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Abstract:

The decoupling of output growth and employment growth, known popularly as “jobless growth” has been a problem plaguing many countries. Using cross-country data, we show that India has underperformed significantly on job creation compared to the average developing country with lower than average employment elasticities at both the aggregate level and for the non-agricultural sector. Strikingly, we find a one-for-one relationship between output growth and productivity growth in India’s non-agricultural sector, i.e. a Kaldor-Verdoorn coefficient of one. Despite this joblessness of growth, the Indian economy has experienced some structural transformation with the share of the non-agricultural sector and the share of regular wage employment rising at the expense of agriculture and self-employment. We develop a theoretical model which clarifies the relative roles of labour demand and labour supply in determining the output-employment relationship. In this model, the Indian case of some structural transformation even with jobless growth emerges as one case among four possible cases (growth with or without jobs / structural change or no structural change). We conclude with some policy implications.

1. Introduction

The challenge of "jobless growth" facing many developing countries today needs urgent attention since it has not only economic but also social and political consequences. Alongside this problem where output growth seems to be decoupled from employment growth, developing countries also face the challenge of structural transformation- how to grow the share of relatively higher productivity, formal employment and reduce the share of workers engaged in agriculture as well as informal work. In this paper we present evidence on the Indian experience with regard to these two challenges. We also develop a model that clarifies the conditions under which growth will deliver jobs as well as structural transformation, either jobs or structural transformation, or neither.

Since the 1980s the Indian economy has shown two features. The first feature is that while the Indian economy was able to attain a higher output growth rate, the responsiveness of employment growth rate remained weak (Basole et al 2018; Kannan and Raveendran 2009; Tejani 2016). The second feature is that there was a rise in the share of regular wage employment in the non-agricultural sector. If such a rising share of employment is considered as an indicator of structural transformation, then the phenomenon of jobless growth would appear to coincide with the phenomenon of structural transformation.[1]

While the theoretical discussions on these two issues have been conducted in the literature separately and independently of each other, this paper attempts to understand the mechanism that creates the two phenomena simultaneously in the Indian context. Since structural transformation depends on the relative strength of labour demand in the modern sector with respect to labour supply, we attempt to analyse the dynamics of the two variables in the case of the non-agricultural sector along with their relationship to output growth.

With the growth rate of employment or labour demand getting determined by the difference between output and productivity growth rates, the nature of relationship between employment growth rate and output growth rate depends on the manner in which productivity growth rate responds to output

[1] Admittedly "regular wage" as opposed to casual/daily wage and self-employment is a liberal definition of "formality." Stricter definitions such as the presence of social security, protection under labour laws etc, will change the nature of the trends, but for our purposes the key analytical difference is between employment that is created via labour demand in the capitalist economy and does not display income sharing or work sharing properties. Regular wage employment fulfils this criterion.

growth rate. While post-Keynesian theories can be argued to provide a more general framework than neoclassical theories to analyse employment constraints, there have been limited analyses of the employment constraints in the specific context of a developing country like India.

The productivity function has been analysed in post-Keynesian literature through two different routes. The first route involves an exogenously given labour productivity growth rate. At any given productivity growth rate, changes in output growth rate would bring about proportional changes in employment growth rate in this route. Arrow (a) in Figure 1 reflects the channel through which growth affects employment. Any exogenous rise in productivity growth rate, however, adversely affects employment growth rate via arrow (b). The growth regime can be characterised as jobless if the adverse effect of higher productivity growth rate offsets the positive effect of output growth rate on employment growth rate. The phenomenon of jobless growth emerges *despite* higher output growth rate.

In the second route, productivity growth rate is endogenous and affected by output growth rate. The magnitude of impact is given by the Kaldor-Verdoorn (KV) coefficient. Output growth rate affects employment growth rate through two channels, arrow (a) and a combination of arrow (b) and (c) (FIgure 1). The phenomenon of jobless growth within the second route pertains to the case where the KV coefficient attains a high value of 1 or above (Rada and Arnim, 2012). The phenomenon of jobless growth emerges because of higher output growth rate that brings about a sharp rise in productivity growth rate .

[Insert Figure 1 here]

In the case of labour supply, its dynamics can be argued to depend on at least three sets of factors. The first includes demographic and cultural factors that are exogenous to the changes in employment opportunities and output growth rate of the formal capitalist sector. The second factor comprises the positive effect of the employment opportunities created in this sector, which in turn encourages a greater number of out-of-labour force workers to participate in the labour force. The third set of factors involve outflow and inflow towards the non-agricultural sector on account of higher output growth rate in the formal sector. Higher output growth rate can be associated with a negative income effect on labour supply, where rising household incomes lead to some workers withdrawing from the labour force, typically women in the case of India, but also, in an earlier phase of development, a reduction in child labour. Note that a movement of workers from the agricultural sector to out of the labour force due to

the same income effect, as occurred in the case of women during the period 2004 to 2017, does not impact the supply of labour to the non-agricultural sector. On the other hand, the expansion of the formal sector may bring about forcible displacement of labour from agriculture either by "primitive accumulation" (Sanyal, 2007; Patnaik, 2011; Bhaduri, 2018) or by changing the terms of trade against agriculture (Sadhu and Chakrabarti, 2021). If a fraction of such displaced workers happens to seek jobs in the non-agricultural sector, then higher output growth rate in the formal sector can increase labour supply to the non-agricultural sector.

The mutual relationship among growth, employment and structural transformation depends on the relative strength of all these factors. The model presented in Section 4 formalises these ideas. The key aspects of the model are: first the possibility of involuntary unemployment and existence of informality in the long run, second the possibility of jobless growth and its two variants mentioned above, and third the possibility of jobless growth accompanied by structural transformation. Lastly, by endogenizing the labour supply to the non-agricultural sector we make the standard post-Keynesian model more relevant to the case of developing countries such as India.

The main policy implication of our analysis is that setting targets for output growth by itself cannot solve the employment problem in the presence of jobless growth. An independent employment policy is needed. While a detailed discussion of what such policy looks like is not the focus of the paper, we discuss a few aspects in the last section.

The rest of the paper is organised as follows. Section Two presents the key output and employment trends in the Indian economy since the 1980s. Section Three outlines the theoretical approaches that have been used to understand the growth-employment relationship and develops the model. In Section Four we discuss policy implications and conclude.

2. The Indian experience

We now discuss some key empirical relationships between output growth, employment growth, labour supply, and structural transformation observed in the Indian economy over the past 40 years. We start with an overview of India's performance, then we place India in a cross-country perspective with respect to the long-run relationship between output and employment over a three decade period (1990 to 2018). Finally, we divide deeper into the Indian data over a longer period of time (from 1983 to 2018). In both cases, our analysis ends before the growth slowdown of 2019 and the Covid-19 pandemic of 2020.

So we do not discuss pandemic-induced disemployment effects or distortions to the structural transformation process.

2.1 Key stylized facts

The first thing to appreciate when discussing the Indian economy, is the size of the total workforce as well as various main sectors of the economy. Figure 2 shows the key "compartments" as far as the workforce is concerned along with the approximate number of individuals in each as of 2018.[2] The entire working age population of around 985 million can be divided into those in the workforce and those outside it. In a dual economy such as India the workforce is in turn divided into the agricultural (175 million) and the non-agricultural (26 million) parts. Finally, the non-agricultural sector itself is dual, consisting of a subsistence sector and a capitalist sector. The former, also called the informal sector, comprises self-employment (own-account work) as well as casual labour and constitutes the major part of this sector. The hallmark of the informal sector is that labour demand automatically adjusts to labour supply either via income sharing (in the case of self-employment) or via work sharing (in the case of casual labour). The latter, often called the formal sector, employs regular wage labour (typically on weekly or monthly salaries).

[Insert Figure 2 here]

Table 1 shows important indicators for three sub-periods within the overall period of analysis. These correspond roughly to the pre-reform (1983 to 1993), early reform (1993 to 2004) and later reform (2004 to 2018) periods. The choice of start and end points is dictated by the availability of employment data from the quinquennial employment-unemployment surveys of the NSSO.

[Insert Table 1 here]

A few points are worth noting. The Indian economy registered a healthy rate of overall as well as non-agricultural output growth above 6% per annum over the entire period, increasing to more than 7% in the most recent sub-period. Other macroeconomic indicators such as the investment to GDP ratio as well as the export to GDP ratio have also shown an increasing trend over the period. Coming to the employment indicators, note that since the 1990s, the workforce has consistently grown slower than the

[2] We ignore the openly unemployed who constituted less than 2% of the total workforce until very recently. The numbers here are estimates derived by multiplying sample survey derived ratios with Census projections.

working age population indicating that the workforce participation rate has dropped. This happened due to an absolute decline in the number of agricultural workers (a desirable feature of structural transformation) and a withdrawal of women from the labour force (Lahoti and Swaminathan 2016). Most strikingly, in the recent (high-growth) sub-period, it appears that the decrease in agricultural employment was barely met with a commensurate increase in the non-agricultural workforce, resulting in near zero growth of the workforce. Lastly, note that regular wage or salaried employment in the high growth period grew faster than overall non-agricultural employment indicating that the share of salaried workers in the non-agricultural workforce increased in this period. We take this as a sign of structural change occurring in India. We return to this point later.

2.2 Jobless growth and structural transformation in India in cross-country perspective

We start with a commonly used indicator of the job-creating nature of economic growth - the growth elasticity of employment. Figure 3 shows the distribution of elasticities obtained in a cross-country fixed effects log-log regression between aggregate output (value-added) and aggregate employment as well as non-agricultural output and non-agricultural employment.[3] The elasticities for India are indicated by red lines. The aggregate employment elasticity is lower at 0.2 than the elasticity of non-agricultural employment at 0.47. This is expected since agriculture has been shedding labour over a significant part of the period under analysis. More significantly, India's values for both elasticities are significantly lower than the mean across 50 developing countries in the ETD dataset.[4] This shows that, even as most developing countries have been facing headwinds that make employment generation difficult, the pattern of growth in India has been less job-intensive than the developing country average.

[Insert Figure 3 here]

However, in the present study our main concern is with the relationship between output *growth* and employment *growth* rather than the level changes captured by the elasticity numbers. There are two reasons for this. First, analytically, the Kaldor-Verdoorn relationship which describes the role of automation or technical change is understood in growth terms. Second, with respect to policy, stimulating growth is commonly understood to be a solution to increasing employment growth, once

[3] The complete regression results are provided in the appendix.

[4] The results are not substantially different in the World Development Indicators database. We present analysis using ETD here since it gives more detailed sector-wise data on output and employment than does the WDI database. We have also verified that the aggregate and non-agricultural employment elasticities obtained here match those obtained from the India-specific KLEMS database.

again making the relationship between output growth and employment growth the key relationship of interest. In this framework, the term "jobless growth" can be more precisely interpreted to mean a lack of responsiveness of employment growth rate to changes in output growth rate. Since employment growth rate is the difference between output growth rate and the growth rate of labour productivity, it follows that the nature of the relationship between employment growth rate and output growth rate depends on how productivity growth rate responds to output growth rate. The causal relationship between productivity growth and output growth depends, as discussed earlier, on the theoretical perspective one adopts.

We estimate the contemporaneous relationship between output growth rate and employment growth rate as well as output growth rate and labour productivity growth rate in a cross-country regression framework using ETD data. Figure 4 shows the distribution of the coefficients obtained from these two regressions. Strikingly, there is a weak negative relationship between output growth and employment growth for India (coefficient = -0.11) and correspondingly the Kaldor-Verdoorn (KV) coefficient is slightly greater than 1.[5] The corresponding mean values for the coefficient across all the countries in the sample are 0.3 and 0.7. Note that the Kaldor-Verdoorn coefficient is expected to be around 0.7. That is, productivity growth does not rise one-for-one with output growth, allowing some correlation between the former and employment growth. But this has clearly not been the case for India over the period in question. In order to understand this lack of relationship better, we need to look at India-specific data sources, which we do in the next section.

