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AN ENQUIRY IN TO THE EMPLOYMENT OF THE ORGANISED SECTOR IN INDIA

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Abstract

The paper attempts to analyse the trends in the organised sector employment of India for the period 1961 to 2010. It is found that the organised employment is in the state of decline, exhibiting a downward trend throughout the period of analysis. The period of socialist growth (till mid 1980s) was more favourable for the public sector development than the private sector. Despite of this, the public sector employment is found to be modest, whereas the employment in the private sector is low. The employment in the organised sector was expected to surge in the post-reform period; however the adoption of reforms has worsened its employment generation potential. The public sector exhibits poor performance in the post-reform era, while the employment creation capacity of the private sector has not enhanced to the level expected, inspite of its broadened scope. Within the industry groups, manufacturing is the worst performer in both the segments. The service sector, mainly finance and transport help generating substantial employment aftermath the reforms. This holds true however in the case of private sector only and not the public sector. The analysed trends also imply an inclination towards informalisation and casualisation of employment, thereby signalling deterioration in its quality and productivity.

Key Words: Casualisation, Employment, Informalisation, Organised, Private and Public

JEL Code(s): E24, J21

AN ENQUIRY IN TO THE EMPLOYMENT OF THE ORGANISED SECTOR IN INDIA

L. G. Burange[1]
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1. INTRODUCTION:

As an economy moves upwards its economic ladder, the growth process is usually accompanied by the shift of the labour force from the informal to the formal sector. This transition is of significant importance for the development path to be inclusive and productive. Generation of employment in the formal sector has therefore been of utmost importance for the policy makers of India since independence. At the eve of independence, the Indian economy was primarily an agrarian one, with majority of the population dependent on agriculture. Thus, the policy efforts were aimed to create employment opportunities in the non-farm sector and enhance the absorption capacity of the organised sector, to accommodate maximum labour force. With the adoption of the socialistic pattern of development, the public sector was entrusted the responsibility of creating substantial employment in the organised sector. This set up, however, starved the economy of its vital nutrients resulting in the poor performance of all the macroeconomic indicators, including employment. Though, the contribution of the agriculture sector in terms of GDP declined; the employment structure of the economy remained comparatively informal in nature.

With the move towards liberalisation in the 1990s, the burden of all round development was shifted to the private sector. High growth rates, due to added benefits of globalisation, were expected to create substantial employment in the economy. However, though the reforms succeeded in achieving ascend in the growth rates of GDP, the employment potential of the economy did not enhance to the level expected. The organised sector employment was found to be decelerating, encrypting the post-reform period as an era of ‘jobless growth’. The absorption capacity of the

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organised sector therefore did not improve at all, making it one of the weakest contributors to the employment generating process.

The present paper attempts to analyse the performance of the employment in the organised sector and tries to explain it with the help of plausible explanations. The paper is organised in to six sections. Section *two* reviews the employment scenario of the country with respect to the industrial policies and the subsequent five year plans. Section *three* deals with the data and methodology applied for the purpose of analysis. The examination of the trends in the employment in organised sector is studied in depth in the *fourth* Section. The *fifth* Section tries to find out theoretical justifications from the analysed trends, while the *last* Section concludes the paper.

2. EMPLOYMENT IN THE INDIAN ECONOMY:

With the advent of freedom in 1947, India inherited an economically drained and a politically unstable economy. The country faced several problems like wide spread poverty, inequality, unemployment, weak and underdeveloped industrial base, low savings and investment rate and inadequate infrastructure. All these factors led the then policy makers to adopt a socialistic pattern of development, with the government assuming the role of the supreme controller of key economic activities. High growth rates were thought to be the immediate focus of the development policies for marching towards sustainable and inclusive growth in the long term. A gradual change from a primitive agrarian economy to an industrialised one with a dynamic service sector was aimed. The industrial policies of 1948 and 1956 emphasised on heavy industrialisation for achieving rapid economic growth by entrusting the public sector a fundamental role in the growth process. All industries of strategic importance were assigned to the public sector, in view of the weak resource base. The private sector, on the other hand, was expected to work in concordance with the public sector, thereby limiting its role as a supplement where ever the public sector fell short (Burange and Yamini, 2011). The industrial policies and the initial Five Year Plans were, therefore skewed towards the public sector development by imposing strict and stringent controls on the private sector.

Employment however did not form the basis of planning. The focus was on growth, which along with industrialisation was expected to generate employment, sufficient enough to absorb the moderately growing labour force, considering the small rate of unemployment prevalent at that time (Papola, 1994, 2007 and 2008). It was acknowledged in the First Five Year Plan (1951-56) that, population growth and inadequate development of non-agricultural sectors were the major deterrents in generating employment (GOI, 2011a). Existence of vast informal sector thus, led to the reliance on labour-intensive techniques and development of small scale industries to help absorb the surplus labour from agriculture. The infrastructure development activities like construction of dams, irrigation projects and metallurgical industries were presupposed to act as an additional cushion in generating employment opportunities for the masses. Meanwhile, the public sector was considered to be the 'model employer' in the organised segment, while the role of the private sector was miniscule. Number of regulations guaranteeing labour welfare and protection were enacted to ensure a healthy and a competitive work atmosphere. The Second Five Year Plan (1956-61) set a target of generating 6.3 million employment opportunities in the urban areas and 9.0 million opportunities in the rural areas to eradicate unemployment by the end of its tenure. Since, the Second Plan created 6.5 million additional employment opportunities outside agriculture, the Third Plan (1961-66) envisaged to increase this to 10.5 million, in addition to the 3.5 million opportunities in the agriculture sector. Employment therefore increased from 12.09 million in 1960-61 to 15.46 million in 1965-66, during the Third Plan (GOI, 2011a). As against the economic growth rate of 3.5 percent per annum, the rate of employment was 2 percent; considered adequate to tackle the unemployment rates at that time. However, due to continuous surge in the population, labour force grew at the rate of 2.5 percent creating a severe backlog of employment opportunities (Papola, 1991).

The First quinquennial survey by the National Sample Survey Organisation (NSSO), published in the year 1973, exposed the dearth of economic and demographic performance by indicating high unemployment rates of 8.4 percent as per the current daily status and 4.3 percent as per the current weekly status (Papola, 2006). The magnitude of unemployment had doubled from 5 million in 1956 to 10 million in 1972. The trend indicated alarming casualisation of work, accompanied by stagnant organised sector employment. It was after this, that the policy makers realised, that for growth to be sustainable and inclusive, issues of employment and unemployment must be incorporated in the planning agenda of the government. The original draft of the Fifth Five Year Plan (1974-79) clearly mentioned that, "the main causes of abject poverty were open unemployment, under employment and low resource base of very large number of producers in agriculture and services sector" (Datt and Mahajan, 2011, p.228). This draft, however, did not materialise and the revised draft placed importance on self reliance through high economic growth, proper distribution of income and by raising domestic savings (Datt and Mahajan, 2011). Nevertheless, the plan emphasised the need to re-orient the development policies towards employment generating sectors, with emphasis on manufacturing and a number of special employment programmes were launched and channelised towards the relatively dominant informal sector. Public sector dominated the growth scenario of organised employment and the industrial policies announced from time to time made private sector growth miserable by enforcing several impediments like the MRTP (1969), FERA (1973) etc.

The latter half of the 1970s was marked by political turmoil though the emphasis still remained on self reliance through inward oriented policies and excessive state control. The Sixth Plan (1978-83) framed by the Janta Party Government, outlined the objective of higher productivity through enhancement of employment potentials in agriculture and small scale industries. With the collapse of the Janta Government in 1980, the plan was revised and the traditional policy of poverty reduction with the Nehru model of growth was back (Datt and Mahajan, 2011). Agriculture (95.251 million opportunities by 1984-85), manufacturing (expected to create 27.759 million employment opportunities by 1984-85 from 22.012 million in 1979-80), construction and services were expected to generate substantial employment during the Plan tenure. As revealed in the Seventh Plan, the growth rate of employment during the Sixth Plan was 4.32 percent per annum, indicating employment generation in the order of 186.705 million standard person years (SPY) in 1984-85 as against the predetermined order of 185.389 million SPY (GOI, 2011a). Nevertheless, by mid 1980s, concerns about stagnation and technological backwardness due to high amount of controls, licenses and bureaucratic red tape surfaced, paving a way for decentralisation and partial liberalisation of the economy. Growth in the employment lagged severely behind that of the GDP. In addition, it was found that the aim of structural change was accomplished in terms of the composition of GDP, but not in terms of employment. From the period 1972 to 1988, the share of agriculture in GDP declined from 75 percent to 21 percent but increased in case of employment from 8 percent to 11 percent (Papola, 1991). It was thus acknowledged that there is an immediate need to internalise employment in the core development strategies and the Seventh Plan (1985-90) emphasised gainful and productive employment opportunities as one of its important objectives. An annual growth rate of 4 percent in employment was projected in the plan (Papola, 2007). An impetus to industry and rural non-farm sectors, along with the small scale industries and village and cottage industries was assigned in order to generate additional employment in the economy. Technological up-gradation and efficiency enhancement were also thought of as important instruments in boosting up the country's employment scenario.

