion, O., Y. Gorodnichenko, and M. Weber. 2022. "Monetary policy communications and their effects on household inflation expectations." *Journal of Political Economy*, forthcoming.
https://doi.org/10.1086/718982

Goyal, A. 2018. "The Indian Fiscal-Monetary Framework: Dominance or Coordination?" *International Journal of Development and Conflict* 8, no. 1 (June): 01-13.
http://www.ijdc.org.in/uploads/1/7/5/7/17570463/jun_18_art_1_goyal.pdf

http://www.ijdc.org.in/volume-8-issue-1.html.

Goyal, A. 2016. "Unconventional Monetary Policy in Emerging Markets." *Macroeconomics and Finance in Emerging Market Economies* 9(2): 101–108.
https://www.tandfonline.com/doi/full/10.1080/17520843.2016.1180835

Goyal, A. 2015. "Understanding High Inflation Trend in India." *South Asian Journal of Macroeconomics and Public Finance* 4(1): 1–44.
https://journals.sagepub.com/doi/full/10.1177/2277978715574614

Goyal, A. 2002. "Coordinating Monetary and Fiscal Policies: a role for rules?" In *India Development Report 2002,* edited by Kirit S. Parikh and R. Radhakrishna, 48-64. New Delhi: IGIDR and Oxford University Press.   https://mpra.ub.uni-muenchen.de/29200/7/MPRA_paper_29200.pdf

Goyal, A. and S. Arora. 2016. "Estimating the Indian Natural Interest Rate: A semi-structural approach." *Economic Modelling* 58 (November): 141–153.

https://www.sciencedirect.com/science/article/abs/pii/S0264999316301468

Goyal, A. and S. Arora. 2013. "Inferring India's Potential Growth and Policy Stance." *Journal of Quantitative Economics.* 11(1&2): 60-83. January-July.

https://www.researchgate.net/publication/303909727_Inferring_Indias_Potential_Growth_and_Policy_Stance

Goyal, A. and A. Kumar. 2018. "Active Monetary Policy and the Slowdown: Evidence from DSGE Based Indian Aggregate Demand and Supply." *Journal of Economic Asymmetries* 17 (June): 21-40. DOI: https://doi.org/10.1016/j.jeca.2018.01.001.

Goyal, A. and P. Parab. 2020. 'Inflation Convergence and Anchoring of Expectations in India' *Economic and Political Weekly* 55(47): 37-46. https://www.epw.in/journal/2020/47/special-articles/inflation-convergence-and-anchoring-expectations.html

Goyal, A. and P. Parab. 2021a. "What Influences Aggregate Inflation Expectations of Households in India?" *Journal of Asian Economics* 72 (February) 101260. https://www.sciencedirect.com/science/article/abs/pii/S1049007820301408

Goyal, A. and P. Parab. 2021b. "Effectiveness of Expectations Channel of Monetary Policy Transmission: Evidence from India." IGIDR. Working paper no. WP-2021-011 http://www.igidr.ac.in/pdf/publication/WP-2021-011.pdf

Goyal, A. and S. Tripathi. 2015. "Separating Shocks from Cyclicality in Indian Aggregate Supply." *Journal of Asian Economics* 38 (June): 93-103. https://www.sciencedirect.com/science/article/abs/pii/S1049007815000329

Goyal, A. and S. Tripathi. 2014. "Stability and Transitions in Emerging Market Policy Rules." *Indian Economic Review* 49 (2): 153-172, July-December. https://www.jstor.org/stable/24725790

Goyal, A. and S. Tripathi. 2011. "New Keynesian Aggregate Supply in the Tropics: Food prices, wages and inflation." *International Journal of Monetary Economics and Finance* 4(4): 330-354. https://www.inderscience.com/info/inarticle.php?artid=43399

Anand, R., Ding, D. and Tulin, V. 2014. "Food Inflation in India: The Role for Monetary Policy." *International Monetary Fund Working Paper Series* no. WP/14/178. https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Food-Inflation-in-India-The-Role-for-Monetary-Policy-42366

International Monetary Fund. 2017. "India: 2017 Article IV Consultation-Press Release; Staff Report and Statement by the Executive Director for India." Accessed on February 22, 2017. https://www.imf.org/en/Publications/CR/Issues/2017/02/22/India-2017-Article-IV-Consultation-Press-Release-Staff-Report-and-Statement-by-the-Executive-44670

Mishkin, F.S. 1999. "International experience with monetary policy rules." *Journal of Monetary Economics* 43(3): 579-606. https://www.sciencedirect.com/science/article/abs/pii/S0304393299000069

Niedzwiedzinska, J. 2018. "Inflation Targeting Institutional features of the strategy in price." Narodowy Bank Polski (NBP). Working paper no. 299. https://www.nbp.pl/publikacje/materialy_i_studia/299_en.pdf

Reserve Bank of India. 2014. "Report of the Expert Committee to Revise and Strengthen the Monetary Policy Framework." Accessed on January 21, 2014.
https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/ECOMRF210114_F.pdf

Reserve Bank of India. 2021. "Report on Currency and Finance 2020-21. Reviewing the Monetary Policy Framework." Accessed on February 26, 2021.
https://rbi.org.in/scripts/BS_PressReleaseDisplay.aspx?prid=51187

Svensson, L. E.O. 2007. "Inflation Targeting." Princeton University, CEPS Working Paper No. 144.
http://www.princeton.edu/~ceps/workingpapers/144svensson.pdf

Notes

[1] The preamble of the RBI Act, 1934, as amended by the Finance Act, 2016, states "AND WHEREAS the primary objective of the monetary policy is to maintain price stability while keeping in mind the objective of growth;" thereby enshrining a flexible inflation targeting framework for India. The initial agreement between the Government of India and the RBI in February 2015 also explicitly mentions flexible inflation targeting (RBI 2021).

[2] Clarida et al (1999) is a comprehensive survey. See also Bernanke and Mishkin (1997). Goyal (2012) is an adaption to an EM, which we develop further here. RBI (2021) examines IT application in India.

[3] A short-term fall in growth below potential can trigger a shift to a lower steady-state growth path, creating persistent losses (Goyal and Kumar, 2018).

[4] Markets had priced in excessive rate hikes after the US Fed began talking of tightening. The steep surprise hike in Indian Repo rates, in an out-of-cycle meeting in May 2022, prevented additional rate hikes being priced in as domestic rate-rising began.

[5] A non-stationary economy can have many possible long-run outcomes. That people have different degrees and types of information makes learning about, foreseeing and arriving at a unique equilibrium more difficult.

[6] The RBI Act, 1934 was amended to provide a constitutional basis for the implementation of the flexible inflation targeting (FIT) framework, and the MPC was set up only in May 2016. RBI Act 45-ZB states: 'The MPC shall determine the Policy Rate required to achieve the IT.' It defines the inflation target as the 'consumer price index' (RBI 2021).

[7] In the headline WPI (base year 2011-12) basket, Manufactured Products had a weight of 64.2, Oil 13.2, and Primary Articles 22.6. In the headline CPI (base 2012) rural and urban combined, the basket weights are Food & Beverages 45.86, Pan, Tobacco & Intoxicants 2.38, Fuel & Light 6.84, Clothing & Footwear 6.53, Housing 10.07, Miscellaneous, 28.32. The CPI includes services.

[8] The one year Treasury bill rate is used to give the one-year ahead expected inflation. Although the market for this is thin, most short-rates respond well to changes in the policy rate. The latter is inappropriate for comparative purposes because the policy rate switched from the repo to the reverse repo during the Covid-19 period.

[9] Items constituting CPI core have a weight of 47.3 in the combined CPI index, excluding only the categories Food & Beverages and Fuel & Light. Core WPI, comprising of non-food manufactured products, has a weight of 55.1. Weight of WPI manufactured products is 64.13.

[10] On the glide path, the April 2014 forecast was 8 per cent CPI by January 2015, but CPI fell to 5.2 per cent. The April 2015 CPI prediction for March 2016 was 5.8 per cent by, but it fell to 4.83 per cent. The early 2016 prediction for March 2017 was 5 per cent, but CPI fell to 3.89 per cent.

[11] The bimonthly monetary policy statements from 2014-16 show the one-year-ahead inflation announced was almost always about one percent above realized inflation.

[12] Goyal and Tripathi (2011) show the dominance of food price inflation in second-round inflation effects in India makes CPI inflation cause WPI inflation in statistical tests rather than the reverse, although normally it is producer prices that are expected to affect consumer prices.

[13] Even though the RBI created excess liquidity, broad money and credit growth depends on bank lending, which was low. Banks returned the excess to the RBI who absorbed it in reverse repo balances on which it paid interest to banks.

[14] In their SVAR estimation, the share of a shock to core inflation in one-year-ahead household inflation expectations' variance decomposition rises from 1% in the first quarter to 53% by the 7th quarter.

[15] Among EMs, Korea targeted core inflation between 2000 and 2006, Thailand between 2001 and 2014, and Brazil began its adoption of inflation targeting with core inflation as its target (Niedzwiedzinska, 2018).

[16] Anand et al. (2014) showed that Indian headline inflation affects core inflation in the high-inflation period of the late 2010s. Their result did not hold after inflation fell below double digits.

IPPR

A sectoral view of conceptualising macroeconomics of a 'just transition' in India

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Abstract

In light of India's COP26 commitment of reaching net zero by 2070, it is important to understand how India could ensure a 'just transition.' Since the transition raises several questions regarding who will benefit from it and who will lose out, this paper offers an assessment of the sectors that will be impacted most by the transition. This includes coal, mining, power, formal manufacturing sectors, and MSMEs. Macroeconomic consequences of the transition in terms of employment intensity, energy intensity, the total value added, and export competitiveness of the above-mentioned sectors have been examined. Using data from the Annual Survey of Industries for 2017-18 and 2018-19 and key informant interviews, the paper presents a sectoral analysis of the transition in the Indian context. In terms of employment, the power and the coal sector will be affected the most. In terms of fuel use, manufacturing sectors that either use coal or purchase electricity (indirectly using coal) will also be impacted. The spatial dimension of the transition will be very important, since certain coal-producing districts will be affected the most.

Keywords: Just transition, climate change, energy transition, coal transition, manufacturing, and employment

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1. Introduction

With the increasing exigency of the climate crisis, the shift towards a low-carbon economy has become even more crucial. Effecting this change is a herculean task since it affects the population in a multifarious manner. This transition, as with any other change, raises several questions regarding *who will benefit from it* and *who will lose out.* Thus, the concept of 'just transition' becomes significant.

The case for a just transition in India has been made and its gravity has been emphasised (Bhushan, 2020). Just transition is moving to a state of the economy with lower carbon footprint while precluding exclusion of any population group and ensuring a social and economic better outcome for all. For India, just transition has been interpreted as an economic change that is structural and is essentially 'a socio-economic transition' (Bhushan et al., n.d.). The energy sector has been recognised as a core element in India's just transition narrative (Roy et al., 2019). Energy transition and just transition should be simultaneously implemented in the case of India (Bhushan et al., n.d.). This paper analyses how the transition to a low-carbon economy will affect sectors like coal, mining, power, manufacturing sectors, and MSMEs in terms of broad macroeconomic indicators.

The paper is organised in the following manner: Section 2 states the objective of the study and the methodology; Section 3 presents the macroeconomic consequences of the transition in terms of output, employment, government revenue, regional inequality, and energy prices; Section 4 presents the sectoral analysis in terms of coal, mining, power, manufacturing industries, and MSMEs; Section 5 concludes with broad contours of a just transition policy.

2. Objective of the Study and Methodology

The objective of the study is to understand the concept of a *just transition* strategy, based on evidence from the Indian manufacturing sector, including the medium, small, and micro-scale enterprises (MSMEs), the coal mining sector, and the power sector. The study analyses some important characteristics like employment intensity, energy intensity, and the total value added and export competitiveness of some industries in the organised manufacturing sector to present a macroeconomic picture of what the just transition would entail. The study uses data from 2017-18 to 2018-19. While examining the industrial characteristics of the Indian organised manufacturing sector, the study used the Annual Survey of Industries (ASI) database and their summary reports of the Rounds 2017-18 and 2018-19. The ASI database is one of the principal sources of industrial statistics in India. The ASI is a comprehensive database that annually reports data on several industrial characteristics like the number of workers employed, wages, net value added, fixed capital, working capital, depreciation, material consumed, etc.

The survey covers all the factories registered under the Factories Act of 1948 and employing 10 or more workers using power, and those employing 20 or more workers without using power. The survey is conducted across Indian states and union territories. The basic unit of enumeration is the factory. The survey follows a stratified sampling technique where the strata are defined by State, District, Sector, and Industry (National Industrial Classification 3-digit level). The NIC is followed to define each industry under the survey.

The NIC has been revised over time based on the United Nation's International Standard Industrial Classification (UNISIC or ISIC). The industries in ASI Round 2017-18 have been defined following the NIC-2008 classification. The NIC-2008 classification has been developed based on the ISIC-Rev 4. The present study has examined the industrial characteristics at an aggregated level of industrial classification, that is, NIC 2-digit level. The study has used ASI 2017-18 and 2018-19 summary reports on the principal industrial characteristics, published by the Ministry of Statistics and Programme Implementation (MOSPI), to extract information on the number of workers and net value added (as shown in Table A.1).

The Directorate General of Commercial Intelligence and Statistics (DGCI&S) is one of the principal sources of foreign trade statistics in India. DGCI&S reports commodity-wise trade statistics following the Harmonized System or HS classification. The information on the export value across industries (at the 2-digit level) defined on the basis of International Standard of Industrial Classification (ISIC) Revision 3, has been extracted from the World Bank's World Integrated Trade Solution (WITS) database[1] for the year 2017-18 and 2018-19. The discussion on establishing concordance between ASI and WITS data is presented in Appendix.

3. Macroeconomic consequences of the transition

The transition to a low-carbon setup is likely to affect many of the macroeconomic variables of the Indian economy. In this paper, we discuss output, employment, regional inequality, government revenue, and energy prices, to show what the transition could mean in the Indian context.

3.1 Output
Tandon et al. (2021) identify the states most likely to be affected by the transition to net-zero as Madhya Pradesh, Jharkhand, Chhattisgarh, Uttar Pradesh, Bihar, Odisha, Telangana and Rajasthan. These states contributed about 30% to India's real Gross Domestic Product (GDP) in 2019-20.[2] The methodology for identification looks at risks pertaining to livelihoods, energy access, public finance, and human development.

3.2 Employment
Pai et al. (2021) observe that in order to meet the emission reduction target across the globe, fossil fuel extraction jobs would rapidly decline, but losses will be compensated by gains in solar

and wind jobs, particularly in the manufacturing sector (totalling 7.7 million in 2050). India's on-grid solar employment is estimated at 93,900 jobs, with another 69,600 in off-grid settings, for a total of 163,500 jobs

Worldwide, solar PV added 127 gigawatts (GW) of new capacity in 2020, up from 98 GW in 2019. More than 60%, almost 78 GW, was added in Asia, principally in five countries (China, Viet Nam, India, the Republic of Korea, and Japan); Europe installed 20.8 GW, the United States another 15 GW, Australia 4.4 GW and Brazil 3.3 GW. The potential for creating jobs is enormous: 3.4 million jobs (short and long term) by installing 238 GW solar and 101 GW new wind capacity (Tyagi et al., 2022).

The power sector is likely to be impacted the most in terms of employment due to the transition, since it is one of the largest contributors to carbon dioxide (CO_2) emissions (Jha, 2021). Besides being a significant emitter, the electricity sector in India exhibits a very high dependence on coal. The electricity generation reliance on coal has been pegged at a staggering 71% by Bhushan et al. (n.d.).

In terms of the number of jobs in fossil-fuel-based power generation (inclusive of coal mining) per lakh state jobs, Jharkhand is the state that has the highest number (1,119), as indicated by the data from the Periodic Labour Force Survey (PLFS) 2018-19, followed by Chhattisgarh (629) and Telangana (424) (Jha, 2021). The state with the lowest number is Rajasthan (14) (Jha, 2021).

A staggering 15 million people are reliant on the coal industry in a direct or indirect manner (Bhushan et al., n.d.). Nearly 25 districts are dependent on coal for growth and employment (Bhushan et al., n.d.). For instance, Ramgarh, a district in Jharkhand, has a high level of dependence on coal-related activities in respect of employment (a large share of informal workers) and the GDP of the district (Bhushan, 2020).

Zooming out from the state- and the district-level employment scenario, the employment situation during and after the completion of the transition will depend on two key parameters:

1) Availability of alternatives: There are sectors that currently do not have any alternatives, such as steel. Further, the current debate in India is not around steel decarbonisation but power sector decarbonisation, because of the ease of finding alternatives to fossil fuels for power generation. Further, the absorption of the currently employed workforce in the new sectors depends on suitability and geography.

   a. Geographically, coal is primarily based in the eastern part of India, whereas solar power is concentrated on the western side. This can make the absorption of the job losses due to coal difficult for solar power.[3]

   b. In terms of suitability, Pai et al. (2020) inspect the local solar and wind capacity required in each coal mining area to transition to solar/wind jobs for China, India, the US, and Australia. In India, almost all coal mining areas are suitable for solar power, but not for wind power.

       i. For transitioning all coal miners to local solar jobs, 1.96 gigawatt electric (GWe) of solar power capacity needs to be installed in each local coal mining area (Pai et al., 2020).

      ii. In the case of wind power, 1.96 GWe of wind power capacity in each coal mining is necessitated for transitioning all coal mining jobs to wind jobs (Ibid). That said, virtually no mining area is amenable to wind power generation (Ibid).

2) Labour intensity of the new sectors: Depending on whether the new sectors are as labour-intensive as the old ones, there may be changes in employment, as the labour absorption capacity of the new sectors may not be the same. For instance, it has been observed in the case of the electric vehicle sector (the new sector steadily replacing the traditional automotive sector) that the labour requirement and intensity are lower as compared to the traditional automotive sector.

Presence of informal workforce is another complicating factor. Large swathes of workers are informal (around three times the formal labour force) (Bhushan et al., n.d.). There is no comprehensive database capturing information on the employment of informal workers. The process of transition can prove to be excruciatingly painful for them. While there can still be opportunities for the formal sector workers, the informal workers may be left with no alternative livelihoods at all, putting even their survival at risk.

3.3 Regional inequality

Another possible challenge to just transition is that of regional inequality, owing to the uneven conglomeration of renewable energy in south and west India, and coal being concentrated in central and eastern parts of India (Shreeshan and Mahale, 2020).[4]

3.4 Government revenue

Governments in India draw significant shares of their revenue from resources and sectors that are likely to be phased out by the transition. 44% of Indian Railways' revenue comes from coal (Bhushan et al., n.d.). Coal royalties constitute close to half of the revenues in some states (Gambhir et al., 2018). Coal revenue accounts for 5-6% of the state budget of Jharkhand (Bhushan et al., n.d.).

3.5 Energy prices

The transition is likely to lead to increases in energy prices. Gambhir et al. (2018) underscore that transitioning to a low-carbon setup can trigger a rise in energy prices for low-income households.

4. Sectoral Analysis

In this section, the study attempts to understand each of the sectors in terms of their employment, energy intensity, value-added, and export competitiveness. This indicates which sectors may suffer or gain in the post-transition period.[5] The section also highlights different efforts and sector-policy measures taken up by the Government of India to accelerate the process of 'just transition'.

4.1 Coal

Coal accounts for approximately 55% of the total energy demand in India. It is a labour-intensive sector, directly employing a workforce of 1.2 million (Pai and Zerriffi, 2021). This study also estimated that there were 744,984 direct coal mining jobs in the financial year 2019-20; moreover, it has been observed that employment in coal mines varies across districts, with Dhanbad district in Jharkhand accounting for the highest number of coal mining jobs. Presently, coal is being produced in 51 districts across 13 states in India, with Korba district in Chhattisgarh accounting for the highest coal production, approximately 120 million tonnes.

Table 1 reflects the coal production and export-import statistics of the sector. As seen from the table, coal production in India has increased over the last three years, and currently India produces 730.87 million tonnes. Coal India Limited (CIL) and Singareni Collieries are the two major public sector enterprises accounting for the bulk of the coal produced in India.

According to the Indian Mineral Book 2019, 87.1% of the total raw coal produced in India is dispatched to the Electricity sector, followed by Steel Manufacturing, Fertilizers, Cement, and the Paper and Pulp industry. Table 1 further shows that India is a net importer of coal in the world market.

Table 1: Coal Sector Statistics[6]

	2017-18	2018-19	2019-20
Total Coal Production (Quantity in Million tonnes)	675.40	728.72	730.87
Total Export of Coal (Quantity in Million tonnes)	1.50	1.30	1.03
Total Import of Coal (Quantity in Million tonnes)	208.25	235.35	248.53

Source: Ministry of Coal

4.2 Mining

There were 1,303 mines (excluding fuel minerals, atomic fuel, and minor minerals) in India, located across all States and UTs, in 2019-20. Among them, 567 belong to metallic minerals and

736 to non-metallic minerals. There were 146 mines in the public sector, and the remaining 1,157 mines were in the private sector.

The number of existing mining leases as of March 31, 2020, for eight metallic minerals (including gold & tin) was 1,137 (33%), covering an area of 1,34,704.79 hectares (43%). On the other hand, the number of existing leases for 32 non-metallic minerals / industrial minerals was 2,300 (67%), which covered an area of 1,77,940.93 hectares (57%).

The percentage share of GVA of metallic and non-metallic minerals under the ambit of Mineral Conservation and Development Rules (MCDR) in the country's GDP (PIB, 2022) varies between 0.4 and 0.5%.

The average daily employment of labour engaged in the mining sector (excluding fuel minerals, atomic minerals, and minor minerals) was 1,11,946 in 2019-20. Out of this, 35,218 or 31% were in the public sector, and 76,728 or 69% in the private sector. Metallic minerals accounted for 80% and non-metallic minerals 20% of the total labour force during the year.

From Table 2, it can be observed that in the year 2019-20 India has been a net exporter of ores, slag, and ash.

Table 2: Mining Sector Statistics[7]

	2017-18	2018-19	2019-20
GVA (at base prices; 2011-12=100) (Rs. Crore)	329612	330521	322116
Export of Ores, Slag, and Ash (Rs. Lakh)	1,158,657.68	1,290,944.88	2,240,051.12
Import of Ores, Slag, and Ash (Rs. Lakh)	4,181,561.98	2,963,129.54	1,869,924.58

Source: RBI database; Trade data: Export-Import databank, Ministry of Commerce.

In a recent study on the environmental impact of mines of CIL conducted by the Comptroller and Auditor General of India (CAG) (Kaur, 2019), in six mines the concentration of air pollutants like $PM_{2.5}$ and PM_{10} has been higher than the prescribed limit. CAG observed that during 2013-18, out of the 28 mines studied, water pollutants exceeded the limits prescribed by Bureau of Indian Standards in eight mines. Further, certain mines continued to use groundwater for their operations without obtaining a no-objection certificate from the Central Ground Water Authority.

CAG noted that six of the seven coal-producing subsidiaries of CIL did not have an environment policy approved by the Board of Directors as mandated by the Ministry. It recommended that all coal sector companies should have an environment policy approved by their respective Boards.