[Insert Figure 4 here]

Before leaving the cross-country framework, we show how India has performed in comparison to other developing countries with regard to structural change. For the purposes of the present study it is important to note that a key sign that structural transformation is occurring is the rise in share of formal employment and not just a rise in the share of non-agricultural employment. Following Ghose (2016) we may label these two distinct processes that are part of structural transformation as the Lewis process and the Kuznets process. The former is the process of moving workers from subsistence to the capitalist economy. The latter is the process of moving workers from the agricultural to the non-agricultural sector. Available data usually enables us to estimate the pace of the Kuznets process without much difficulty.

[5] As before the full regression results are displayed in the Appendix. And once again we have verified that the KV coefficient obtained in ETD is the same as that obtained in KLEMS.

For the Lewis process, however, we need to resort to proxies, since data on "subsistence economy" are not directly available. In this paper we use two proxies. The share of regular wage employment in the non-agricultural sector and the share of employment accounted for by establishments that employ 10 or more workers (known in India as the "organised sector").

Figure 5 plots agricultural as well as informal share of employment as a function of GDP per capita for the year 2018. As expected there is a strong negative relationship seen in both plots. The thing to note however, is that India (shown in red) lies much closer to the regression line for the agricultural share and is a significant outlier in the case of informal share.[6]

[Insert Figure 5 here]

This point can be substantiated by looking at detailed labour force data from India from the quinquennial NSSO employment surveys as well the more recent annual Periodic Labour Force Surveys. Figure 6 shows that the share of agriculture in total employment has been steadily declining in India, picking up pace since the early 2000s. The share of non-agricultural employment rose from 37% in 1983 to 60% in 2018. However, the pace of rise in non-agricultural employment was not matched by the rise in the share of formal employment within the non-agricultural sector. Only in the most recent high growth period do we see a small increase in the share of regular wage workers in the non-agricultural sector, as well as a small increase in the share of workers employed in establishments having 10 or more workers. This means that workers leaving agriculture were much more likely to end up in the informal non-agricultural sector. As pointed out by Ghose (2016) and Basole (2022) this points to a weakening of the link between the Lewis and Kuznets processes.

[Insert Figure 6 here]

2.2 Trends in employment and output growth

We use two main data sources, the KLEMS database and the NSSO employment survey database to dive deeper into the relationship between output growth and employment growth in India. KLEMS gives us value-added and employment at the aggregate level as well as sectoral level since the 1980s. But it does not distinguish between formal and informal employment or output. The labour force data from the quinquennial employment-unemployment surveys conducted by the NSSO give us more detailed

[6] A more detailed discussion on these graphs is available in (Basole 2022).

information on movements into and out of the labour force as well as the distribution of employment type since the 1980s.

As expected from the cross-country analysis presented earlier, the KLEMS data shows that annual growth rates of output were weakly negatively correlated with employment growth rates (beta = -0.16) and strongly correlated one-for-one with labour productivity growth (beta = 1.13). This relationship is even clearer at the sectoral level (Figure 7). It is worth noting here that the overall relationship shown here does hide some variation in the correlation between output and productivity growth rate at the level of individual industries. While the Kaldor-Verdoorn coefficient is close to 1 for several industries in both manufacturing and services, it is 0.77 for Construction and 0.66 for miscellaneous services (such as personal services). Naturally these tend to be the labour absorbing sectors, be definition.

[Insert Figure 7 here]

The heterogeneity with respect to the output-productivity relationship within manufacturing is also worth noting. The manufacturing sector includes both a formal or registered as well as an informal or unregistered part. Using data from the Annual Survey of Industries (ASI) that provides data for formal manufacturing we find the Kaldor-Verdoorn coefficient to be significantly lower at 0.54. This value is closer to (and lower than) the cross-country average that was shown earlier. We discuss possible reasons for this discrepancy in the Discussion section.

Moving beyond KLEMS data, and drawing on the NSSO surveys, we can look at the output-employment relationship in more detail by type of employment. The survey points are only available every five years or so until 2017 and on an annual basis after that. Our analysis ends in 2018-19, a year prior to the Covid-19 pandemic.

We find that employment growth and output growth move roughly out of phase with each other over the entire period from 1983 to 2018. This is the case for both the aggregate economy and the non-agricultural sector (Figure 8). Note that the growth rates presented here are CAGRs for the period between two survey years. The period of notably high output growth in the Indian economy, from 2004 to 2017 was accompanied by a decline in employment growth. At the aggregate level, employment growth turned negative during the period 2011 to 2017 (Figure 8a). This was because the fall in agricultural employment was not met by adequate employment generation in the non-agricultural

sector. Note that during this period, the CAGR for employment in the non-agricultural sector was a mere 1%, as compared to 5% in the period 1999 to 2004 (Figure 8b).

[Insert Figure 8 here]

As noted earlier, from a structural change perspective, it is not only the movement of workers out of agriculture that matters, but also their movement into the capitalist part of the non-agricultural sector rather than the subsistence part. We now focus on the former proxied here by two variables - salaried employment and employment in firms in the organised sector. We find again that there is no clear relationship between non-agricultural output growth and the growth of salaried or organised sector employment (Figure 9). Observe that employment growth in the organised sector correlated positively with output growth during the first part of the high growth period, rising from 4.2% to 5.8% CAGR between 1999-2004 and 2004-2011. But subsequently it plummeted to less than 1% in the 2011-2017 period. In the most recent period after 2017 when growth was beginning to slow down, there was an uptick in both indicators.

[Insert Figure 9 here]

2.3 Movements into and out of various sectors

As outlined in the Introduction, the lack of relationship between output growth and employment growth can be due to two distinct channels. First, with the modern or capitalist economy, the Kaldor-Verdoorn channel. And second, the labour supply dynamics or movements into and out of the capitalist economy.

To get a better handle on the latter, we start by looking at how the working age population has moved into either the workforce (employment), education or domestic duties (care work and other household work). The way to read the following three figures is that we show what fraction of the change in the working age population or the workforce between two survey years is accounted for by different components mentioned in the figure. So for example, if the working age population increased by 100 individuals between two time points and 25 of them went into education, the value of education will be 0.25. Keep in mind that sometimes there may be a decrease in a particular component even as the denominator increases.

We focus on the differences between male and female workers rather than looking at the aggregate numbers which hide substantial gender-based heterogeneity (Figure 10). Several features are worth noting. As expected, domestic (unpaid) work forms a large destination for new women entering the working age. In contrast, this is negligible for men. Pertinent to our current story, note that during the high growth years (2004 to 2017), the share of women in the workforce turned negative. This means that there was an absolute fall in the size of the female workforce in this period. No such decline is seen for men. It appears that at least some of the lack of relationship between output growth and employment growth could be explained by falling women's employment during the high growth period. Much has been written about India's declining (rural) female labour force participation rate (Lahoti and Swaminathan 2016; Mehrotra and Parida 2017). We do not enter that debate here except to note that two major factors have been identified for the falling LFPR in rural areas - a displacement of women workers due to mechanisation (Afridi, Bishnu and Mahajan 2023) and rising household income combined with social norms that value women's unpaid work more than paid work. Our interest lies in exploring the implications of movements into and out of the labour force as well as within the labour force across different sectors, for the aggregate relationship between output growth and employment growth.

[Insert Figure 10 here]

The most striking decline in female employment has been in agriculture. Figure 11 shows what part of the change in the workforce between each survey year is accounted for by changes in agricultural versus non-agricultural employment. Once again, it is more instructive to look at the gender-disaggregated data. For men, in each period post 2004, agricultural employment fell in absolute terms while non-agricultural employment rose. The rise in the latter more than compensated for the fall in the former. But for women, between 2004 and 2011 the rise in non-farm work did not compensate for the decline in farm work and in the 2011-2017 period there was an absolute decline in both kinds of employment. It is only in the most recent period, post 2017 that we see a rise in women's non-farm employment more than compensating for the loss of farm work. As a result, post 2018, there has been a recovery in the female labour force participation rate.

[Insert Figure 11 here]

These movements, especially of women workers, from agriculture to out of the workforce during the high growth period can explain the converse relationship between growth and aggregate employment,

but cannot explain the lack of relationship between non-farm output and employment. For this, we look at the change in just the non-agricultural part of the labour force. Here we hope to see a decline in the share of informal employment (self-employed and casual wage work) and a rise in regular wage work. Overall (for both men and women), we see this only for the period 2011-2017 (Figure 12). And this is driven largely by women workers. Strikingly, in this period, even though overall non-farm employment for women fell (see Figure 11c), we see a significant increase in salaried or regular wage non-farm employment (Figure 12c). However, it is more than compensated for by a fall in self-employment and casual wage work, resulting in an overall decline in non-farm work for women in this period. Thus it seems that the income effect dominates the pace of employment generation in the formal sector. However, this increase in salaried work for women, taken together with the fact that the same period saw the largest increase in salaried work for men as well (Figure 12b), meant that the proportion of regular wage or salaried workers in the workforce increased sharply during this period (see Figure 6).

[Insert Figure 12 here]

The empirical evidence presented in this section highlights two aspects of the Indian story. First, a strikingly high KV coefficient implying jobless growth, and second, significant labour supply flows into and out of the non-agricultural sector along with some structural transformation. We now turn to some theoretical considerations that link growth, employment and structural change, and develop a model that can account for the observed features. In the model, the Indian case emerges as one possibility out of four different cases.

3. Growth, employment and structural change: Theoretical approaches and model

Developing countries have historically confronted the dual challenge of maintaining high output growth rate as well as increasing employment growth rate in the modern and high-productive sectors. The latter objective is closely related to the issue of structural transformation, which involves increasing the share of employment in favour of the modern or capitalist part of the non-agricultural sector. The pace of structural transformation depends on the extent to which employment opportunities in this sector expand in relation to the labour supply. Since employment opportunities depend on output and labour productivity, the pace of structural transformation can be argued to depend on output growth rate, productivity growth rate and labour supply growth rate. The mutual relationship among these variables can be analysed in two distinct and contesting theoretical frameworks.

3.1 Growth, Employment and Labour Supply: Contesting theoretical considerations

The neoclassical framework is characterised by at least two distinguishing features. The first feature relates to how employment is determined in the short run. Under the assumption of flexible wages and prices, any gap between labour demand and labour supply brings about necessary adjustment in the real wage rate via which the economy necessarily settles to full employment output. The second feature involves the manner in which output and employment growth rate are determined in the long run. The issue of long run growth has been analysed within the neoclassical framework in terms of either exogenous or endogenous theories. The former (Solow 1956) took productivity growth rate as exogenously given, whereas the latter following Romer (1986 and 1990) and Lucas (1988) endogenised productivity growth rate in terms of knowledge spillovers and accumulation of human capital. But notwithstanding such differences, all neoclassical growth theories presume wage-price flexibility in the long run and assign a one-way causal relationship from the 'natural' growth rate to the actual output growth rate and from the labour supply growth rate to employment growth rate.[7] Such a causal relationship is based on the proposition that any rise in labour productivity growth rate or labour supply growth rate as compared to output growth rate brings about an increase in technological output-capital ratio (fall in capital-labour ratio), which in turn leads to an increase in savings-capital ratio, investment rate and steady state output growth rate.

There are at least three theoretical implications that follow from this mechanism. First, involuntary unemployment ceases to exist when wages and prices become flexible in the long run. Second, with employment growth rate being determined by labour supply, the explanation for low employment growth rate can be sought in terms of low growth rate of labour supply. Third, labour saving technological progress per se does not exert any adverse impact on employment growth rate as higher labour productivity keeps the latter unchanged by bringing about proportional change in output growth rate.