The Eighth Plan (1992-97) was set against the background of the severe balance of payments crisis that engulfed the economy in the late 1980s. This, in turn, forced India to adopt an open door policy. The New Economic Policy of 1991 distinctly mentioned that the way for India to develop further would be through liberalisation, privatisation and globalisation. Several norms in the areas of trade, finance, investment and infrastructure were relaxed and the license system was abolished. The reforms ended many public monopolies thereby laying substantial importance on the private sector. Generation of gainful employment was assigned a prime role in the policy statement and was reflected in the concurrent Eighth Plan too. Indeed, this was the first time that employment was allotted a special chapter. The Plan pointed out the decelerating contribution of the organised sector in the total employment of the economy. The growth rate of employment was found to decline from 2.48 percent during 1977-83 to 1.38 percent during 1983-88. The growth rate of organised manufacturing was also revealed to be stagnant during this period. Thus, the target of achieving 2.6 percent to 2.8 percent employment growth per annum was set in order to achieve 'employment for all' by 2002 (GOI, 2011a). Sectors like construction, manufacturing and services were promoted to act as the support systems to agriculture in generating additional employment in the economy.

The Ninth Plan (1997-2002) placed employment amongst one of the three utmost objectives of the state policy. It emphasised that higher economic growth during the preceding decade had enhanced the employment opportunities in the productive sectors. Accordingly, the focus of the Plan was to target the sectors with high employment opportunities and simultaneously encourage labour-intensive techniques of production in order to boost employment generation (Papola, 2007). It was decided to bring down the average rate of unemployment to 1.66 percent as compared to 1.87 percent during the Eighth Plan. A growth rate of 2.77 percent in the employment was thought to be necessary in order to achieve employment for all by the year 2007 (GOI, 2011a). In the mean time, the NSSO survey report 1999-2000 once again exposed the stark reality of Indian employment. It was found that, out of the total workforce of the country; only 7 percent was employed in the organised sector while the rest was entirely in the unorganised sector. It also indicated the limited labour absorption capacity of the organised sector (GOI, 2000). As revealed by Papola (2006), out of 21 million employment opportunities generated during 1994-2000, only 4 percent were in the organised sector, suggesting a trend towards the informalisation of the employment scenario. Thus, the fears of 'jobless growth' as a consequence of the reforms began erupting. The Planning Commission appointed two committees, 'The Task Force on Employment Opportunities' in 2001 and 'Special Group on Targeting Ten Million Opportunities per Year' in the year 2002. The 2001 Report (GOI, 2001) expressed concern about the shrinking organised sector employment, due to the limited job creating capacity of the newly adopted technology, post-reforms. It emphasised faster development of private sector as the employment provider, since the public sector continued to be the victim of over-crowding. An impetus to accelerated growth, to help create additional demand for labour, coupled with sound macroeconomic policies, higher rates of investment and infrastructure advancement were some of the measures suggested to boost employment in the economy. Similarly, the report of the Special Group (GOI, 2002) focused on the poor employment profile of the organised sector and considered skill development and appropriate policies to enhance labour absorption capacity of the organised sector as the vital elements in employment generation.

Against this background, the Tenth Five Year Plan (2002-07) laid the target of creating 50 million employment opportunities to replete the unemployment backlog of 35 million persons, 9 percent of the total labour force. It admitted that the growth in the 1990s created less work opportunities than expected and unless the pace of job creation is accelerated, it signalled ever mounting unemployment. It was argued that increased capital intensity and labour productivity in the economy aftermath the globalisation, especially in the organised sector, has reduced the employment generation potential of the output. Therefore, sectors like agriculture and allied activities, social services and small and medium enterprises were assigned the role of creating additional employment opportunities to the masses. Generation of gainful employment to take care of the additions in the labour force therefore, formed the basis of the plan (GOI, 2010).

The current Eleventh Five Year Plan (2007-12) encapsulates the creation of productive employment, with decent working conditions, in order to absorb the growing labour force, as an important element of the growth strategy. The Plan openly confesses about the permanent decline in organised sector employment, especially since 1994, thereby signalling the deteriorating quality of employment and informalisation within the organised sector. It also indicates that, the decline is mainly in the public sector and though employment in the organised private segment is on a surge, it is insufficient to offset the public sector decline. Moreover, the Plan reveals that, though the Tenth Plan set an ambitious target of generating 50 million employment opportunities, only 47 million were actually realised. Sectors like agriculture, manufacturing, trade and transport fell short of their predetermined targets, while employment in the service sector exceeded the decided target. Amongst the entire industry groups, the largest shortfall was in the manufacturing sector (8.64 million employment opportunities generated as against the target of 11.62 million) (GOI, 2011a).

Thus, the creation of employment in the organised sector is placed high in the Plan. It is intended to create 58 million employment opportunities in 21 high growth sectors to bring down the unemployment rate to 4.83 percent by the end of its tenure. The unemployment rate is further projected to be brought down to 1 percent by the end of the 12th Plan. Sectors like manufacturing (expected to generate employment opportunities at the rate of 4 percent per annum from 2007 to 2016), construction (employment generation at the rate of 8.2 percent per annum) and transport (7.6 percent per annum) are expected to play a pivotal role in the employment generation process. Within the service sector, IT enabled services, healthcare, education, tourism, financial services and entertainment industry are envisioned to help create substantial employment. Therefore, the main aim is to reduce the dependence of the employment on the agriculture sector and shift it towards industry and the tertiary sectors. In addition to this, reduction in informalisation within the organised sector, social security measures and skill development are amongst the long term objectives of the Plan. The recently published 'Annual Report to People on Employment, 2010' also argues for increasing the share of the organised sector in the employment generation process by laying emphasis on manufacturing and services. Considering the impressive growth rates during the present decade, it targets employment growth of at least 2.5 percent per annum as its short term strategy (GOI, 2010c).

It can be therefore deduced that, employment in India's development path evolved as an internalised factor step by step and plan by plan. In the initial years it did not figure in the priority list of Indian planning. However, with the revelation of ever-increasing backlog in providing suitable job opportunities and the concomitant failure of the industrial policies to perform up to its mark, employment began to emerge as an important element of the planning goal. After the opening up of the economy, it was distinctly spelt out that employment generation remains at the core of development policy for the economic growth to be inclusive and sustainable. At present; decent, productive and gainful employment generation has become the crux amongst all the policy measures aimed towards fruitful development.

Inspite of this, the employment scenario of the country continues to be daunted by an alarming unorganised segment and limited role of the organised sector. It can be deduced that the organised sector has failed to absorb significant amount of labour and generate sufficient employment opportunities, which is clearly reflected by the Five Year Plans too. The structural change in employment for India does not seem to have taken place despite of the high GDP rates and the declining share of primary sector to it (Hazra, 1991; Papola, 1991; Kumar and Dixit, 2009; Datt and Mahajan, 2011). Moreover, the quality of non-farm employment generated appears to be poor, in view of the increasing informalisation and growing casualisation of work. Thus, unless and until apt employment policies with an ultimate aim of creating a vibrant organised sector are adopted, the employment scenario of India will not be promising in the coming years.

3. DATA COVERAGE AND METHODOLOGY:

The present study uses the data on the employment in the organised sector, published in the Economic Survey (GOI, 2012) of the Ministry of Finance, Government of India, for the period 1961 to 2010. Employment at an aggregate level for the public and private sectors as well as its disaggregation across the industries is covered under the domain of the organised sector. In addition to this, the employment by branch is also reported for the public sector in the Economic Survey.

