Is India creating adequate jobs post 2000: *treading through employment elasticity*

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We look into diverse databases to gauge if economic growth in India creates adequate volume of jobs since the year 2000. In our exercise, we use a popular index called employment elasticity. This indicator says to what extent the employment expands while the economy grows. First, gauging the employment elasticity, we provide a comparative picture of India and other BRICS countries during 2000-2017. Second, using the time series data for 2000 to 2016, we present the analysis pertinent to India, disaggregated for Industries. Finally, we examine the temporal change in employment elasticity with respect to the organised manufacturing in India during 2000-2014. In essence, the data conveys that India needs to create discernibly higher volume of jobs in response to the impending economic growth or find other avenues like Manpower exports or entrepreneurship growth. All three exercises concur with the conclusion that job creation in India needs a gearing up since proportionate expansion in employment is not even a fifth of expansion in value added in the economy. What makes our attempt distinct from the extant literature is we use more granular data with respect to the household and the enterprise, while we examine the indicator from the macro angle, as well.

We examine Indian Economy's potential to create jobs –formal and informal. Our exercise covers the time span since the year 2000. The analysis revolves around a measure called Employment Elasticity (EE). EE is a ratio of proportionate change in employment to proportionate change in value added by the economy for a given period of time. This measure is widely used as an indicator that gauges economy's ability to generate jobs[1]. EE signifies which direction the economy destines towards as far as job creation is concerned. An EE of one denotes that the magnitude of change in employment in the economy exactly corresponds to the change in value added. However, a value that varies between 0 and 1 means the economy's job creation is not commensurate with the economic growth.

[1]See Basu and Das (2015) and Misra and Anoop (2014) for recent empirical investigation.

If EE is negative, the volume of employment contracts, while the economy is growing. Nevertheless, a value that exceeds one means that the economic growth propels more than a proportionate change in employment. Table 1 briefs implication of EE.

Table 1: Employment Elasticity (EE) and Implications

Definition: Employment Elasticity (EE) = Proportionate Change in Employment divided by Proportionate Change in Value Added	
EE = 1	Proportionate Change in Employment = Proportionate Change in Value Added
EE > 1	Proportionate Change in Employment > Proportionate Change in Value Added
0 < EE < 1	Proportionate Change in Employment < Proportionate Change in Value Added
EE = 0	Zero growth in employment
EE < 0	Negative growth in employment (Contraction in employment)

This essay has three objectives. First, we compare EE of BRICS (Brazil, Russian Federation, India, China, and South Africa) countries during 2001-2017. Second, we examine EE for India at industry level during 2000-01 to 2016-2017. Third, we measure EE in Indian organised manufacturing[2], using factory as a unit of analysis. Table 2 outlines the methodology[3] of the analysis with respect to each objective, briefing the models, the variables, the span of period, and the source of data.

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[2] There is a widely held belief that employment growth in manufacturing is essential for India and hence understanding the trend of EE in manufacturing is essential

[3] Kapsos (2005) provides an exposition methodological nuances.