In the specific context of long run growth, there are *at least* two criticisms that have been levelled against neoclassical theories from two different theoretical traditions. The first criticism emerges from the Keynesian tradition that points out the limitation of the assumption of investment necessarily adjusting to *ex-ante* savings. This is because investment decisions are based on subjective expectations

[7] The natural growth rate is defined as the sum of labour productivity growth rate and labour supply growth rate. Since employment growth rate is the difference between output and productivity growth rate, growth rate of employment (labour demand) is equal to growth rate of labour supply when actual and natural growth rate are equal.

of capitalists and the latter remain analytically distinct from savings decisions. The short run implication of acknowledging the role of subjective expectations and exogenous investment decision in Keynes (1936) was the emergence of the possibility of involuntary unemployment.[8] In the long run, as pointed out by Sen (1970), investment rate and output growth rate would cease to adjust to natural growth rate once an analytically distinct investment function is included within an otherwise neoclassical growth model.

The second strand of criticism comes from the Kaleckian and classical framework, which highlights the unrealistic assumption of wage-price flexibility on account of institutional factors. The capitalist economy is perceived as a terrain of conflicting interests, where antagonistic classes contest over distributional shares through wage bargaining and cost-plus pricing (Bhaduri, 1986).

Post-Keynesian theories provide an alternative analytical framework to the neoclassical growth theories. While there are multiple and contesting theories within this tradition that widely vary in terms of their analysis of investment behaviour or binding constraint on growth, there are at least two common features that make them distinct from neoclassical theories. First, it is only by chance that output happens to be at full employment. Investment plays a key role in determining output growth rate, employment growth rate and unemployment rate (Blecker and Setterfield, 2018 and Palley, 2019). Second, steady state output growth rate gets determined by factors that can be independent of productivity growth rate and labour supply growth rate. The steady state output growth rate is determined by autonomous components of demand in Kaleckian, Harrodian and neo-Keynesian models, whereas it is determined by exports and capital flows in the Balance of Payment constrained growth model (Kaldor 1966; Thirlwall 1979). Third, a causal relation runs from actual to natural growth rate and from growth rate of labour demand to labour supply. There are two routes through which this mechanism operates. The first mechanism involves endogenizing technological progress in terms of output growth rate on account of increasing returns to scale (IRS) and firms engaging in learning-by-doing (Kaldor, 1961 and 1966; Verdoorn, 2002). The second mechanism involves labour supply growth rate adjusting to output growth rate (Patnaik, 1997; Lavoie, 2014).

There are three implications of this analytical framework. First, the possibility of involuntary unemployment within this framework exists both in the short run and the long run. Such a notion of

[8] While the assumption of rigid nominal wage rate in Keynes acts as a stability condition, the possibility of involuntary unemployment in this framework emerges independent of the assumption of wage-price flexibility (Marglin, 2020).

involuntary unemployment has been used to understand the phenomenon of "disguised unemployment" in a developing country. Similar to involuntary unemployment, the phenomenon of disguised unemployment has been perceived as a symptom of demand constraint in the non-agricultural sector (Robinson, 1937).[9] Second, employment growth rate is determined by the difference between output growth rate and productivity growth rate. In other words, the growth rate of labour supply does not *necessarily* affect the employment growth rate. By implication, the phenomenon of low employment growth rate cannot be explained exclusively in terms of constraints in labour supply. Third, in the absence of any adjustment mechanism where productivity growth rate leads to proportional change in output growth rate, technological progress can exert adverse impact on the employment growth rate.

3.2 The Model

This section attempts to outline the mutual relationship among output growth rate, employment growth rate and the degree of structural transformation in a dual economy as indicated by the share of the modern or capitalist sector employment in the non-agricultural sector. For simplicity we use the term "formal" to describe this sector, though it should be clear that the regulatory or legal aspects of formality are not the concern here. Simplifying the actually existing complexity of employment relations, analytically the "formal" is synonymous with "capitalist" and "informal" with subsistence. In order to highlight the key arguments, we develop a simple dual economy model comprising the non-agricultural formal and informal sector. The role of the agricultural sector is limited to supplying labour to the non-agricultural sector. For the sake of simplicity, all relative prices are assumed to be constant. The model abstracts away from the agricultural sector.

3.2.1 The Basic Equations

The basic equations are divided into two analytical blocks-the short run and the long run. In the short run labour productivity, labour supply and autonomous component of demand are exogenously given. The long run is defined as a period when all these variables change and register positive growth rate.

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[9] As noted by Joan Robinson (1937), "decline in demand for product of the general run of industries leads to a diversion of labour from occupations in which productivity is higher to others where it is lower. The cause of this diversion, a decline in effective demand, is exactly the same as the cause of unemployment in the ordinary sense, and it is natural to describe the adoption of inferior occupations by dismissed workers as *disguised unemployment*".

Short Run: The non-agricultural output (Y) is defined as the sum of formal sector (Y_f) and informal sector output (Y_n). The terms of trade between the formal and informal sector are assumed to be constant and normalised at the value 1. The relationship between non-agricultural, formal and informal sector output is described as equation (1).

$$Y = Y_f + Y_n \qquad (1)$$

The formal and the informal sector engage in trade. The informal sector output is given by its consumption demand and the trade balance between informal and formal sector. The consumption demand of informal sector equals the product of consumption propensity (c_n) and output of the informal sector. While exports to the formal sector are assumed to be proportional to output of the formal sector (fY_f), imports from the formal sector is assumed to be a product of import propensity of informal sector and output of informal sector ($m_n Y_n$). The informal sector output is given by equation (2).

$$Y_n = (c_n - m_n)Y_n + fY_f \qquad (2)$$

Where

$$0 < c_n < 1; 0 < m_n < 1; 0 < f < 1$$

The short run relationship between output in the formal sector and non-agricultural sector as a whole are respectively given by equations (3a) and (3b). Since the formal sector acts as an external market for informal sector output, any rise in formal sector output brings about an expansion in output in the informal sector via equation (3a). By implication, the non-agricultural output in equation (3b) positively responds to the formal sector output through the trade multiplier

$\left(1 + \frac{f}{1-c_n+m_n}\right)$.

$$Y_n = \frac{fY_f}{1-c_n+m_n} \qquad (3a)$$

$$Y = Y_f\left[1 + \frac{f}{1-c_n+m_n}\right] \qquad (3b)$$

The labour force (N) seeking jobs in the non-agricultural sector is disaggregated into two components- workers employed by the formal sector (L) and workers who are absorbed in the informal sector (S). For the sake of simplicity, open unemployment is assumed to be zero. In the absence of open unemployment, labour supply to the non-agricultural sector equals total employment in the

non-agricultural sector and is given by the sum of formal and informal sector employment as equation (4).

$$L + S = N \qquad (4)$$

The level of employment in the formal sector is determined by labour demand in the formal sector as described by equation (5). Higher output (Y_f) increases labour demand, whereas higher labour productivity (q) reduces labour demand at a given level of output.

$$L = \frac{Y_f}{q} \qquad (5)$$

The employment rate in the formal sector (v) is defined as the ratio between formal sector employment and labour force in the non-agricultural sector as described in equation (6a). The ratio v can be interpreted as an indicator of the extent of structural transformation, the value of which is bounded between 0 and 1. The informal employment ratio is a residual (equation 6b).

$$\frac{L}{N} = v \qquad (6a)$$

$$\frac{S}{N} = 1 - v \qquad (6b)$$

From equations (3a), (5) and (6a), the short run equilibrium employment rate in the formal sector is given by equation (7). At the given level of labour productivity and labour supply, higher level of autonomous demand is associated with higher level short run employment rate in the formal sector.

$$v_s = \frac{Y_f^*}{qN} = \frac{A}{(1-b)qN} \qquad (7)$$

Long Run: In the long run, output, labour productivity and labour supply register positive growth rate. The employment rate (v) responds to the changes in these variables and its long run value depends on the relative strength of these variables.

Taking derivatives and making necessary adjustments in equations (3a)-(3b), the output growth rates of the formal, informal and non-agricultural sector as a whole become equal. Long run growth rate of output is denoted as g. and described by equation (8).

$$\hat{Y}_n = \hat{Y}_f = \hat{Y} = g \qquad (8)$$

Technological progress in the non-agricultural sector is assumed to be Harrod-neutral and is associated with higher growth rate of labour productivity. The labour productivity function is given by equation (9), where labour productivity growth rate in the formal sector ($\hat{q}$) is assumed to be a positive function of

output growth rate of non-agricultural sector and an exogenous component (λ_0). The positive coefficient λ_1 can be termed as the Kaldor-Verdoorn (KV) coefficient. The emphasis of canonical Kaldorian models has been exclusively on the technological aspect, with the positive KV coefficient reflecting increasing returns to scale. We see this coefficient as being sensitive to both technological as well as historically given institutional and socio-economic factors of a country, as the latter affects the ease at which new (labour-saving) technology can be introduced. Lower the bargaining power of workers in resisting being displaced by new machines, other things remaining unchanged, greater is the KV coefficient in our framework.

$$\hat{q} = \lambda_0 + \lambda_1 g \qquad (9)$$

Where

$$\lambda_1 > 0$$

By definition, growth rate of labour demand in the formal sector ($\hat{L}$) is given by the difference between the growth rate of output and the labour productivity growth rate in the formal sector. Thus employment growth rate in the formal sector is given by equation (10).

$$\hat{L} = g - \hat{q} \qquad (10)$$

The dynamics of labour supply growth rate ($\hat{N}$) is given by equation (11). The autonomous component n_o includes all factors that affect labour supply growth rate at given employment opportunities and output growth rate. The second term of the RHS reflects the relationship between labour supply growth rate and formal employment rate (v). With v indicating the extent of job opportunities in the formal sector. The positive coefficient n_1 indicates the positive responsiveness of labour supply growth rate to changes in employment opportunities. It includes the possibility of a discouraged worker effect whereby reduction in the employment opportunities leads workers to withdraw from the labour force. The third term of the RHS captures the effect of output growth rate on labour supply at any given employment rate in the formal sector. Output growth rate in the formal sector affects labour supply through two distinct mechanisms-the income effect and the dispossession effect.

The possibility of negative income effect on labour supply emerges as higher output growth rate in formal sector increases income growth rate in informal sector through equation (8) leading workers (generally women, but also children or young adults) to withdraw from the labour force. The coefficient n_n captures the negative income effect of formal sector output growth rate on labour supply. The

dispossession effect is similar to the mechanism described in Sanyal (2007) and Bhaduri (2018), where the expansion of formal sector output brings about forcible displacement of workers from the agricultural sector to the non-agricultural informal sector. The positive responsiveness on non-agricultural workforce due to changes in formal sector output growth rate is captured by the coefficient n_a. The net effect of output growth rate in the non-agricultural sector on labour supply ($n_n - n_a$) depends on the relative strength of the income effect as compared to the dispossession effect. The coefficient ($n_n - n_a$) plays a key role in our model and can be termed as the growth elasticity of labour supply (ϵ_N). Depending on the relative strength of income and dispossession effects, the sign of growth elasticity of labour supply can be positive, negative or zero.

$$\begin{aligned} \hat{N} &= n_o + n_1 v - (n_n - n_a) g \\ &= n_o + n_1 v - \epsilon_N g \qquad (11) \\ n_1 > 0;\ n_a > 0;\ n_n > 0; \epsilon_N &= n_n - n_a \end{aligned}$$

3.2.2 Long Run Equilibrium and Comparative Statics

Steady State Equilibrium: The growth rate of the share of employment in the formal sector in the long run is given by $\hat{v} = \hat{L} - \hat{N}$. Plugging in equations (8)-(11), we get equation (12a)

$$\hat{v} = (1 - \lambda_1) g - \lambda_0 - n_o - n_1 v - \epsilon_N g \qquad (12a)$$

The long run equilibrium condition is given by $\hat{v} = 0$. Setting equation (12a) to 0, we get equation (12b)

$$n_o + n_1 v - \epsilon_N g = (1 - \lambda_1) g - \lambda_0 \qquad (12b)$$

Solving for the endogenous variable v in equation (12b), the long run equilibrium employment rate in the formal sector can be derived as equation (13). Taking the partial derivative of equation (12a) w.r.t 'v', the stability condition is described as condition (C.1). The steady state equilibrium in equation (12b) is stable since $\frac{\partial \hat{v}}{\partial v} < 0$.

$$v^* = \frac{(1 - \lambda_1 + \epsilon_N) g}{n_1} - \frac{(\lambda_0 + n_o)}{n_1} \qquad (13)$$

$$\frac{\partial \hat{v}}{\partial v} = - n_1 < 0 \qquad (C.1)$$

The steady state employment growth rate in the formal sector and the non-agricultural sector can be derived as equation (14) by plugging in the value of v^* in equation (11)and using equation (9) and (10).

$$\hat{L}^{*} = \hat{N}^{*} = \left(1 - \lambda_1\right)g \qquad (14)$$

Figure 13 depicts the mechanism by which output growth rate, productivity growth rate and labour supply growth rate determine the long run equilibrium level of formal sector employment rate (v) and employment growth rate.