In line with the commitment of our country to reduce the total projected carbon emissions by one billion tonnes from now onwards until 2030, bio-reclamation of mined-out land has already been taken up on a big scale by all coal companies through massive tree plantation drives. In the next five years, the target is to cover more than 12,000 hectares of land for plantation, which will help in having carbon sink potential to the tune of more than one lakh tonnes per annum. Monitoring of such efforts is being done through remote sensing.

In order to contribute to our commitment to increasing, non-fossil energy capacity to 500GW by 2030, coal and lignite companies have planned to install an additional 5560 megawatts (MW) of renewable capacity with an investment of over Rs 15,000 crore. This will take the total installed capacity to 7 GW. Coal India alone has planned to install 3 GW of solar power in the next five years to achieve its net zero targets.

4.3 Power Sector

In the process of shifting towards a low-carbon path, the transition from fossil fuel-based power generation to non-fossil fuel-based power generation will play a critical role. Presently, the share of fossil fuels (coal, lignite, gas diesel) in the power generation accounts for 58.6% of the total installed capacity and non-fossil fuel (wind, solar, hydro, nuclear, and other renewable energy like biomass, etc.) accounts for 41.4% of the total installed capacity in India.

Figure 1: Category-wise Installed capacity

INSTALLED CAPACITY
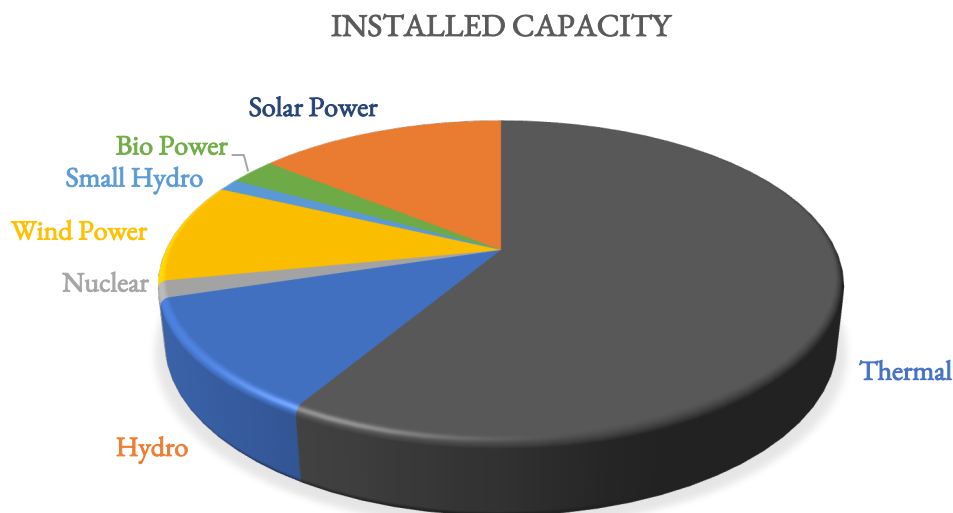
Source: National Power Portal (as of July 5, 2022)[8]

As of December 31, 2021, the total installed capacity for renewable energy in India is 151.4 GW. The government of India has set targets to reduce India's total projected carbon emission

by 1 billion tonnes by 2030, reduce the carbon intensity of the nation's economy by less than 45% by the end of the decade, achieve net-zero carbon emissions by 2070, and expand India's renewable energy installed capacity to 500 GW by 2030.

As per the Foreign Direct Investment (FDI) Data Cell, DPIIT, the Indian Non-Conventional Energy sector received approximately US$ 7.27 billion as FDI from the year 2014-15 up to June 2021. Of this, an FDI of US$ 797.21 million was attracted during 2020-21.

As part of the 2021-22 Union Budget, the Government of India announced an additional capital infusion of Rs 1,000 crore to the Solar Energy Corporation of India (SECI) and Rs.1,500 crore to the Indian Renewable Energy Development Agency (IREDA). The capital infusion of Rs. 1,000 crores will enable SECI to tender 15,000 MW of new solar energy generation capacity a year. This is estimated to attract an annual investment of more than Rs 60,000 crore, generate employment of 45,000 job-years, and reduce emissions by 28.5 million tons of CO_2 per year.

This same capital infusion will also enable SECI to deliver innovative projects with an investment value of around Rs. 17,000 crores. The Government of India's equity infusion of Rs. 1,500 crores to IREDA would support an extension of their loan facility of Rs. 12,000 crores to support renewable energy, in addition to IREDA's existing loan balance sheet of Rs. 27,000 crores.

The additional equity will help improve IREDA's financial position, in turn supporting lower interest rates for IREDA and renewable energy project developers. This investment is estimated to support the financing of around 4,500 MW of renewable energy projects (valued from Rs. 180 to 19,000 crore), generate employment of 13,500 job-years, and reduce emissions by 8.55 million tons of CO_2.

In January 2020, a study by Pai said that India would need to scale up its current solar capacity to nearly 30 times (about 1,000 GW) to transition about half a million people directly working in coal mines. The Government of India is aware of the potential issues in the just transition of the energy sector as well. It has been pushing for renewable energy jobs, too.

The Union Government launched a 'Suryamitra Skill Development Programme' in 2015, aimed to train people for employability in the solar sector. (Aggarwal, 2021) Around 12 million man-days' employment is being created per annum in the sector. More than 40,000 Suryamitras have been trained in the last five years to cater to the growing needs of the solar energy sector and its service industry (MNRE Annual Report 2019).

4.4 Manufacturing Sectors

Five industries (basic metals, paper, paper-related products, textiles, and chemicals and chemical products) constitute 32% of the total workers employed in the organised manufacturing sector in the year 2018-19. The manufacturing of textiles constitutes the bulk of these, accounting for 11% of the total workers employed in the organised manufacturing sector.

These sectors and some other labour-intensive manufacturing sectors are also analysed on the basis of other parameters like employment, net value added, total export, etc. Details are provided in Table A.2 of the Appendix.

Manufacturing of Chemicals and Chemical Products constitutes 16% of India's total exports, and 5% of the total employment in the organised manufacturing sector in India. The sector is also important in terms of its total value-addition, accounting for 10% of the total value added by the organised manufacturing sector.

While analysing the fuel intensity (defined as the total fuel consumed as a share of the total output of the industry) of the Indian organised manufacturing industries (defined at the two-digit level of National Industrial Classification 2008), Figure 1 shows that the 'non-metallic mineral industry follows highly energy-intensive production techniques, followed by the manufacturing of basic metals, paper, paper-related products, textiles, and chemicals and chemical products.

This detailed analysis of the energy composition of these industries indicates that electricity purchased constitutes the bulk of the total energy consumed, followed by coal, petrol, and other fuels. Figure 2 shows that the consumption of coal is higher in the manufacturing of basic metals, followed by the manufacturing of other non-metallic minerals.

The other non-metallic mineral products (including glass and cement) sector, which follows a highly energy-intensive production technique, also accounts for 6% of the total employment in the organised manufacturing sector. The net value added by the sector, on average, for the two consecutive years 2017-18 and 2018-19 is 5%. It accounts for only 1.5% of the total exports of India.

Figure 2: Fuel intensity across organised manufacturing industries

FUEL INTENSITY
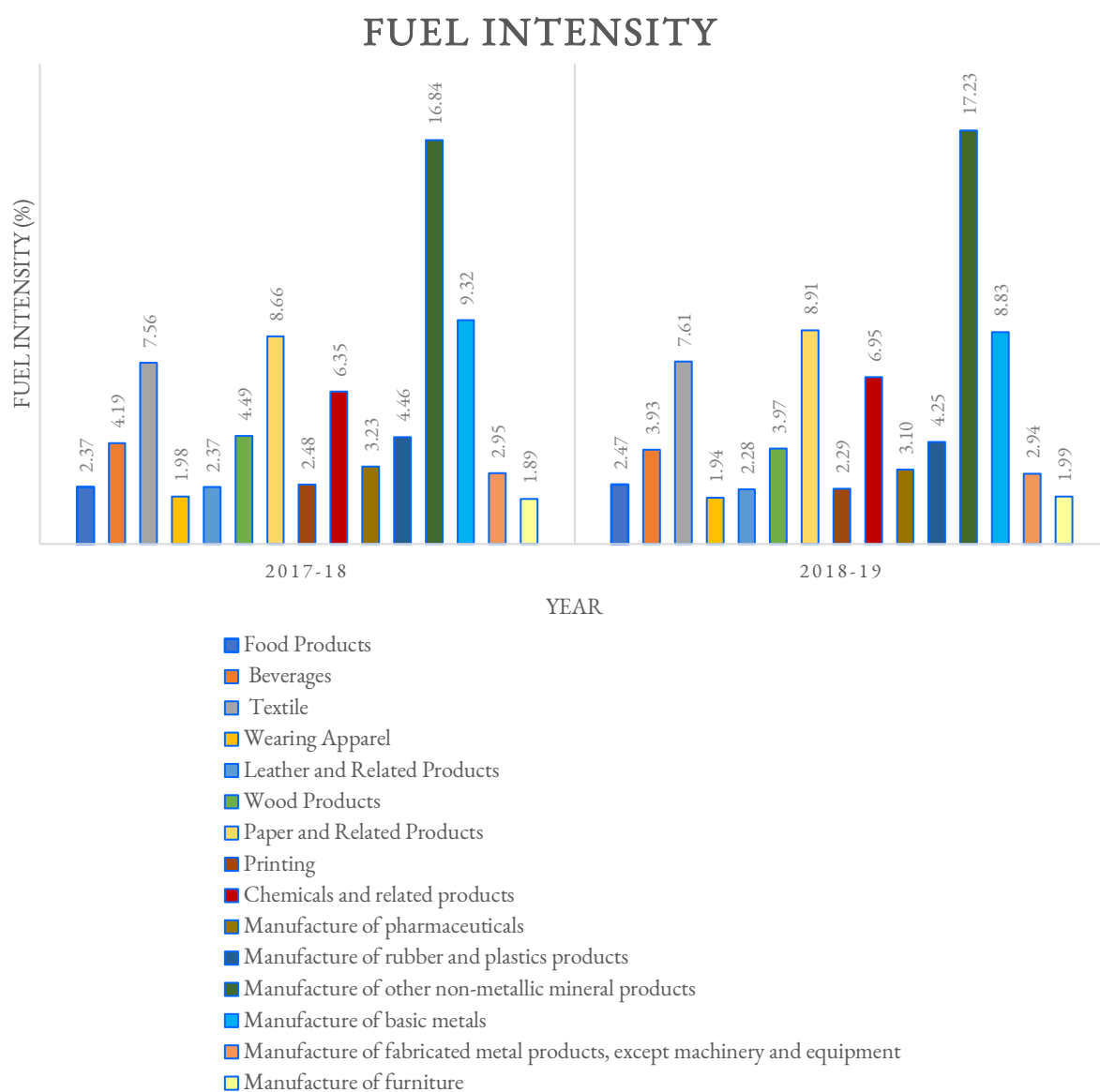
Source: Authors' calculation based on ASI 2017-18 and ASI 2018-19 data

Figure 2. Energy Composition of selected organised manufacturing industries (2018-19)
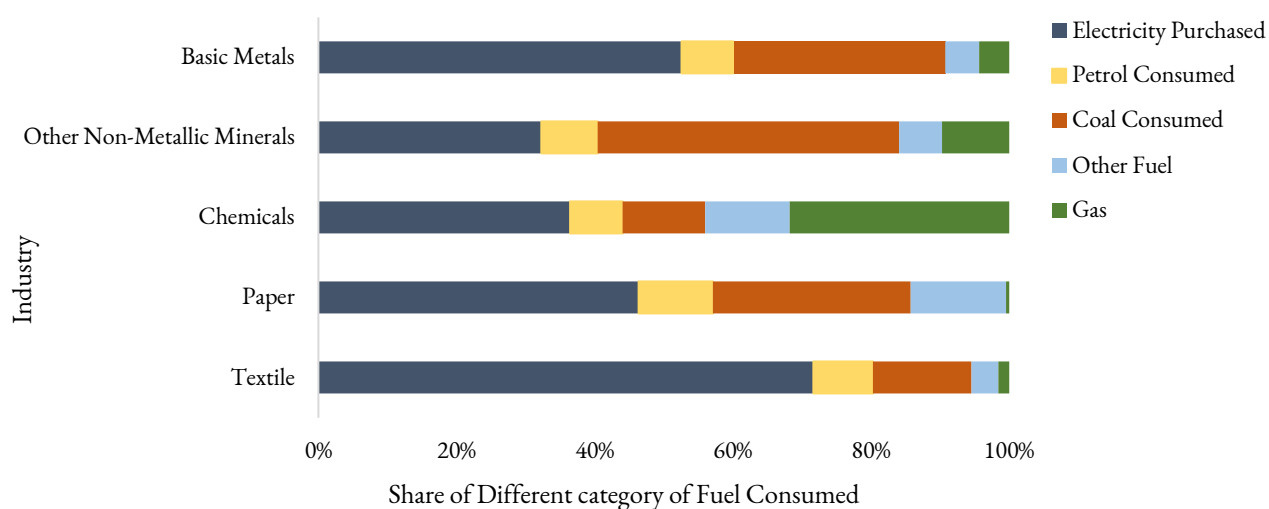
Source: Authors' calculation based on ASI 2017-18 and ASI 2018-19 data.

The manufacturing of basic metals is the second-highest energy intensive sector. It is important to note that the share of coal in the total energy consumption is also very high. Moreover, the sector accounts for 6-7% of the employment in the organised manufacturing sector. The sector also accounts for 9-10% of the total value addition of the organised manufacturing sector. The sector is also important in terms of its export share: 5-6% of India's total export during both the periods of analysis, 2017-18 and 2018-19.

The manufacturing of paper and paper products is the third highest energy-intensive sector. In contrast to the manufacturing of other non-metallic mineral products and manufacturing basic metals, the paper manufacturing sector accounts for only 1% of the total employment in the organised manufacturing sector. Moreover, the share in India's total export has been also lower, accounting for only 0.5% in both 2017-18 and 2018-19, as shown in Table A.2 of the Appendix.

The Perform Achieve and Trade (PAT) Scheme is a key programme for large industries and establishments. This scheme aims to enhance the cost-effectiveness of energy savings, by upgrading technologies or by taking in-house actions to minimise energy consumption. The scheme provides mandatory targets for the identified large units and the excess energy saved by them is issued as Energy Saving Certificates, which are tradable instruments.

Different industries and establishments are assigned separate energy efficiency targets based on their levels of energy consumption and the potential for energy savings. By the year 2020, the scheme coverage has been extended to the 13 most energy intensive sectors in the country, including Cement, Iron and Steel, Fertilizer, Thermal Power Plants, Refineries, Petrochemicals, Railways, etc. This initiative is currently leading to energy savings of about 17 MTOE (Million

Tonnes of Oil Equivalent) and has resulted in the mitigation of about 87 million tonnes of CO_2 per year.

5. MSMEs

The Micro, Small and Medium Enterprises (MSME) sector has emerged as a highly vibrant and dynamic sector of the Indian economy over the last five decades. It contributes significantly to the economic and social development of the country by fostering entrepreneurship and generating large employment opportunities. The MSME sector occupies a position of prominence in the Indian economy, contributing to more than 45% of the industrial output and 40% of the country's exports in value addition terms.[9]

As per the National Sample Survey (NSS) 73rd round, conducted by National Sample Survey Office, Ministry of Statistics & Programme Implementation during the period 2015-16, there were 633.88 lakh unincorporated non-agriculture MSMEs in the country engaged in different economic activities[10], excluding those MSMEs registered under (a) Sections 2m(i) and 2m(ii) of the Factories Act, 1948, (b) Companies Act, 1956 and (c) construction activities falling under Section F of NIC 2008. Uttar Pradesh had the largest number of estimated MSMEs, with a share of 14.20% of MSMEs in the country.

The NSS 73rd round (conducted during the period 2015-16), shows that the MSME sector created 11.10 crore jobs[11] in the rural and urban areas across the country.

- The Micro sector, with 630.52 lakh estimated enterprises provided employment to 1076.19 lakh persons, accounted for around 97% of total employment in the sector.

- The Small sector, with 3.31 lakh estimated enterprises, and the Medium sector, with 0.05 lakh, provided employment to 31.95 lakh (2.88%) and 1.75 lakh (0.16%) persons of total employment in the MSME sector, respectively.

- Out of 1109.89 lakh people employed in the MSME sector, 844.68 (76%) are male employees, and the remaining 264.92 lakh (24%) are females.

Lack of access to the latest technologies makes this sector vulnerable to energy security and competitiveness in the global market. The poor energy and environmental performance are directly related to the lack of technical capacity in these enterprises to identify, access, adapt and adopt better technologies and operating practices.

In 2007, to recognise the importance of MSMEs in promoting energy efficiency, the 'National Programme on Energy Efficiency and Technology Upgradation of MSMEs' was flagged off by the Bureau of Energy Efficiency. Lack of access to finance for MSMEs is one of the stumbling blocks to implementing energy conservation measures and energy-efficient technologies.

The Bureau of Energy Efficiency has also implemented EE technologies in energy-intensive clusters of India with the support from Global Environment Facility through UNIDO and World Bank. The project "Financing of Energy Efficiency at MSMEs" is part of the Global Environmental Facility (GEF) Programmatic Framework for Energy Efficiency in India, with an objective to increase demand for energy efficiency investments in target clusters, and to build their capacity to access commercial finance.

With climate change intensifying, the transition towards an energy-efficient economy is highly imperative for the manufacturing sector, including MSMEs, which account for a large part of the world's consumption of resources. While analysing the energy composition of MSMEs in the organised manufacturing sector, information regarding the electricity purchased, coal used, petrol used, gas used, and other fuel consumed by each manufacturing plant was extracted from the ASI unit level data 2018-19. The energy requirement across some of the MSME clusters is reported in Table A.3 of the Appendix.

From figure 3, it can be observed that MSMEs are highly dependent on electricity: 69% of the total energy used by **small enterprises,** 60% of the total energy used by th**e micro-enterprises,** and 44% of the total energy used by the **medium enterprises** comprises of electricity purchased.

In contrast to micro and small enterprises, coal used by medium enterprises is higher: approximately 25% of the total energy used. In micro and small enterprises, the share of coal is 11% and 6% of the total energy mix respectively. The share of gas used by medium enterprises is also higher than the micro and small enterprises. However, the share of petrol consumption in the total energy mix is higher in micro and small enterprises as opposed to medium enterprises.

Figure 3. Energy Composition of the MSMEs in the organised manufacturing sector
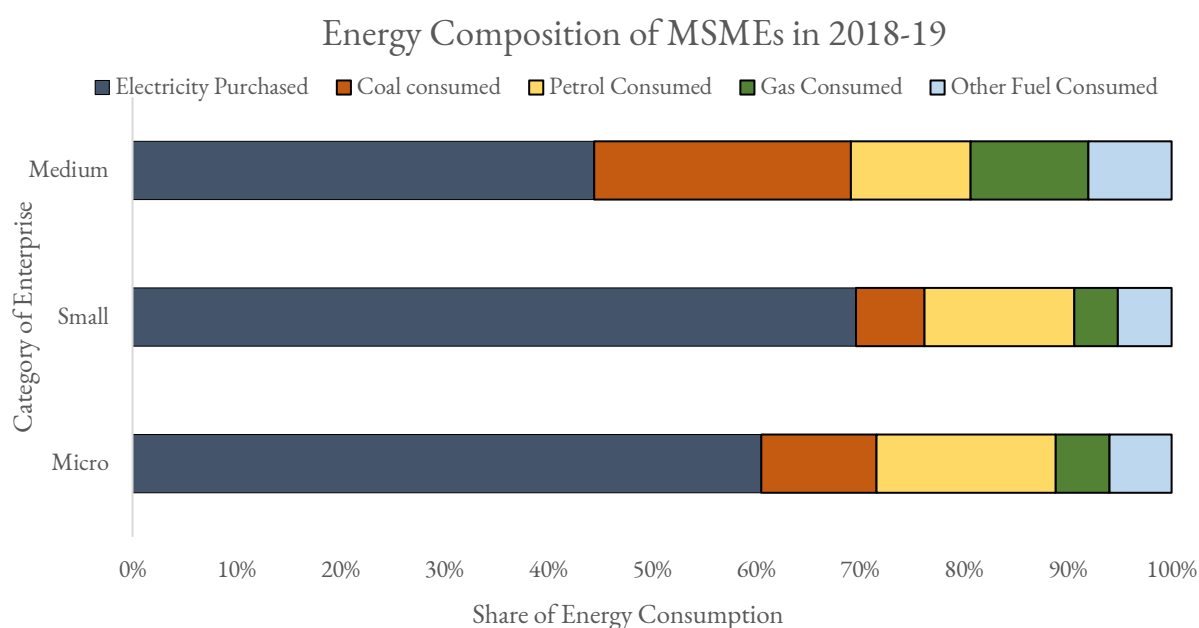
Source: Authors' calculation based on ASI 2018-19 data.

6. Conclusion

In light of India's COP26 commitment of reaching net zero by 2070, it is important to understand how India could ensure a 'just transition.' The process of transitioning to a low-carbon economy will affect sectors like coal, mining, power, formal manufacturing, and MSMEs. The study attempts to understand which sector may suffer or gain from efforts to transition. It looks at each of the sectors in terms of their employment, energy intensity, value-added, and export competitiveness. It also highlights different efforts and sector-policy measures taken up by the Government of India to accelerate the process of transition.

The study analyses some of the important macroeconomic consequences of the transition in terms of employment intensity, energy intensity, total value added, and export competitiveness of the above-mentioned sectors. Using data from the Annual Survey of Industries for 2017-18 and 2018-19 and key informant interviews, the paper presents a sectoral analysis of the transition in the Indian context.

Since the transition raises several questions regarding who will benefit from it and who will lose out, this paper offers an assessment of the sectors that will be impacted most by the transition. In terms of employment, the power and the coal sector will be affected the most.

As far as fuel use is concerned, there are differences within the manufacturing sectors – while for all the sectors, electricity purchased constitutes the largest source of fuel, it is highest in the textiles but lowest in other non-metallic minerals sector. Similarly, the consumption of coal is highest in the other non-metallic minerals and lowest for chemicals.

Among the MSMEs, electricity purchased is the largest source of fuel but varies from 44% in medium firms to 69% in small firms. The use of coal is highest in the medium firms at 25% while lowest in the small firms at 6%.

The spatial dimension of the transition will also be very important, since certain districts producing coal will be affected the most. Coal is being produced in 51 districts across 13 states in India. Korba district in Chhattisgarh accounts for the highest coal production.

There are several dimensions of the policy that need to be addressed. As noted, certain policies have been enumerated above. However, there are some dimensions that need attention – first, certain sectors and certain regions will be impacted more than others. This aspect of the transition needs to be recognised by the policy. Second, the losers in the process of transition will have to be compensated; alternatives in the form of technology, livelihood, and paths will have to be explored to ensure that the transition is just.