Table 2: Methodology in Nutshell

Objective	Model	Variables	Period	Source of data
To compare EE of BRICS	$\text{Ln } Y_t = \beta_0 + \beta_1 \text{ Ln } X_t + u_t$ (Time Series Regression with Newey-West standard errors) $EE = \beta_1$ Comparison Model: $\text{Ln } Y_t = \beta_0 + \beta_1 \text{ Ln } X_t + \beta_1 \text{ Ln } Y_{t-1} + u_t$ For comparison model, results are not elucidated. (Ordinary Least Square Regression with Robust standard errors)	$\text{Ln } Y_t$ = Logarithm of Real Gross Domestic Product (output), $\text{Ln } X_t$ = Logarithm of Employment, $\text{Ln } Y_{t-1}$ = Logarithm of Employment (lagged for a Year) u_t = Error Term	2000-2017	Penn World Table (Version 9.1)
To gauge EE for India at industry level	$\text{Ln } Y_t = \beta_0 + \beta_1 \text{ Ln } X_t + u_t$ (Time Series Regression with Newey-West standard errors) $EE = \beta_1$ Comparison Model: $\text{Ln } Y_t = \beta_0 + \beta_1 \text{ Ln } X_t + \beta_1 \text{ Ln } Y_{t-1} + u_t$ For comparison model, results are not elucidated. (Ordinary Least Square Regression with Robust standard errors) EE (point to point data)= $\dfrac{Proportionate\ Change\ in\ Employment}{Proportionate\ Change\ in\ Value\ Added}$	$\text{Ln } Y_t$ = Logarithm of Real Gross Value Added, $\text{Ln } X_t$ = Logarithm of Employment, $\text{Ln } Y_{t-1}$ = Logarithm of Employment (lagged for a Year) u_t = Error Term	2000-01 – 2016-17	KLEMS data, Reserve Bank of India (2018)
To gauge EE for India at economic activity, nature of employment and institution level	$EE = \dfrac{CAGR\ of\ Employment}{CAGR\ of\ Value\ Added}$ CAGR= Compound Annual Growth Rate. CAGR of $X = \left(\left(\dfrac{X_t}{X_0}\right)^{1/t} - 1\right) \times 100$	Employment count with respect to principal and subsidiary engagements. Aggregate employment is disaggregated for economic activity and institution. Value added is disaggregated for economic activity and institution.	2011-2012 to 2017-2018	Computed from unit records of Periodic Labour Force Survey (2017-2018) and National Sample Survey 68th Round (2011-2012), and National Accounts Statistics (2018)

As shown in Figure 1, for the BRICS countries, during 2000-2017, EE varies between 0.05 and 0.52 (Russia (0.05), China (0.06), India (0.13), Brazil (0.31) and South Africa (0.52)). What the pattern indicates is, for large transition economies such as India, expansion of employment visibly fell short of the pace in economic growth. With regard to India, as our estimate says, if the value added in the economy expands by 100 units, proportionate expansion in employment is merely 13. We subjected our analysis to empirical scrutiny by altering the model. In the model, we included lagged values of values of employment as an independent variable. Nevertheless, these alterations in the model point to EE of discernibly lower magnitudes; results are more disheartening than the previous ones are. Here, we go by our original model that does not have a lagged dependent variable in the model.
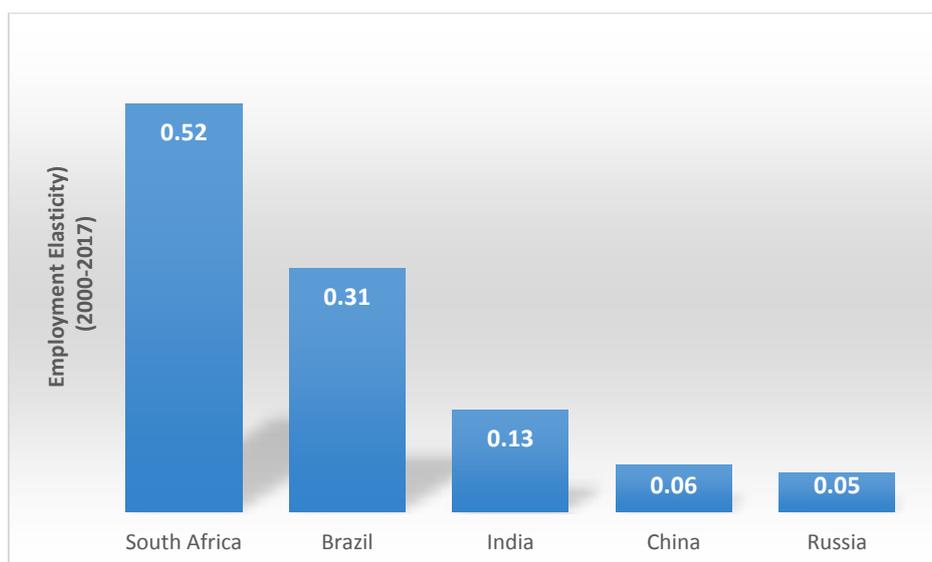
Source: Penn World Table (Version 9.1)[4]