[Insert Figure 13 here]

The right panel plots the employment rate of formal sector (v) in the horizontal axis and the output growth rate (g) and sum of productivity and labour supply growth rate ($g_n = \lambda + \hat{N}$) in the vertical axis. The output growth rate is exogenously given and the growth line (G_0) is horizontal in the g-v space. The sum of productivity and labour supply growth rate is described by $g_n = \lambda_0 + n_o + (\lambda_1 - \epsilon_N)g + n_1 v$ and depicted by a positively sloped line (P_0) with slope $n_1 > 0$ and intercept term $\lambda_0 + n_o + (\lambda_1 - \epsilon_N)g$. At any point to the left (right) of v_0, employment growth rate is greater (lower) than the growth rate of labour supply since output growth rate is greater (lower) than the sum of productivity and labour supply growth rate. Starting from any point to the left of equilibrium, employment rate increases (falls) till it settles at v_0. The steady state employment rate (v_0) is one where $\hat{v} = 0$ or output growth rate is equal to the sum of productivity and labour supply growth rate. The share of surplus labour in non-agricultural workforce is given by the segment 1- v_0.

The left panel describes the relationship between formal sector employment growth rate ($\hat{L}$) and output growth rate as described by $\hat{L} = \left(1 - \lambda_1\right)g - \lambda_0$. The two lines L_0 and L_1 have slopes $1 - \lambda_1$ and intercept terms $-\lambda_0$. The two lines depict two different values of KV coefficients. While the KV coefficient $\lambda_1 = 1$ for the line L_0, the KV coefficient $\lambda_1 < 1$ for the line L_1. The two lines intersect with the growth line (G_0) to provide equilibrium employment growth rate l_0 and l_1 respectively. The figure shows that depending on the value of KV coefficients, same amount of output growth rate (g_o) and employment rate in formal sector (v_o) can be associated with different levels of employment growth rate in the formal and non-agricultural sector (l_0 and l_1).

Comparative Dynamics: The effect of exogenous change in output growth rate on employment growth rate in formal and non-agricultural sector is described by equation (15). The sign of the partial derivative

depends on the value of the Kaldor-Verdoorn coefficient λ_1. The partial derivatives $\frac{\partial \hat{L}^*}{\partial g} > 0$ and $\frac{\partial \hat{N}^*}{\partial g} > 0$ if $\lambda_1 < 1$. The partial derivatives $\frac{\partial \hat{L}^*}{\partial g} \leq 0$ and $\frac{\partial \hat{N}^*}{\partial g} \leq 0$ if $\lambda_1 \geq 1$. The absence of a positive relationship between formal sector output growth rate on one hand and the employment growth rate in formal and non-agricultural sector can be described as a phenomenon of jobless growth.

$$\frac{\partial \hat{L}^*}{\partial g} = \frac{\partial \hat{N}^*}{\partial g} = 1 - \lambda_1 \quad (15)$$

The effect of exogenous change in output growth rate on the employment rate in the formal sector is described by equation (16). The sign of the partial derivative depends on the relative strength of two factors- value of the KV coefficient (λ_1) and the growth elasticity of labour supply (ϵ_N). Higher the KV coefficient, lower is the responsiveness of employment rate to changes in output growth. At any given KV coefficient, high (low) value of growth elasticity of labour supply (ϵ_N) is associated with strong responsiveness of employment rate to changes in output growth rate. Since $\epsilon_N = n_n - n_a$, strong dispossession effect (n_a) is associated with low elasticity values and strong income effect (n_n) is associated with high elasticity values. The partial derivative $\frac{\partial v^*}{\partial g} > 0$ if $1 - \lambda_1 + \epsilon_N > 0$. The partial derivative $\frac{\partial v^*}{\partial g} \leq 0$ if $1 - \lambda_1 + \epsilon_N \leq 0$.

$$\frac{\partial v^*}{\partial g} = \frac{1 - \lambda_1 + \epsilon_N}{n_1} \quad (16)$$

Combining the four possibilities, the relationship between output growth rate, employment growth rate and structural transformation can be categorised into 4 distinct cases.

[Insert Table 2 here]

The common feature in case 1 and 2 is that both are job-creating growth regimes where employment growth rate responds positively to output growth rate ($\frac{\partial \hat{L}^*}{\partial g} > 0$) with $0 < \lambda_1 < 1$. The difference between the two cases lies in the magnitude of the effect of output growth rate on structural transformation or the employment share of the formal sector. For case 1, higher output growth rate leads to structural transformation ($\frac{\partial v^*}{\partial g} > 0$) with $1 - \lambda_1 + \epsilon_N > 0$. For case 2, higher output growth

rate is associated with absence of structural transformation ($\frac{\partial \hat{v}^*}{\partial g} \leq 0$) with $1 - \lambda_1 + \epsilon_N \leq 0$. This is because at any given value of KV coefficient, the value of ϵ_N is lower for case 2 as compared to case 1 reflecting a relatively strong dispossession effect (n_a) or weak income effect (n_n). That is, the influx of workers into the non-agricultural sector due to dispossession exceeds the withdrawal of workers from the non-agricultural sector due to rising incomes. It can be noted, that the necessary (but not sufficient) condition for case 2 is that $\epsilon_N < 0$.

The mechanisms that bring about these two cases 1 and 2 can be illustrated in figure 14 by considering different values of growth elasticity of labour supply. In both cases KV coefficient is sufficiently low with $0 < \lambda_1 < 1$. Case 1 can be depicted by considering a scenario where income effect is sufficiently high with respect to dispossession effect such that growth elasticity of labour supply, $\epsilon_N = \lambda_1 > 0$. These examples are consistent with the conditions that bring about case 1, as they guarantee $1 - \lambda_1 > 0$ and $1 - \lambda_1 + \epsilon_N > 0$. Case 2 can be illustrated by considering a scenario where the dispossession effect is sufficiently high with respect to income effect, such that growth elasticity of labour supply is negative with $\epsilon_N < 0 < \lambda_1 < 1$ and $1 - \lambda_1 + \epsilon_N = 0$.

The P_0 and G_0 lines in figure 14 correspond to the baseline scenarios for both cases. Any rise in output growth rate leads to an upward shift of the growth line from G_0 to G_1, leading to higher employment growth rate from l_1 to l_2. For case 1, the P_0 line remains unchanged as the intercept term remains unchanged in response to higher output growth rate with $\epsilon_N = \lambda_1$. The long run equilibrium is attained by the intersection of G_1 and P_0 as the steady state employment share rises from v_0 to v_1. For case 2, the intercept term of P_0 line increases (since $\lambda_1 - \epsilon_N > 0$) in response to higher output growth rate, bringing about an upward shift of the line to P_1. The steady state employment share is attained by the intersection of G_1 and P_1 line at v_0. The formal sector employment share in this case remains unchanged despite higher output growth rate and employment growth rate due to high dispossession effect (low income effect).

[Insert Figure 14 here]

The common feature in case 3 and 4 is that both are jobless growth regimes where employment growth rate remains unresponsive or responds negatively to output growth rate ($\frac{\partial \hat{L}^*}{\partial g} \leq 0$) with $\lambda_1 \geq 1$. While both

these cases indicate weak employment elasticity due to high KV coefficient, the difference between the two cases pertains to the effect of output growth rate on structural transformation. For case 3, higher output growth rate leads to structural transformation ($\frac{\partial v^*}{\partial g} > 0$) with $1 - \lambda_1 + \epsilon_N > 0$. For case 4, higher output growth rate is associated with absence of structural transformation ($\frac{\partial v^*}{\partial g} \leq 0$) with $1 - \lambda_1 + \epsilon_N \leq 0$. The specificity of case 3 lies in high positive value of growth elasticity of labour supply such that the condition of $1 - \lambda_1 + \epsilon_N > 0$ is satisfied despite $1 - \lambda_1 \leq 0$. It indicates a stronger income effect with respect to the dispossession effect. That is, the outflow of workers from the non-agricultural sector due to rising household incomes far exceeds the influx due to dispossession from the agricultural sector. Note that the Case 3 way of achieving a rising share of formal employment relies primarily on a "falling denominator" rather than a rising numerator. Thus, from a larger perspective it is not the desirable way to achieve structural transformation. From the evidence presented in Section 3, this appears to be the Indian case. The mechanisms that bring about cases 3 and 4 can be illustrated in figure 15.

[Insert Figure 15]

In both these cases, the KV coefficient is high and can be illustrated by setting $\lambda_1 = 1$. The key difference between case 3 and 4 again lies in the values of growth elasticity of labour supply. Case 3 has high income effect with respect to dispossession effect and can be illustrated by setting $\epsilon_N = \lambda_1 \geq 1$. These examples are consistent with the conditions that bring about case 3, as they guarantee $1 - \lambda_1 = 0$ and $1 - \lambda_1 + \epsilon_N > 0$. Case 4 has high dispossession effect with respect to income effect and can be illustrated by setting the value of growth elasticity of labour supply negative with $\epsilon_N < 0 < \lambda_1 < 1$ such that $1 - \lambda_1 = 0$ and $1 - \lambda_1 + \epsilon_N = 0$. The effect of higher output growth rate on employment growth rate and employment share is shown in figure 15. The employment line L1 in figure 15 is vertical for case 3 and 4 as employment growth rate remains unaffected by output growth rate with $\lambda_1 = 1$. For reasons similar to figure 14, higher output growth rate increases employment share from v0 to v1 in case 3 while employment share remains unchanged for case 4.

4. Discussion and conclusion

This paper outlines the key features of India's structural transformation process since the decade of 80s and attempts to provide a theoretical framework to understand their underlying mechanisms. Challenging dual economy theories where the binding constraint on employment growth rate and structural transformation is the output growth rate, the Indian experience has been different in at least two ways. First, its employment growth rate remained unresponsive despite higher output growth rate. Second, it registered a higher share of regular wage and organised sector employment without any improvement in the overall employment growth rate. We locate the explanation for such a dual phenomenon of jobless growth and structural transformation in a dual economy framework by analysing the mutual interactions between growth, labour demand and labour supply.

The model presented here produces four distinct cases depending on how employment growth rate and employment share of the formal sector respond to output growth rate. The Indian experience is a specific case out of different theoretical possibilities on account of a high KV coefficient and income effect on labour supply.

Unlike many post-Keynesian models, labour supply plays an important role in our analytical framework in explaining employment share or the pace of structural transformation. At any given labour demand, employment share of the formal sector gets adversely affected by labour supply growth rate. The latter responds to output growth rate, the direction of which depends on the relative strength of the income and dispossession effects. In contrast to neoclassical models, growth rate of labour supply does not affect employment growth rate in this analysis. Rather, similar to post-Keynesian theories, employment growth rate depends on labour demand and is derived as a difference between output and productivity growth rate. The constraint on employment growth rate and the phenomenon of jobless growth is explained through the productivity channel, that reflects the real-world phenomenon of automation and rapid introduction of labour saving technology.