References

Aggarwal, Mayank. The balance between jobs in the renewable energy and fossil fuel sectors could play on India's energy transition. 2021. July 8. Retrieved from https://india.mongabay.com/2021/07/the-balance-between-jobs-in-the-renewable-energy-and-fossil-fuel-sectors-could-play-on-indias-energy-transition/. Accessed on March 24, 2022.

Atteridge, Aaron, and Strambo, Claudia. *Seven principles to realize a just transition to a low-carbon economy.* SEI policy report. 2020. June.

Bhushan, Chandra. Energy transition and Just Transition must go hand in hand – as coal mines become rapidly unprofitable. *The Times of India.* 2020. Retrieved from https://timesofindia.indiatimes.com/blogs/toi-edit-page/energy-transition-and-just-transition-must-go-hand-in-hand-as-coal-mines-become-rapidly-unprofitable/   November 28

Bhushan, Chandra, Banerjee, Srestha., and Agarwal, Shruti. *Just Transition in India: an inquiry into the challenges and opportunities for a post-coal future.* 2020. New Delhi: International Forum for Environment, Sustainability & Technology.

D'Souza, Swati and Singhal, Kavya. *Socio-economic impacts of coal transitions in India: bottom-up analysis of jobs in coal and coal-consuming industries.* 2021. National Foundation of India, November.

Gambhir, Ajay, Green, Fergus, and Pearson, Peter J.G. *Towards a just and equitable low-carbon energy transition.* 2018. Imperial College London Grantham Institute Briefing Paper No 26.

Government of Canada. Canada Launches Just Transition Engagement. 2021, July 20. Canada.Ca. Retrieved from https://www.canada.ca/en/natural-resources-canada/news/2021/07/canada-launches-just-transition-engagement.html. Accessed on April 1, 2022.

Gupta, Kashyap, Ghosh, Bipul Kumar, and Kumar, Sunil. Coal Supply-Demand Situation V and Implications. RBI Bulletin. 2021. December 15. Retrieved from: https://rbidocs.rbi.org.in/rdocs/Bulletin/PDFs/04AR_15122021AEF77E4C072D45689052A64B845B3957.PDF Accessed on March 24, 2022.

Jha, Abhishek. Path to a just transition to lower CO_2 emissions. *Hindustan Times.* 2021. Retrieved from   https://www.hindustantimes.com/india-news/path-to-a-just-transition-to-lower-co2-emissions-101612819859591.html

Kaur, Prachi. CAG Report Summary Assessment of Environmental Impact due to Mining Activities and its Mitigation in Coal India Limited. PRS Legislative Research. 2019. December 19. Retrieved from https://prsindia.org/files/policy/policy_committee_reports/CAG%20summary_environment%20assessment.pdf. Accessed on March 24, 2022.

Pai, Sandeep, and Zerriffi, Hisham. A novel dataset for analysing sub-national socioeconomic developments in the Indian coal industry. *IOP Sci Notes,* 2021. 2 014001.

Pai, Sandeep, Zerriffi, Hisham, Jewell, Jessica, and Pathak, Jaivik. Solar has greater techno-economic resource suitability than wind for replacing coal mining jobs. *Environ. Res. Lett.,* 2020. 15 034065. doi: https://doi.org/10.1088/1748-9326/ab6c6d

PIB, Press Information Bureau. Centre Aims 8.5 per cent Growth In Mining Sctor During 2018 – 23. 2022. March 16. Retrieved from: https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1806557. Accessed on March 24, 2022.

Robins, Nick, Brunsting, Vonda, and Wood, David. *Climate change and the just transition: A guide for investor action.* December. 2018. The Grantham Research Institute on Climate Change and the Environment.

Roy, Ashim, Kuruvilla, Benny, and Bhardwaj, Ankit. Energy and climate change: a just transition for Indian labour. In Navroz. K. Dubash (Ed.), *India in a Warming World: Integrating Climate Change and Development.* 2019. (pp. 285-300). Oxford University Press.

Shreeshan, V., and Mahale, Anushka Mohite. *Justice a tricky prospect in India's low-carbon push.* Carboncopy. 2020. Retrieved from https://carboncopy.info/just-transition-tricky-india-low-carbon-push/ December 27.

Tandon, Suranjali., Mitra, Annapurna, and Robins, Nick. *Towards a Just Transition finance roadmap for India: laying the foundations for practical action.* 2021. CDC Investment Works Research Insight.

Tyagi, Akanksha, Charu Lata, Jessica Korsh, Ankit Nagarwal, Deepak Rai, Sameer Kwatra, Neeraj Kuldeep, and Praveen Saxena. 2022. India's Expanding Clean Energy Workforce. Council on Energy, Environment and Water, Natural Resources Defense Council, and Skill Council for Green Jobs.

The European Commission. *Launching the Just Transition Mechanism - for a green transition based on solidarity and fairness.* 2020. Retrieved from: https://ec.europa.eu/info/news/launching-just-transition-mechanism-green-transition-based-solidarity-and-fairness-2020-jan-15_en January 15. Accessed on March 31, 2021

The European Commission. *The Just Transition Mechanism: making sure no one is left behind.* (n.d.). Retrieved from European Commission: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu/just-transition-mechanism_en. Accessed on March 31, 2021.

The Green Initiative and International Labour Organisation. *A just transition to climate-resilient economies and societies: Issues and perspectives for the world of work.* 2016. Technical Paper. December.

APPENDIX

Establishing concordance between ASI and WITS data

Since the industrial characteristics in the Annual Survey of Industries database (ASI) are reported following NIC-2008, and the trade data extracted from the WITS database for each industry are reported following the ISIC Rev 3, it is necessary to establish concordance between the two structures. The steps followed in establishing the concordance include the following:

1. First, the detailed structure of ISIC Rev 4 and ISIC Rev 3 has been studied. It has been observed that the NIC 2008 has been developed based on ISIC Rev 4. For the selected seven industries concordance was established between NIC 2008 and the ISIC Rev 3 structure Accordingly, the export value of each industry (defined at the 2-digit level NIC 2008) was mapped.

2. While establishing one-to-one mapping of industries defined at the NIC 2-digit level, the detailed industrial structure at the 4-digit level of industrial disaggregation for both NIC 2008 and ISIC Rev 3 has been compared. The comparison at the 4-digit level becomes important because with the revision of industrial structure over time, the codes have been revised to maintain parity with the International Standard of Industrial Classification – and either new industrial codes have been assigned or many industrial codes have been subsumed under one.

For example, as shown in **Table A.1**, manufacturing of basic iron and steel defined by single industrial code 2410 (defined under NIC2008) subsumes 9 industrial codes (defined at the 4-digit level of ISIC rev 3). The detailed concordance has been reported in Table A.1 of the appendix.

Table A.1. Concordance between ISIC- REV3 and NIC 2008

NIC-2008 (Corresponds to ISIC Rev 4)	Industry Description	ISIC Rev 3
13	Manufacture of Textile	17
1311	Preparation and spinning of textile fibres	1711(p)+1713(p)
1312	Weaving of textiles	1711(p)+1713(p)
1313	Finishing of textiles	1712+1714
1391	Manufacture of knitted and crocheted fabrics	1730(p)
1392	Manufacture of made-up textile articles, except apparel	1721(p)+ 1722 (p)+1725(p)
1393	Manufacture of carpets and rugs	1722(p)+ 1725(p)
1394	Manufacture of cordage, rope, twine and netting	1723(p)
1399	Manufacture of other textiles n.e.c.	1724+1729

24	Manufacture of Basic Metals	27
2410	Manufacture of basic iron and steel	2711+ 2712+ 2713+ 2714+ 2715+ 2716+ 2717+2718+2719
2420	Manufacture of basic precious and other non-ferrous metals	2720
2431	Casting of iron and steel	2731
2432	Casting of non-ferrous metals	2732
10	Manufacture of Food Products	15
1010	Processing and preserving of meat	1511
1020	Processing and preserving of fish, crustaceans and molluscs and products thereof	1512(p)
1030	Processing and preserving of fruit and vegetables	1513(p)
1040	Manufacture of vegetable and animal oils and fats	1514
1050	Manufacture of dairy products	1520
1061	Manufacture of grain mill products, starches and starch products	1531
1062	Manufacture of starches and starch products	1532
1071	Manufacture of bakery products	1541
23	Other Non-Metallic Mineral Products	26
2391	Manufacture of refractory products	2692
2392	Manufacture of clay building materials	2691 (p)+2693
2393	Manufacture of other porcelain and ceramic products	2691(p)
2394	Manufacture of cement, lime and plaster	2694
2395	Manufacture of articles of concrete, cement and plaster	2695
2396	Cutting, shaping and finishing of stone	2696
2399	Manufacture of other non-metallic mineral products n.e.c.	2699
29	Motor Vehicles, Trailers and Semi-Trailers	34
2910	Manufacture of motor vehicles	3410
2920	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	3420(p)
2930	Manufacture of parts and accessories for motor vehicles	3430
22	Manufacture of Rubber and Plastic Products	25
2211	Manufacture of rubber tyres and tubes; re-treading and rebuilding of rubber tyres	2511
2219	Manufacture of other rubber products	2519(p)
2220	Manufacture of plastic products	2520(p)

12	Manufacture of tobacco products	16
1200	Manufacture of tobacco products	1600
20	**Manufacturing of Chemical and Chemical Products**	**24**
2011	Manufacture of basic chemicals	2330(p)+2411+2429(p)
2012	Manufacture of fertilizers and nitrogen compounds	2412
2013	Manufacture of plastics and synthetic rubber in primary forms	2413
2021	Manufacture of pesticides and other agrochemical products	2421
2022	Manufacture of paints, varnishes and similar coatings, printing ink and mastics	2422
2023	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations	2424
2029	Manufacture of other chemical products n.e.c.	2429(p)
2030	Manufacture of man-made fibres	2430
17	**Manufacture of Paper and Paper Products**	**21**
1701	Manufacture of pulp, paper and paperboard	2101
1702	Manufacture of corrugated paper and paperboard and containers of paper and paperboard	2102
1709	Manufacture of other articles of paper and paperboard	2109+3699(p)

Source: National Industrial Classification 2008 and 2004, MOSPI

Table A.2 Industry Characteristics 2017-18 to 2018-19

Industry Description (NIC 2008 2-digit)	Workers (in numbers) 2017-18	Workers (in numbers) 2018-19	Percentage Share in total employment in organised sector (%) 2017-18	Percentage Share in total employment in organised sector (%) 2018-19	Net Value added (in Rs. Lakh) 2017-18	Net Value added (in Rs. Lakh) 2018-19	Percentage Share in net value added by the organised sector (%) 2017-18	Percentage Share in net value added by the organised sector (%) 2018-19	Export Value (in USD billion) 2018	Percentage Share in India's Total Export (%) in 2018	Export Value (in USD billion) 2019	Percentage Share in India's Total Export (%) in 2019
Col(2)	Col(3)	Col(4)	Col(5)	Col(6)	Col(7)	Col(8)	Col(9)	Col(10)	Col(11)	Col(12)	Col(13)	Col(14)
Textiles (13)	1429168	1428149	11.69	11.16	5594451	6462473	4.55	5.3	18.07	5.61	17.25	5.12
Food Products (10)	1371958	1415573	11.22	11.06	9387541	9428615	7.63	7.4	26.7	8.3	26.48	8.2
Basic Metals (24)	814855	924754	6.67	7.72	11072814	13168672	9	10.3	19.32	6	18.35	5.6
Motor Vehicles, Trailers and Semi-Trailers (29)	788182	856670	6.45	6.69	7957894	10026992	6.47	7.9	15.56	4.83	15.04	4.6
Other Non-Metallic Mineral Products (23)	898228	853892	7.35	6.67	6104750	6775892	4.96	5.3	4.35	1.35	4.72	1.5
Manufacture of Chemicals and Chemical Products (20)	614733	666623	5.03	5.21	12405946	13944760	10.08	10.92	51.43	16	54.36	16.8

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Rubber and Plastics Products (22)	561191	4.59	644332	5.03	4326804	3.52	5081636	4	6.34	1.97	6.68	2.1
Manufacture of Tobacco Products (12)	441117	3.61	437560	3.41	1639754	1.33	1778954	1.4	0.4	0.13	0.42	0.13
Manufacture of Paper and Paper Products (17)	224756	1.83	252063	1.96	1728626	1.40	2130830	1.67	1.69	0.52	1.90	0.59

Source: ASI Round 2017-18 & 2018-19 Summary statistics, MOSPI; Trade Data: WITS, World Bank

Table A.3 Energy requirement of MSME clusters

Sl. no.	State	MSME Cluster	Major Products Produced	Energy Requirement (consumption per annum)					
				Electricity	Firewood/Husk	Light Diesel oil (LDO)	PNG/LNG/LPG	Coal/Hard Coke	Lignite
1	Gujarat	Ahmedabad Cluster	Chemical and allied products (manufacture of various types of dyes & chemicals, pigments)	6142878 Units	45534 Tonnes	299760 Litres	PNG: 784200 Kg	3300 Tonnes	-
2	Gujarat	Jamnagar Cluster	Manufacture of various types of brass related products	16275625 Unit	4425 Tonnes	-	-	59777 Tonnes	-
3	Gujarat	Morbi	Manufacture of different types of tiles – wall tiles floor tiles & vitrified tiles	16020000 Units	-	High Speed Diesel (HSD): 6092400 Litres		102000 Tonnes	-
4	Rajasthan	Pali	Textile dyeing and Printing units	51317071 Units	2716 Tonne	LDO: 1500300 litres High Speed Diesel: 89640 litres	LNG: 9360900 Kg	2967 Tonnes; Lignite Coal: 16635 Tonnes; Petro Coal: 11820 Tonnes;	-

5	Maharashtra	Solapur	Textile activities. Towels, napkins, bed sheets.	6404261 Units	70209 Tonnes	-	-	-	-
6	Gujarat	Surat	Textile processing	144143128 Units	-	7822500 litres; HSD: 2749200 litres	-	378600 Tonnes	297900 Tonnes es
7	Telangana	Warangal	Manufactured boiled rice and raw rice	88,50,000 Units	Firewood:30300 Tonnes; Husk: 10650 Tonnes	-	-	-	-
8	Punjab	Sawai Madhopur/Alwar	Extraction of various types of edible oils	51777712 Units	-	High Speed Diesel: 300000 litres	-	-	-
9	Karnataka	Bangalore	Manufacturing various CNC machine components & normal machine components.	78308112 Units	-	High Speed Diesel: 200 litres	-	-	-
10	Orissa	Bhubaneshwar	Manufacturing of lota, thali,	-	-	-	-	2435 Kg/Day	-

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			lamp, worship idols					
11	Andhra Pradesh	West Godavari /East Godavari Cluster	Manufacture of various types of firebricks.	1702670 Units	1560 Tons			21840 Tons
12	Rajasthan	Jodhpur Cluster	Manufacture of limestone	-	-	-	-	11142 Tonnes
13	Assam	Jorhat Cluster	tea processing	40041600 Units	-	HSD: 5235600 litres	LPG:95190 Tonnes	8460Tonnes
14	Kerala	Cochin Cluster	Sea Food Processing cluster	24513600 Units	-	LDO:22,55,100 litres; HSD: 60000 Litres	-	-
15	Bihar	Muzaffarnagar Cluster	Manufacturing of Paper	325000000 Units				
16	Bihar	Bihar Cluster	Manufacturing of Sponge Iron	40038000 Units	-	HSD: 644000 litres	-	3781560 Tonnes
17	Gujarat	Vapi Cluster	Chemical Cluster	30857544 Units	4086 Tonnes	LDO: 2207160 litres; HSD:181200 litres	-	-
18	Uttar Pradesh	Varanasi Cluster	Manufacture of various	-	--	-	-	426900 Tonnes

			types of bricks and tiles	2457600 Units	-	-	-	348000 Tons	-
19	Uttar Pradesh	Meerut (Khandsari Cluster)	Manufacture of khandsari as well as gur	2457600 Units	-	-	-	348000 Tons	-
20	Tamil Nadu	Tiruppur	knitting, garment manufacturing, fabric, embroidery, and dyeing, bleaching units	-	-	HSD:1167365 litres per annum; Diesel:360 Tonnes	-	Coal: 370 tonnes; Chinese coke:60tonnes	-
21	Karnataka	Belgaum	Foundry	3866453 Units	27348 Tonnes	LDO: 78 litres	-	846 Tonnes	-
22	Tamil Nadu	Coimbatore	Manufacturing of base for casting – ferrous as well as nonferrous					Chinese coke:6431 TONNES; Coal: 6856 Tonnes	
23	Gujarat	Rajkot	Foundry and forging activities	36871932 Units	-	-	-	126384 Tonnes	-

Source: Bureau of Energy Efficiency of India reports.

Notes

[1] The database provides information on different trade indicators: export/import, tariff rates, and non-tariff measures across both industries (defined based on Standard international trade classification (SITC) and ISIC classification) as well as commodities (defined based on Harmonized Codes classification) for 223 countries over the period from 1962 to 2020.

[2] Data used for calculation is sourced from the RBI Reserve Bank of India and the metric for the gross domestic product at the national and sub-national level is GDP at constant prices.

[3] Based on stakeholder interactions.

[4] Ibid

[5] The post-transition period will vary by sector.

[6] https://coal.gov.in/sites/default/files/2021-01/productiondata_tenyear.pdf

Import:https://coal.gov.in/en/major-statistics/production-and-supplies#:~:text=%E0%A4%95%E0%A5%8B%E0%A4%AF%E0%A4%B2%E0%A4%BE%20%E0%A4%AE%E0%A4%82%E0%A4%A4%E0%A5%8D%E0%A4%B0%E0%A4%BE%E0%A4%B2%E0%A4%AF%20Ministry%20of%20Coal&text=Coal%20India%20Limited%20(CIL)%20and,a%20negative%20growth%20of%200.98%25.

Export: https://coal.gov.in/sites/default/files/2021-01/Export-of-Coal-last-ten-years.pdf

[7] Mining and Quarrying: https://www.rbi.org.in/scripts/PublicationsView.aspx?id=20408 (as accessed on 23.3.2022)

Trade data: https://tradestat.commerce.gov.in/eidb/default.asp

[8] As accessed on July 7, 2022.

[9] During the period 2014-15 to 2018-19 the contribution of MSMEs in total manufacturing (at current prices) has varied between 31-33%. According to the DGCIS report, the export of MSME sector in India's total export is 49.8% and 49.5% in the year 2018-19 and 2019-20 respectively. https://msme.gov.in/sites/default/files/MSME-ANNUAL-REPORT-ENGLISH%202020-21.pdf

[10] 196.65 lakh in Manufacturing, 0.03 lakh in Non-captive Electricity Generation and Transmission, 230.35 lakh in Trade and 206.85 lakh in Other Services.

[11] 360.41 lakh in Manufacturing, 0.07 lakh in Non-captive Electricity Generation and Transmission, 387.18 lakh in Trade and 362.22 lakh in Other Services.

Conditional convergence and Spatial convergence across 103 Sub-state Indian regions:
Using spatial econometrics for panel data

Vivek Jadhav[*]   **Brinda Viswanathan**[#]

Abstract

Recent studies have devoted great emphasis to examining the phenomenon of income convergence across regions. The empirical efforts made in the context of India look at convergence among the states of India. Although there have been a few studies done on the district level, the sub-state regions that are prevalent within each state have been largely ignored in the Indian regional literature. The purpose of this research is to investigate the extent to which 103 sub-state regions within 20 Indian states converge. This research adopts a method that differs from the conventional convergence strategy by instead focusing on the spatial convergence aspect. It has been shown that not only does spatial convergence but also β-convergence: a growth process where poor regions grow faster than rich regions occur among India's 103 different regions. This study sheds insight on the two distinct forms of convergence, namely, β-convergence across all regions, and β-convergence among neighbouring regions. The finding of the existence of β-convergence and spatial convergence among neighbouring regions invites policy attention regarding the development of backward regions.

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1. Introduction

India's per capita GDP has climbed from USD 758 in 2000 to USD 1606 in 2015. Because of this impressive national growth, attention has been drawn to the regional growth that occurred during the same period. It's interesting to see if the growth of regions is at par with national growth.

In the context of the regional economy, growth has always attracted debate about convergence and divergence. The concept of convergence is not new since it was proposed by Robert Solow's growth model. In literature, two broad concepts of convergence are discussed[1]: β-convergence and σ-convergence. β-convergence reflects to a process where poor economies grow faster than rich economies and σ-convergence reflects the process where the differences in the real GDP of economies tends to decrease. Neoclassical exogenous growth theory and augmented growth theory (Solow-Swan, 1956; Mankiw, Romer, and Weil (MRW), 1992; Barro and Sala-I-Martin, 1995) believe that early per capita income differences will ultimately be 'conditionally converged[2]' due to capital accumulation and diminishing returns. This convergence argument is also backed by region as well as country-specific recent empirical studies (Maddison, 1991; Barro and Sala-i-Martin, 1991, 1992; Cashin, 1995; Sala-i-Martin, 1996; Armstrong, 1995; Persson, 1995; Cashin and Sahay, 1996; Barro-Lee, 2001 data set; Singh, et al, 2010).

In the context of India, the literature on convergence is vast and expanding. The recent development in the convergence literature also incorporates spatial aspects (Shaban, 2006; Kocornik-Mina, 2009; Kalra and Thakur, 2015). While empirical studies incorporate recent theoretical advances, they are limited to the state level. This study shifts the level of analysis for regional studies from Indian states to sub-state regions. The regions in this research are distinct from 'Indian states'. The regions considered in this study are administrative and geopolitical divisions within its states, comprising districts. This research first defines the regions in India and then tries to understand the convergence as well as spatial convergence using panel data for the 2001-2015 period.

The regions can be described in many ways depending on their characteristics. A region is characterised primarily by its size, content, location, and border. The region also has another characteristic, and that is homogeneity (Malgavkar & Ghiara, 1969). A set of countries, states, districts, or villages might be referred to as a region.

When applied to the context of India, regional studies tend to focus more on the Indian states in convergence literature. In the context of this study, a region refers to a set of districts that have similar characteristics and come together to create administrative divisions. In accordance with the concept presented by Malgavkar & Ghiara (1969), these regions are not only administrative divisions, but they are also homogeneous in terms of social identity, which includes religion and caste.

In the analysis, the regions that exist in twenty states are included. Table no. A1 in the appendix gives details regarding the 103 regions, and the districts that form these regions. Figures A1 to A3 in the appendix give an idea of the homogeneity of the regions. Identifying whether convergence and

spatial convergence exist across these 'clusters', that is sub-state regions, becomes essential from the perspective of state policy planning.

2. Regional Income

The districts are the basic units used to create regions in this study. Therefore, to understand the regional income, the income at the district level should be aggregated at the regional level. Per-worker regional domestic product is used to identify the regional income. A per-worker regional domestic product also represents the productivity of the region.

Indicus Analytics provides information about the domestic product at a district level for the years 2001-2015. The aggregated Gross Regional Domestic Product (GRDP) is derived from aggregating the Gross District Domestic Product (GDDP) (Current Prices). The worker population at the district level is determined from the division of GDDP by GDDP per worker. This worker population at the district level is aggregated to compute the worker population at the regional level. A per-worker Gross Regional Domestic Product (GRDP) at current prices is derived from the aggregated regional population and GRDP. The equations (1) to (3) explain the process of calculating the per worker GRDP.