Figure 1: Employment Elasticity (EE) in BRICS Countries

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[4] https://www.rug.nl/ggdc/productivity/pwt/ (Feenstra, Robert C., Robert Inklaar and Marcel P. Timmer (2015))

Table 3 Provides EE across industries in India during 2000-01 – 2015-2016. We use two approaches for measuring EE. One is regression based, while the other is point to point based. With respect to the first approach (regression based), EE varies in the range of (-) 0.5 (wood and products of wood) to 1.08 (construction). Construction is the only industry reporting EE above one. Quite important, eight industries report EE of more than 0.5 (Construction (1.08), Electrical and Optical Equipment (0.68), Health and Social Work (0.67), Education (0.59), Transport Equipment (0.58), Hotels and Restaurants (0.58), and Recycling (0.51). However, presumably labour intensive activities like Textiles, Textile Products, Leather and Footwear report almost zero EE.

For the Second measure, by and large the hierarchy of EE values resembles the order of the first measure, albeit a few exceptions. As shown in the table, values marked by the green colour (19 industries) imply that the orders with respect to these two measures converge, while just eight industries report discernible divergences in these measures. For the second measure, construction reports the highest EE (1.45), while public administration and defense reports the least ((-) 0.38). For the whole economy, EE is 0.23.

Figure 2 portrays EE for the organised manufacturing in India, using 506059 plant level records of Annual Survey of Industries, during 2000-01 – 2013-2014. An interesting pattern emerging from the data is that the range of EE fell during the span of period. In 2001, the range was 0.21 to 0.29. while the range in 2014, the range dropped to 0.16 - 0.26

Table 3: Employment Elasticity in India (Disaggregated with respect to the Industry)

Serial Number	Economic Activity	Employment Elasticity (2000-01 to 2015-16) (Regression with Newey-West standard errors) Time Series	Mean Employment Elasticity (2000-01 to 2015-16) (Point Data)%
1	Construction	1.08	1.45
2	Electrical and Optical Equipment	0.68	0.27
3	Health and Social Work	0.67	0.63
4	Business Service	0.64	0.67
5	Education	0.59	0.67
6	Transport Equipment	0.58	0.16
7	Hotels and Restaurants	0.58	0.57
8	Recycling	0.51	0.08
9	Other services	0.5	0.60
10	Financial Services	0.49	0.48
11	Rubber and Plastic Products	0.47	0.29
12	Basic Metals and Fabricated Metal Products	0.42	0.17
13	Machinery	0.41	0.16
14	Coke, Refined Petroleum Products and Nuclear fuel	0.39	0.25
15	Transport and Storage	0.36	0.39
16	Other Non-Metallic Mineral Products	0.34	0.65
17	Trade	0.22	0.33
18	Food Products, Beverages and Tobacco	0.17	0.05
19	Pulp, Paper, Paper products, Printing and Publishing	0.12	0.05
20	Chemicals and Chemical Products	0.07	0.16
21	Post and Telecommunication	0.06	0.05
22	Textiles, Textile Products, Leather and Footwear	0	-0.19
23	Public Administration and Defense; Compulsory Social Security	-0.04	-0.38
24	Electricity, Gas and Water Supply	-0.053	0.01
25	Mining and Quarrying	-0.06	-0.35
26	Agriculture, Hunting, Forestry and Fishing	-0.38	-0.27
27	Wood and Products of wood	-0.5	0.14
	Total Economy	0.16	0.23