The phenomenon of jobless growth has been argued to emerge from two distinct routes, which were respectively described as routes 1 and 2 in the Introduction. While jobless growth in route 1 emerges *despite* higher output growth rate due to proportional and exogenous changes in labour productivity growth rate, jobless growth in route 2 emerges because of higher output growth rate involving high KV coefficient. This paper highlighted the problem of India's jobless growth particularly in terms of route 2. If the KV coefficient is interpreted in a broader sense that includes historically given socio-economic

factors, then a plausible explanation for its high value can be located in the presence of large surplus labour that India inherited during the time of independence and the nature of social institutions that emerged since the introduction of liberalisation policies. In this context, it is worth returning to the observation that the KV coefficient is far lower for the organised manufacturing sector (as measured in the ASI data) than for the manufacturing sector as a whole (as measured in KLEMS). This can happen if the informal part of the manufacturing sector absorbs more of the negative shock from labour-displacing technical change. It can also happen if this sector is more prone to labour supply changes arising from the income or dispossession effects. Both these factors will serve to weaken the relationship between output growth and employment growth.

This specific nature of jobless growth has key policy implications for employment generation. In route 1, employment growth rate can be increased by implementing policies that increase output growth rate over and above the labour productivity growth rate. For example, if output growth rate at a specific level is unable to increase employment growth rate in the midst of automation and rapid introduction of labour saving technology, policy makers can aim for even higher output growth rate that sufficiently counters the adverse effect of labour productivity growth rate. The policy target of increasing output growth rate remains analytically the same as increasing employment growth rate when KV coefficient is adequately low.

In route 2, employment constraints cannot be relaxed exclusively through the output channel. This is reflected in the case of India which was unable to relax its employment constraint despite registering higher output growth rate since 2004. This is because higher output growth rate in itself pushes up labour productivity growth rate proportionately involving the KV channel. The policy targets of increasing output growth rate and employment growth rate are analytically distinct in this case. Additional policy instruments are needed to increase employment growth rate over and above the ones that increase output growth rate.

Coming to structural transformation, the model produces a scenario where, even in the case of jobless growth, the share of formal employment rises due to the dominance of the income effect over the dispossession effect. That is, higher output growth pushes some workers (mostly women) out of the non-agricultural workforce thereby lowering the denominator and raising the share of formal employment. This describes the Indian case but is obviously not a desirable route to structural

transformation. Rather, we would wish to see a scenario where the KV coefficient is small enough that even if there is a net positive flow of workers into the non-agricultural sector, we still obtain a rising share of formal employment. Clearly, this remains the policy challenge.

We end with two observations in this regard. First, if fiscal policy is seen as one possible instrument for addressing the employment constraint, then the nature of such policy can be changed in keeping with the nature of jobless growth. If an economy is characterised by route 1 jobless growth, then capital expenditures that typically have high multiplier values as compared to revenue expenditures can be a preferred instrument for job-creation. But if an economy is confronting jobless growth of route 2, then implementing such expenditure may not be sufficient to relax employment constraints. The objective of employment generation may require undertaking expenditures in the form of employment guarantee programs, despite them having relatively lower multiplier value as compared to capital expenditures.

Second, there is likely to be significant heterogeneity in the KV coefficient across the firm size spectrum, with smaller firms showing lower coefficients. In other words, the composition of output growth also matters for employment growth. If most of the output growth comes from large firms that have high KV coefficients, growth will be much more jobless than if growth comes from smaller firms. This, of course, is the commonly advanced argument in favour of industrial policy that promotes smaller firms.

Lastly, in the present study, we have abstracted away from income distribution impacts of growth and the implications of changes in the former for the structure of demand as well as employment-intensity of growth. This remains a topic for future research.

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TABLES AND FIGURES

Table 1: Key indicators of the Indian economy

Indicator (%)	1983 to 1993	1993 to 2004	2004 to 2018
GDP growth	5.2	6.2	7.0
Non-agri value-added growth	6.5	6.9	7.6
Investment-GDP ratio	25.6	28.1	36.5
Export-GDP ratio	6.9	12.3	21.7
Working age population growth	3.2	2.3	2.3
Workforce growth	3.6	2.2	0.2
Non-agri employment growth	4.2	3.2	2.3
Non-agri salaried growth	3.3	3.0	3.9

Sources: RBI and MOSPI

Table 2: The 4 cases of Structural Transformation

Cases	$1 - \lambda_1$ (how labour demand responds to output growth)	$1 - \lambda_1 + \epsilon_N$ (how formal share responds to labour demand and labour supply)	**Nature of Growth Regime**
Case 1	$+$	$+$	Job-creating growth *with* Structural Transformation
Case 2	$+$	$-/0$	Job-creating growth *without* Structural Transformation
Case 3	$-/0$	$+$	Jobless growth *with* Structural Transformation
Case 4	$-/0$	$-/0$	Jobless growth *without* Structural Transformation

FIgure 1: Jobless growth causal mechanisms

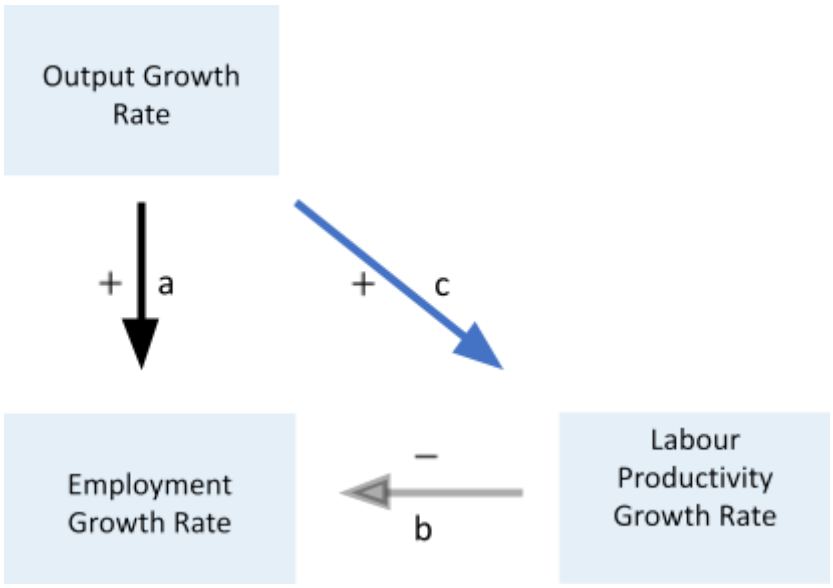
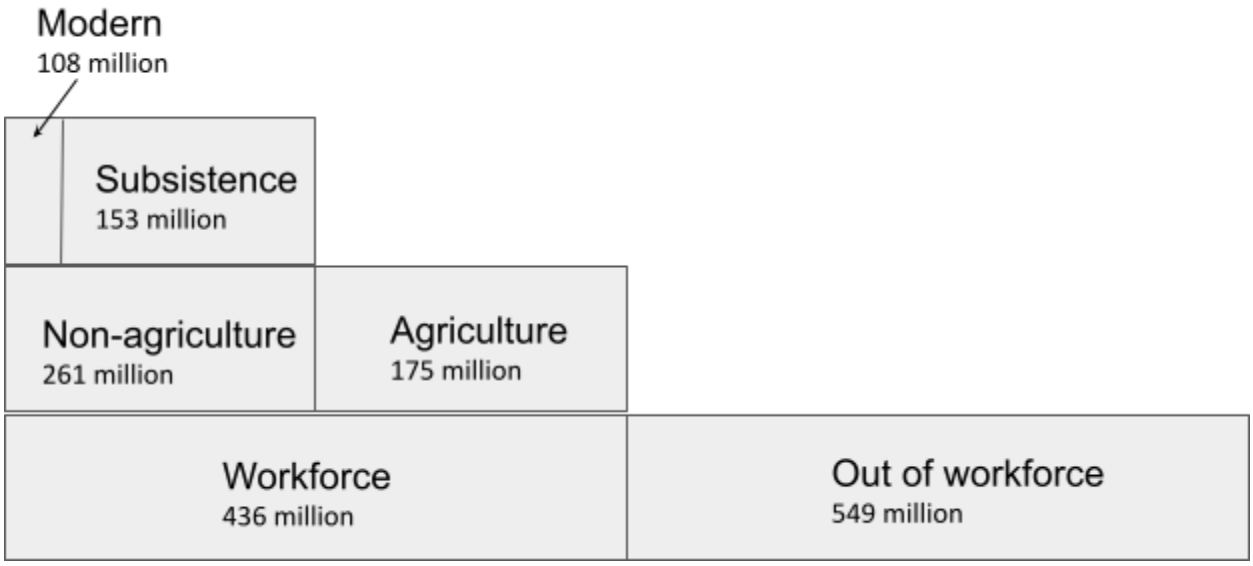
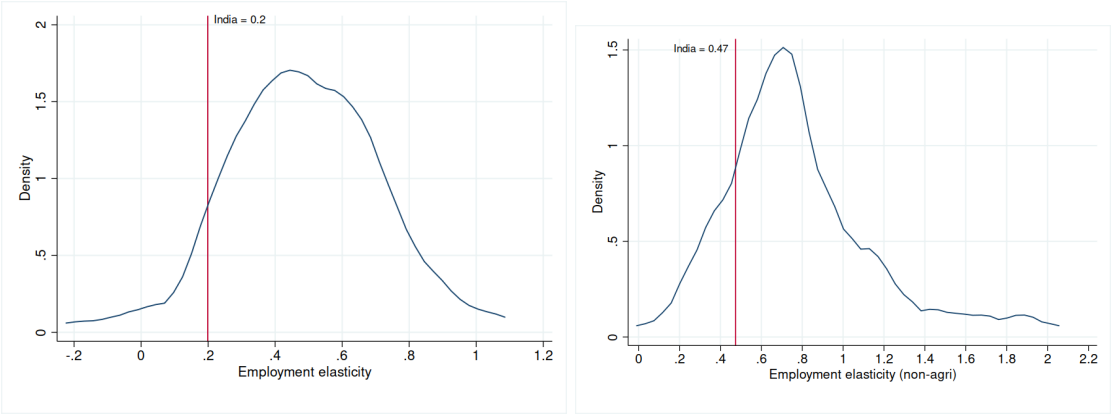


Figure 2: Main "compartments" of the economy



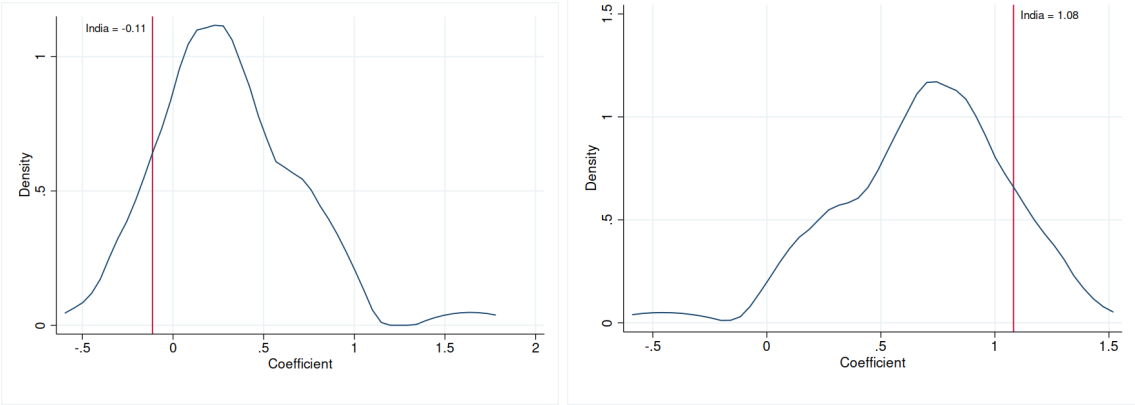
Source: Periodic Labour Force Survey (2018-19)

Figure 3: Cross-country distribution of aggregate (left) and non-agricultural (right) employment elasticities (1991-2018)