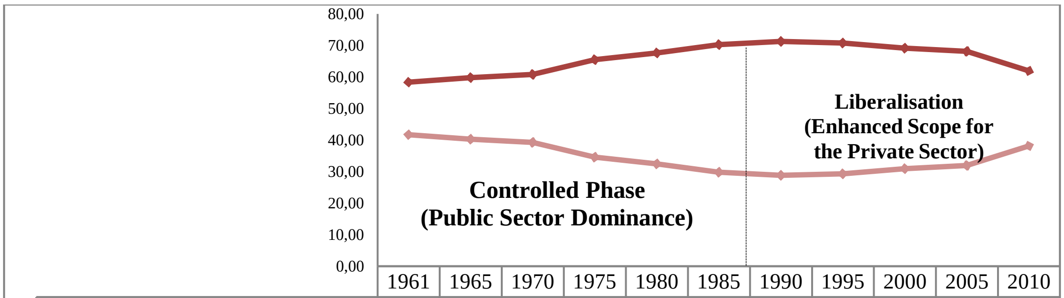
However, there are some limitations of the data. Firstly, there is inadequate coverage for the construction sector, particularly on the private account. Secondly, employment in private sector relates to non-agriculture establishments in the private sector employing 10 or more persons, while that in public sector relates to all establishments irrespective of the size. Thirdly, the data excludes states like Sikkim, Arunachal Pradesh, Dadra and Nagar Haveli and Lakshadweep. Fourthly, J&K, Manipur, Puducherry, Mizoram, Daman and Diu are not included in totals due to non-availability of the data as per NIC 1998. For the purpose of analysis, the paper relents to the following basic tools:

1. Annual (Y-o-Y) growth rates.
2. Average annual (Y-o-Y) growth rates.
3. Compound annual growth rates (CAGR) (Appendix A).
4. Moving averages.
5. The Hodrick-Prescott (HP) filter (Appendix B).

4. EMPLOYMENT TRENDS IN THE ORGANISED SECTOR:

The organised sector is a bunch of legally entitled firms, following the rules and procedures framed by the government, with an active labour union ensuring all the benefits, prudent wages and safeguards to its employees. The public sector and the organised private sector are the two major components of the organised segment. While the public sector makes up for almost two-third of the organised employment, the scope for private sector has broadened since the 1991 reforms. Figure 1 represents

Figure 1: Share of Public and Private Sectors in Total Employment (Percent)



	1961	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010
Share of Public Sector in Total Employment	58,31	59,77	60,79	65,43	67,60	70,26	71,22	70,72	69,07	68,06	61,87
Share of Private Sector in Total Employment	41,69	40,23	39,21	34,57	32,40	29,74	28,78	29,28	30,93	31,94	38,13

the shares of public and the private sector in the total employment in the organised sector. It can be seen that, the public sector was a dominant employer within the organised segment till 1990. Since then, its role and importance in the employment creation reduced (especially from 2005 onwards) while that of the private sector increased. Nevertheless, the public sector still occupies almost 60 percent of the share in the employment of the organised sector. Table 1 further helps in understanding the shares of the various industries in the total employment. It can be inferred from the following table that the average share of community, social and personal services in total employment is the highest, followed by manufacturing, transport and agriculture. These sectors are therefore of prime importance in the employment generation process of the organised segment. In addition to this, mining and construction also contribute modestly to the employment share. For the individual decades, it can be noticed that the share of services, finance and transport seems to be increasing, while the rest exhibit a declining share. Studying the behavioural patterns of these industries is therefore very crucial, to gain a rigorous understanding of the overall employment scenario.

However, the empirical literature on the trends in organised employment is scarce, since it constitutes a very small portion of the total employment. The NSSO annual and quinquennial surveys are the back bone of most of the studies addressing issues relating to employment. Results of two studies that analyse employment trends in the organised segment can be stressed. The first study is by Hazra (1991) and the recent one is by Kumar and Dixit (2009).

Table 1: Industry-wise Total Employment (Percent share)

Industry/Decade	1960s	1970s	1980s	1990s	2000s	Average
1. Agriculture, Livestock, Forestry and Fishing	6.93	5.88	5.48	5.22	5.24	5.76
2. Mining and Quarrying	4.29	3.95	4.17	3.89	4.12	4.09
3. Manufacturing	27.71	26.60	25.17	23.86	22.06	25.10
4. Electricity, Gas, Water and Sanitary Services	2.29	2.92	3.30	3.54	3.38	3.08
5. Construction	6.09	5.52	4.89	4.35	3.62	4.91
6. Wholesale and Retail Trade Etc.	2.82	2.49	1.66	1.70	2.04	2.14
7. Transport, Storage and Communications	14.15	12.46	11.93	11.35	10.54	12.11
8. Financing, Insurance, Real Estate*	0.00	2.29	4.84	5.69	7.80	4.10
9. Community, Social and Personal Services	35.74	37.89	38.56	40.39	41.20	38.72
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

* Financing, insurance and real estate were included from 1975 onwards, with the adoption of NIC 1970.

Hazra (1991) analysed the employment trends in India for the period 1977-78 to 1987-88. The study strongly pointed out the failure of organised manufacturing, construction, electricity, transport and communication and trade to generate employment. In case of manufacturing, both public and private sectors were the worst performers. The study also revealed an asymmetry between the employment growth and the GDP. Thus, it clearly indicated the weak labour absorption capacity of the organised sector as the major cause for the prevalence of various types of unemployment within the organised segment.

Kumar and Dixit (2009) analysed the trends and patterns in the employment growth from 1961 onwards, with a special focus on the post-reform period. The study deciphered an absolute decline in the organised sector employment post-reforms (1991 to 2005); the major sectors contributing to this being the public sector and manufacturing. It stated that the structural reforms have adversely impacted both, the organised as well as unorganised segment of the economy. Tendency towards informalisation, retrenchment and casualisation of employment in the organised sector was also depicted.

It will therefore be useful to further explore the organised sector employment by examining the actual trends and drawing inferences about the assessed behaviour. Since the existing literature on the employment in the organised sector is limited, the present study will help in filling the empirical gap. Moreover, the study aims to undertake an in-depth analysis of all the elements of the organised sector making it more comprehensive than the others. In addition to this, it is also intended to find out appropriate reasons behind the observed trends and draw implications from them, which the present studies do not cover. Thus, the overall analysis will definitely be an improvement over the existing ones and add up significantly to the literature.

4.1. Employment Trends in the Total Organised Sector:

Table 2 shows the average annual (Y-o-Y) growth rate and the CAGR of total employment, for the decades 1960 to 2000. It may be observed that, the average growth rate continuously declined from 1960s and was at its worst during the post-reform years. The growth rate decreased from an average rate of 3.54 percent in the 1960s to 1.68 percent in the 1980s. However, after the initiation of the reforms in the 1990s, the descent is steep. In fact, it is lowest for the decade 2000 (0.13 percent). Similar trends can be observed in case of the CAGR. The CAGR was 3.78 percent in the 1960s, falling sharply thereafter. The post-liberalisation era was marked by further deceleration, with growth of 0.35 percent in the 1990s and a negative rate (-0.27 percent) for the decade 2000. Figure 2 further presents the actual employment series and the estimated kinked exponential series from 1961 to 2010 (Boyce, 1986). The downward inclination of employment can be distinctly traced, especially for the post-reform period.

Table 2: Average Annual (Y-o-Y) Growth Rate and CAGR for Total Organised Employment (Percent)

Decade	Average Annual Growth Rate	CAGR
1960s	3.54	3.78
1970s	2.72	2.50
1980s	1.68	1.82
1990s	0.60	0.35
2000s	0.13	- 0.27

This declining pattern can be also confirmed with the help of Figure 3, where the total employment trends are measured using simple annual (Y-o-Y) growth rates, the five year moving averages and finally the HP filter mechanism (Hodrick and Prescott, 1997). As depicted in the graph, the Y-o-Y growth rate in employment saw a spurt from the period 1961 to 1965, sharply collapsing for the years 1966 to 1967. Thereafter, it accelerated till 1971, remaining above average (1.73 percent) till the period 1981-82. After that the growth rate is below average throughout and has worsened post-reforms, especially since 1993. In fact, it was negative for the period

Figure 2: Decadal CAGR for Total Employment in the Organised Sector of India (1961 to 2010) (Persons in Lakh)