% after removing outliers
Source: Computed from KLEMS data, Reserve Bank of India (2018)
(https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=894)
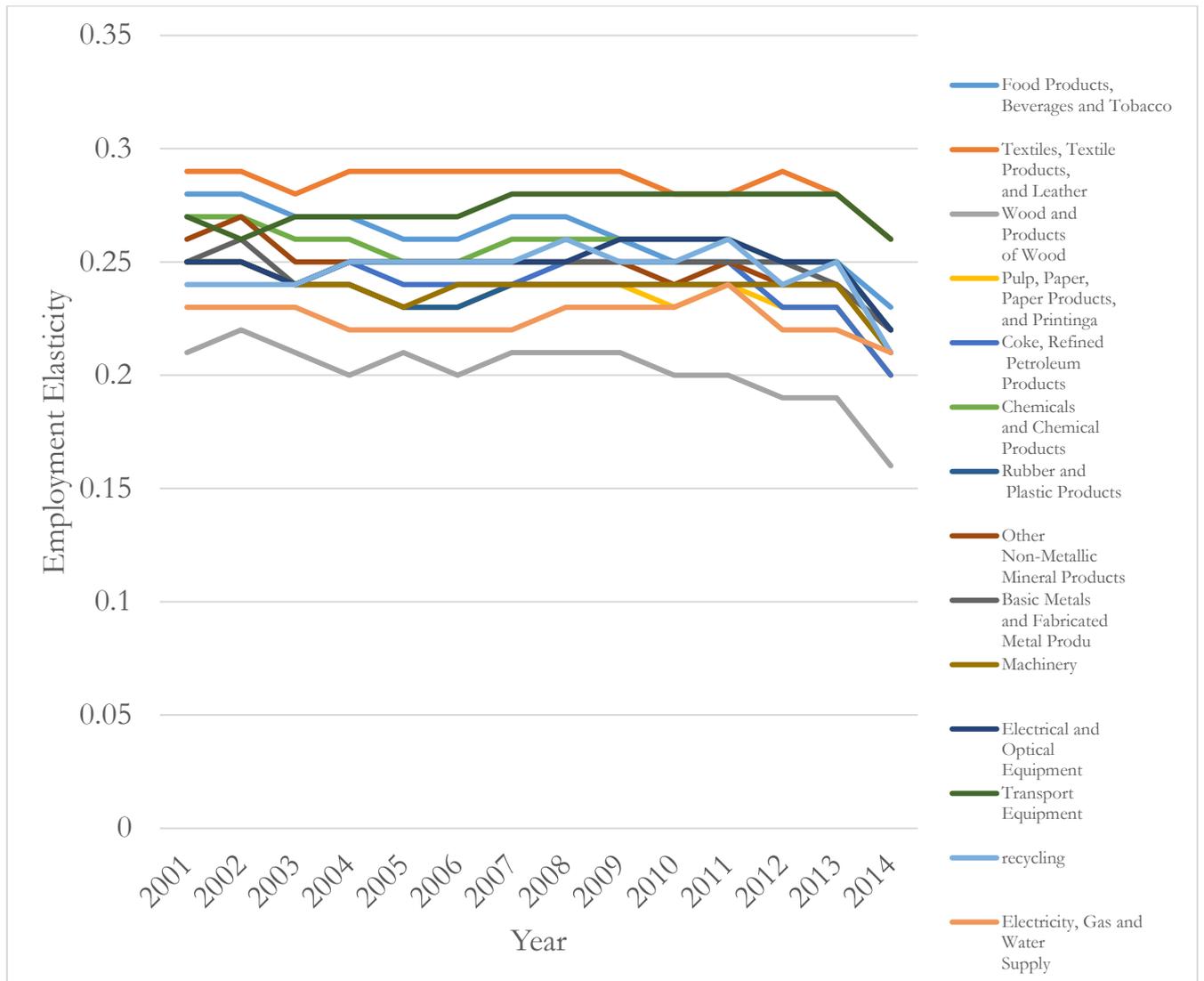
Note: Employment Elasticity was calculated by applying Regression with Newey-West standard errors.

Source: Computed from unit records of Annual Survey of Industries (2001-2014) (N=506059)

Figure 2: Employment Elasticity (EE) in Indian Organised Manufacturing

An interesting pattern emerging from the data is that the range of EE fell during the span of period. In 2001, the range was 0.21 to 0.29. while the range in 2014, the range dropped to 0.16 to 0.26. Interesting across industries, EE is showing a downward trend over a 13 year period. Even more alarming is the significant drop of EE in 2014. Even labour intensive industries like Textiles reported a declining EE.