Equation 1

$$GRDP_A = \sum_{i=1}^{n} GDDP_i$$

(1)

Where,

$GDDP_i$ is a Gross District Domestic Product of 'i' district in region 'A',

"n" is a total number of the districts in region "A",

$GRDP_A$ is a Gross Regional Domestic Product of region "A"

Equation 2

(2)

$$Worker_A = \sum_{i=1}^{n} \frac{GDDP_i}{Per\ Worker\ GDDP_i}$$

Where, $GDDP_i$ is a Gross District Domestic Product of 'i' district in region 'A',

"n" is a total number of the district in region 'A',

$Worker_A$ is a total number of workers in region 'A'

Equation 3: $Per\ Worker\ GRDP_A = \frac{GRDP_A}{Worker_A}$ (3)

Figure 1: Per Worker Regional Domestic Product
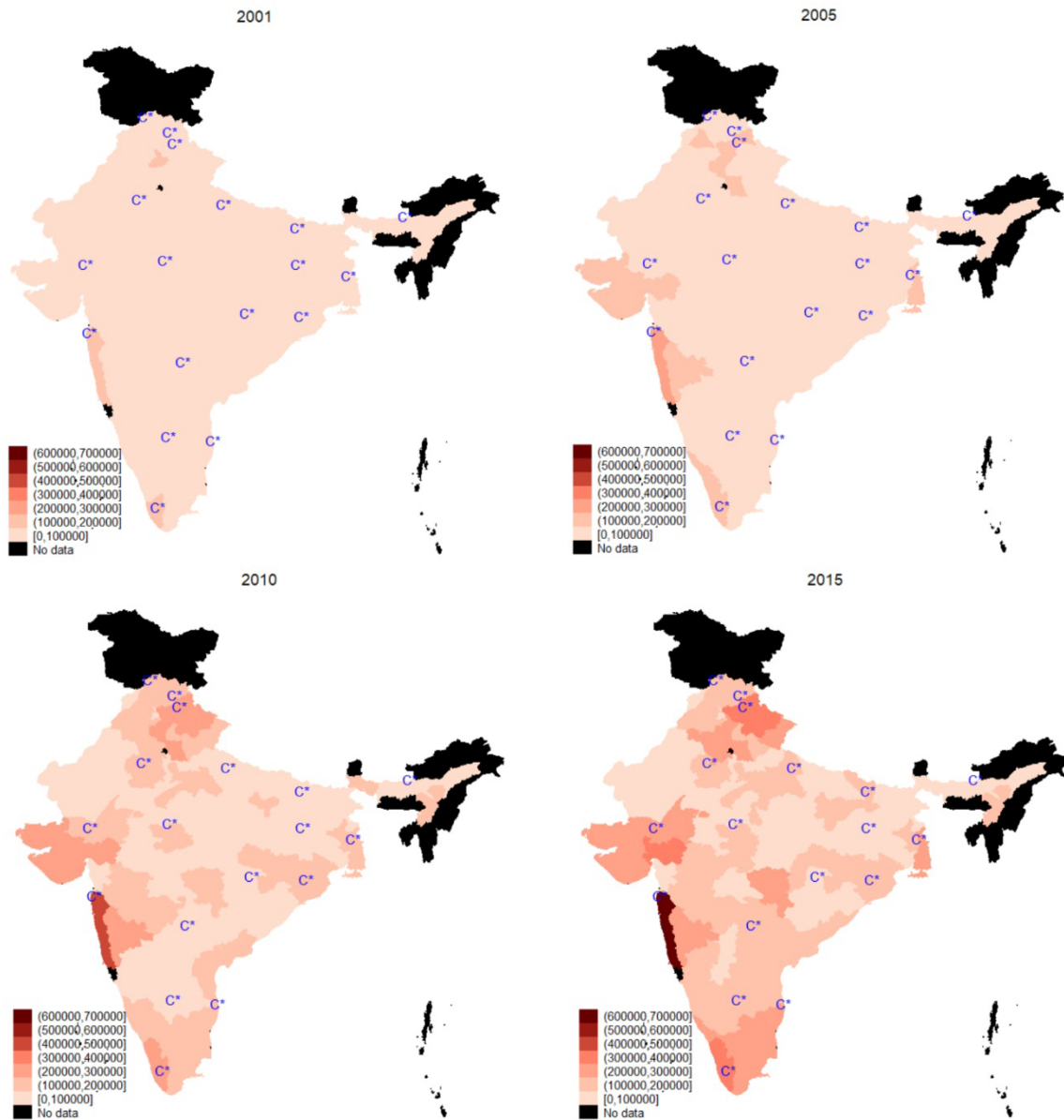
An interactive map depicts how per worker GRDP changes over the period of time across the regions (Figure 1).

- Regions with a state capital in a given state begin to improve in terms of per worker GRDP.

- In the latter stages, the neighbouring region also shows improvement.

- Gujarat and Chhattisgarh are the exceptions; in these states, the initial growth in per-worker GRDP occurs in regions other than the state capital. This is because both these regions have some cities that are historically involved in industrial (Bilaspur in the Bilaspur region of Chhattisgarh) and trade-related activities (Porbandar, Jamnagar, Bhavnagar, Ahmedabad in the Saurashtra region of Gujarat).

- As is seen in regions with a state capital, the regions neighbouring Bilaspur and Saurashtra show an improvement in per-worker GRDP.

- The remote regions that don't have a state capital are either picking up late or still not picking up in terms of per-worker GRDP.

Clearly, there is a spillover of wealth from one region to another. Figure 1 shows that while early increases in per-worker GRDP may be seen in specific regions (such as those with the state capital or those with a significant history of economic activity), the neighbouring regions are also benefiting from this growth. There's a lot to learn from this spatial pattern. Therefore, it is important to comprehend how regional income and neighbouring regions' income are moving and whether they are converging or not. This study thus includes regions within a state to highlight how convergence works across sub-state regions within a state. It also implements spatial panel data analysis to incorporate the spatial aspects of convergence.

3. Convergence

Empirical identification of convergence can be done by using the β-regression model (Durlauf and Quah, 1999). It gives the estimation for Beta convergence, which refers to a growth phenomenon where poor regions grow faster than rich regions (Sala-i-Martin, 1996). The empirical findings of growth models support the theoretical argument that convergence is possible (Maddison, 1991 and Barro-Lee, 2001 data set). Region-specific studies and cross-country studies do identify the presence of convergence. Table 1 describes cross-country studies and region-specific studies for Neoclassical and Augmented Neoclassical theories.

Table 1: Empirical Studies for Neoclassical and Augmented Neoclassical theories

Empirical studies	Country/Region	Approach	Result
Barro, et al., (1991) Barro and Sala-i-Martin (1992)	United States of America	Augmented neoclassical growth model where human capital is included in the model.	β-convergence across states which suggests poorer regions within country tends to grow faster than richer regions
Barro and Sala-i-Martin (1992)	Japanese Prefectures and United States of America	Augmented neoclassical growth model where human capital is included in the model.	β-convergence across states and prefectures.
Cashin (1995)	Australian Colonies	Neoclassical growth model	Divergence across colonies tends to decline.
Sala-i-Martin (1996)	European Countries OCED Countries	Neoclassical growth model	Convergence with different speed for different periods. Divergence for few periods.
Armstrong (1995)	European Countries	Neoclassical growth model	Convergence with declining rate.
Persson (1995)	Sweden	Neoclassical growth model	Convergence.
Cashin and Sahay (1996)	India States	Neoclassical growth model	Convergence.
Singh, et al (2010)	Indian districts	Neoclassical growth model	Convergence to steady state

While empirical studies based on Neoclassical and Augmented Neoclassical growth theories show convergence, empirical studies based on theories critical to Neoclassical growth theories (including disequilibrium theories and New Endogenous Growth theories) show the opposite. Table 2 summarises the empirical studies.

Table 2: Empirical Studies for Disequilibrium theories as well New Endogenous Growth theories

Empirical studies	Country/Region	Approach	Result
Quah (1996a) Quah (1996b)	European Countries United States	Critical to empirical approach of Neoclassical Growth Model due to non-inclusion of spill-over effects.	Ambiguous Result.
Marjit and Mitra (1996)	Indian States	Critical to empirical approach of Neoclassical Growth Model	Divergence.
Rao, Shand and Kalirajan (1999)	India States	Modification in Augmented Neoclassical growth model by adding population related variables.	Divergence.
Sachs, et al (2002)	India States	Incorporating agricultural reforms in growth equation	Divergence.
Rey and Montouri (1999)	United States	Inclusion of spill-over effects.	Convergence due to spill-over effect
Arbia and Piras (2005) Sardadvar (2012)	European Regions European Regions	Inclusion of spill-effect Inclusion of spatial dependence	Convergence Convergence
Shaban (2006)	Maharashtra Districts	Spatial Convergence	Regional convergence.
Kocornik-Mina (2009)	Indian States	Spatial Convergence	Divergence
Kalra and Thakur (2015)	Indian States	Spatial Convergence	Divergence

Above empirical works talk about how the spill-over effect affects the growth and income of a region. These works include the spill-over effect from regions and convergence across regions. The research question of how spill-over effects can be included in the framework of convergence is not investigated explicitly in the Indian regional context. This research work tries to fill the gap by adapting spatial convergence analysis for Indian sub-state regions. In this section, in addition to the traditional approach of convergence by β-regression, spatial convergence is also investigated. Spatial convergence is a process where the differences in income across regions adjacent to each other in space

tend to decrease. The panel data model incorporates the spatial aspects as well as the fixed effect to control the time-invariant characteristics of the regions.

3.1 Panel data beta convergence

Mathematically, the growth equation for convergence for panel data can be written as[3]:

Equation 4:

$$ln\left[\frac{y_{i,t+k}}{y_{i,t}}\right] = \alpha + \beta \times ln\, y_{i,t} + \sum_{i=2}^{N} \delta_i \times R_i + \varepsilon_{i,t} \tag{4}$$

Where, i (i=1,2,3,4,...,N) represents regions and t (t=1,2,3,4,..,T) represents the time periods. ln $ln\left[\frac{y_{i,t+k}}{y_{i,t}}\right]$ is the annual growth rate of per worker gross regional domestic product (per worker GRDP) of region 'i' for a time period t-k. $ln\, y_{i,t}$ can be interpreted as initial per worker GRDP for the given time period. R_i is a dummy variable for region 'i' and δ_i is its coefficient. R_i is included to incorporate the region-specific effects. If β is positive, then divergence is happening across regional growth rate and if β is negative then beta convergence that is conditional convergence is happening across regional growth rate

3.2 Panel data spatial beta convergence

As **Error! Reference source not found.** shows the spatial pattern, the spatial aspect should also be investigated. The equation 4 can be modified to incorporate the spatial aspect.

Equation 5

$$ln\left[\frac{y_{i,t+k}}{y_{i,t}}\right] = \alpha + \beta \times ln\, y_{i,t} + \sum_{i=2}^{N} \delta_i \times R_i + \rho \sum_{j=1}^{N} w_{ij} \times ln\, y_{j,t} + \varepsilon_{i,t} \tag{5}$$

w_{ij} is an element from the binary spatial weights matrix (W), which is one if region i and region j are the neighbouring regions. A binary spatial weights matrix W represents the relationship between neighbour regions i and j. It has zero in diagonal. The neighbouring regions of region i are defined as j regions that have w_{ij} =1. w_{ij} is one only if regions are sharing borders otherwise it is zero. $\varepsilon_{i,t}$ is independently and identically distributed. It is also assumed that it has no spatial autocorrelation.

The model specification can be done to incorporate spatial autocorrelation.

Equation 6

$$ln\left[\frac{y_{i,t+k}}{y_{i,t}}\right] = \alpha + \beta \times ln\, y_{i,t} + \sum_{i=2}^{N} \delta_i \times R_i + \rho \sum_{j=1}^{N} w_{ij} \times ln\, y_{j,t} + \lambda \sum_{j=1}^{N} w_{ij} \times \varepsilon_{i,t} + u_{i,t} \tag{6}$$

Equation 6 incorporates the spatial autocorrelation. The appropriate model is selected by adopting the approach given by LeSage and Pace (2009), Belotti, et al. (2013), and Elhorst (2014). Spxtregress stata package is used to estimate the spatial models (Kapoor, et al., 2007; StataCorp, 2017). Following

Elhorst (2014), diagnostic tests are also done to select the appropriate model (Appendix 7.2 discusses this in detail).

As a fixed effect is involved, adding the dummy for state capital regions will be omitted due to its time-invariant nature. Therefore, to check the convergence across non-state capital regions separately, separate models are used for 'all regions' and 'regions without state capital'. The spatial model for regions with state capital can't be implemented as the weight matrix is in binary form, and most of the regions with state capitals don't share boundaries with each other. ρ shows the impact of initial neighbouring regions' income on a given region's growth for a given time period. If it is negative, then it shows negative spill-over, which means rich income regions have negative impact on the neighbouring region's growth; if it is positive, rich income regions have positive impact on the neighbouring region's growth (positive spill-over).

Table 3: Conditions for β-convergence and spatial convergence

$\rho>0$	$\beta>0$	Spatial convergence with beta divergence with
$\rho>0$	$\beta<0$	Spatial convergence with beta convergence
$\rho<0$	$\beta>0$	Spatial divergence with beta divergence
$\rho<0$	$\beta<0$	Spatial divergence with beta convergence

4. Result

Table 4: Descriptive Statistics

Variable	Observation	Mean	Std. Dev.	Min	Max
Per worker GRDP	1442	81743.02	66748.04	588.01	570814.9
Log (Per worker GRDP)	1442	10.93	1.06	6.38	13.255
Annual Growth rate of per worker GRDP	1442	0. 079	0 .098	-0.116	2.053
Regions	1442	52	29.742	1	103
Year	1442	2008.5	4.033	2001	2014

Table 1 shows the descriptive statistics. The annual growth rate for the region has a negative lower-bound value.

Figure 2: Histogram with Normal Density Plot
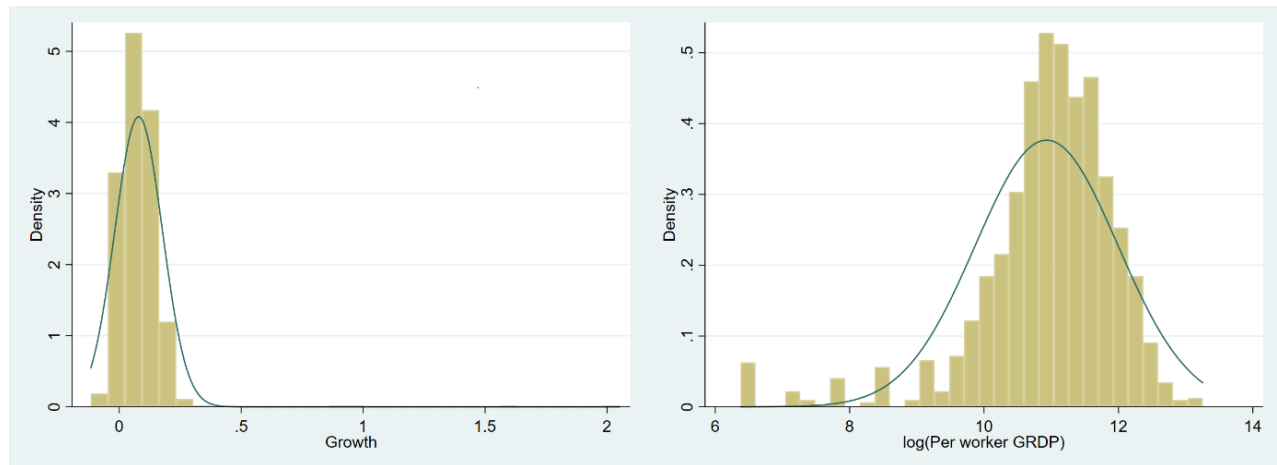
Figure 2 shows histogram which does suggest that panel data growth rate[4] and log (Per Capita GRDP) tend to be normally distributed.

Table 5: Panel data Fixed Effect Model

	All regions (FE model)	Regions with state capital (FE model)	Regions without state capital (FE model)
log (Per-Worker GRDP)	-0.06***	-0.08***	-0.06***
	(0.006)	(0.02)	(0.004)
Constant	0.79***	0.94***	0.74***
	(0.06)	(0.24)	(0.05)
R2 within	0.0846	0.0527	0.1460
R2 between	0.0406	0.5846	0.3260
R2 overall	0.0038	0.0384	0.0019
F value	123.68	12.23	190.96
(P value)	(0.00)	(0.00)	(0.00)
Number of Observations	1442	238	1204
Number of Groups	103	17	86
Hausman test:			
chi2	123.02	6.39	244.14
(P value)	(0.00)	(0.01)	(0.00)
Test for region specific effect:	2.26	1.84	4.47
F value	(0.00)	(0.03)	(0.00)
(P value)			

Table 2 shows panel data regression for convergence. A fixed effect model is an appropriate model over random effect and pooled models. The coefficients of log(Per-Worker GRDP) in all three models are statistically significant and negative, which suggests convergence. The coefficient of log (Per-Worker GRDP) for regions with a state capital is more negative than the coefficient of log (Per Worker GRDP) for overall regions as well as other regions, which suggests the convergence of growth rate across regions with state capital is faster compared to convergence across all regions.

Table 6: Spatial Panel Model

	All regions (Spatial Durbin Error FE model)	Regions without state capital (Spatial Durbin Error FE model)
log (Per-Worker GRDP)	-0.11***	-0.08***
	(0.011)	(0.008)
Spatial lag of log (Per-Worker GRDP)	0.01***	0.005**
	(0.002)	(0.002)
λ	0.06***	0.12***
	(0.007)	(0.007)
Log-likelihood	1314.4530	1689.3619
Number of Observations	1442	1204
Number of Groups	103	86
AIC value	-2620.906	-3370.724
Hausman test:		
chi2	90.80	117.62
(P value)	(0.00)	(0.00)
Wald test of spatial terms:		
chi2	88.36	268.39
(P value)	(0.00)	(0.00)

The Spatial Durbin Error Fixed Effect model is appropriate over the Spatial Lag Fixed Effect model[5]. In the spatial model, the coefficient of log(per-worker GRDP) is negative, which does suggest the convergence across region. Adding to that, the coefficient of spatial lag of log(per-worker GRDP) is positive, which means the positive spillover of per worker regional GRDP. This suggests that the region with a high per-worker regional GRDP leaves a positive impact on the neighbouring regions' growth.

5. Concluding remarks

In this empirical study, the primary focus was placed on analysing the convergence of gross regional domestic product (GRDP) per worker across 103 Indian regions over a course of time spanning from 2001 to 2015. The findings of a study using fixed-effect panel data on 103 regions, including 17 regions with state capitals, provide evidence of convergence.

The process of convergence is stronger for the regions with state capitals compared to regions without state capitals. The spatial analysis has also provided some insight regarding the convergences. It is found that there is a positive spill-over impact of GRDP per worker. The "rich regions" are able to boost the economic growth of their neighbouring regions. The interactive map also points out the spill-over of per worker GRDP.

The spatial analysis indicates that there are two types of convergence: β-convergence across all regions, and β-convergence among neighbouring regions. This study provides clear evidence for spatial convergence in the Indian context. As spatial dependence with a positive spill-over effect of per-worker GRDP is observed, it will be interesting to understand the phenomena through which this spill-over effect is happening.

References

Alesina, A., Bagir, R., & Easterly, W. (1999). Public goods and ethnic divisions. The Quarterly journal of economics, 114(4), 1243-1284.

Arbia, G., & Piras, G. (2005). Convergence in per-capita GDP across European regions using panel data models extended to spatial autocorrelation effects.

Arbia, G., Basile, R. and Piras G. (2005), "Using Spatial Panel Data in Modelling Regional Growth and Convergence", ISAE Working Paper No. 55, Rome: ISAE.

Armstrong, H. W. (1995). Convergence among regions of the European Union, 1950–1990. Papers in Regional Science, 74(2), 143-152.

Barro, R. J., & Lee, J. W. (2001). Barro-Lee Education Data.

Barro, R. J., Sala-i-Martin, X., Blanchard, O. J., & Hall, R. E. (1991). Convergence across states and regions. Brookings papers on economic activity, 107-182.

Barro, R. T., & Sala-i-Martin, X. (1992). Regional growth and migration: A Japan-United States comparison. Journal of the japanese and International Economies, 6(4), 312-346.

Barro, R. J., & Sala-i-Martin, X. (1995). Economic Growth McGraw-Hill. New York.

Belotti, F., Hughes, G., & Mortari, A. P. (2013). XSMLE: Stata module for spatial panel data models estimation. Statistical software components S, 457610.

Cashin, P. (1995). Economic growth and convergence across the seven colonies of Australasia: 1861–1991. Economic Record, 71(2), 132-144.

Cashin, P., & Sahay, R. (1996). Regional economic growth and convergence in India. Finance & Development, 33(001).

Durlauf, S. N., & Quah, D. T. (1999). The new empirics of economic growth. Handbook of macroeconomics, 1, 235-308.

Elhorst, J. P. (2014). Spatial econometrics: from cross-sectional data to spatial panels (Vol. 479, p. 480). Heidelberg: Springer.

Hirschman, A. O. (1958). The strategy of economic development. New Haven: Yale University Press.

Kalra, R., & Thakur, S. (2015). Development patterns in India: Spatial convergence or divergence?. GeoJournal, 80(1), 15-31.

Kapoor, M., Kelejian, H. H., & Prucha, I. R. (2007). Panel data models with spatially correlated error components. Journal of econometrics, 140(1), 97-130.

Kocornik-Mina, A. (2009). Spatial econometrics of multiregional growth: The case of India. Papers in Regional Science, 88(2), 279-300.

LeSage, J., & Pace, R. K. (2009). Introduction to spatial econometrics. Chapman and Hall/CRC.

Maddison, A. (1991). Dynamic forces in capitalist development: A long-run comparative view. Oxford University Press, USA.

Malgavkar, P. D., & Ghiara, B. M. (1969). Regional development: Where and how. In L. k. Sen (Ed.), Readings of micro level planning and rural growth centers. Hyderabad: National Institute of Community Development.

Mankiw, N. G., Romer, D., & Weil, D. N. (1992). A contribution to the empirics of economic growth. The quarterly journal of economics, 107(2), 407-437.

Marjit, S., & Mitra, S. (1996). Convergence in regional growth rates: Indian research agenda. Economic and Political Weekly, 2239-2242.

Persson, J. (1995). Convergence in per capita income and migration across the Swedish counties 1906-1990. IIES.

Quah, D. T. (1996a). Regional convergence clusters across Europe. European economic review, 40(3-5), 951-958.

Quah, D. T. (1996b). Empirics for economic growth and convergence. European economic review, 40(6), 1353-1375.

Rao, M. G., Shand, R. T., & Kalirajan, K. P. (1999). Convergence of incomes across Indian states: A divergent view. Economic and Political Weekly, 769-778.