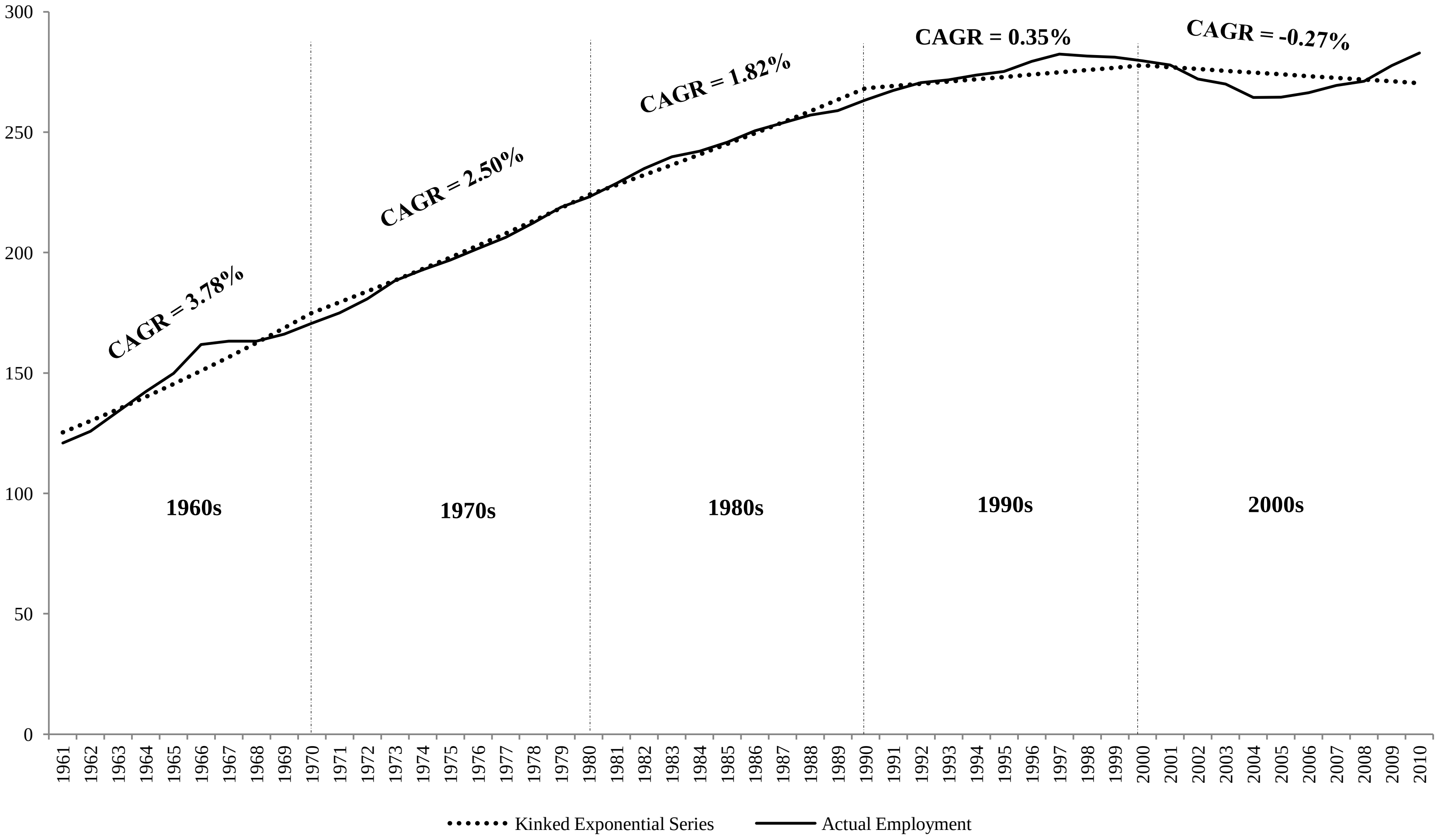
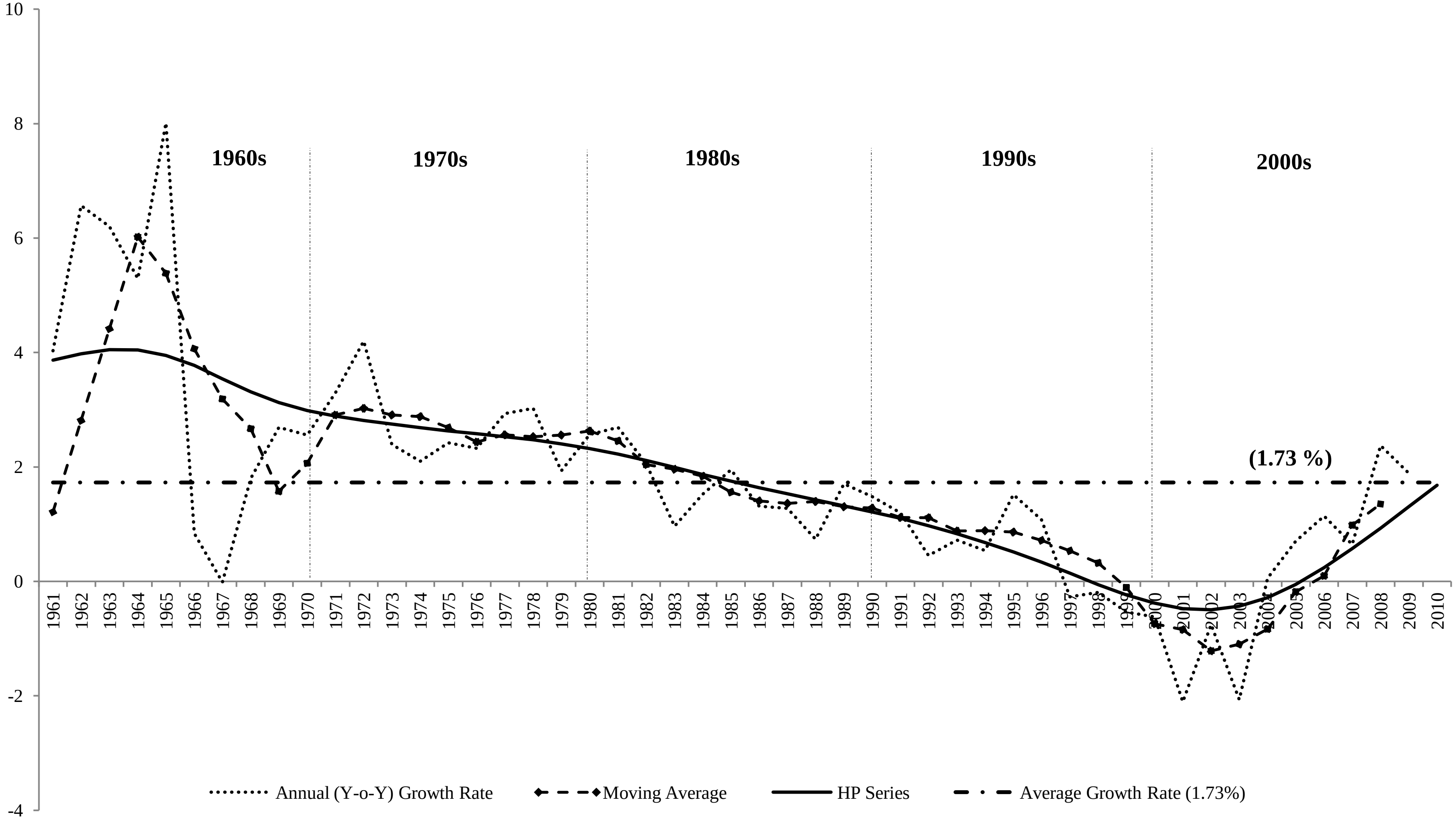


Figure 3: Trends in the Total Employment in the Organised Sector of India (1961 to 2010) (Percent)



1997 to 2004; thereby indicating the incompetence of the reforms to create employment. Similar trends are indicated by the moving averages and the HP filtered series, with slow convergence to average growth rate from 2005 onwards. A final insight in to total employment can be sought by examining the CAGR for total employment across various industries.

Form the table (Table 3); it is evident that the CAGR for total employment across all the industries exhibits a downward trend. The growth rates have fallen the sharpest aftermath the reforms of 1991. In fact, for the decade 2000, manufacturing, electricity, construction, transport, storage and communication and community, social and personal services have registered a negative CAGR, with the only exception of mining and quarrying, trade and finance. The finance and insurance industry performs better amongst all the industry groups. The CAGR for agriculture is also dismal (0.06 percent). This indicates that the employment generation in most of the organised sector industries has definitely deteriorated over the period of time. An in-depth analysis of this degradation can be undertaken by dissecting its two major components, the public sector and the private sector.