In Indian context, employment covers not just principal engagement in terms major part of time being utilized for a certain paid work, it also covers peripheral engagements that are subsidiary in nature. Quite important, a fraction of workforce just settles around subsidiary engagements. In gauging growth of employment, assessing principal and subsidiary engagements tells us the picture of broader absorption of workforce in employment. Drawing cues from National Sample Survey Organisation, (NSSO) employment in terms of principal and subsidiary engagement is classified into three (Go I, 2019): (a) Workforce being engaged in principal activity, however not pursuing any subsidiary activity, (b) engaged in both principal and subsidiary activities, and (c) engaged only in subsidiary activity. To consider any activity as a subsidiary one, the engagement should not be less than 30 days. Over different NSSO rounds, proportion of workforce who were engaged in any subsidiary activity out of total employment remained less than one tenth. Nevertheless, by using subsidiary paid engagement as a criterion, the count of employment absorbs persons who are either unemployed or not in labour force as per the yardstick of principal criterion. Therefore, by using subsidiary engagement, measurement of employment becomes more boarder than counting only principal engagement as employment Table 4 provides a schema of Principal and Subsidiary Employment.

During 2011-12 – 2017-2018, as shown in Table 5, all three measures of employment (E_{PS}, E_P, E_S) report either discernible deceleration or stagnation. While E_S contracted by 13 %, rates with respect to E_P are E_{PS} are 0.83 and 0.05. What this pattern conveys is that Indian labour market has become less absorptive of its ever burgeoning population. Perhaps, this emanates from changes in the structure of the economy. The phenomenon of contraction in employment, in particular subsidiary engagement, is quite palpable for major activities like Agriculture ((-) 13 %), Manufacturing ((-) 15 %), Construction ((-) 14 %), and Trade ((-) 10 %). Nevertheless, financial services turn out to be a silver lining, showing a positive growth rate of 6 %. Resonating the pattern of contraction in employment, employment elasticity (EE) also shows a picture of decline (Table 6). In aggregate, EE for 2011-12 – 2016-2017 is (-) 0.21. This means that for one-unit expansion in value added, employment contracts by 0.21. While the phenomenon of negative employment elasticity is valid for major activities such as Agriculture (-0.2) and Manufacturing (-0.05), values with respect to other principal activities such as construction (0.3), Trade, repair, hotels and restaurants (0.2), and Transport, storage, communication & services related to broadcasting (0.4) are less than 0.5. Real estate, ownership of dwelling and professional services report the highest employment elasticity (0.65).

Further, we decompose the economy into three institutional streams: household, public, and private corporate. Household is invariably the unorganized sector employing informal work, forming a major chunk of employment (figure 3). Household covers proprietor owned units, partnerships, nonprofit institutions, and private households. Public Sector includes Government, Public Sector Enterprises and Autonomous Bodies. Private Corporate Sector has two constituents: Public/Private limited company and Co-operative societies. While the private corporate reports an employment elasticity of 0.41, values in regard to other two streams are (-) 1.04 (Public) and (-).06 (household). Except services activities like Real estate, ownership of dwelling and professional services, negative employment elasticity or stagnation (less than 0.5) emerges as a general pattern. This implies that contraction in employment is valid for both organized and unorganized sector. Quite important, in manufacturing and select service streams, the private corporate reports exceptionally higher values of employment elasticity. Another interesting scenario is that the household reports close to unitary elasticity in construction.

Table 4: Schema of Principal and Subsidiary Employment

Condition (During an Year)	Outcome
$L \geq N$ & $E \geq U$	E_P
$L \geq N$ & $U > E$	U_P
$L < N$	N_p
Irrespective of Principal Status, if $E \geq 30$ days	S
Combination of Principal and Subsidiary activities	(E_P, S), (U_P, S), (N_P, S), $(E_P, \sim S)$, $(U_P, \sim S)$, $(N_P, \sim S)$
Total = $(E_P, S) + (U_P, S) + (N_P, S) + (E_P, \sim S) + (U_P, \sim S) + (N_P, \sim S)$ $E_{PS} = (E_P, S) + (U_P, S) + (N_P, S) + (E_P, \sim S)$ $E_P = (E_P, S) + (E_P, \sim S)$ $E_S = (U_P, S) + (N_P, S)$	