Rey, S. J., & Montouri, B. D. (1999). US regional income convergence: a spatial econometric perspective. Regional studies, 33(2), 143-156.

Sachs, J. D., Bajpai, N., & Ramiah, A. (2002). Understanding regional economic growth in India. Asian Economic Papers, 1(3), 32-62.

Sala-i-Martin, X. X. (1996). The classical approach to convergence analysis. The economic journal, 1019-1036.

Sardadvar, S. (2012). Growth and disparities in Europe: Insights from a spatial growth model. Papers in Regional Science, 91(2), 257-274.

Schaeffer, M. (2013). Can competing diversity indices inform us about why ethnic diversity erodes social cohesion? a test of five diversity indices in Germany. Social Science Research, 42(3), 755-774.

Shaban, A. (2006). Regional structures, growth and convergence of income in Maharashtra. Economic and Political Weekly, 1803-18.

Singh, N., Kendall, J., Jain, R. K., & Chander, J. (2010). Regional Inequality in India in the 1990s: Trends and Policy Implications, Development Research Group Study No. 35, Department of Economic Analysis and Policy, Reserve Bank of India, Mumbai.

Solow, R. M. (1956). A contribution to the theory of economic growth. The quarterly journal of economics, 70(1), 65-94.

StataCorp, L. L. C. (2017). Stata spatial autoregressive models reference manual.

Swan, T. W. (1956). Economic growth and capital accumulation. Economic record, 32(2), 334-361.

Appendix

A1. Homogeneity

The degree of diversity that exists in a society can be measured by its ethnic fractionalization (Alesina et al., 1999). Schaeffer (2013) also use the ethnic diversity index, which is computed by deducting the conventional Hirschman-Herfindahl Index (HHI) (Hirschman, 1958) from one. This gives the ethnic diversity index. In order to have a better understanding of the presence of homogeneity, the HHI index is used. Based on the categories of caste, religion, and caste-religion that are available in the NFHS-4 data, three different HHI concentration indices are constructed. Values that are higher indicate a higher concentration, which may be interpreted as a sign that the regions are homogeneous.

$$\text{HHI (Caste Based)}_i = \sum_{i=1}^{4} x_i^2 \tag{A1}$$

Where, x_i is a share of caste "i" and caste categories are:
Scheduled Caste, Scheduled Tribes, Other Backward Communities and Don't know.

$$\text{HHI (Religion based)}_i = \sum_{i=1}^{9} y_i^2 \tag{A2}$$

Where, y_i is a share of religion "i" and religion categories are:
Buddhism, Christian, Hindu, Jain, Muslim, Parsi, Sikh, Other Religion, No Religion.

$$\text{HHI (Caste Based)}_i = \sum_{i=1}^{4} z_i^2 \tag{A3}$$

Where, z_i is a share of categories formed by religion and caste categories which are 36 in total.

The caste-based concentration is seen in the figure A1. The caste-based concentration for the states is shown in the left panel, while the caste-based concentration for the regions defined in the research is displayed in the right panel. The concentration level is not dropping for regions compared to states where few regions have higher concentration.

Figure A 1: Caste Based Concentration
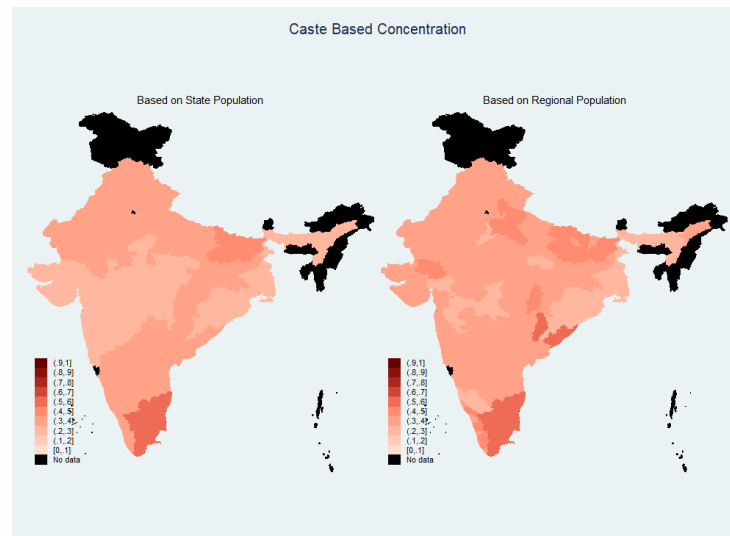
Figure A2 shows the religion-based concentration. Similar to caste-based concentration, map is getting "redder" for regions compared to states which show few regions have higher concentration.

Figure A 2: Religion Based Concentration
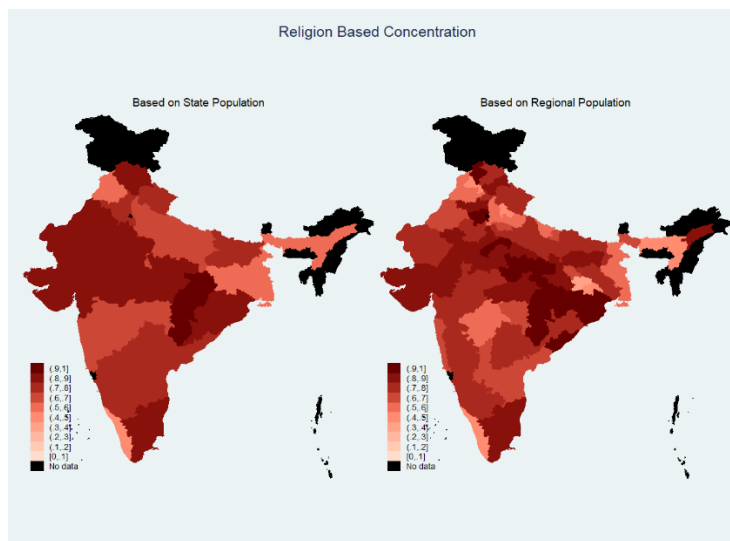
Figure A3 shows the religion-caste-based concentration. Due to more categories, the indices value naturally will be lower. But pattern is still similar to figure A1 and figure A2 Similar to caste-based concentration, map is getting "redder" for regions compared to states which show few regions have higher concentration.

Figure A 3: Caste and Religion Based Concentration
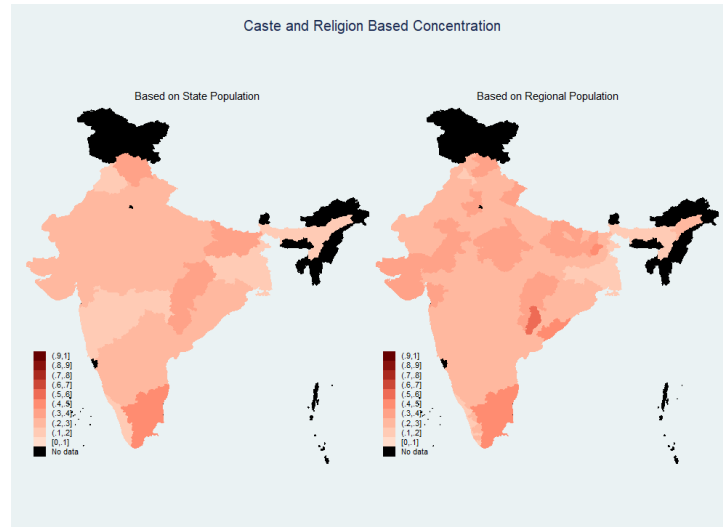
Following the concentration maps, the Indian regions formed in the given study do have homogeneity. These regions do possess both the important characteristics: administrative characteristics and homogeneity.

Table A 1: Regions

State	Region	Districts	Reason behind region-formation
Andhra Pradesh	Coastal Andhra Region	East Godavari Guntur Krishna Prakasam S.P.S. Nellore West Godavari	Physiographical regions, Political regions, Historical division
	Rayalaseema Region	Anantapur Chittoor Kadapa YSR Kurnool	Physiographical regions, Political regions, Historical division
	Uttarandhra Region	Srikakulam Visakhapatnam Vizianagaram	Physiographical regions, Political regions, Historical division
Assam	Hills and Barak Valley	Cachar Hailakandi Karbi Anglong Karimganj North Cachar Hil	Political regions, Historical division
	Lower Assam	Baksa	Political regions,

		Barpeta	Historical division
		Bongaigaon	
		Chirang	
		Dhubri	
		Goalpara	
		Kamrup	
		Kamrup (Metro)	
		Kokrajhar	
		Nalbari	
	North Assam	Darrang	Political regions, Historical division
		Marigaon	
		Nagaon	
		Sonitpur	
		Udalguri	
	Upper Assam	Dhemaji	Political regions, Historical division
		Dibrugarh	
		Golaghat	
		Jorhat	
		Lakhimpur	
		Sibsagar	
		Tinsukia	
Bihar	Bhagalpur	Banka	Political regions, Administration division
		Bhagalpur	
	Darbhanga	Darbhanga	Political regions, Administration division
		Madhubani	
		Samastipur	
	Kosi	Madhepura	Political regions, Administration division
		Saharsa	
		Supaul	
	Magadh	Arwal	Political regions, Administration division
		Aurangabad	
		Gaya	
		Jehanabad	
		Nawada	
	Munger	Begusarai	Political regions, Administration division
		Jamui	
		Khagaria	

		Lakhisarai	
		Mungair	
		Sheikapura	
	Patna	Bhabhua / Kaimur	Political regions, Administration division
		Bhojpur	
		Buxar	
		Nalanda	
		Patna	
		Rohtas	
	Purnea	Araria	Political regions, Administration division
		Katihar	
		Kishanganj	
		Purnea	
	Saran	Gopalganj	Political regions, Administration division
		Saran	
		Siwan	
	Tirhut	Champaran (East)	Political regions, Administration division
		Champaran (West)	
		Muzaffarpur	
		Sheohar	
		Sitamarhi	
		Vaishali	
Chhattisgarh	Bastar	Bastar	Political regions, Administration division
		Dantewara	
	Bilaspur	Bilaspur	Political regions, Administration division
		Janjgir	
		Korba	
		Raigarh	
	Durg	Durg	Political regions, Administration division
		Kawardha	
		Rajnandgaon	
	Raipur	Bijapur	Political regions, Administration division
		Dhamtari	
		Kanker	
		Mahasmund	
		Narayanpur	
		Raipur	

Gujarat	Surguja	Jashpur Koriya Surguja	Political regions, Administration division
	Central Gujarat	Ahmedabad	Physiographical regions, Political regions, Historical division
		Anand Dahod Kheda Panchmahal Vadodara	
	North Gujarat	Banaskantha Gandhinagar Mehsana Patan Sabarkantha	Physiographical regions, Political regions, Historical division
	Saurashtra - Kutch	Amreli Bhavnagar Jamnagar Junagadh Kutch Porbandar Rajkot Surendranagar	Physiographical regions, Political regions, Historical division
	South Gujarat	Bharuch Dangs Narmada Navsari Surat Tapi Valsad	Physiographical regions, Political regions, Historical division
Haryana	Ambala	Ambala Kurukshetra Panchkula Yamunanagar	Political regions, Administration division
	Faridabad	Faridabad	Political regions,

		Mewat	Administration division
		Palwal	
	Gurugram	Gurgaon	Political regions, Administration division
		Mahendragarh	
		Rewari	
	Hisar	Fatehabad	Political regions, Administration division
		Hissar	
		Jind	
		Sirsa	
	Karnal	Kaithal	Political regions, Administration division
		Karnal	
		Panipat	
	Rohtak	Bhiwani	Political regions, Administration division
		Jhajjar	
		Rohtak	
		Sonepat	
Himachal Pradesh	Kangra	Chamba	Political regions, Administration division
		Kangra	
		Una	
	Mandi	Bilashpur	Political regions, Administration division
		Hamirpur	
		Kullu	
		Lahul & Spiti	
		Mandi	
	Shimla	Kinnaur	Political regions, Administration division
		Shimla	
		Sirmaur	
		Solan	
Jharkhand	Kolhan	Sariakela / Kharsawan	Political regions, Administration division
		Singhbhum East	
		Singhbhum West	
	North Chotanagpur	Bokaro	Political regions, Administration division
		Chatra	

		Dhanbad	
		Giridih	
		Hazaribagh	
		Khodrama / Koderma	
		Ramgadh	
	Palamu	Gadva / Garhwa	Political regions, Administration division
		Latehar	
		Palamau	
	Santhal Pargana	Devghar / Deogarh	Political regions, Administration division
		Godda	
		Jamtara	
		Pakund / Pakur	
		Sahebganj	
		Santhal Paragana / Dumka	
	South Chotanagpur	Gumla	Political regions, Administration division
		Khunti	
		Lohardagga	
		Ranchi	
		Simdega	
Karnataka	Belagavi	Bagalkote	Political regions, Administration division
		Belgaum	
		Bijapur	
		Dharwad	
		Gadag	
		Haveri	
		Uttara Kannada	
	Bengaluru	Bangalore (Rural)	Political regions, Administration division
		Bangalore (Urban)	
		Chikkaballapur	
		Chitradurga	
		Davanagere	

		Kolar	
		Ramanagaram	
		Shimoga	
		Tumkur	
	Gulbarga	Bellary	Political regions, Administration division
		Bidar	
		Gulbarga	
		Koppal	
		Raichur	
		Yadagiri	
	Mysuru	Chamaraja Nagar	Political regions, Administration division
		Chickmagalur	
		Dakshina Kannada	
		Hassan	
		Kodagu	
		Mandya	
		Mysore	
		Udupi	
Kerala	Central Kerala	Eranakulam	Political regions, Administration division
		Malappuram	
		Palakkad	
		Thrissur	
	North Kerala	Kannur	Political regions, Administration division
		Kasaragod	
		Kozhikode	
		Wayanad	
	South Kerala	Alappuzha	Political regions, Administration division

		Pathanamthitta	
		Idukki	
		Kollam	
		Kottayam	
		Thiruvananthapuram	
Madhya Pradesh	Bhopal	Bhopal	Political regions, Administration division
		Raisen	
		Rajgarh	
		Sehore	
		Vidisha	
	Chambal	Bhind	Political regions, Administration division
		Morena	
		Sheopur Kalan	
	Gwalior	Ashoknagar	Political regions, Administration division
		Datia	
		Guna	
		Gwalior	
		Shivpuri	
	Indore	Alirajpur	Political regions, Administration division
		Barwani	
		Burhanpur	
		Dhar	
		Indore	
		Jhabua	
		Khandwa	
		Khargone	

Jabalpur		Political regions, Administration division
	Balaghat	
	Chhindwara	
	Dindori	
	Jabalpur	
	Katni	
	Mandla	
	Narsinghpur	
	Seoni	
Narmadapuram		Political regions, Administration division
	Betul	
	Harda	
	Hoshangabad	
Rewa		Political regions, Administration division
	Rewa	
	Satna	
	Sidhi	
	Singrauli	
Sagar		Political regions, Administration division
	Chhatarpur	
	Damoh	
	Panna	
	Sagar	
	Tikamgarh	
Shahdol		Political regions, Administration division
	Anuppur	
	Shahdol	
	Umaria	
Ujjain		Political regions, Administration division
	Dewas	

		Mandsaur	
		Neemuch	
		Ratlam	
		Shajapur	
		Ujjain	
Maharashtra	Khandesh	Ahmednagar	Political regions, Administration division
		Dhule	
		Jalgaon	
		Nandurbar	
		Nasik	
	Konkan	Mumbai sub	Political regions, Administration division
		Mumbai sub	
		Raigad	
		Ratnagiri	
		Sindhudurg	
		Thane	
	Marathwada	Aurangabad	Political regions, Administration division
		Beed	
		Hingoli	
		Jalna	
		Latur	
		Nanded	
		Osmanabad	
		Parbhani	
	Paschim Maharashtra	Kolhapur	Political regions, Administration division

		Pune Sangli Satara Solapur	
	Vidarbha (Nagpur)	Bhandara Chandrapur Gadchiroli Gondia Nagpur Wardha	Political regions, Administration division
	Vidarbha (Varhad)	Akola Amarawati Buldhana Washim Yeotmal	Political regions, Administration division
Odisha	Central Revenue Division (Cuttack)	Balasore Bhadrak Cuttack Jagatsinghapur Jajapur Kendrapara Khurda Mayurbhanja Nayagarh Puri	Political regions, Administration division, Revenue

	Northern Revenue Division (Sambalpur)		Political regions, Administration division, Revenue
		Angul	
		Bargarh	
		Bolangir	
		Deogarh	
		Dhenkanal	
		Jharsuguda	
		Keonjhar	
		Sambalpur	
		Sonepur	
		Sundargarh	
	Southern Revenue Division (Berhampur)	Boudh	Political regions, Administration division, Revenue
		Gajapati	
		Ganjam	
		Kalahandi	
		Koraput	
		Malkangiri	
		Nawarangpur	
		Nuapada	
		Phulbani (Kandhamal)	
		Rayagada	
Punjab	Doaba	Hoshiarpur Jalandhar	Political regions, Administration division

		Kapurthala	
		S.B.S Nagar	
	Majha	Amritsar	Political regions, Administration division
		Gurdaspur	
		Taran Taran	
	Malwa	Barnala	Political regions, Administration division
		Bhatinda	
		Faridkot	
		Ferozpur	
		Ludhiana	
		Mansa	
		Moga	
		Patiala	
		Sangrur	
		Shri Mukatsar Sahib	
	Poadh	Fatehgarh Sahib	Political regions, Administration division
		Roopnagar	
		S.A.S Nagar	
Rajasthan	Ajmer	Ajmer	Political regions, Administration division
		Bhilwara	
		Nagaur	
		Tonk	
	Bharatpur	Bharatpur	Political regions, Administration division
		Dholpur	
		Karoli	
		Swami Madhopur	

Bikaner	Bikaner	Political regions, Administration division
	Churu	
	Ganganagar	
	Hanumangarh	
Jaipur	Alwar	Political regions, Administration division
	Dausa	
	Jaipur	
	Jhunjhunu	
	Sikar	
Jodhpur	Barmer	Political regions, Administration division
	Jaisalmer	
	Jalore	
	Jodhpur	
	Pali	
	Sirohi	
Kota	Baran	Political regions, Administration division
	Bundi	
	Jhalawar	
	Kota	
Udaipur	Banswara	Political regions, Administration division
	Chittorgarh	
	Dungarpur	
	Pratapgarh	
	Rajsamand	
	Udaipur	Political regions,

Tamil Nadu	Tamil Nadu	Ariyalur	Political regions
		Chengalpattu MGR / Kancheepuram	
		Chennai	
		Chidambanar / Toothukudi	
		Coimbatore	
		Dharmapuri	
		Dindigul Anna	
		Kanyakumari	
		Karur	
		Krishnagiri	
		Madurai	
		Nagapattinam	
		Namakkal	
		North Arcot / Vellore	
		Perambular	
		Periyar (Erode)	
		Pudukkottai	
		Ramananthapuram	
		Salem	
		Sivagangai / Pasumpon	
		South Arcot / Cuddalore	
		Thanjavur	
		The Nilgiris	
		Theni	
		Thirunelveli	
		Thiruppur	
		Thiruvallur	
		Thiruvannamalai	
		Tiruchirapalli / Trichy	
		Tiruvarur	
		Villupuram	
		Virudhunagar / Kamarajar	
Telangana	Telangana	Adilabad	Political regions
		Hyderabad	

		Karimnagar	
		Khammam	
		Mahabubnagar	
		Medak	
		Nalgonda	
		Nizamabad	
		Rangareddy	
		Warangal	
Uttar Pradesh	Agra division	Agra	Political regions, Administration division
		Firozabad	
		Mainpuri	
		Mathura	
	Aligarh division	Aligarh	Political regions, Administration division
		Etah	
		Hathras	
		Kasganj/Khansi Ram Nagar	
	Ayodhya division	Ambedkar Nagar	Political regions, Administration division
		Barabanki	
		Faizabad	
		Sultanpur	
	Azamgarh division	Azamgarh	Political regions, Administration division
		Ballia	
		Mau	
	Bareilly division	Bareilly	Political regions, Administration division
		Budaun	
		Pilibhit	
		Shahjahanpur	

Basti division	Basti	Political regions, Administration division
	Santh Kabir Nagar	
	Sidharthnagar	
Chitrakoot division	Banda	Political regions, Administration division
	Chitrakoot	
	Hamirpur	
	Mahoba	
Devipatan division	Bahraich	Political regions, Administration division
	Balrampur	
	Gonda	
	Shravasti	
Gorakhpur division	Deoria	Political regions, Administration division
	Gorakhpur	
	Kushi Nagar / Padrauna	
	Mahrajgani	
Jhansi division	Jalaun	Political regions, Administration division
	Jhansi	
	Lalitpur	
Kanpur division	Auraiya	Political regions, Administration division
	Etawah	
	Farrukhabad	
	Kannauj	
	Kanpur Dehat	

	Kanpur Nagar	
Lucknow division	Hardoi	Political regions, Administration division
	Kheri	
	Lucknow	
	Rae-Bareily	
	Sitapur	
	Unnao	
Meerut division	Bagpat	Political regions, Administration division
	Buland Shahar	
	G.B.Nagar	
	Ghaziabad	
	Meerut	
Mirzapur division	Mirzpur	Political regions, Administration division
	Santh Ravi Das Nagar / Bhadoi	
	Sonbhadra	
Moradabad division	Amroha/J.B.Fulenagar	Political regions, Administration division
	Bijnor	
	Moradabad	
	Rampur	
Prayagraj division	Allahabad	Political regions, Administration division
	Fatehpur	
	Kushambi	
	Pratapgarh	

	Saharanpur division	Muzaffarnagar	Political regions, Administration division
		Saharanpur	
	Varanasi division	Chandauli	Political regions, Administration division
		Ghazipur	
		Jaunpur	
		Varanasi	
Uttarakhand	Garhwal	Chamoli	Political regions, Administration division
		Dehradun	
		Garhwal	
		Haridwar	
		Rudraprayag	
		Tehri Garhwal	
		Uttar Kashi	
	Kumaon	Almorah	Political regions, Administration division
		Bageshwar	
		Champavat	
		Nainital	
		Pithorgarh	
		Udham Singh Nagar	
West Bengal	Burdwan division	Birbhum	Political regions, Administration division
		Burdwan	
		Hooghly	
	Jalpaiguri division	Cooch Behar	Political regions, Administration division
		Darjeeling	
		Jalpaiguri	

Malda division		Political regions, Administration division
	Dakshin Dinajpur	
	Malda	
	Murshidabad	
	Uttar Dinajpur	
Medinipur division		Political regions, Administration division
	Bankura	
	East Midnapore / Purba Midnapore	
	Jhargram	
	Purulia	
	West Midnapore	
Presidency division		Political regions, Administration division
	24-Paraganas North	
	24-Paraganas South	
	Kolkata	
	Nadia	

A.2: Spatial Models and diagnostic test

Spatial Model can be represented as
$$Y = \rho WY + \beta X + WX\theta + \varepsilon$$
where β is parameters for exogenous explanatory variables which denotes the K×1 vector, ρWY represents the endogenous interaction effect and $WX\theta$ represents the exogenous interaction effects.
Y is vector of dimension N×1, X represents an N×K matrix and $\varepsilon = \lambda W\varepsilon + u$
If $\rho = 0$ then,
$$Y = \beta X + WX\theta + \varepsilon$$
Above equation represents Spatially Lagged explanatory variables (SLX) where there is no endogenous interaction but there is a presence of exogenous interaction.
If $\theta = 0$ and where $\lambda \neq 0$ then Spatial Error Model (SEM) and if λ is also equal to 0 then OLS: $Y = \beta X + \varepsilon$

In equation, $Y = \rho WY + \beta X + WX\theta + \lambda W\varepsilon + u$
If $\rho = 0$, $\theta \neq 0$ and $\lambda \neq 0$ then model is known as Spatial Durbin Error Model (SDEM),
If $\rho = 0$, $\theta \neq 0$ and $\lambda = 0$ then model is known as Spatial Lagged Model (SLX),

If $\rho = 0$, $\theta = 0$ and $\lambda \neq 0$ then model is known as Spatial Error Model (SEM),

If $\rho = 0$, $\theta = 0$ and $\lambda = 0$ then model is known as OLS,

If $\rho \neq 0$, $\theta = 0$ and $\lambda = 0$ then model is known as Spatial Autoregressive Model (SAR),

If $\rho \neq 0$, $\theta = 0$ and $\lambda \neq 0$ then model is known as Spatial Autoregressive Model with Autoregressive Disturbances (SARAR),

If $\rho \neq 0$, $\theta \neq 0$ and $\lambda = 0$ then model is known as Spatial Durbin Model (SDM),

If $\rho \neq 0$, $\theta \neq 0$ and $\lambda \neq 0$ then model is known as General Nesting Spatial Model (GES),

Based on the condition of ρ, λ and θ, the appropriate model can be selected among above specifications (LeSage and Pace, 2009; Elhorst, 2014).