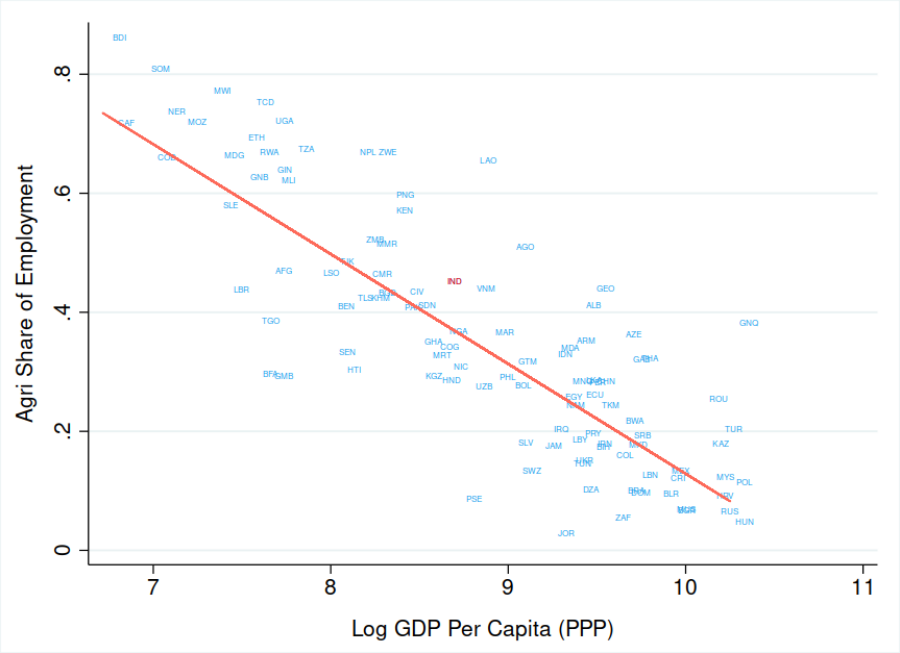
Source: Groningen ETD

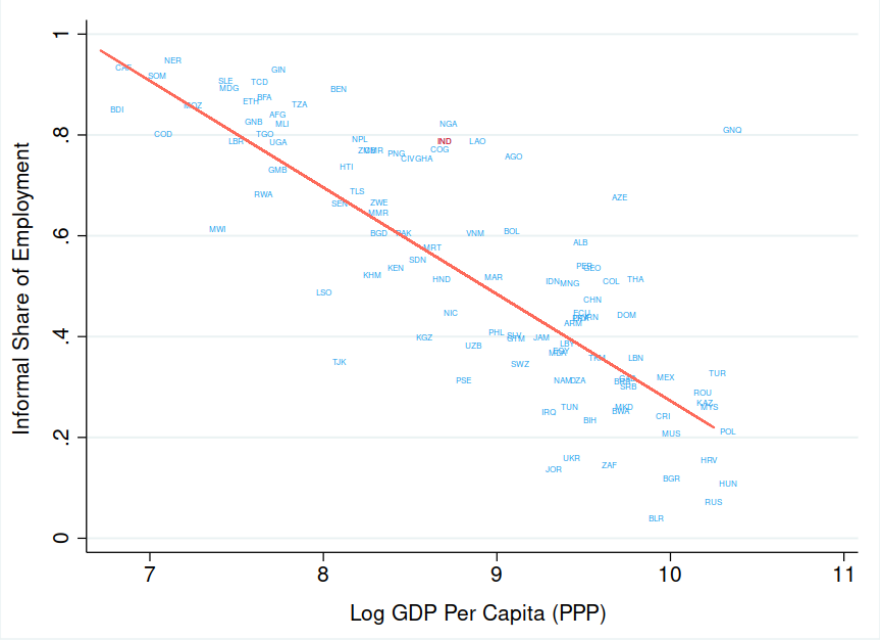
Figure 4: Cross-country distribution of coefficients - output growth and employment growth (left) and output growth-productivity growth (right) in the non-agricultural sector



Source: Groningen ETD

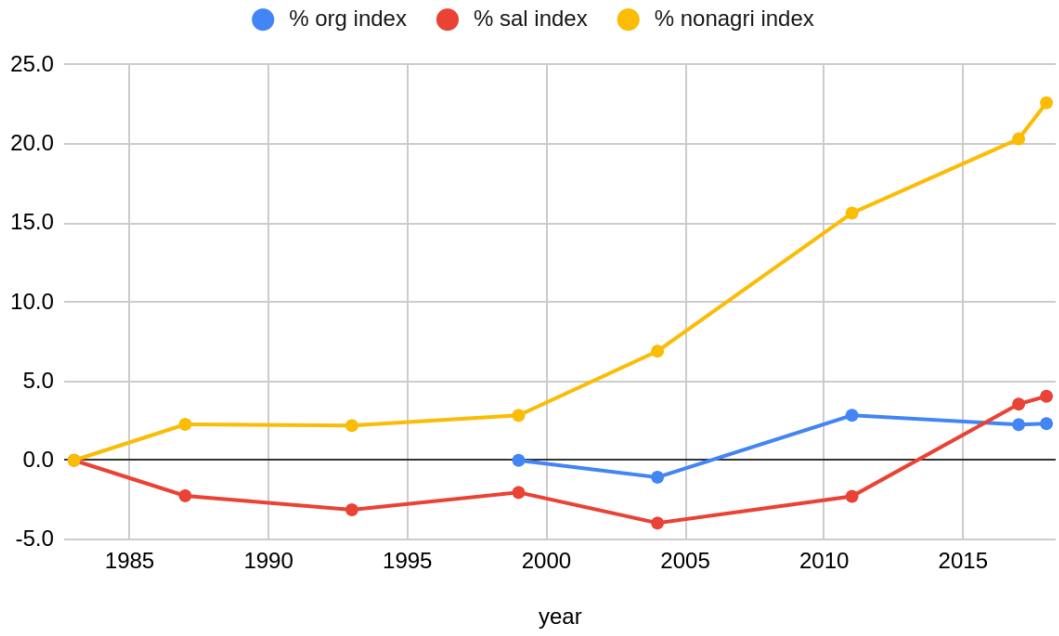
Figure 5: Agricultural (top) and informal (bottom) share across developing countries as a function of GDP per capita





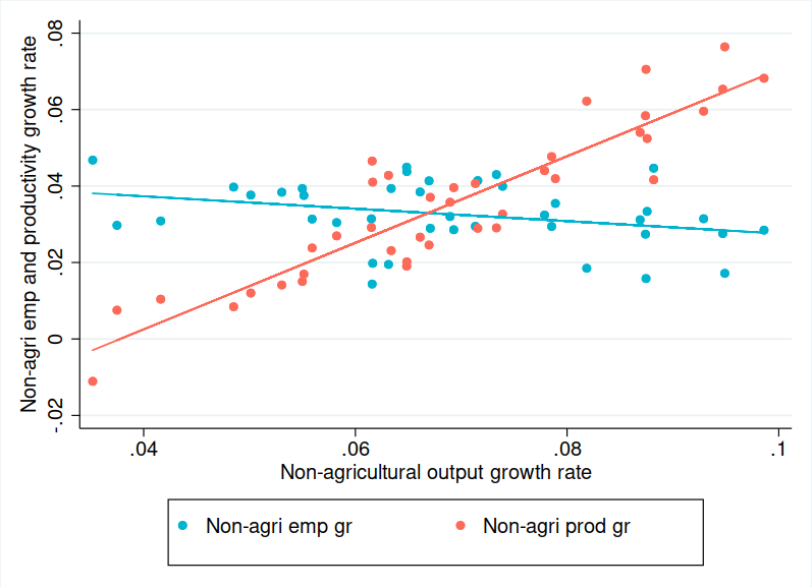
Source: WDI database. India is shown in red.

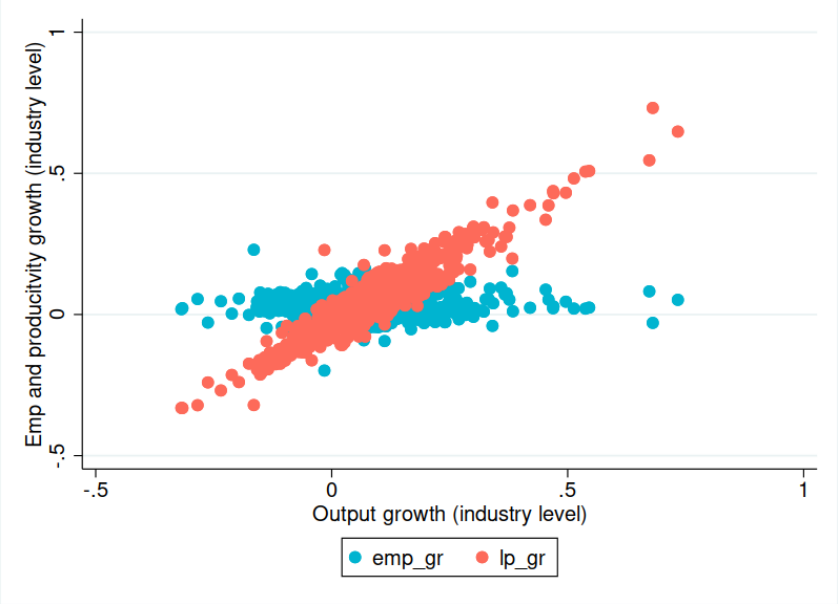
FIgure 6: Share of non-agricultural (yellow), organized (blue) and regular wage (red) employment in total non-agricultural employment



Source: NSSO surveys, various years.

Figure 7: Relationship between employment growth and output growth (blue) as well as productivity growth and output growth (red) at the aggregate and industry level (1980 to 2019)