Note: L = Labour Force, N = Not in Labour Force, E = Employed, U = Unemployed

E_P = Employed (Principal Status) , U_P = Unemployed (Principal Status),

N_P = Not in Labour Force (Principal Status), S = Subsidiary Employment, $\sim$S = Not bebeing engaged in Subsidiary Employment

Subscript P = Principal, Subscript S = Subsidiary, Subscript PS = Principal plus Subsidiary

Table 5: Growth in Employment (Principal and Subsidiary engagements) (2011-2012 - 2017-2018)

Economic Activity	Employment (Principal + Subsidiary) (E_{PS}) (CAGR)$	Employment (Principal Status) (E_P) (CAGR)	Employment (Subsidiary Status) (E_S) (CAGR)
Agriculture, forestry & fishing	-1.39	-0.34	-13.17
Mining & quarrying	-3.89	-3.76	-20.37
Manufacturing	-0.37	0.46	-14.95
Electricity, gas, water supply and other utility services	2.03	2.10	-4.18
Construction	1.38	2.15	-14.16
Trade, repair, hotels and restaurants	1.69	1.85	-9.60
Transport, storage, communication & services related to broadcasting	3.74	3.75	2.09
Financial services	2.15	2.07	6.02
Real estate, ownership of dwelling and professional services	6.78	6.96	-8.51
Public administration and defence	-0.51	-0.51	-10.27
Other services	2.24	2.71	-14.07
Total	0.05	0.83	-13.23

$CAGR= Compound Annual Growth Rate. CAGR of $X= \left(\left(\frac{x_t}{x_0} \right)^{1/t} - 1 \right) \times 100$

Source: Computed from unit records of Periodic Labour Force Survey (2017-2018) and National Sample Survey 68th Round (2011-2012)

Table 6: Employment Elasticity (2011-2012 - 2016-2017)

	Aggregate	Household	Public Sector	Private Corporate
		Institution $		
Agriculture, forestry & fishing	-0.19	-0.33	0.00	-3.26
Mining & quarrying	-1.10	-1.12	-18.52	0.88
Manufacturing	-0.05	-0.37	-5.77	3.93
Electricity, gas, water supply and other utility services	0.20	0.00	-0.12	3.44
Construction	0.34	0.89	-0.83	-3.96
Trade, repair, hotels and restaurants	0.19	0.04	-1.16	0.59
Transport, storage, communication & services related to broadcasting	0.44	-0.13	-2.67	6.32
Financial services	0.33		-1.72	4.36
Real estate, ownership of dwelling and professional services	0.65	0.43	-0.15	2.66
Public administration and defence	-0.06		-0.06	
Other services	0.22	0.43	0.00	-1.25
Total	0.01	-0.06	-1.04	0.41