Table 3: CAGR of Employment in the Organised Sector by Industry (Percent)

Industry/ Decade	**1960s**	**1970s**	**1980s**	**1990s**	**2000s**
1. Agriculture, Livestock, Forestry and Fishing	1.88	1.26	1.44	- 0.22	0.06
2. Mining and Quarrying	- 1.39	4.84	1.53	- 1.35	2.67
3. Manufacturing	3.31	2.26	0.82	0.08	- 1.16
4. Electricity, Gas, Water and Sanitary Services	6.66	4.26	3.12	0.62	- 1.48
5. Construction	2.30	1.25	0.86	- 1.00	- 2.50
6. Wholesale and Retail Trade Etc.	11.36	- 6.26	2.47	0.87	2.20
7. Transport, Storage and Communications	2.09	1.64	1.43	0.09	- 1.75
8. Financing, Insurance, Real Estate	--	32.47	2.03	1.46	5.23
9. Community, Social and Personal Services	5.45	2.32	2.34	0.88	- 0.56
Total	**3.78**	**2.50**	**1.82**	**0.35**	**- 0.27**

4.2. Employment Trends in the Public Sector:

Public sector has been the most favoured sector and often reckoned as the change and development agent since independence. It constituted significant proportion of the total organised segment, until the embarkment of the neo-liberal reforms. Since then, its role as an exemplar of development has reduced. Yet, it is the only sector assuring highest safety and protection to its employees. In terms of reporting the employment, the sector is split in to two parts; one is the public sector employment by industry and the other is by branch. It will be therefore useful to understand the behaviour of this sector by separately scrutinising its two sub-segments.

4.2.1. Employment in the Public Sector by Industry:

Table 4 represents the average annual (Y-o-Y) growth rates and the CAGR for the public sector. From the table, it is evident that there has been a descent in the public sector employment irrespective of placing enormous importance on it. The average (Y-o-Y) growth rates exhibited a downward trend from being 3.96 percent in the 1960s to 3.82 percent in 1970s and further to 0.29 percent in the 1990s. It was negative for the decade 2000 (-0.97 percent). A similar trend is repeated for the CAGR, where the decade of 2000 is characterised by a negative rate of growth (-1.24 percent). Figure 4 helps in showing the above indicated trend with the help of actual and the estimated kinked exponential series.

Table 4: Average Annual (Y-o-Y) Growth Rate and CAGR for the Public Sector Employment (Percent)

Decade	Average Annual Growth Rate	CAGR
1960s	3.96	4.31
1970s	3.82	3.66
1980s	2.21	2.29
1990s	0.29	0.11
2000s	- 0.97	- 1.24

Thus, despite of the deliberate measures to promote public sector as an epitome of all round development in the pre-liberalisation period, there was a definite policy failure in regards to employment. This can be seen from Figure 5. The annual (Y-o-Y) growth rate shows an upward trend from 1961 to 1963, steeply declining then till the year 1968. It surged again from 1969 to 1972, falling sharply for the year 1974. Thereafter, it remained above average (1.86 percent) till 1986. From then onwards, there has been sharp deceleration in the growth rate. From 1995 onwards; the period post-liberalisation; the growth rate is below average and negative from the year 1997, without showing any tendency to return to the average annual growth rate level. This cycle is repeated for moving averages as well as the HP filtered series.

A final investigation in this sub-segment can be done with the help of CAGR (Table 5) across the various industry groups. It can be inferred from the table that,

Figure 4: Decadal CAGR for the Public Sector by Industry (1961 to 2010) (Persons in Lakh)

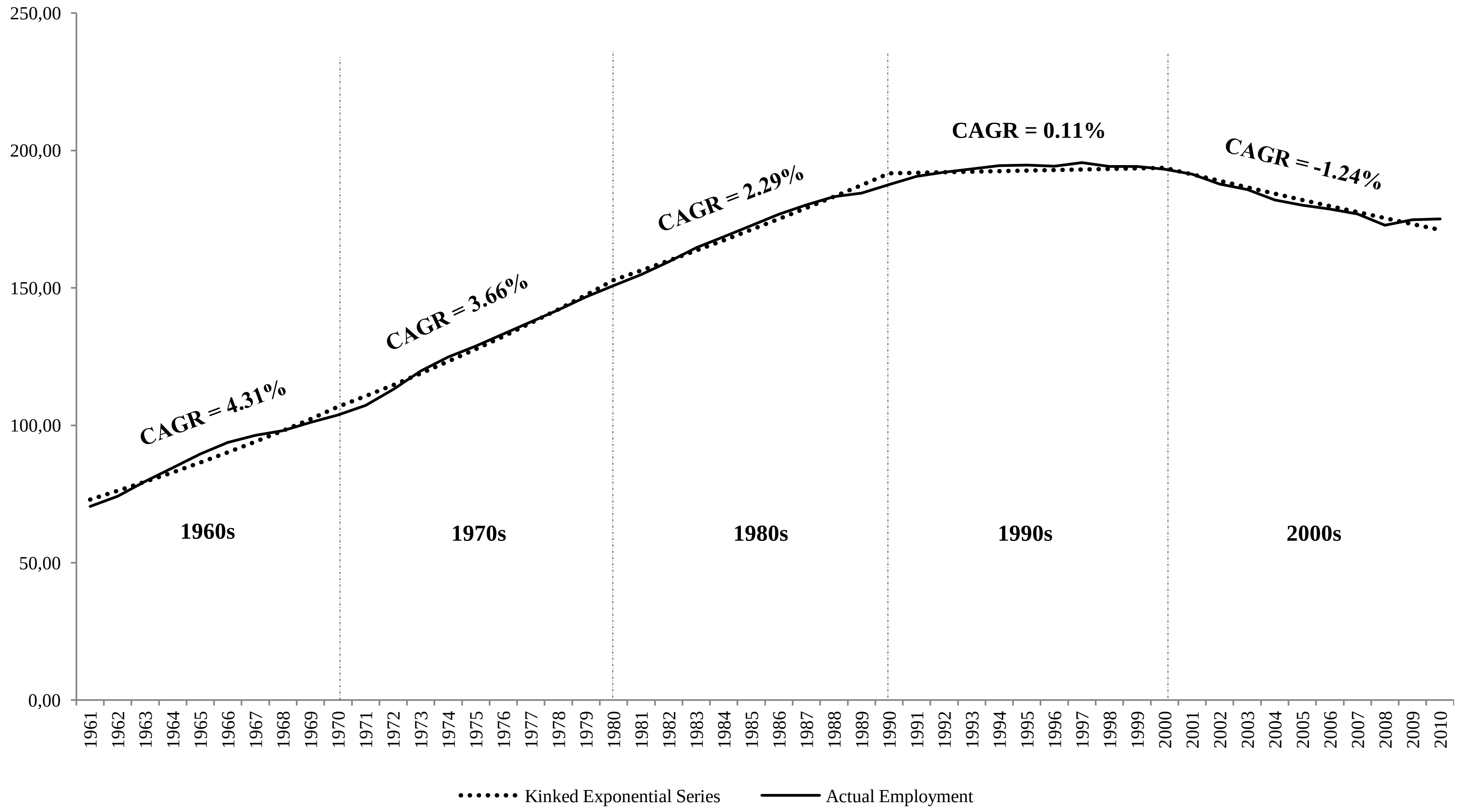


Figure 5: Trends in the Public Sector Employment by Industry (1961 to 2010) (Percent)