Souce: KLEMS

Figure 8a: Trends in aggregate output growth and employment growth

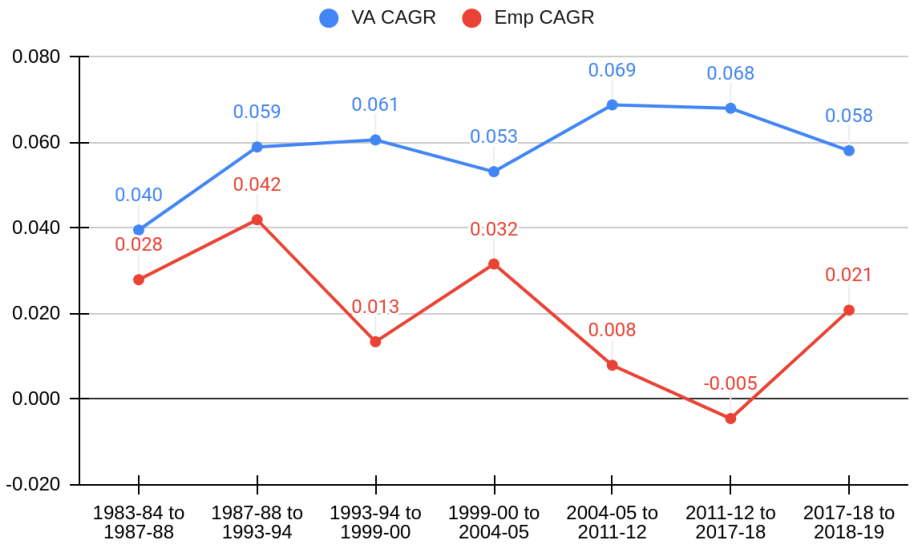
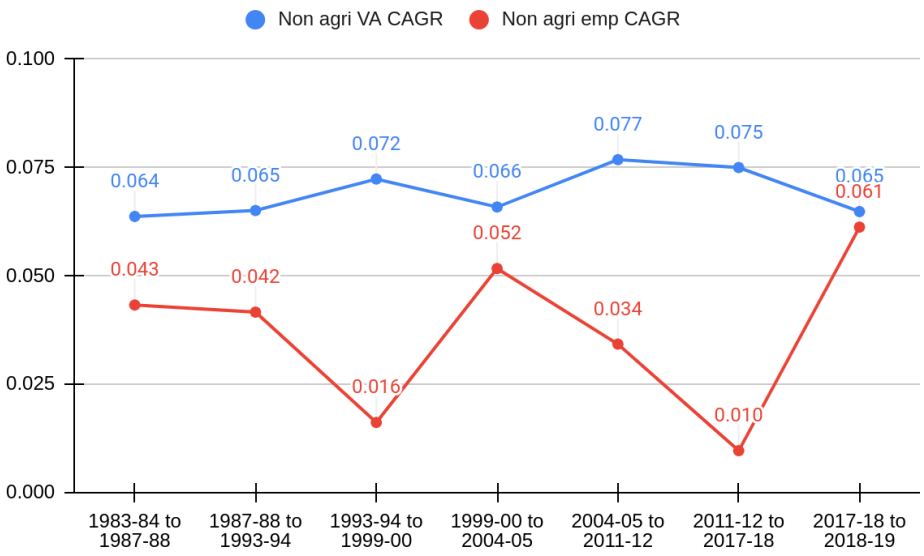
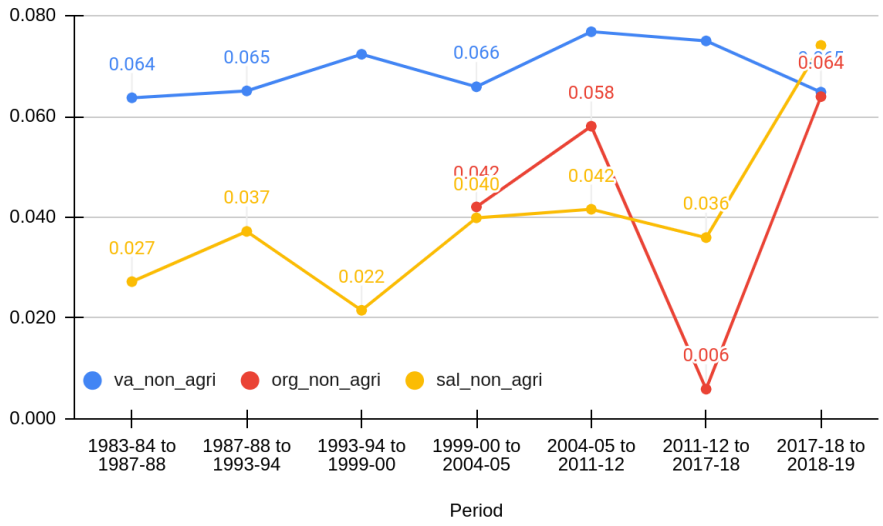


Figure 8b: Trends in non-agricultural output growth and employment growth



Source: NSSO surveys various years

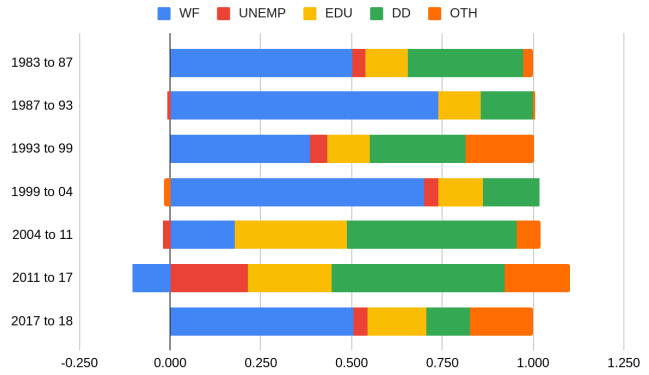
Figure 9: Non-agricultural output growth and salaried/organised sector employment growth



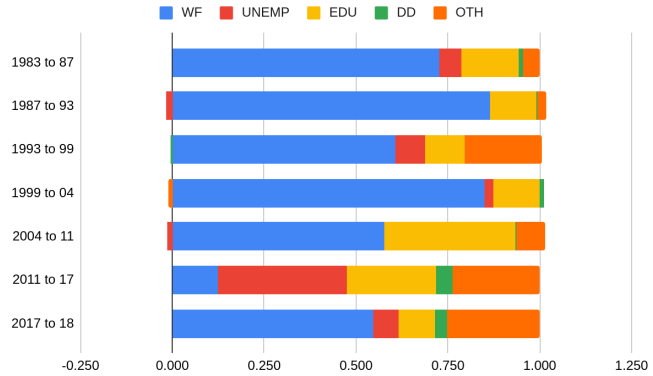
Source: NSSO surveys, various years.

Figure 10: Where did the additional working age individuals go in each period?

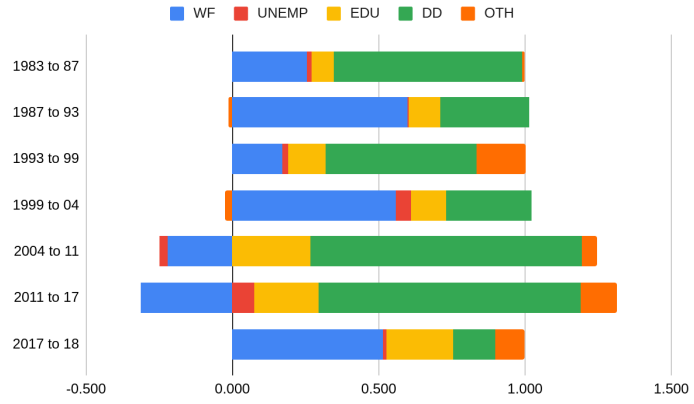
a. Overall



b. Male



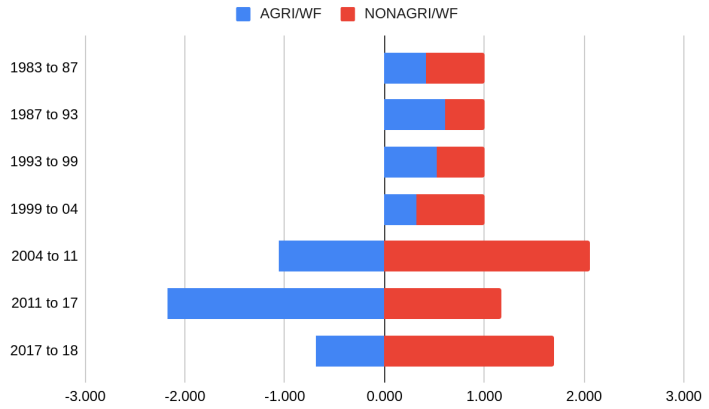
c. Female



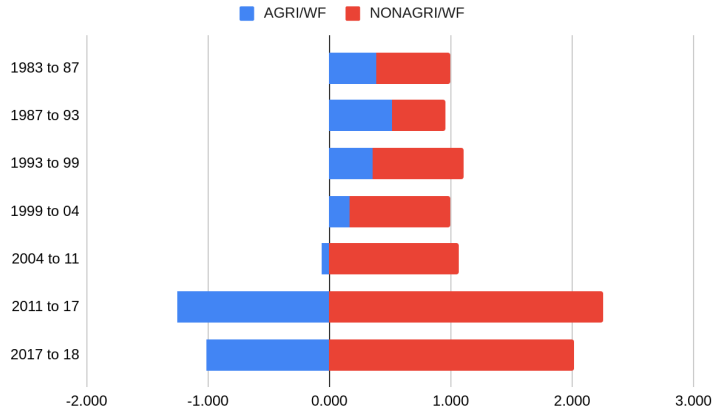
Source: NSSO surveys, various years. Working age = 15+ years. WF- workforce, UNEMP-unemployed, EDU-In education, DD- domestic duties

Figure 11: Change in workforce broken down by changes in agricultural and non-agricultural components

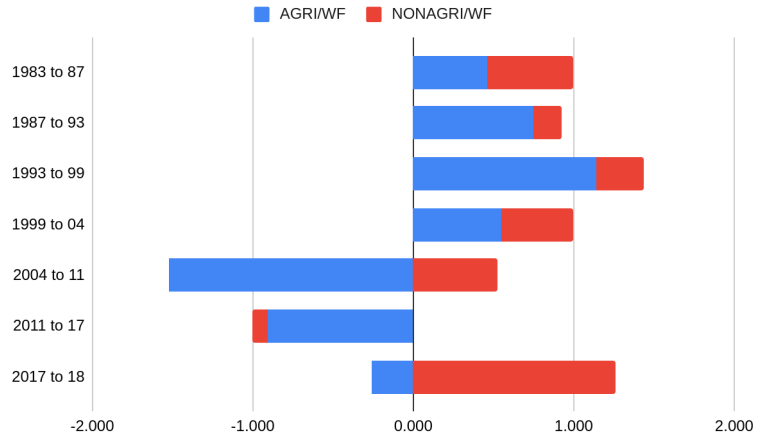
a. Overall



b. Male



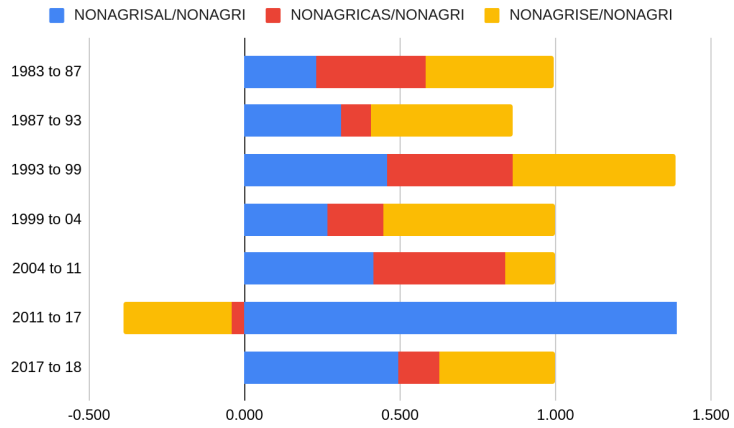
c. Female



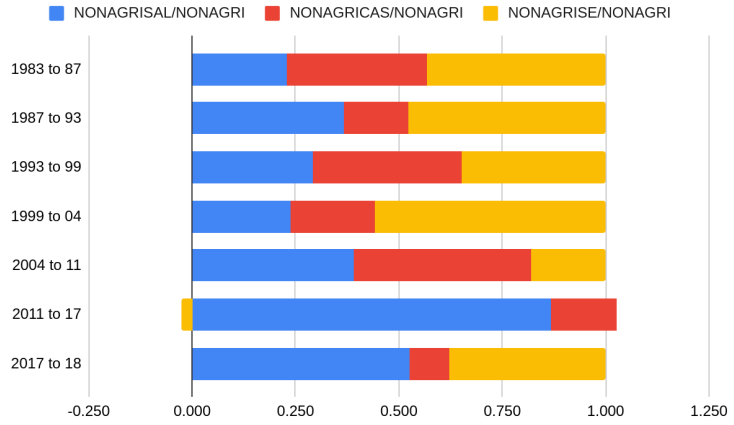
Source: NSSO surveys, various years.