NOTES

[1]Refer to Sala-i-Martin (1996).

[2]Poor regions grow faster than rich regions.

[3]Refer to Arbia et al (2005).

[4]There are outliers in growth rate. But these outliers are non-influencing as dropping them is not causing any significant changes in the result.

[5]Following Elhorst (2014), appropriate model is selected.

Caste, Conservative, Colonial, and State Paternalism in India's Alcohol Policies

Shivakumar Jolad[*]   **Chaitanya Ravi**[**]

Abstract

Alcohol consumption in India is governed by social and moral codes and religious norms, stratified by caste and gender, and controlled by state policies. Indian alcohol policy today consists of measures ranging from high taxation to strict prohibition across different states. Our article examines whether the Western state paternalistic framework is adequate to explain the alcohol policies of India. We conduct a critical reading of texts on socio-cultural and political history of alcohol consumption, taxation, and regulation in India, and study their influence on contemporary alcohol policies of Indian states. A central theme presented in this paper is that India's complex history, with social institutions of caste, religious conservatism, regional politics and colonialism, has created a unique complex of experiences related to alcohol, and argues for a greater alignment of Western paternalistic frameworks with Indian socio-political context. Broadly, we argue that state paternalism should be understood beyond the national and state politics of the present, and factor in the path-dependency of socio-cultural and political history of the state being examined.

Keywords: Alcohol Policy, Alcohol taxation, Paternalism, Caste Paternalism, Colonial Paternalism.

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1. Introduction

India is the world's third largest liquor market, valued at $35 billion in 2017 (Kashyap 2017), and is expected to grow to $39.7 billion by 2024 at a Combined Average Growth Rate (CAGR) of 7.4% (Goldstein Research 2020). Per capita consumption, however, is low: 5.7 litres as of 2016, compared to the global average of 6.2 litres (WHO, 2018).

Major states continue to derive as much as 15% of their revenues from alcohol excise duties (Sharma 2020), a continuation of the "lock-in" effect of colonial-era state policies that commodified alcohol. High excise duties interact with a peculiar, price-inelastic drinking culture (Kumar 2017) characterised by a preference for hard liquors (30% spirits and 30% country liquor), even as India is already the world's second largest consumer of spirits (Ambekar *et al.* 2019).

Alcohol consumption patterns in India vary widely across caste, religion, and gender. According to National Family Health Survey (NFHS)-4 (2015-16) data, 41% Scheduled Tribe and 31% of Scheduled Caste men drink, while only 21% of other/higher caste men drink. NFHS-4 data also shows, only 1 % of women drink alcohol, compared with 29% of men, but with wide variations across religion, caste, and states. Muslim men (11.3%) are four times less likely than Christian men (43%) and three times less likely than Hindu men (31.6%) to drink (IIPS and ICF 2017).

The diversity in drinking habits across social strata attests to Colvard (2013)'s contention that the act of drinking in India is governed by a complex milieu of "*social and moral codes, religious rituals, and individual desires that differ widely across the population.*" From the ancient Vedic times to the present, the pattern of social stratification of drinking seems to have been preserved, with Brahmins being forbidden from drinking alcohol, while Kshatriyas were permitted to drink different wines and beer made from wheat or barley (Sharma et al. 2010). The lower castes and tribal groups have their own customs of drinking, which varies across regions but does not find adequate reflection in current Indian alcohol policies. Upper caste norms, preserved over two millennia, have combined powerfully with the issue-based, conservative bonhomie between upper caste Hindus and Muslims regarding alcohol.

India's continental size, population, civilisational history and cultural diversity has resulted in complex experiences in the production, consumption, and regulation of alcohol. Patterns of caste stratification, religious conservatism, colonial experiences, anti-colonial nationalism, and regional populism have acted powerfully through state power to shape India's current alcohol policies (Sharma *et al.*, 2010; Hurst, 1889; Bhattacharya, 2017; Pande, 2017).

Alcohol policies of Indian states tend to navigate between raising alcohol revenues and curbing deleterious effects of alcohol through a suite of policies including excessive taxation, over-regulation (protectionism) and outright, but sometimes oscillating prohibition (Chari, 2016; Janyala 2019; Kamei, 2014). Many Indian states have oscillated between prohibition, relaxation, and repeal of alcohol, depending on the local movements, conservative anti-liquor lobby groups, and regional electoral politics (Nidheesh, 2015; Gururaj *et al.*, 2020). Further, India's non-prohibition states have

adopted an ambivalent 'permit but don't promote' approach, in which they benefit from alcohol sales through high taxes, even as they are careful to not actively and openly promote alcohol.

Many western scholars have used 'state paternalism' as a framework to understand policies to regulate people's behaviour, including consumption of alcohol (New 1999; Poikolainen, 2020; Grill and Nihlen Fahlquist, 2012). Western understandings of paternalism classify it along six axes: hard/soft, broad/narrow, pure/impure, old/new, strong/weak, and moral/welfare (Dworkin, 2020).

Such variants of paternalism are only partially useful in understanding the history and current status of alcohol policies in India, as they are unable to factor in the complex and combined influence of colonial, conservative, caste, state-nationalist, and regional factors, unique to the Indian context. We contend that the Indian experience with alcohol necessitates a realignment of a Western paternalistic framework based on Indian socio-political history and context, which is capable of accounting for the use of state power by caste, conservative, nationalist, and regional factions.

In this article, we dissect the broad pattern of alcohol policies pursued by the states of the Indian Union from 1950-2019, highlighting the variations in prohibition, tight regulation, repeal, and reimposition, depending on the local movements, lobby groups, and regional politics. At present, alcohol continues to be a dominant revenue source in the non-prohibition states, and they face a constant dilemma in catering to electoral politics and revenue generation.

We trace the historical roots of alcohol consumption norms and regulation to derive India's unique paternalism framework for alcohol policies, from the origin of caste and religious stratification of drinking in the Vedic era, to the versions of paternalism that emerged during the Maurya, Gupta and Mughal periods. We then examine the commodification of alcohol and emergence of new paternalism under colonial rule. Colonial commodification of alcohol altered the alcohol production, taxation, distribution, and consumption in India, a pattern continued to present.

We dissect the upper-caste, conservative attitudes developed during the temperance movement with its anticolonial, nationalistic current, which completely disregarded the complex role of alcohol in marginalized and tribal cultures. We also cover the issue-based coalition between otherwise antagonistic conservative elements in the Congress and the Muslim League for Prohibition. We critically examine the arguments by different social groups during the constitutionalisation of prohibition in India. We tabulate and analyse the alcohol policies of Indian states during the post-colonial period, and examine the influence of history, social norms, social movements, and political compulsions at the regional level. We blend the observations and arguments on the complex socio-political history of alcohol in India and contend that it necessitates a new approach to understanding paternalism in India.

2. Alcohol in India

2.1 High on spirits; divided by Gender, Caste, and Regional inequalities

Data on the gender, caste, and regional consumption patterns of alcohol illustrates the complex nature of drinking inequalities embedded in Indian society, the root causes of which have not been systematically examined. India's social stratifications result in unequal drinking patterns, and the National Family Health Survey (NFHS)-4 (2015-16) records some interesting disparities in this regard (See Figure 1).

There is stark gender, caste, and regional disparity in drinking. In the 15-49 year age group, Scheduled Tribe men (41%) and women (6.5 %) drink more than other groups. Among major religions, Christian men (43%) and women (4%) drink more than all others, while Muslim (0.1%) and Jain women (0.2%) drink the least. There is also considerable regional variation in alcohol consumption. North-eastern states, especially Arunachal Pradesh (59% men, 26% women) and tribal states like Chhattisgarh (53%, 5%) and Jharkhand (39%, 4%) have the highest alcohol consumption (IIPS and ICF, 2017).

There is a cultural taboo against women drinking in India, although it is fast changing. Within Hindus, lower castes tribal women drink more (see Figure 1); so do Parsi (Zoroastrian) and Christian women. The diversity in consumption practices across caste and religious groups does not find adequate accommodation in India's current alcohol policies, which also goes against the principle of decentralized decision-making, the stated overarching goal of successive Indian governments.

Indians are predominantly spirit drinkers, with country liquor (30%) and spirits (30%) being the most consumed hard liquors. The strong preference among Indian drinkers for high alcohol-concentration drinks is further aggravated by their heavy drinking habits. The Substance Use Study-2019points out that around 43% of consumers have more than four drinks in a single sitting, a dangerous habit categorized as 'Heavy Episodic Drinking' which places drinkers at an elevated risk for chronic health ailments (Ambekar *et al.* 2019).

Figure 1: Social Stratification of Drinking in India

Percentage of People who drink Alcohol in india by schooling, religion, CASTE and WEALTH (NFHS-4: 2015-16)
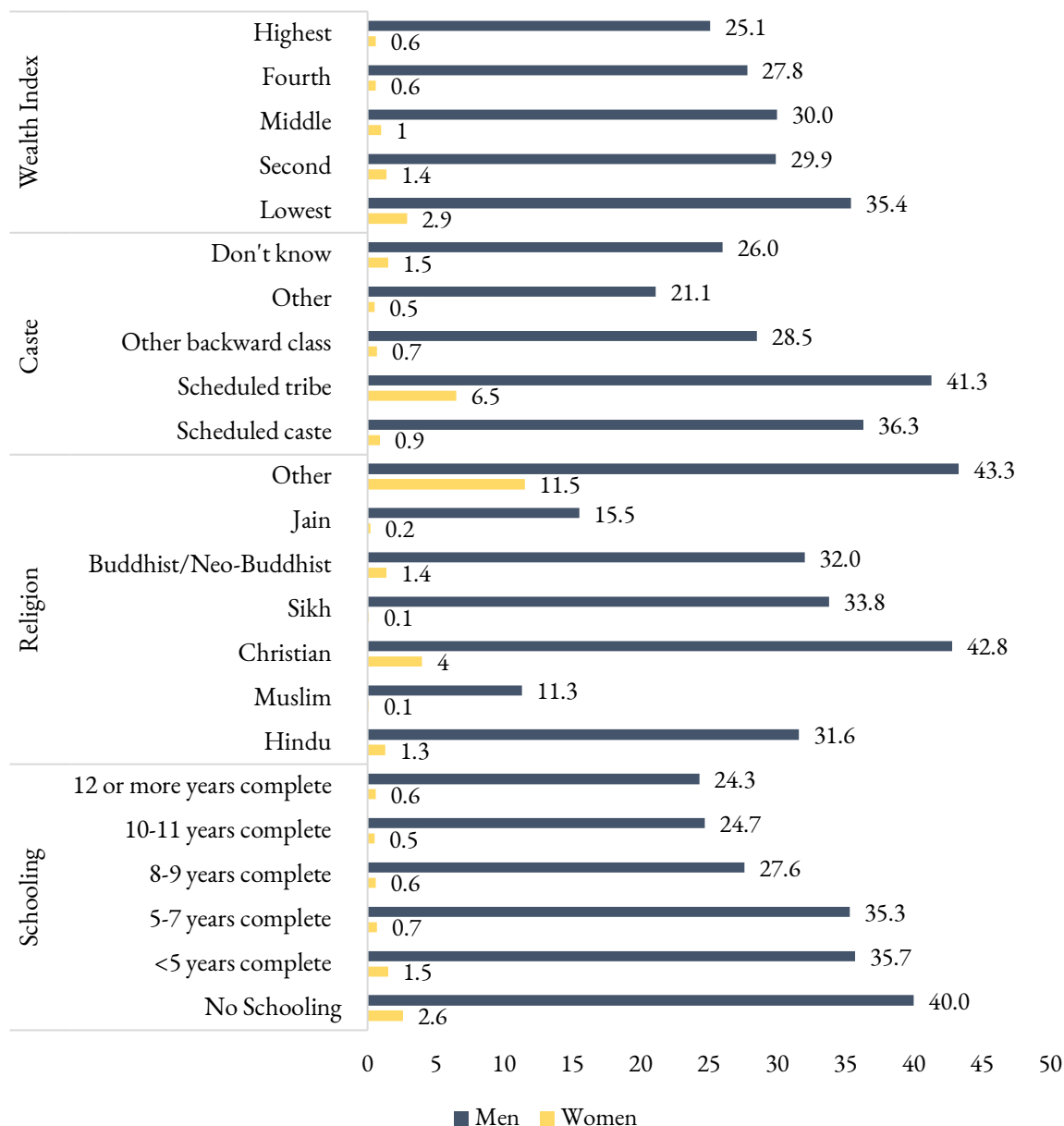
Data Source: National Family Health Survey-4: 2015-16

2.2 State Policies

2.2.1 Taxation

The non-prohibition states have a 'permit, but not promote' policy for alcohol. The government levies excessive very high "sin tax" to prevent people from drinking, while simultaneously maximizing revenue from its sale. The Reserve Bank of India (RBI) report on state budgets shows that during 2018-19, Indian States and Union Territories collected Rs. 1.51 trillion ($19.89 billion) from excise

duty on liquor (Reserve Bank of India, 2019). The excise revenue from liquor accounts for 10-20% of the revenue of states like Uttar Pradesh (UP), Karnataka, and Madhya Pradesh (Kant 2020).

Further, the rate of taxation is high across all three major categories of alcoholic drinks (beers, wines, and spirits) with widely varying levels of alcohol percentage. Thus, even as the claimed policy goal of states is to use high taxation as a policy instrument to create a strong price signal to curb excessive drinking, state governments have acquired a perverse incentive in the continuation of high taxes (regardless of their efficacy or lack thereof in curbing drinking) for the stability of their state budgets.

In Maharashtra for example, the excise duty is 300% on Indian-Made Foreign Liquor (IMFL-spirits) including brandy, whisky, rum, and vodka (among others) with a high alcohol content of 42% by volume. Drinks such as beer with low alcohol content (5-8%) are also taxed at a relatively high 175-235%, while wines (12-15%) are taxed from between 100-200% depending on the place of origin and blending (Government of Maharashtra Excise Department 2019). The only exception made in case of wines is for grapes grown within the state without the addition of alcohol. Even country liquor (apart from cashew and Mahua flower-based liquors) is taxed at 213% of manufacturing cost.

2.2.2 Prohibition

Many states in post-independence India imposed prohibition laws. Almost one fourth of India was under prohibition law in 1954. By the mid-1960s, most states repealed or relaxed prohibition law due to shortfall in revenue, as well as illicit brewing and hooch tragedies. Only Gujarat (which was split from Bombay state) has a continuous history of prohibition -- from 1949, continuing through its inception as a state in 1960, to the present -- due to the strong influence of Gandhian abhorrence towards alcohol.

Bihar is the latest state to have introduced prohibition, with the Bihar Prohibition and Excise Act 2016. Additionally, Nagaland and Manipur (partially) have prohibition in effect now (Eashwar *et al.* 2020). States have a varied history of prohibition imposition, tight regulation, and repeal. Table 1 summarizes the state policies, current status and reasons for prohibition.

Alcohol policies at the state level have been subject to the opposing pressures of revenue generation through lucrative excise duties on the one hand, and a desire to accommodate the concerns of interest groups calling for prohibition on the other (see Table 1).

- o Maharashtra went in for state-wide prohibition from 1949 to 1960, and again from 1960 to 1964, before prohibition's repeal and the onset of a comparatively more liberal regime (with high taxation).

- o Tamil Nadu has also followed a similar trajectory, with strict prohibition from 1948 to 1971 and again from 1974 to 1981, followed by repeal but strict state monopoly control over alcohol sales.

- o The women's movement in Andhra Pradesh became a key pressure group during elections, leading to imposition of prohibition in 1995, before its rapid withdrawal in 1997.

- o Church and community organizations campaigned successfully for Prohibition in Mizoram (1995 to 2014) and its reimposition again in 2019, followed by current relaxations.
- o Kerala, with its leftist politics, still opted for partial curbs on alcohol from 2014 to 2017.

Table 1: State and history of prohibition and alcohol curbs in India

ALCOHOL PROHIBITION AND CURBS IN INDIAN STATES - AS OF 2021

STATES	Prohibition years and Current status	Notes
MAHARASHTRA (PREVIOUSLY BOMBAY)	1949-60 (Bombay) 1960-64 (Maharashtra) Now Repealed	Bombay Prohibition Act 1949 (see text). Liberalized in 1964.
GUJARAT	1960-Present	Continuation of Bombay Prohibition Act 1949
TAMIL NADU (PREVIOUSLY MADRAS)	1948-71 1974-81 Now Repealed with strict state control	Madras (Tamil Nadu) Prohibition Act 1937 - extension till 1971 1971-74 Repeal under chief Minister Mr. Karunanidhi; 74-77 Arrack and Toddy ban 1974-81: Strict Prohibition 1981-Sporadic ban on arrack and Country liquor , tight state control (Chari 2016)
ANDHRA PRADESH (UNDIVIDED)	1995-97 Repealed 2019- new attempts for phase wise prohibition	Women's movement in 1994 became a major poll issue. Prohibition imposed by Chief Minister N T Rama Rao 1995, repealed in 1997 (Janyala 2019). The current CM Jagan Reddy is considering Prohibition
NAGALAND	1989-Present Largely ineffective	Campaign by Nagaland Baptist Church Council and Naga Mothers' Association in the 1980 against growing alcoholism and associated social evils (Nagaland Post 2019) led to Nagaland Liquor Total Prohibition Act (NLTP) 1989.
MANIPUR	1991-Present Requires its residents to have a permit to procure alcohol.	Long-civil society campaign against alcohol led by a group *Meira Paibis* – "the women torch bearers" of Manipur (70-80s). 1991- Manipur Liquor Prohibition Act. Home brewing allowed for Scheduled castes and Tribes(Kamei 2014).
MIZORAM	1995- 2014 Mizoram Liquor Total Prohibition (MNTP) Act, 1995, 2019- Present (relaxations)	Church and Community organizations prompted MNTP .Prohibition to different levels Reimposed in 2019 by Mizo National Front (MNF) (Press Trust of India 2019)
KERALA	2014-17	Repealed (Swamy2017)
BIHAR	April 2016- Present Bihar Prohibition and Excise Act, 2016	Chief Minister Nitish Kumar made a poll promise due to Women activist groups protesting against alcohol and domestic abuse. Harshest Prohibition law in India (Tewary 2016)

Source: Inputs from different sources listed in the third column. See also Nidheesh 2015.

3. Theoretical framework: Paternalism

Paternalism is the notion that allows the government to "restrict the choices of individual citizens for their own good" (Dworkin 2011). For an act to be paternalistic, it must involve interference in a person's freedom (choice or opportunity to choose), with an expressed objective of enhancing the target person's welfare, without his/her consent (New 1999: 63-83).

Variants of paternalism have been classified, including hard/soft, broad/narrow, weak/strong, pure/impure and moral/welfare. In the following paragraphs, we largely follow Stanford Encyclopaedia of Philosophy definitions to briefly describe different types of paternalisms (Dworkin 2011) and test their suitability for analysing alcohol taxation and prohibition in India.

Hard paternalism: Paternalism's more stringent version, known as hard paternalism, is premised on the belief that the state reserves the legitimate right to interfere in a person's actions, despite the actions being undertaken willingly by the individual and with full knowledge, including awareness of the deleterious consequences of such actions (Pope 2005; Thomas & Buckmaster 2010). Examples of hard paternalism include high cigarette taxes to dissuade smoking (Lucas 2011) and "sin taxes" on alcohol and gambling (Kapeliushnikov 2015). Prohibition is one of the strictest forms of paternalism (Thomas & Buckmaster 2010), making it hard paternalism. The state intervenes even when drinkers are acting voluntarily and knowledgeably, and a 'moral corruption' argument is used to justify such intervention.

Soft paternalism on the other hand allows intervention only if an action is committed involuntarily. It tries to correct information asymmetries and behavioural anomalies, while not restricting voluntary choices (Kirchgässner 2017). Soft paternalism advances a less intrusive approach towards shaping individual choices which will enhance their self-perceived welfare. Thus, a calibrated taxation based on alcohol content does not intrude into the individual choice of drinking but dissuades excess drinking by monetary costs.

Moral/Welfare: Moral paternalism is concerned with interference by the state to improve a person's moral character, while welfare paternalism claims legitimate grounds for interference by the state if such interference will make the subject better off in material terms (Dworkin 2011). Forbidding drinking by messaging it as 'immoral' (as advocated by Gandhi) is moral paternalism; arguments that alcohol is injurious to health, and the economic progress of the nation, as argued by Nehru (De 2018) can be termed as welfare paternalism.

This paper attempts to derive and construct an Indian framework of paternalism, with roots in India's colonial past, pan-religious conservatism, stratified caste structure, anti-colonial state nationalism, and eclectic regionalism.

4. Historical legacy of alcohol consumption, taxation, and regulation

4.1 Ancient and Medieval Era

Norms by caste and religion: Alcohol has a complex history in the subcontinent, and its study is essential to provide the moorings for a new policy framework. Documented socio-cultural history of fermented and distilled alcohol from fruits, grains and flowers in India can be traced even in Vedic literature. The social sanction for alcohol consumption was restricted by the Varnas (Sharma *et al.* 2010). While Brahmins were totally forbidden from drinking alcohol, Kshatriyas used to drink both Soma ('celestial nectar') and Sura (beer manufactured from rice meal, barley). Sura was more common among the general populace. Lower castes usually consumed 'cheap' distilled local spirits. On the other hand, Buddhism and Jainism strongly condemned the use of alcohol. Caste stratification influenced the feudal-state alcohol policies for much of Indian history.