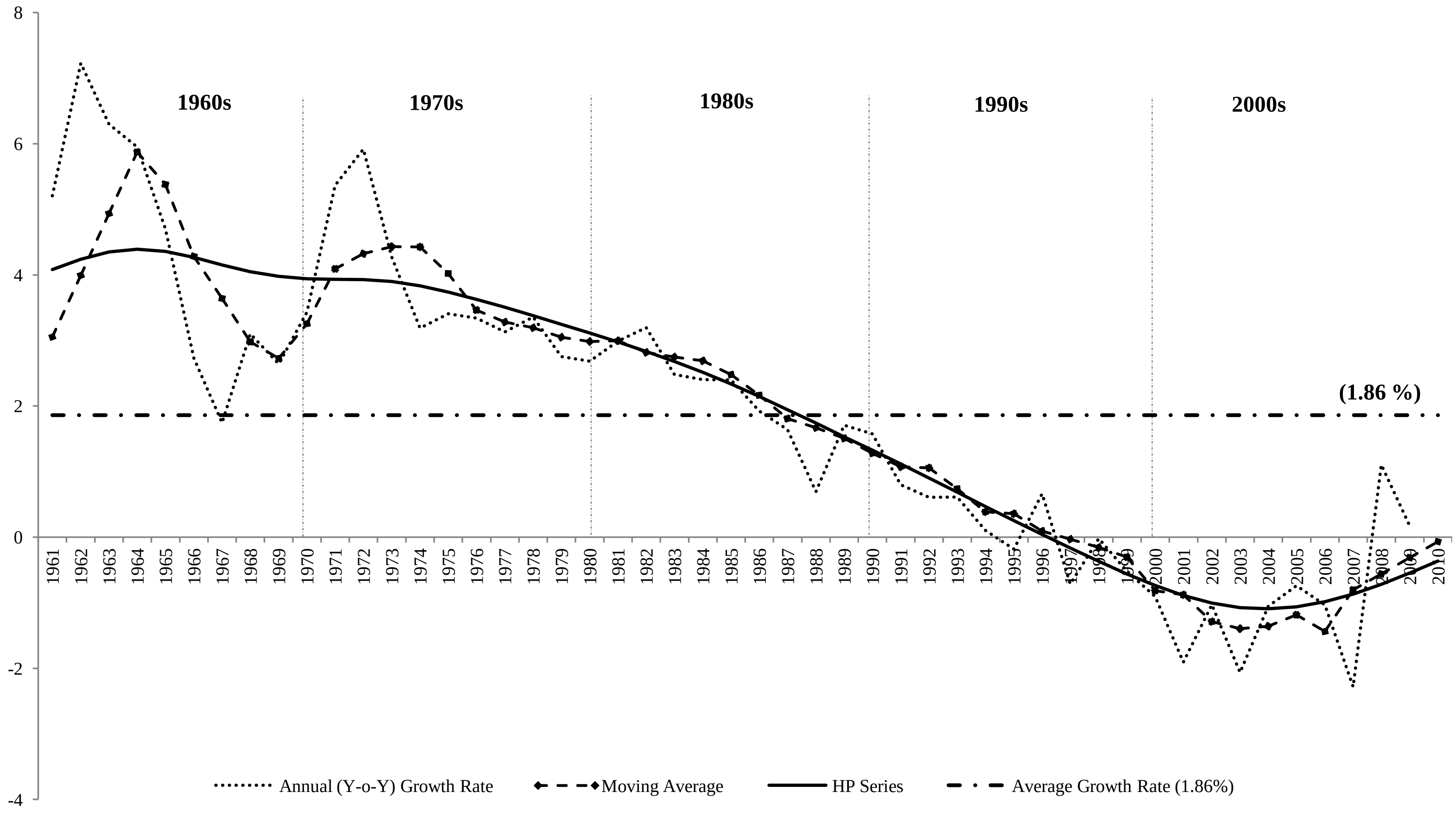


Table 5: CAGR of Employment in the Public Sector by Industry (Percent)

Industry/Decade	1960s	1970s	1980s	1990s	2000s
1. Agriculture, Livestock, Forestry and Fishing	4.89	5.02	2.90	- 1.26	- 0.83
2. Mining and Quarrying	5.48	16.57	- 0.12	- 0.71	2.59
3. Manufacturing	7.48	6.11	3.01	- 2.83	- 4.14
4. Electricity, Gas, Water and Sanitary Services	7.36	4.83	3.16	0.65	- 1.75
5. Construction	3.63	2.44	0.89	- 0.90	- 2.90
6. Wholesale and Retail Trade Etc.	15.10	- 12.21	6.83	0.20	0.82
7. Transport, Storage and Communications	2.28	1.88	1.48	0.06	- 2.05
8. Financing, Insurance, Real Estate	--	28.50	3.18	1.28	0.55
9. Community, Social and Personal Services	4.31	2.54	2.30	0.81	- 1.30
Total	**4.31**	**3.66**	**2.29**	**0.11**	**- 1.24**

there has been an overall decline in the employment levels for all the industry groups. None of the industries display a rising connection with employment. The contribution of agriculture, forestry and fishing, which form the back bone of the primary sector, degraded over the period of analysis. The CAGR for this industry was 4.89 percent in the decade of 1960, falling to 2.90 percent in 1980s. Since then it was negative in the post-liberalisation period. Mining reached its peak in the decade of 1970 (CAGR of 16.57 percent) but declined thereafter, showing a recovery only in the 2000s. Manufacturing has been considered as a vital ingredient in the employment generation process since independence. It is an indicator of a healthy industrial sector and real growth of the economy. Though this criterion is fulfilled in case of output contribution to the economy, in case of organised employment, the situation is bleak. The contribution of manufacturing sector towards employment generation is not at all encouraging. From a CAGR of 7.48 percent in 1960s, it declined to 3.01 percent in the 1980s. Since then it has registered a negative CAGR, the values indicating worst performance across all industry groups. Even for electricity and construction industries, the CAGR is on a downtrodden path.

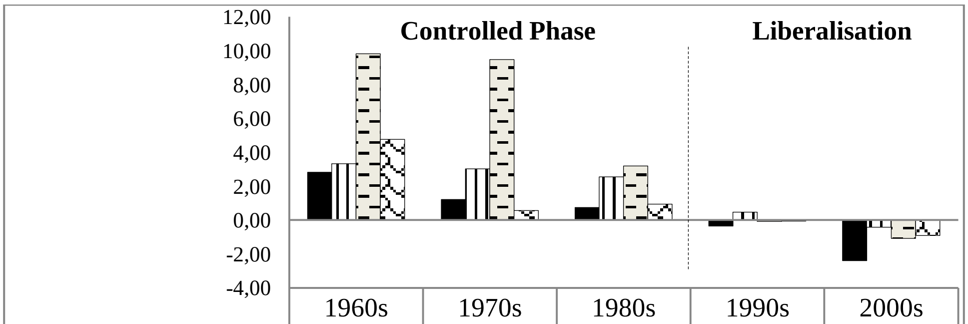
Within the services component, the trade and the transport and communication industries also exhibit a downward trend. The decade of 1970s was not fruitful for employment generation for trade. Though the CAGR is not negative for trade post-liberalisation, the positive factor is not encouraging enough. Financing, insurance and real estate was a late starter amongst all the industry groups, recording a CAGR of 28.50 percent for the decade 1970s. This can be attributed mainly to the nationalisation of banks in 1969 and the insurance companies in early 1970s. Since then the CAGR is declining continually but is positive throughout. In case of community, social and personal services, the CAGR is 0.81 percent for the decade

1990s and is negative at -1.30 percent for the decade 2000. This is more serious because it is not a part of the New Economic Policy of 1991. Hence, employment remains poor in this category also.

4.2.2. Employment in the Public Sector by Branch:

Public sector by branch comprises of four segments. They are the Central Government, the State Government, the Quasi Government and the Local Bodies. Figure 6 gives the CAGR for employment in the public sector by branch. The fall in the employment can be precisely distinguished for all the branches. The performance, especially post-liberalisation, indicates the reverse operation of the reforms against the employment generation capacity of this segment. Out of the four segments, Quasi Government employed the highest; for the decades 1960 and 1970. Since then the declining trend began for all the segments. The decline is greatest for the Central Government and the Local Bodies. Furthermore, the post-reform era exposes the ugly picture of the organised employment. The CAGR is negative for all the segments for the decade 2000 and 1990s (except for the State Government in the 1990s).

Figure 6: CAGR of Employment in the Public Sector by Branch (Percent)



	1960s	1970s	1980s	1990s	2000s
Central Government	2,83	1,22	0,74	-0,35	-2,40
State Government	3,33	3,04	2,57	0,48	-0,42
Quasi Government	9,83	9,49	3,20	-0,07	-1,07
Local Bodies	4,77	0,57	0,96	-0,05	-0,90

Therefore, it is clear that the employment performance of the Central Government, which is again the segment with highest benefits and safeguards, is dismal. For Quasi Government, there is a steep decline post 1970s, the same is true in case of the State Government. For the Local Bodies, only the decade of 1960s was promising in terms of employment. The overall picture of this sub-segment of the public sector is not positive. The employment scenario for the entire public sector is thus, quite distressing and needs immediate concerns in regards to policy and planning as it constitutes major portion of the total organised employment.

4.3. Employment Trends in the Private Sector:

Trends in the private organised sector can be analysed with the help of industry wise classification as there exists no other categorisation for this sector. The private sector was always assigned with a very miniscule role in the development process. Its progress was restricted by the use of restraining measures; until the start of reforms in 1991, which envisaged a better growth prospect through private sector development. Table 6 presents the average annual (Y-o-Y) growth rates and the CAGR for the private sector for the decades 1960 to 2000. It can be observed that in

Table 6: Average Annual (Y-o-Y) Growth Rate and CAGR for the Private Sector Employment (Percent)

Decade	Average Annual Growth Rate	CAGR
1960s	2.96	3.01
1970s	0.78	0.46
1980s	0.49	0.66
1990s	1.34	1.00
2000s	2.28	1.63

both the cases, the growth rates show an increasing trend since liberalisation. The average annual growth rate for private sector has steadily increased at a modest pace since 1980s. For CAGR also, the decade of 2000 deciphers highest increase (1.63 percent) in employment, after a continual rise from 1980s to 1990s. This can also be studied from Figure 7 where such a rising and declining pattern is clearly visible.