Figure 12: Change in non-agricultural workforce broken down by type of employment

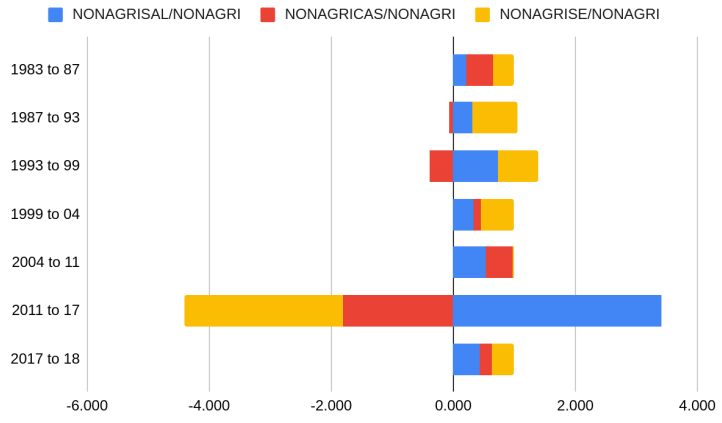
a. Overall



b. Male



c. Female



Source: NSSO surveys, various years

Figure 13: Long Run Equilibrium

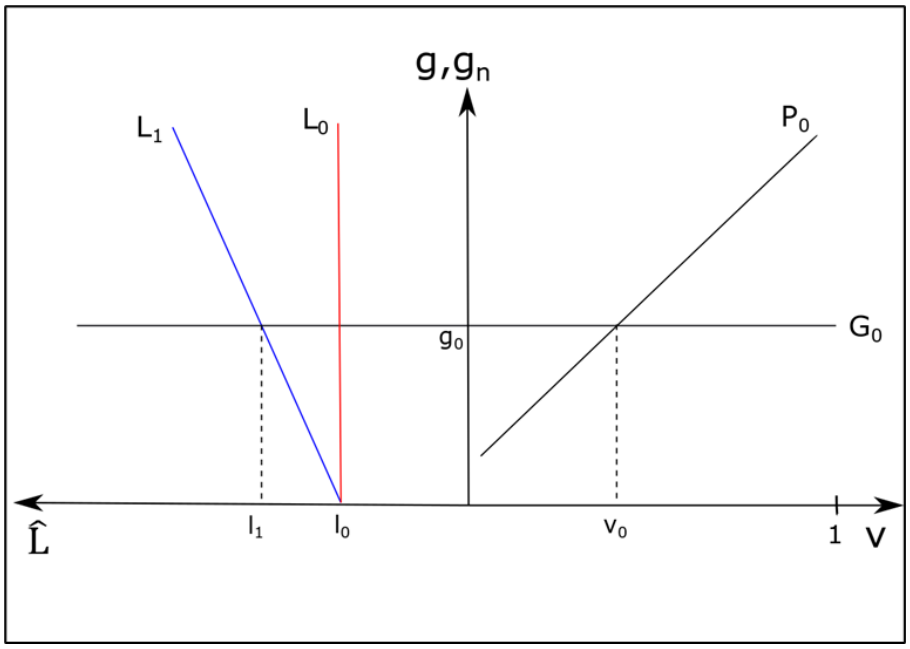


Figure 14: Job-creating Growth Regime with and without Structural transformation (Cases 1 and 2)

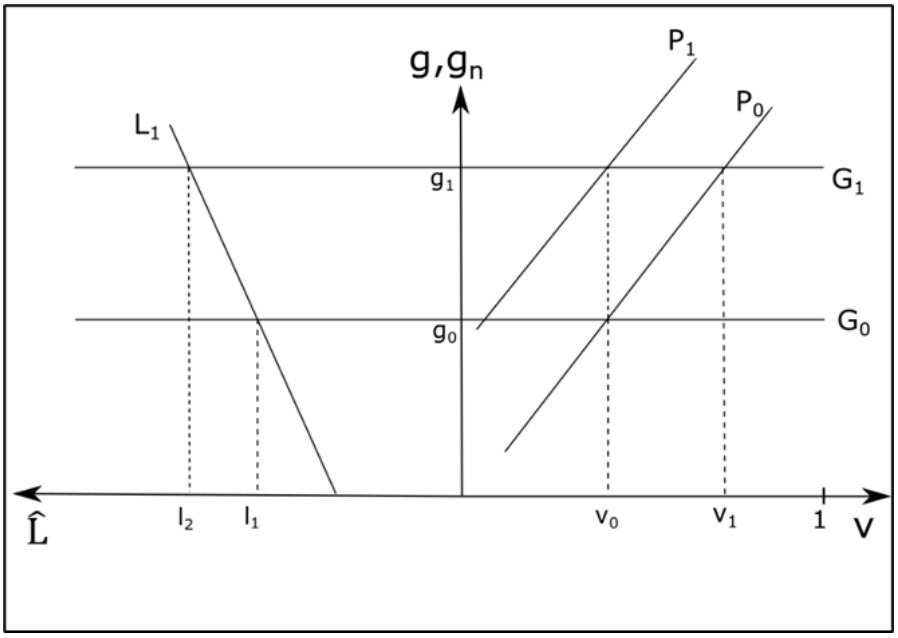
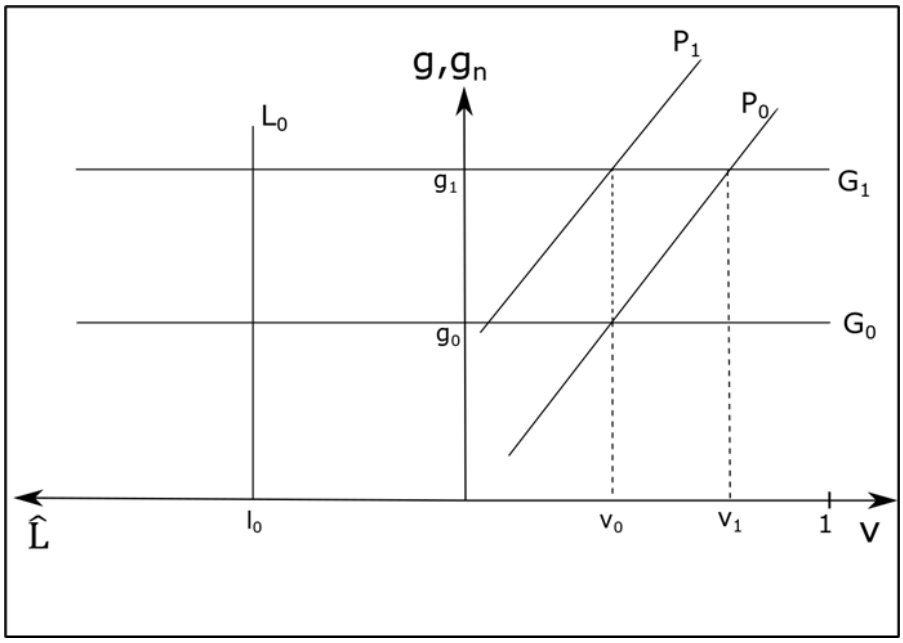


Figure 15: Jobless Growth Regime with and without Structural transformation (Cases 3 and 4)



APPENDIX TABLE: Elasticities and Kaldor-Verdoorn coefficients for countries in the ETD database

		Aggregate		Non-agricultural							
WDI Code	Country	Coefficient	Elasticity	Coefficient	Elasticity		Country	Coefficient	Emp KV	Coefficient	Prod KV
110	IND	--	0.20	--	0.47		IND	--	-0.11	--	1.08
10	ARG	0.55	0.74	0.36	0.83		ARG	0.40	0.29	-0.38	0.70
20	BFA	0.07	0.27	0.82	1.29		BFA	0.46	0.35	-0.43	0.65
21	BGD	0.11	0.30	0.20	0.68		BGD	1.75	1.64	-1.54	-0.46
29	BOL	0.32	0.52	0.58	1.06		BOL	-0.34	-0.46	0.31	1.39
30	BRA	0.45	0.65	0.56	1.04		BRA	0.63	0.51	-0.60	0.48
34	BWA	0.46	0.65	0.23	0.71		BWA	-0.07	-0.18	0.09	1.17
40	CHL	0.31	0.51	0.12	0.59		CHL	0.60	0.48	-0.59	0.49
41	CHN	-0.13	0.07	-0.18	0.29		CHN	0.45	0.34	-0.46	0.62
43	CMR	0.58	0.78	1.30	1.78		CMR	0.20	0.08	-0.18	0.90
46	COL	0.53	0.73	0.41	0.88		COL	0.65	0.53	-0.61	0.47
49	CRI	0.41	0.60	0.31	0.79		CRI	0.55	0.44	-0.54	0.54
67	ECU	0.80	1.00	0.72	1.19		ECU	0.90	0.79	-0.86	0.22
68	EGY	0.40	0.59	0.17	0.64		EGY	0.21	0.09	-0.20	0.88
73	ETH	0.24	0.44	0.34	0.81		ETH	0.89	0.77	-0.88	0.21
84	GHA	0.34	0.54	0.32	0.79		GHA	0.99	0.87	-0.99	0.10
97	HKG	0.14	0.34	-0.11	0.36		HKG	0.26	0.15	-0.24	0.84
107	IDN	0.21	0.41	0.24	0.71		IDN	0.48	0.37	-0.43	0.65
116	ISR	0.51	0.71	0.35	0.82		ISR	0.80	0.69	-0.79	0.29
120	JPN	-0.33	-0.13	-0.39	0.08		JPN	0.37	0.26	-0.34	0.75

122	KEN	0.47	0.67	1.49	1.96		KEN	-0.20	-0.31	0.18	1.27
124	KHM	0.20	0.40	0.27	0.74		KHM	0.22	0.11	-0.24	0.85
127	KOR	0.07	0.27	-0.10	0.38		KOR	0.76	0.65	-0.75	0.33
130	LAO	0.13	0.33	0.18	0.66		LAO	0.16	0.04	-0.03	1.05
139	LKA	0.16	0.36	0.00	0.47		LKA	-0.01	-0.12	0.07	1.15
142	LSO	0.44	0.63	-0.09	0.38		LSO	-0.10	-0.21	0.13	1.21
149	MAR	0.14	0.33	-0.04	0.43		MAR	0.28	0.17	-0.26	0.82
155	MEX	0.75	0.95	0.62	1.09		MEX	0.38	0.27	-0.36	0.72
161	MMR	-0.07	0.13	-0.21	0.26		MMR	0.01	-0.11	-0.01	1.07
166	MOZ	0.14	0.34	0.20	0.67		MOZ	0.38	0.26	-0.39	0.70
168	MUS	0.07	0.27	-0.13	0.34		MUS	-0.01	-0.12	0.04	1.12
169	MWI	0.11	0.31	1.11	1.58		MWI	0.89	0.77	-0.81	0.27
170	MYS	0.36	0.56	0.15	0.62		MYS	0.43	0.31	-0.42	0.66
172	NAM	0.40	0.60	0.41	0.89		NAM	0.19	0.08	-0.19	0.89
175	NGA	0.41	0.61	0.64	1.11		NGA	0.95	0.84	-0.92	0.16
179	NPL	0.39	0.58	0.34	0.81		NPL	0.14	0.02	-0.15	0.93
185	PAK	0.56	0.76	0.31	0.79		PAK	0.32	0.21	-0.33	0.76
187	PER	0.36	0.56	0.16	0.63		PER	0.37	0.26	-0.38	0.71
188	PHL	0.30	0.50	0.18	0.65		PHL	0.28	0.17	-0.28	0.81
204	RWA	0.11	0.31	0.70	1.17		RWA	0.63	0.51	-0.56	0.52
208	SEN	0.62	0.82	0.97	1.44		SEN	0.93	0.82	-0.89	0.20
209	SGP	0.44	0.64	0.13	0.61		SGP	0.32	0.21	-0.31	0.77
234	THA	0.11	0.31	0.21	0.68		THA	0.49	0.38	-0.47	0.61
244	TUN	0.27	0.47	0.04	0.51		TUN	0.17	0.06	-0.17	0.91
245	TUR	0.23	0.43	0.19	0.67		TUR	0.39	0.28	-0.38	0.70

247	TZA	0.32	0.52	0.50	0.97		TZA	0.96	0.84	-0.91	0.17
248	UGA	0.25	0.44	0.04	0.52		UGA	0.03	-0.08	-0.04	1.04
258	VNM	0.15	0.35	0.41	0.88		VNM	0.07	-0.04	-0.11	0.97
264	ZAF	0.18	0.38	0.11	0.59		ZAF	0.39	0.28	-0.35	0.73
265	ZMB	0.32	0.52	0.17	0.65		ZMB	0.71	0.60	-0.70	0.38