State Paternalism under Mauryan Empire: Elements of state paternalism can be seen from the recorded history of large empires in India. In the Mauryan period (321 B.C.E-circa 185 BCE) when much of India came under central rule, Chanakya's *Arthashastra* describes the need for "regulation of alcohol production and sales, including directions for the establishment of drinking places". The Mauryan government exercised tight control on the production of alcoholic drinks, and even had government-owned alehouses for legal consumption of alcohol, as well as a 'Comptroller of Spirituous Liquors' (Kautilya/Shamsastry (translator) 2009).

Confluence of Caste, Religion, and State: During the reign of Buddhist empires in India, state sanction of Liquor seems to have plummeted, as Buddhism strongly condemned alcohol (Singh 2017). Al-Biruni, the great Iranian polymath and historian who studied India in great depth in the early 11th century, noted caste and liquor equations of Indians in his *Tarikh-Al Hind* (history of India). Brahmins abstained from intoxicants, while warriors and businessmen drank wine (Al-Biruni1910 / *Alberuni's India*, Columbia Archive2006; Singh 2017). The lower castes (Shudras) could drink spirits distilled from honey and flowers.

Periods of Islamic rule in India show ambivalent liquor regulation, depending on the Emperor's personal choice and preferences. While the Quran specifically forbids alcohol, wine remained part of court life, especially during the Mughal rule. The rulers usually did not interfere with consumption by Hindus and Christian Populace (Sharma *et al.* 2010). However, there were many exceptions.

o   Alauddin Khalji (1296–1316) prohibited wine-drinking and wine-selling.

o   In the Mughal era, Babur (reigned 1526–1530) mentions his regular drinking in *Baburnama* (Pande 2017).

o   Emperor Akbar (1542-1605) was largely a teetotaller, and prohibited and enforced a non-drinking rule within the empire

o   His son Jehangir (1605–1627) was a heavy drinker, and the use of alcohol became widespread in the Mughal empire.

o   Aurangzeb (1618 – 1707) on the other hand was highly intolerant towards drinking. During his reign, according to Manucci's (2010) work *Aurangzeb and Prohibition*, Aurangazeb ordered his chief of police to search out all the Muslim and Hindu sellers of alcohol and ordered that "*...every one of whom was to lose one hand and one foot.*".

Despite these vagaries in feudal policy in the last millennia, 'country liquor' and homebrewed beers (often rice beer), as well as toddy (in south India), continued to be common among the lower-income, lower caste people, especially in rural areas. (Sharma *et al* 2010).

4.2 Colonial-era

Commodification and Colonial Paternalism

Alcohol production, consumption, and state regulation acquired a new dimension during British colonial rule in India. The production and sale of alcohol in India had become a state project in colonial India (De 2018). Till then, liquor production was largely an affair of small communities.

o   The Abkari Act of 1878 barred toddy extraction without permission and license and shifted the mahua spirit from traditional decentralised farm distillation to central distillation.

o   Liquor produced at the distillery was taxed, changing the form of alcohol taxation from revenue to excise (Saldanha 1995; De 2018).

o   The public auctioning of liquor licences led to the rapid increase in government distilleries, and the replacement of traditional (low alcohol content) alcoholic beverages with industrial-scale liquor with higher alcohol content.

o   Tribal populations in Bombay state used Mhowra (Mahua) flowers for food, cattle grazing, and for brewing alcohol. The Mhowra Act of 1892, banned collection and sale of Mhowra flowers, leading to a high number of prosecutions dealing with cases of sale of illicit liquor (Saldana 1995).

This new commodification of liquor production and heavy taxation led to a surge in revenue collections (Hurst 1889). Towards the end of the colonial period, excise duty on liquor came second only to land revenue, and alcohol emerged as a commodity essential to Indian economic nationalism and industrialisation (Bhattacharya 2017).

Colonial commodification of alcohol altered the alcohol production, distribution, and consumption in India. It created a new class of drinkers including British Indian civil servants, Army

officers, rulers of princely states, and educated Indians who were emulating the British in tastes and manner.

The British liquor policy was guided "*by the twin objectives of generating revenue on the one hand and checking intemperance among people towards safeguarding their 'morality', on the other*" (Saldanha 1995). This came into conflict with the morality of peasants, and the *Adivasis* (tribals), "for whom drinking formed an integral part of their material as well as symbolic reality" (Saldanha 1995).

While hard paternalism's preference for coercive state policies that constrict individual autonomy helps to better understand the Indian state's high taxation policies, it does not sufficiently contextualize said state policies as influenced by India's colonial history. A more holistic approach would view India's versions of hard paternalism (ranging from high-taxation to outright prohibition) as the continuing path-dependence of British colonialism's policies such as the Abkari Act which centralized alcohol production and set the precedent for high excise duties.

The discourse of civilizing the errant natives by safeguarding their morality, served as a powerful legitimizing cover for such policies, the path-dependence of which can be seen to this day in current Indian alcohol policies. This colonial influence on Indian alcohol policy -- consisting of high taxation, centralization of production to distilleries, and the powerful legitimizing discourse of emancipation of the natives -- is categorized as colonial paternalism.

4.3 Temperance and nationalism: Confluence of Caste, Conservatism, and State Paternalism

In the late 19th and early 20th century, temperance movements started gaining prominence in India. National leader Bal Gangadhar Tilak called for boycott of British goods, including government liquor shops, which is considered the beginning of the Prohibition movement in India. Expanding liquor market in cities and countryside, due to mass production, led to an increase in alcohol consumption by locals, which some historians believe further led to an increase in drunkenness and crime (Saladhana, 1995).

Alcohol was treated as a licentious trait of tribals and socially backward groups (Hassan 1922; Tekchand 1972). National leaders began to project that drinking itself was alien to Indian culture, and an import from the British (Colvard, 2013). Mahatma Gandhi staunchly opposed alcohol consumption and hoped that purging India of alcoholic beverages would revitalize its society (Fahey & Manian 2005).

The temperance movement in India led to a confluence of Caste and Conservative paternalism, with state paternalism. The upper caste Brahmins and Baniyas (Gandhi included) who dominated the National movement, selectively ignored the drinking practices among the *Adivasis*, which remained unchanged despite the coercive efforts by the state and co-optation by the nationalists (De 2018). For the Indian National Congress, Prohibition was integral to the process of nation building, and was included in Karachi Charter of Fundamental Rights and Economic Principles of 1931. An unusual

bonhomie existed between Hindu conservatives, the Gandhians, and the Muslim League in their support for Prohibition (De 2018).

Views of the three pillars of India's national movement and social reform on Prohibition are summarized below:

Gandhi: Gandhi viewed drinking as "a foreign custom that debilitated the body of the Indian worker and peasant and, by extension, the Indian body politic". He saw alcohol as the most deplorable curse next only to untouchability. While advocating total prohibition, he wrote that no country was "better fitted for immediate prohibition than India." Ironically, while he staunchly opposed 'white man's burden' to lift the morals of the Natives, he advocated that "the poor had to be saved from themselves through an intervention of the enlightened classes... A drunkard was a diseased man, he wrote, "quite unable to help himself." (Gandhi 1926). Gandhi's adverse views on alcohol set the stage for the transition of the burden of civilising the natives from the colonizer to the upper castes (and classes). Thus, the paternalistic attitudes held by Gandhi combined upper-caste and class privilege with a moralistic impulse to rescue the poor from alcoholism, to be prosecuted by an anti-colonial state apparatus through hard paternalistic measures such as prohibition.

Jawahar Lal Nehru: Nehru was a rationalist, and liberal nationalist. He argued that if Prohibition were to triumph in India, it would do so not on religious grounds but, for the well- being and economic progress of the nation (De 2018).

Ambedkar: Being the tallest among the lower caste leaders and an architect of India's Constitution, Ambedkar's views mattered next only to Gandhi (whom he fiercely opposed). Ambedkar did not reject Prohibition outright but cited the failure of Prohibition in the United States. In a speech during the provincial administration in 1939, he cautioned that prohibition would significantly impact state revenues (Ambedkar 1932). During the debate on prohibition in the Constituent Assembly in 1948, Dr. Ambedkar opined that any "future law on prohibition would be applicable in tribal areas only according to the restrictions imposed by the Sixth Schedule of the Constitution." He was dismissive of the obsession with imposing prohibition and again cautioned that losing revenue is "going to make a very heavy call upon the finances of this presidency" (CAD- Vol VII, 1948- Nov 24).

Gandhian views clearly resonated with the Congress party and the public at large. Any discussion on prohibition, invariably brought Gandhi into arguments, including the Constituent Assembly Debates. The drinking practices of the tribal population remained unchanged despite the "coercive efforts by the state and co-optation by the nationalists", and "the failure of Prohibition and temperance is predicated on the gap between the masses and the state" (De 2018).

Old paternalism's understanding of state intrusion into individual autonomy to enforce the religious/moral values of the policymakers partially explains the conservative factions (including Mahatma Gandhi), whose ideas of religious morality made its way into legislation. However, the unique Indian, pan-religious conservative alliance between Hindus and Muslims to come up with an

issue-based political alliance to impose prohibition (at the expense of others, such as Parsis) shows a prevalence of majority-minority morality (Hindu-Muslim) over a super-minority morality (Parsis), whose dynamics are more complicated than the blanket category of old paternalism. We use 'conservative paternalism' to summarize the influence of India's dominant majority religion (Hinduism) and its largest minority (Islam) on Indian alcohol policy, pushing it towards prohibition.

5. Constitutionalizing Prohibition

The Constituent Assembly of India met for three years from (Dec 1946- Nov 1949) to chart out the Constitution for free India, and to usher in political, social, and economic revolution (Austin 1999). The Constituent Assembly Debates (CAD) were crucial in shaping the Indian Constitution and in setting the stage for alcohol policies of Indian states.

Caste and Religious Conservatism: In the Assembly, Mahavir Tyagi (Hindu Brahmin from United Provinces) called for the complete abolition of alcohol consumption. Kazi Syed Karimuddin (Muslim League member from Central Province and Berar), advocated an amendment to include Prohibition, warning the assembly that rejecting this clause would be "the rejection of the wishes of the Mahatma" (CAD- Vol VII,1948-Nov 24). Shibban Lal Saxena defended the loss of revenue through prohibition by arguing that this would lead to at least one hundred crore savings of income of the Harijans (lower castes) (Saxena 1948).

Arguments of liberty by Dalit (depressed lower caste) Leaders: B. H. Khardekar (member All India Depressed Classes, later Congress) strongly opposed the move for inclusion of Prohibition in the Constitution, citing the American experience in attempted prohibition and its failure. He also cited the Madras prohibition law, which could not stop alcohol indulgence, but filled the jails and left a deep hole in the state coffers. He quoted Harold Laski's 'Liberty in the Modern State', and argued that "*prohibition goes against the very grain of personal liberty... The real development of personality comes without suppression, taboos, and inhibitions*". Khandekar also questioned the claims of "unanimous consensus on Prohibition" by pointing out that several Christians and Parsis, for whom drink was part of social life, were not in favour of Prohibition (CAD- Vol VII Nov 24, 1948; De 2018).

Rights to Drink and Tribal Customs: Leaders of the scheduled Tribes opposed Prohibition on the ground that it will infringe on the rights and practices of the Tribal community in India. Jaipal Singh Munda (President of the *Adibasi* (Tribals) Mahasabha) argued that "as far as the *Adibasi* no religious function can be performed (among *Adibasis*) without the use of rice beer". The amendment (which included Prohibition) "is a vicious one. It seeks to interfere with my religious right..." (CAD- Vol VII, 1948- Nov 24). Thus, the Opposition to Prohibition came from Dalits and Tribal members. Rohit De observes that "*the claims to the Indian culture of temperance were reproduction of certain caste norms*".

Prohibition was finally included in the Directive Principles of State Policy in Article 47 of Indian Constitution, stating "the State shall endeavour to bring about prohibition of the consumption except for medicinal purposes of intoxicating drinks and of drugs which are injurious to health". Alcohol taxation and prohibition was left as a state subject, listed in the seventh schedule.

Gandhi did not live to see the enactment of the Constitution. Many Gandhians both within and outside the Constituent Assembly felt the Constitution was un-Gandhian. Gandhi's vision of building the society from the bottom-up with village Panchayats as the foundation of Governance did not materialize in Indian Constitution. However, his strong advocacy for Prohibition did linger on in Indian states' policy for the next few decades (see **Table 1**).

Soon after the Constitution came into effect, prohibition came to be challenged by many citizens in courts, legislative assemblies, and committee reports. They questioned the constitutionality and exceptions provided to armed forces personnel and foreign residents, citing liberty and equality before law. In the famous Nusserwanji Balsara v. State of Bombay (1950), Balsara argued that the Bombay Prohibition Act violated his right to equal treatment and the constitutional right to equality mandated an equal right to alcohol consumption (De, 2020). Eventually many states either diluted or eventually repealed the Prohibition Acts.

6. Gaps in Western Paternalism framework in Indian Context

6.1 Western paternalism's implicit universalism

Western variants of paternalism help to better understand certain key aspects of India's alcohol policy experience, albeit to a limited extent due to fundamental epistemological constraints, stemming from the West's unique historical experiences, which do not include influences by social institutions such as caste, or by a syncretic yet hierarchical religion such as Hinduism.

A focus on paternalism operating at the individual, institutional, and state levels helps explain the impacts of institutions such as religion and caste norms in constricting individual autonomy and freedom in India. Hard paternalism helps to understand hard-line coercive policies such as prohibition, which prevent even conscientious citizens who understand the risks from drinking and desire to drink responsibly, from drinking.

A crucial enabler of the tremendous power vested in the state to judge certain citizens' end- goals (such as alcohol consumption) as dangerous in themselves is the influence of Gandhian morality on Indian alcohol policy, which can be understood well through moral paternalism. Gandhi's views on the inherent immorality of alcoholism would go on to shape Indian alcohol policy and the paternalistic posture of the Indian state as explained in detail with examples in later sections. On the other hand, Nehru and Ambedkar's support for restrictions on alcohol consumption were more aligned with notions of welfare paternalism.

However, a key oversight in the current understandings of paternalism, as it pertains to Indian alcohol policy, is the implicit assumption that the state (as the entity responsible for operationalizing paternalistic policies) is identical in the European and Indian cases. The institution of caste and its role in shaping Indian attitudes and policies towards alcohol has not been systematically examined in terms of the structural violence (destruction of tribal cultural practices) caused by the supposedly benevolent upper-caste insistence on prohibition on public health, morality and welfare grounds. These restrictions imposed by dominant castes were ultimately also about imposing a certain lifestyle on the entire nation, in disregard of the importance of alcohol in certain tribal cultural practices.

There is insufficient reckoning of the particular characteristics of British colonialism in India, native bedrock institutions such as caste, unique religious conservatism, and anti-colonial state nationalism (as also populist regionalism) in the composition of India's state structure with the attendant implications for alcohol policy. A second oversight is the influence of such factors in creating a unitary and pan-state approach, whose homogeneity (in terms of imposition of state-wide uniform policies) marginalizes the age-old alcohol practices of tribals, scheduled castes and other historically marginalized social groups.

7. Discussions and Debates on Pragmatic Alcohol Policy in India

Indian alcohol policy of today is the end-product of a fusion of colonial, caste, conservative, nationalist, and regional impulses that influence the very nature of the state and the shape of the policies it produces. The overall aim of this paper is to derive the rudiments of a paternalistic framework with Indian characteristics, which is capable of understanding and explaining the Indian experience with alcohol without resorting to the universalism of blanket categories such as 'hard/soft,' 'new/old' etc. Such a framework opens the conceptual space for exploration into the vast terrain of Indian paternalisms (such as British colonial and caste paternalism).

The benefit of such exploration is to both conceptualize more context-specific theories as well as to conduct granular, region-specific studies on specific caste-relations and their influence on the local political-economies of alcohol. How did 'colonial-caste-conservative-nationalist-regional' factors act in individual states to shape alcohol policy? How did the aforementioned nexus of factors manifest in states with predominantly tribal populations? India's variegated geography, large population, diverse culture, social institutions such as caste, and subjugation under colonialism has created a unique complex of experiences related to alcohol; we argue for it to be studied in its own right, using theoretical frameworks derived from its own milieu.

This paper reviewed the history of alcohol in India and found strong currents of colonialism, caste-preferences, conservatism, state-nationalism, and regional populism that have combined to influence Indian alcohol policy. Should current Indian policies continue to commodify and centralize alcohol production, impose blanket prohibitions, sustain high taxation, and severely prosecute poor and marginalized offenders? Or should they break away from the aforementioned path-dependencies

towards a more liberal alcohol policy, which treats alcohol both as a commodity and a socio-cultural product, and regulates its production and consumption with respect for local cultural customs, thereby mitigating the marginalization of tribal communities?

Should alcohol be viewed as a societal risk, to be regulated in the Gandhian manner of prohibition, or should it be viewed as an essential part of Indian rural and tribal culture, to be decentralized in terms of production and consumption? Current Indian alcohol policy is constrained by the straitjacket of commodification, centralization, caste-preferences, religious conservatism, anti-colonial nationalism and erratic regional populism. The ability to better understand the Indian experience with alcohol as a particular kind of paternalism, imposing a certain path-dependency via state power, helps to open the space for a truly secular, decentralized, decommodified, re-cultured, egalitarian, and predictable alcohol policy.

For example, an alcohol policy for Maharashtra state could avoid the Western approach of a single (colonialism-inspired) region-wide set of regulations. It could be highly localized and context-specific, with regulations of varying degrees of permissiveness or restrictiveness, based on the local history of a particular district/sub-region. Such an approach would enable governments to be more sensitive to the particularities of tribal practices towards alcohol (or practices of scheduled castes) in regions where their population is high. Such an approach could also enable alcohol regulation in areas such as South Mumbai to be more sensitive to the cultural practices of the Parsi community.

Such a localized, context-specific approach would also better align with the Indian government's own stated goal of decentralization, which aims to transcend colonialism's emphasis on a strong central government through a post-colonial devolution of power to state and local administrations. The assumption being that such devolution would strengthen democracy, through greater sensitivity in regional and local regulations for regional/local context.

References

Ambedkar, B.R. (1939). On Budget. Moon.V. 1982. *Dr. Babasaheb Ambedkar. Writings and Speeches.* Volume 2 https://tinyurl.com/Ambedkar-Budget-1939

Ambekar, A., A. Agrawal, R. Rao, A. K. Mishra, S. K. Khandelwal, R. K. Chadda- as part of NDDTC and AIIMS. (2019). Magnitude of Substance Abuse in India. *Ministry of Social Justice and Empowerment- Government of India.* https://tinyurl.com/MagSubUseIndia2019.

Austin, Granville. (1999). *The Indian constitution: Cornerstone of a nation.* Oxford University Press.

Bhattacharya, Nandini. (2017). The Problem of Alcohol in Colonial India (c. 1907–1942). *Studies in History, 33(2),* 187-212. URL:https://tinyurl.com/Bhattacharya2017

Biruni, Muḥammad ibn Aḥmad. (1910).*Alberuni's India*, London : Kegan Paul, Trench, Trübner& Co., 1910. Electronic reproduction. Vol. 1 and 2. New York, N.Y. : Columbia University Libraries, 2006.

CAD- Vol VII, (1948). *Constituent Assembly Debates.* https://tinyurl.com/CAD-Nov24-1948

Chari, Mridula. (2016, April 11). The long and twisted history of prohibition in Tamil Nadu. *Scroll.* https://tinyurl.com/Chari-Scroll-2016

Colvard, Robert Eric. (2013). *A World without Drink: Temperance in Modern India, 1880– 1940*, PhD dissertation, University of Iowa, 2013

De, Rohit. (2018). *A People's Constitution: The Everyday Life of Law in the Indian Republic* (Histories of Economic Life, 18). Princeton University Press.

Dworkin, Gerald. (2011). Paternalism. *Stanford Encyclopaedia of Philosophy.* URL:*http://plato.stanford.edu/entries/paternalism* .

Eashwar, Anantha., R. Umadevi and S. Gopalakrishnan. (2020). Alcohol consumption in India- An epidemiological review. *Journal of family medicine and primary care*, *9(1),* 49–55. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7014857/

Fahey, David and Padma Manian. (2005). Poverty and purification: the politics of Gandhi's campaign for prohibition. *The Historian, 67*(3), 489-506.

Gandhi, Mohandas. (1926). Total Prohibition, *Young India*, February 4, 1926, in Collected Works of Mahatma Gandhi, 33.pp- 49. Quoted in (De, 2020)

Goldstein Research (2020, May 15): India Alcoholic Beverages Market Trends, Growth and Forecast Analysis 2020-24. *Goldstein Research* , URL:https://tinyurl.com/GoldsteinIndiaAlcohol

Government of Maharashtra Excise Department. (2019). *Current Duty and Fee Structure*. Mumbai: Government of Maharashtra. URL:https://tinyurl.com/MaharashtraExcise

Grill, K., J. Nihlen Fahlquist.(2012). Responsibility, Paternalism and Alcohol Interlocks. *Public Health Ethics* 5, no 2: 116–27. https://doi.org/10.1093/phe/phs015

Gururaj, Gopalkrishna, Melur S. Gautham, Banavaram A. Arvind.(2020).*Alcohol consumption in India: A rising burden and a fractured response. Drug and Alcohol Review* 40, no 3: 368–84. https://doi.org/10.1111/dar.13179 .

Hassan, B. (1922). The Drink and Drug Evil of India.

Hurst, John. (1889). The Temperance Question in India. *The Century Magazine,* vol. 38, 3. URL:https://tinyurl.com/Hurst-Temperance-1989

IIPS and ICF. (2017). *National Family Health Survey (NFHS-4), 2015-16*. Mumbai: IIPS. Retrieved fromhttps://tinyurl.com/IIPS2017

Janyala, Sreenivas. (2019, November 28). Explained: How a women-led movement influenced Andhra to reduce its liquor consumption. *The Indian Express*.

Kamei, Richard. (2014). Prohibition in Manipur: Deliberations over its "Dry State" Status. *Economic and Political Weekly*, 49(52).

Kant, Krishna. (2020, May 5). Minting money: States earned Rs 1.75 trillion from sale of alcohol in FY20. *Business Standard.* from https://tinyurl.com/Kant-BS-June-2021

Kapeliushnikov, Rostislav. (2015). Behavioral economics and the 'new' paternalism. *Russian Journal of Economics*, 1(1), 81-107.URL: https://tinyurl.com/Kapeliushnikov2015

Kashyap, Karan. (2017, April 16). How Startups Are Catering To India's $35B Liquour Market, The 3rd Largest In The World. *Forbes*. https://tinyurl.com/Forbes-Kashyap-2017

Kautilya and Rudrapatna Shamsastry(Translator). (2009). *Kautilya's Arthashastra* (English). Unknown.