Further view of the matter can be gained by carefully examining the trends in the employment in the private sector. This can again be done with the help of the annual Y-o-Y growth rate, the five yearly moving averages and the HP filter. It can be inferred from Figure 8 that the private sector employment growth is highly inconsistent throughout. For most of the time periods, it is below average (1.57 percent). The annual Y-o-Y growth rate accelerated from 1961 to 1963, decelerating in the year 1964 and again rising for 1965 and climbing down for the year 1966. It is negative for the year 1967. For the decade of 1970s, it is below average from 1971 to 1976, with rise and fall cycle continuing till 1982. From then onwards, it is below

Figure 7: Decadal CAGR for the Private Sector (1961 to 2010) (Persons in Lakh)

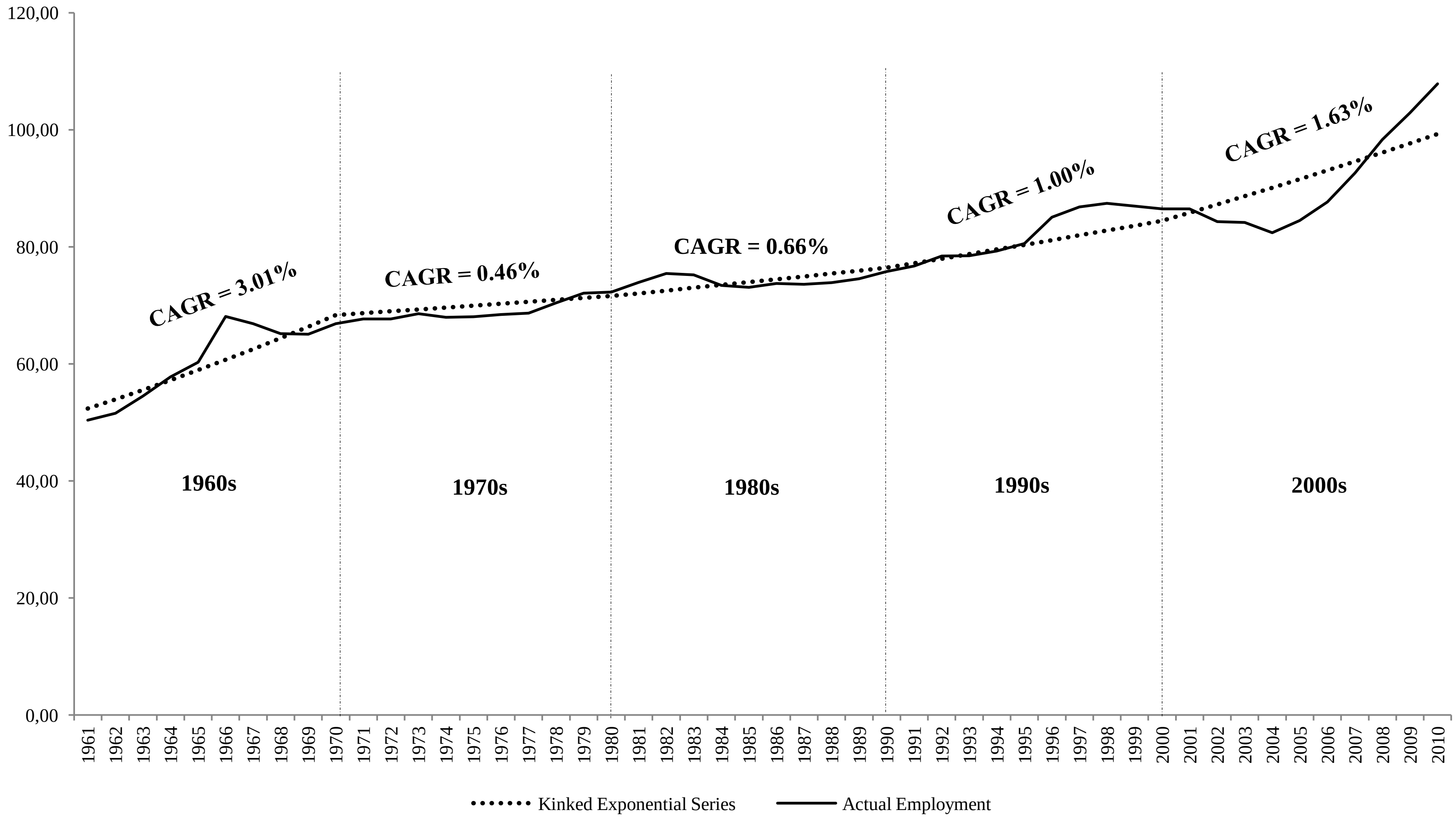
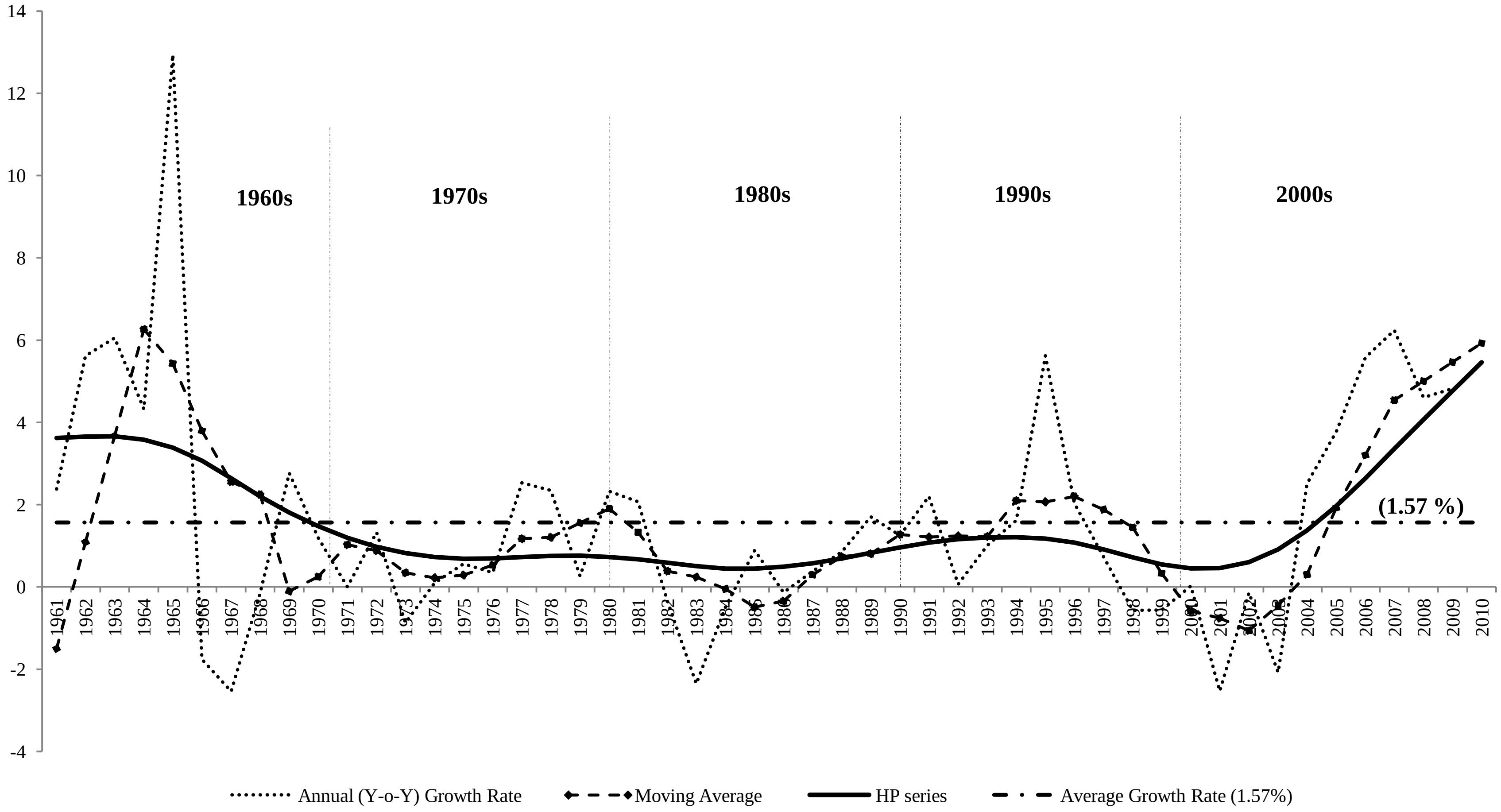


Figure 8: Trends in the Private Sector Employment (1961 to 2010) (Percent)



average till 1992, with small peaks above the average growth line (1.57 percent) for some years. There is an escalation in the growth rate from 1992 onwards; the period aftermath the adoption of reforms, till the year 1997, after which the growth rate is negative till 2004. From there onwards, the continual upward swing for the private sector begins. This relative unstable nature of the growth is explained by the moving averages and HP filter also. The growth in the private sector employment is therefore not sustainable. Even for the period post-reforms, it did not ascend as expected. In fact, the ‘rise-fall’ cycle continues almost every three years, making the private sector employment relatively unstable in nature.