$ Based on Government of India (2012), Sources and Methods.
(http://mospi.nic.in/sites/default/files/publication_reports/sources_method_2012%20(1).pdf viewed on 29/10/2019)
Source: Computed from unit records of Periodic Labour Force Survey (2017-2018) and National Sample Survey 68th Round (2011-2012), and National Accounts Statistics (2018)
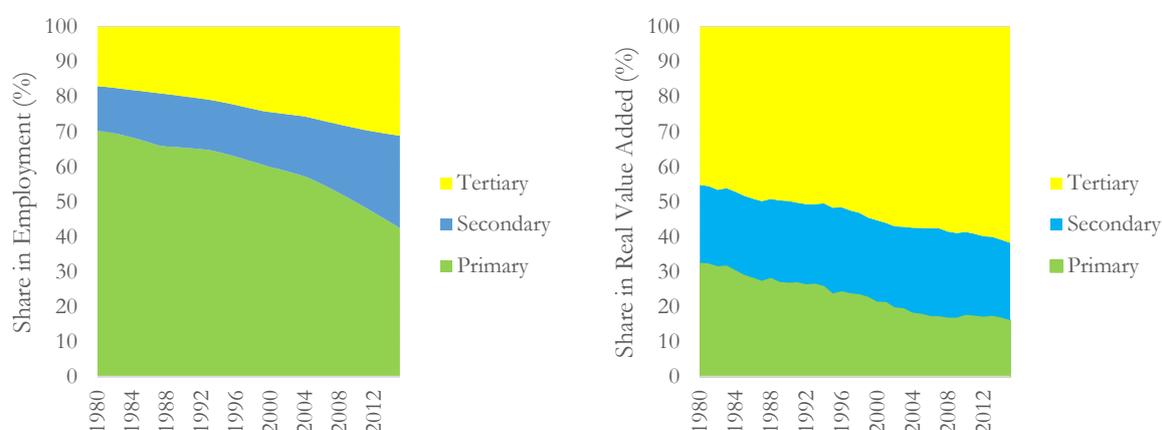(http://www.mospi.gov.in/publication/national-accounts-statistics-2018, viewed on 29/10/2019)
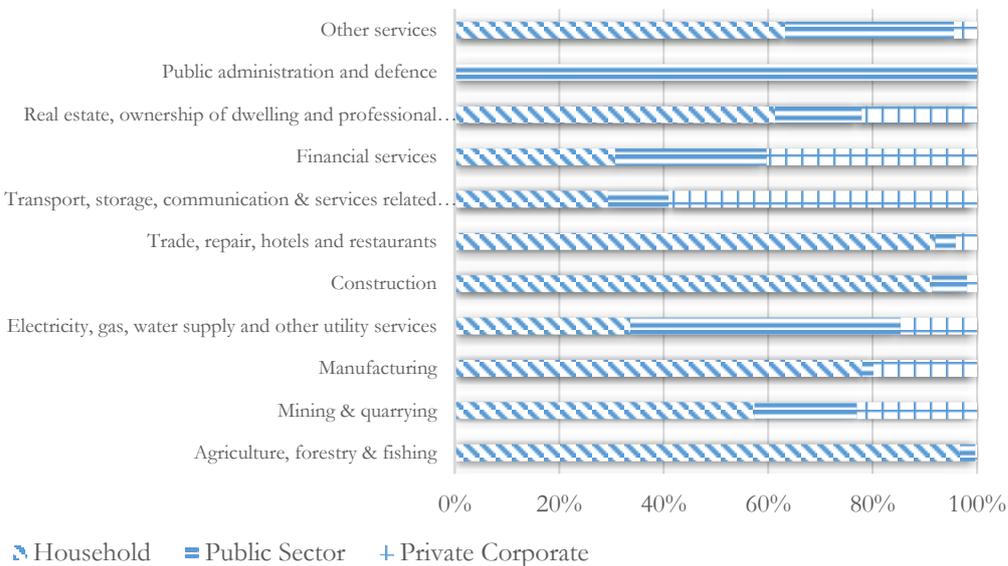
Source: Computed from unit records of Periodic Labour Force Survey (2017-2018)
Figure 3: Composition of Employment (by Institution) in India (2017-2018)

For this pattern of consistent contraction in employment and ostensibly lower magnitudes of employment elasticity, there seems to be a rational for making a data driven postscript. Figure 4 shows the fundamental paradox prevalent in Indian economic system. While the share of primary section in value added has been steadily falling, as to the absorption of workforce, this sector holds the key. The pace at which value addition changes does not resonate in the structure of employment.

Source: Computed from KLEMS data, Reserve Bank of India (2018)
(https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=894)

Figure 4: Composition of Employment and Valued Added (India)

For a populous and growing post-colonial economy like India, consonance between expansion of employment and growth in value added appears to be an essential condition for inclusive and sustainable economic growth. Nevertheless, triangulating results from multiple exercises discussed in this essay, across years, India seems to have been eluding any discernible positive change in employment elasticity. This sustained dampening may have grave consequences in regard to consumption and distribution of national income, triggering a spiral of joblessness and stagnation in the household economy.

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