Kirchgässner, Gebhard. (2017). Soft paternalism, merit goods, and normative individualism. *Eur J Law Econ 43*, 125–152. https://doi.org/10.1007/s10657-015-9500-5

Kumar, Santosh. (2017). Price elasticity of alcohol demand in India. *Alcohol and alcoholism,52(3)*, 390-395.

Lucas, Gary. (2011). Saving smokers from themselves: The paternalistic use of cigarette taxes. *University of Cincinnati Law Review, Vol. 80*(693). URL: https://papers.ssrn.com/abstract=1942068

Manucci, Nicholas. (2010). *Aurangzeb and prohibition*. In: Kaul HK, editor. Historic Delhi: an Anthology. Delhi: *Oxford University Press;* 1996. p. 156–8

Nagaland Post. (2019, November 24). 30 years on: The Nagaland Liquor Total Prohibition Act. *Nagaland Post*https://tinyurl.com/NagalandPost-Nov-2019

New, Bill. (1999). Paternalism and public policy. *Economics & Philosophy*, *15*(1), 63-83

Nidheesh, M.K. (2015, November 30). How Indian states have fared in banning alcohol? *Livemint*. Available from https://tinyurl.com/MKNLivemint2015 (Accessed on 19 August 2020)

Pande, Mrinal. (2017, May 22). From the Vedic age to the Mughals and the Raj: The colourful history of alcohol consumption in India. *Scroll.* https://tinyurl.com/Pande-Scroll-May-2017

Poikolainen, Kari. (2021). Paternalism and alcohol policy. *Drugs and Alcohol Today*, Vol. 21 No. 1, pp. 6-14. https://doi.org/10.1108/DAT-07-2020-0048

Pope, Thaddeus.(2005). Is public health paternalism really never justified? A response to Joel Feinberg, *Oklahoma City University Law Review,* 30:1, 2005, p. 121.

Press Trust of India. (2019, May 28). Prohibition again imposed in Mizoram after four years. *India Today*. https://tinyurl.com/PTI-IndiaToday-May-2019

Reserve Bank of India. (2019). State Finances: A Study of Budgets. Mumbai: Sangita Misra *Reserve Bank of India*. URL: https://tinyurl.com/RBIStateFinance2019

Saldanha, Indra (1995). On Drinking and 'Drunkenness': History of Liquor in Colonial India. *Economic and Political Weekly*, 2323-2331. URL:https://tinyurl.com/Saldania1995

Sharma, H,, B. Tripathi and Pelto, Pertti. (2010). The evolution of alcohol use in India. *AIDS and Behavior*, 14(1), 8-17. URL:https://tinyurl.com/Sharma2010

Sharma, Harikishan. (2020, May 14). 'Explained: Why liquor sales matter to states'. *The Indian Express*. Retrieved fromhttps://tinyurl.com/IEMay1420 .

Singh, Magandeep. (2017). The Indian Spirit. *Penguin Random House India Private Limited* in *dailyO*. Retrieved on 30 June 2021 from https://tinyurl.com/Singh-DailyO-2017

Saxena S.L.(1948)., *Constituent Assembly Debates*, Vol VII, the 24th November.

Swamy, Rohini. (2017, June 8). Kerala says no to total prohibition: All about state's new liquor policy. *India Today.* https://tinyurl.com/Swamy-IndiaToday-2017

Tekchand (1972) Liquor Menace in India. *Gandhi Peace Foundation.* New Delhi.

Tewary, Amarnath. (2016, April 1). Bihar to impose prohibition from April 2016. *The Hindu.*
    https://tinyurl.com/Tiwari-Hindu-2016

Thomas, Matthew and Luke Buckmaster. (2010).Paternalism in social policy when is it justifiable?
    Parliament of Australia. https://tinyurl.com/PopeAU2015

WHO. (2018). Global status report on alcohol and health 2018- Country Profile- India. *World Health
    Organization.*

Six Essential Questions in Indian Public Finance
Review article based on *Studies in Indian Public Finance* by M Govinda Rao

Pranay Kotasthane[*]

Introduction

The discipline of public finance assesses the quality and quantity of government income and spending. As a cross-cutting discipline, public finance offers insights across all public policy domains. Whether it is public health, defence, or scientific research, policies in each of these domains grapple with some common questions:

- Does a prevailing situation warrant a government intervention?
- If yes, should the government produce, finance, or regulate?
- What amount of spending is required, if the government decides to either produce or finance the good/service?
- What mechanism(s) should be used to spend government money in order to realise the policy objectives?
- How should government generate revenue to sustain a policy project?

The discipline of public finance addresses all these questions and more.

Despite its utility, public finance is an underappreciated discipline in Indian public discourse. Discussions on government schemes, budgets, and taxes often descend into ideological fistfights. Even serious debates over these issues dominantly use the framing of political economy, without including the analytical basis that public finance can offer.

For example, a prominent policy debate in the media at the time of writing this essay has been over what constitutes government "freebies". Many opinions were written and debated after the Prime Minister's speech criticising state governments for distributing freebies to win votes.[i]

Public finance can bring much-needed clarity to this debate. Analytically, "freebies" are a particular category of subsidies. The concept of a "subsidy" has been studied by public finance specialists, including in a landmark study co-written by the author of the present book (Rao and Mundle, 1991). Analysing the quantum of subsidies at the union and state levels, it showed that Indian governments were collectively spending almost 15% of GDP on subsidies. The study also crucially differentiated and enumerated subsidies on meritorious goods and services from those on non-meritorious goods or services. Despite the availability and relevance of such analyses, a public finance perspective on freebies was an exception rather than the norm in popular media debates on the issue.

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This lack of popular understanding makes *Studies in Indian Public Finance (SIPF)* a much-needed contribution. The author of this book, M Govinda Rao, is a doyen in the field of public finance. He has several important papers, journal articles, reports, and academic books on public finance issues such as taxation, fiscal federalism, and intergovernmental transfers. As a public policy practitioner, academic, public intellectual, and institution-builder, Rao brings a unique perspective to his writings.

SIPF is a *tour de force*, in which Rao explains India's public finance journey after independence. The introduction chapter succinctly presents twelve takeaways for the reader. In *Chapter 2,* the book discusses opposing answers to a long-standing question that motivates public finance: what is the ultimate role of the State? Chapters 3 through 8 focus on one central concept each in public finance, narrated through India's journey. *Chapter 9* throws light on the unprecedented impact of COVID-19 on government finances in India.

Throughout the book, Rao stays away from the types of strongly held opinions that dominate discussions on government schemes, tax policies, and federalism. Instead, he attempts to educate readers on the analytical foundations and empirical studies which they can then use to derive their own conclusions.

Given the book's foundational nature, this essay departs from the conventional book review article. In place of critically analysing all the claims and studies in the book, the essay applies insights from the book to contemporary questions in India's public policy. The purpose is to highlight key ideas in public finance from *SIPF,* and to impress upon readers that understanding public finance is a valuable skill regardless of the policy domain of their core interest.

To do this, the essay asks six questions, and tries to answer them using insights from the book. A caveat for such an essay is in order: the views on contemporary issues are this writer's, based on insights from *SIPF.* They might differ from the author's perspective on specific issues.

Studies in Indian Public Finance in Six Questions

Question 1: What do we know about the quantity and quality of India's public expenditure?

Every year, there is animated discussion around the union budget regarding public expenditure allocations across sectors. Often, these conversations lament what they see as anaemic expenditure levels in a chosen sector. *SIPF* offers a framework for analysing public expenditure levels in a holistic manner.

Consider the quantitative aspect of public expenditure first. One way to judge government size is to measure public expenditure as a proportion of overall economic activity. The higher this parameter, the bigger the government. In 2018, India's overall public expenditure as a proportion of its GDP stood at 27%. The US was at ~38%; Russia was at ~36%; Sweden was at ~49%; Pakistan was at ~21%. The Indian State is thus no outlier on this measure.

This parameter has been rising steadily for most countries ever since the "welfare State" became mainstream after the Second World War. There is a strong correlation between government spending and income levels — the more prosperous a country is, the higher the share of public expenditure in its economy. This observation is known in public finance literature as Wagner's Law.

While Indian public expenditure fits Wagner's Law in a cross-sectional analysis (i.e. when one compares multiple countries), it does not follow this law in a longitudinal analysis (looking at public spending in India over time). Over the last thirty years, the public-expenditure-to-GDP ratio has hovered

around 26%, despite the considerable rise in per capita income. Poor state capacity and resulting difficulties in raising additional resources for the government to spend are a prominent reason for this divergence (Rao and Kumar, 2017).

Another interesting quantitative highlight is state governments' prominent-yet-under-analysed role in India's public finance landscape. State governments spend nearly 60% of total government expenditure. Constitutionally, the crucial domain of social infrastructure (health, education, etc.) is the primary responsibility of the states, while physical infrastructure is assigned to the union government. Moreover, expenditure at the third tier of government is negligible, as many state governments have failed to decentralise fiscally. This middle-heavy nature of India's public expenditure system demands higher scrutiny of state budgets and performances.

Qualitatively, India's public expenditure is centred around current expenditure, to the detriment of "capital expenditure" – spending that can yield long-term benefits. Over the last three decades, expenditures on consumption, subsidies, and transfers have risen significantly, while the spending on basic public goods (defence, law and order, contract enforcement) has remained stable at 6% of GDP. Similarly, while children constitute nearly 35% of India's population, expenditure on social services that impact this age group continue to be low.

Overall, the long-term productivity of public expenditure seems to be reducing. The author highlights the importance of tying public expenditure on inputs to policy outcomes. He argues that it is possible to get better outcomes from the same level of spending through better accountability, intergovernmental transfer design, and the use of technology.

Rao also suggests that one way to improve the efficiency of public expenditure is to eliminate most subsidies and shift to a basic minimum income scheme. However, he does not detail such a programme's costs and implementation details. Another way to improve productivity discussed in the book is the strategic sale of all public sector enterprises in non-strategic areas.

Question 2: Should India reintroduce wealth and inheritance taxes?

This question is a recurring theme in Indian public policy. Many a scholar advocates the usage of tax policy to contain rising inequality. The calls have only grown louder due to COVID-19. Most recently, the non-governmental organisation Oxfam International released a report titled *Inequality Kills: India Supplement 2022*. It argues:

> "We call upon the government to redistribute India's wealth from the super-rich to generate resources for the majority by reintroducing the wealth tax and to generate revenue to invest in the education and health of future generations by imposing a temporary one per cent surcharge on the rich for health and education." (Oxfam India, 2022)

After reading *SIPF*, the reader would realise that these calls are trying to address a genuine problem with a sub-optimal solution. In the chapter titled *Tax Policy and Reforms in India*, Rao explains that "the most important objective of tax policy is to raise revenue by minimising the three costs associated with taxation: the cost of collection, cost of compliance, and cost of market distortion."

In this writer's view, a wealth tax in India would fail on all three counts. Measuring wealth is not easy. For instance, estimating the cost of the artwork owned by a wealthy family requires the tax authority to have expertise in valuing art. Thus, the administrative and compliance costs would be significant. Nor do

people have all their money in easily visible financial assets such as stocks. Some of the assets could be notional (such as equity in early-stage start-ups), other assets could be outside India, and still others in immovables, such as real estate. Complying with wealth tax regulations on these assets will not be easy.

Finally, such a tax will have distortionary costs, as people will transfer wealth (notionally) to relatives, take money out of India, and invest in assets that are difficult to value. A tax on capital will end up being a burden on labour if companies shift their operations out of India, thus denying employment opportunities to Indian workers. Thus, any calls for new taxes should first assess the three costs.

More broadly, *SIPF* informs us that the tax system is not an effective instrument for redistribution. The idea that changing tax rates can reduce income inequalities has a long history. This vision led to highly progressive personal income tax regimes, combined with high corporate taxes in India and countries such as US and UK. Empirical studies have pointed out that such "Robin Hood taxes" did not lead to a reduction in inequality. In Chile, raising tax rates had a regressive effect, leading to an increase in the Gini coefficient (Engel et al., 1999).

Gradually, many countries have realised that redistribution should be a goal of the expenditure side of the budget. Revenue-raising functions and policies should not be tasked with this goal at all. Broadening the base, lowering the tax rates for all individuals and companies, and getting rid of tax exemptions are more progressive than multiple tax slabs and high tax rates.

It's not just redistribution: India's tax policy is deployed for several other socially desirable objectives, such as "*industrialisation of backward regions, encouraging infrastructure ventures, promotion of small scale industries, generation of employment, encouragement to charitable activities and scientific research, and promotion of enclave-type development through Special Economic Zones (SEZs).*" (Business Standard, 2013)

This multi-objective optimisation is addressed through various exemptions and rates, enabling evasion, rent-seeking, and corruption. Rao points out that this obsession with the tax policy is one of the primary reasons why India's tax-to-GDP ratio is almost 2.75% points lower than its taxable capacity. In a memorable phrase that illustrates the problem with expecting too much from one policy instrument, Rao had likened India's tax policy to kamadhenu (a mythical, miraculous cow which could fulfil all demands of her owner) in his earlier work (Economic Times BFSI, 2022).

Question 3: Is an imperfect Goods and Services Tax (GST) better than no GST?

In recent years, the shoddy implementation of the GST has generated much debate. While the reform was touted as a 'game changer' initially, it has come under criticism for two reasons. First, teething problems on the technical side and multiple GST rates indicated poor planning and implementation. Second, others have argued that the GST takes away some of the state governments' taxation powers, making it anti-federal.

SIPF has an excellent chapter that addresses the GST in detail. The author was the chairperson of an Expert Group on Taxation of Services that first recommended the adoption of GST as early as 2001. Hence, his views on this subject are illuminating. Rao highlights that unlike in other countries where such tax reforms were adopted to boost revenues, the reform in India was motivated by the need to "unify multiple trade taxes, reduce distortions, and harmonise the indirect taxes between the Centre and States". On this objective, GST appears to have paid off.

Acknowledging that it is difficult to quantify some crucial gains from GST, the author suggests that the currently imperfect GST is much better than the pre-GST scenario for five reasons.

1. It has unified myriad consumption taxes, reducing administration and compliance costs compared to the pre-GST tax situation.

2. It harmonises domestic taxes, by merging union excise duties and states' sales taxes and taxing this merged base based on value addition.

3. It has eliminated various tax exemptions that state governments deployed to win over businesses as a substitute to market-friendly policies.

4. It has eliminated checkposts, that physically hindered the movement of goods across the country, in effect bringing down transportation-related costs.

5. Finally, it has led to a significant reduction in cascading of taxes (the effect of charging a tax on tax), increasing money in the hands of citizens.

The author also terms the creation of the GST Council an important innovation in fiscal federalism, "where both the union and State governments pass on their fiscal autonomy to levy important consumption taxes to a joint agency in the interest of tax harmonisation."

The chapter also systematically identifies the current problems with the GST and recommends these solutions: simplify the tax regime, broaden the base, lower the rates, and include the currently excluded items into the GST. While the GST is a good starting point, without resolving these outstanding issues, GST's teething problems might grow into chronic defects.

Question 4: What is the single-largest expenditure item in the union government budget?

Neither defence nor subsidies, the single largest expenditure item in the union budget are interest payments, which account for one-fifth of the total expenditure planned this year. In FY19, before the pandemic, the aggregate public debt of all governments in India was about 72% of GDP, making India an outlier among emerging market economies. Only Brazil, Argentina, Pakistan, and Sri Lanka had a higher outstanding debt. The economic crash in Sri Lanka and the ongoing turmoil in Pakistan should prompt the question — how should India manage its public debt better?

That is the focus of Chapter 6, *Macroeconomics of Indian Public Finance.* The chapter starts with the implications of fiscal deficits and goes on to discuss India's experience with managing deficits and debt. Three insights are worth recalling here.

1. There is no optimal debt-GDP ratio for a government. Borrowing can be made sustainable over time if it is utilised for productive growth. However, if it is used for non-productive purposes, such as financing the day-to-day expenses of the government, increasing debts might eventually result in a financial crisis.

2. Increased government borrowing from the household sector's financial savings crowds out private investment – the backbone of any economy.

3. Today's borrowing results in tomorrow's taxes. Excessive borrowing has intergenerational effects, as it locks in future expenditures as interest payments.

India's 1991 balance of payments crisis highlights the need to monitor fiscal deficits and debt. The book has an illuminating section on how the Fiscal Responsibility and Budget Management (FRBM) Act was passed in 2003. The FRBM Act put limits on deficits of state and union governments. This rule-based fiscal policy initially paid quick dividends, but got derailed in 2008-09, as expansionary fiscal policy took

centre stage. This situation has not improved since then. Since there are no penalties for breaching the FRBM targets, there have been regular slippages through the last decade. COVID-19 has pushed the deficit reduction plan further away into the future.

To tackle this situation, the author highlights a missing institution: an independent fiscal council. The Thirteenth, Fourteenth, and Fifteenth Finance Commissions have highlighted this institutional gap. While India has an institution (the Comptroller and Accountant General) to audit policies that are already in action, no institution conducts and publishes an independent financial evaluation of government policies *before* they receive approval.

The result is that tall promises of handouts often become government policies swiftly, without regard for fiscal sustainability or assessments of opportunity cost. A recent example is the One Rank One Pension (OROP) scheme, which was implemented in 2015 after appearing in the 2014 election manifestos of the major national parties. An independent fiscal council would have made the long-run costs of OROP explicit, thereby enabling a more informed discussion based on cost-benefit analysis, prior to the eventual policy decision.

An independent fiscal council is an institution that is supposed to do three things: evaluate the quality of budget forecasts (given the wide gap between budgeted estimates and actual expenditures); develop cost estimates of budgetary proposals *ex-ante*; and monitor adherence to fiscal rules. Rao argues that the global experience with such institutions is largely positive, and that it is time for India to build a credible and genuinely independent fiscal council.

Question 5: What ails Indian Fiscal Federalism?

Fiscal federalism is a much-debated topic in India's policy discourse. After liberalisation, states in southern India have witnessed impressive growth, while many large states in the Gangetic belt have underperformed. This difference in the economic and demographic centres of gravity manifests as squabbling over the horizontal distribution of revenues between states.

Opinions keep reappearing, suggesting how some states are getting a raw deal in the Indian union, as they contribute far more to the union government's tax revenue collections while getting far less in return. *SIPF* has two chapters that deeply engage with such questions on Indian fiscal federalism.

The author presents various fiscal federalism theories, and an even-handed assessment of India's experience with fiscal federalism. As he explains, the wide disparity in incomes per capita between states—Haryana's per capita income is almost five times that of Bihar, for instance—makes some redistribution across states inevitable.

The states' exclusive focus on horizontal devolution seems to be misplaced, as the real problem lies in vertical devolution, i.e. how the tax resources are split between the union government and all states as a whole. The Indian union has a heavy 'centripetal bias', which allows the union government to corner more revenues to itself, and also apply those revenues to domains that are constitutionally under the State List.

The Fourteenth Finance Commission tried to change this by recommending a higher devolution of revenues to the states as a whole. While most commentaries suggest that the union government increased the devolution substantially, from 32% to 42%, following these recommendations, the author offers an important correction. As the commission's mandate covered the requirements of both plan and non-plan expenditure, in reality, the increase was from 39% to 42%. The union government partially neutralised even this modest 3 percentage point increase by increasing cess and surcharges, which are not shared with states.

In that sense, debates over India's fiscal federalism resemble the 'monkey and the two cats' fable. While states fight amongst each other, the union government can get away with 58% of the divisible pool resources, raising new cesses, and using a part of these funds to run centrally sponsored schemes that fall squarely in the states' constitutional domain. States need to cooperate with each other to reduce this centripetal bias.

Question 6: How many centrally sponsored schemes should the union government run?

Centrally Sponsored Schemes (CSS) are programmes designed and significantly funded by the union government and implemented by state governments. CSS such as the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) or National Health Mission (NHM) occupy an outsized role in Indian public policy discourse.

The chapter *Intergovernmental Transfers in India* analyses these schemes in great depth and offers foundational insights. Conceptually, the union government transfers money to state governments in two ways: general purpose (GP) transfers and specific purpose (SP) transfers.

o   GP transfers are not tied to any specific purpose; states are free to deploy these funds according to their priorities. Such transfers are now recommended by the Finance Commission. GP transfers are meant to "*enable states to provide comparable levels of public services at comparable tax rates by offsetting their revenue and cost disabilities.*" (Rao, 2017)

o   SP transfers, as the name indicates, are funds that states need to spend on pre-determined subjects. SP transfers are meant to ensure a minimum standard of public services, which are considered 'merit goods', and have significant externalities across the country. MGNREGS and NHM fall under this category; conceptually, most CSS would fall under this category as well.

Analysing three primary CSS, the author finds that SP transfers have failed to meet their core objectives. Instead of focusing on a few meritorious public services, they became a vehicle for successive union governments to woo the electorate, by expanding their reach to spend on subjects Constitutionally allocated to the states.

This had led to thinly spread resources and poorly designed schemes. The net result is that SP transfers are less equalising than GP transfers, meaning that such transfers are not able to drive convergence of performance of various states on desired outcomes, as richer states end up getting more allocations per capita under these schemes. The chapter goes on to recommend design changes for SP transfers.

Conclusion

These six questions and their answers based on *SIPF* illustrate the utility of public finance analyses and reasoning in making sense of contemporary policy debates. Additionally, the book has much more to offer on several other issues, such as subsidies, the post-pandemic fiscal situation, and a proposal to reimagine an institution that can help intergovernmental bargaining. *SIPF* is an excellent introduction to Indian public finance for any interested reader.

References

Rao, M.G. and Mundle S (1991), 'Volume and Composition of Government Subsidies in India, 1987-88'. *Economic and Political Weekly* 26, no. 18 (5 June 2015): 7–8.

Rao, M.G. and Kumar S (2017), 'Envisioning Tax Policy for Accelerated Development in India', *NIPFP Working Paper 190,* (February 2017)

Mahendru A et al., 'Inequality kills: India Supplement 2022'. *Oxfam India* (16 Jan 2022)

Engel, Eduardo M., Galetovic, A. and Raddatz, Claudio E., 'Taxes and Income Distribution in Chile: Some Unpleasant Redistributive Arithmetic'. *NBER Working Paper No. w6828*, (December 1998). Available at SSRN: https://ssrn.com/abstract=141491

Rao, M.G. 'Tax Sops - Their Cost and Efficacy'. *Business Standard India*, 4 May 2010. https://www.business-standard.com/article/opinion/m-govinda-rao-tax-sops-their-cost-and-efficacy-110050400031_1.html.

'Tax Policy Is Not Kamadhenu, Says Govinda Rao | ET BFSI'. Accessed 2 September 2022. https://bfsi.economictimes.indiatimes.com/videos/tax-policy-is-not-kamadhenu-says-govinda-rao/89664599.

Rao M.G., 'Central Transfers to States in India: Rewarding Performance While Ensuring Equity', *NITI Aayog* (September 2017)

Notes

[i] The Indian Express. 'Revdi Culture Dangerous, Must End: PM Modi Slams Politics of Freebies', 17 July 2022. https://indianexpress.com/article/cities/lucknow/revdi-culture-dangerous-must-end-pm-modi-slams-politics-of-freebies-8033948/.

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