Lastly, Table 7 gives the CAGR for the private sector employment across the various industries. It can be inferred from the following table that the CAGR for employment exhibits positive trends for the period aftermath reforms. The CAGR was negative for the 1960s and 1970s for most of the sectors, improving since then. Though the performance of agriculture suffered due to severe draughts in the 1970s, it is positive for the remaining decades. Manufacturing has again been a huge disappointment in case of the employment in the private sector too. Its contribution in the private sector employment is decreasing since 1960s and is negative for the decade of 2000 (CAGR of -0.44 percent). Construction also exhibits negative growth till 1990s, improving for the decade 2000. For electricity, the decades of 1960s, 1980s and 2000 seem better.

Table 7: CAGR of Employment in the Private Sector by Industry (Percent)

Industry/Decade	**1960s**	**1970s**	**1980s**	**1990s**	**2000s**
1. Agriculture, Livestock, Forestry and Fishing	1.11	-0.23	0.54	0.41	0.52
2. Mining and Quarrying	-4.51	-12.11	0.58	-3.79	4.73
3. Manufacturing	2.68	1.24	0.01	1.17	-0.44
4. Electricity, Gas, Water and Sanitary Services	2.03	-2.86	1.71	0.23	3.43
5. Construction	-2.90	-8.44	-0.76	-2.23	3.25
6. Wholesale and Retail Trade Etc.	7.60	-2.34	0.82	1.12	2.78
7. Transport, Storage and Communications	-1.12	-4.91	-2.00	2.81	7.04
8. Financing, Insurance, Real Estate	--	8.97	1.61	2.76	15.21
9. Community, Social and Personal Services	15.04	0.72	2.63	1.34	2.15
Total	**3.01**	**0.46**	**0.66**	**1.00**	**1.63**

Amongst the services segment, transport, finance and community and personal services performer better, post-liberalisation. The CAGR for transport and services are on surge since 1990s; though in case of services, the positive growth rate is not as fast as in case of transport. The CAGR in finance, insurance and real estate is commanding, especially for the decade of 2000 (CAGR of 15.21 percent). In case of the wholesale and retail trade, apart from the decade of 1960s (CAGR of 7.60 percent), the growth rate though positive is not assuring aftermath the reforms.

Thus, the analysis for the private sector yields diverging results. The CAGR portray a better and an optimistic picture for the post-liberalisation era, with the impetus coming mainly from the tertiary sector. The manufacturing sector fails to contribute to the employment in the private sector. The trends on the other hand depict the unpredictable nature of the employment growth. Overall, the decade of 2000; especially post 2004, seems to be assuring and conducive for employment growth in most of the industries of the private sector; especially related to the infrastructure and services. The manufacturing sector is nevertheless the real worrisome sector, which should normally be the driving force in employment generation.

5. AN INVESTIGATION OF THE TRENDS IN EMPLOYMENT:

An in-depth scrutiny of the organised employment, heads to the conclusion that, the performance of the organised sector in employment generation has been weak throughout the period of analysis. This weak performance can be attributed to the demographic, economic and social changes that the country has gone through in the past 64 years. In addition to these factors, the development and the industrial policies adopted from time to time have also played a crucial role in moulding the employment structure of the country. It can be certainly deduced that the developmental policies have failed to absorb more labour in the formal sector. The analysed trends imply that the behaviour structure of the organised employment is influenced by host of factors and has in turn acted upon them.

The major threat to the potential performance of the organised sector employment stems from its weak absorption capacity to accommodate substantial employees from the informal sector. Mounting population has further added to the challenge of maintaining a symphony between the growing labour force and decent employment opportunities, pushing the economy in to further informalisation, casualisation and degradation of quality employment. Therefore, the formal sector's growth has proved grossly inadequate to absorb the growing labour force being driven into the non-farm sector.

The phase of absolute control (till mid 1980s) was highly conducive to the growth of public sector, with the private sector designedly playing a subsidiary role. The industrial policies during this phase were tuned towards the public sector, leading to the establishment of large number of public sector enterprises in the core areas and extensive nationalisation of many industries (crude oil, coal, iron and steel, railways, defence, electricity etc.). The public sector employment in this period was therefore substantial. This rise can also be ascribed with the nationalisation of 14 major commercial banks (1969) and industries like coal (1971, 1974) and oil (1974). The economy also witnessed nationalisation of General Insurance Companies as the wholly government owned public sector enterprises. The year 1980 further saw the nationalisation of 6 additional commercial banks. However, the growth in the public sector was highly characterised by over-staffing, low productivity and technological backwardness leading to low profitability and surging losses. As a result of this, an initiative towards reviving the efficiency of the public sector enterprises was launched in the 1980s. The reforms of 1991 further connoted these enterprises as a 'national burden than an asset' due to their low productivity, lack of technological up-gradation and over manning (Tendulkar and Bhavani, 2007). The public sector growth model was replaced by the market oriented open economy one.

Under the New Economic Policy of 1991, efficiency was accorded the highest place, leading to the process of downsizing by the public sector enterprises through shedding the excess labour. Voluntary retirement schemes and compulsory retirement schemes (also known as the 'Golden Handshake') were implemented on a massive scale and the use of contract labour and outsourcing was encouraged. Moreover, the technology acquired in the name of up-gradation was capital-intensive, that is, one with limited employment generation capacity. This resulted in a dip in the public sector employment; the decline being more pronounced since the decade of 2000. In addition to this, our analysis also pointed out the distressing performance of the public sector employment by branch (also connoted as segment of the 'White-collar Employees' (Tendulkar and Bhavani, 2007)). This clearly indicates the unwillingness of the government towards employment generation within the public sector. With the rise in population, it was necessary to accelerate the employment in this segment; particularly in education, health, law and order and administration, as it forms an important element of the state machinery. However, the results indicate descend, implying that the functioning of the state is not at its optimal level of employment.

The private sector on the other hand, was promoted as a complement to the public sector wherever necessary. The industrial policies of 1948 and 1956 did emphasize on the importance of private sector along with foreign companies as the development agents. The share of private sector in employment was therefore considerable till the year 1965. However, aftermath the devaluation of the rupee due to foreign exchange crisis in the 1966, the domestic environment became more restrictive and selective, not conducive for the private sector development. This was followed by the MRTP Act (1969), the Licensing Act (1970) and the FERA (1973). As a consequence of this stringent stance, the share of the private sector in employment generation began to collapse. This situation changed with the neo-liberal reforms of 1991, where the scope of the private sector was up-lifted and it was placed at the corner stone of the development policy. The reforms also opened doors to foreign investors in most of the private sector industries, thereby encouraging many collaborations and joint ventures with the Indian firms. The employment in the private sector thus began to rise, especially in the tertiary sector (‘services led growth’).

However, it is often argued that, the private sector was expected to generate much more employment since the liberalisation than what materialised. Most of the studies, point out in this context that, even the private sector enterprises are casting off their labour in order to compete with the foreign players and in a quest to up-grade themselves, are embracing technologies which do not cater employment growth. Also, the proportion of contracting and outsourcing is enormous in the private sector (twice that of the public sector), adding to informalisation within the organised segment rather than the growth of quality employment (Anant, 2004; Datt, 2007).

One of the notable findings of the paper is the disappointing contribution of the manufacturing sector amongst all industry groups, especially since the 1980s. This underperformance is mainly attributed to the use of high capital-intensive imported technology with limited employment generation capacity, job security regulations and rise in contract labour by most of the studies (Papola, 1991; Goldar, 2000; Anant, 2004; Rangrajan, 2004). However, Papola (1991) argues in this context that, while assessing the employment potential of the manufacturing sector, it is important to note that most of the manufacturing employment is in the unorganised sector, leaving little scope for the organised one. He further points out that the Indian industry is witnessing a structural change from primary raw material based to metal based processed industries. This involves the use of high technology to ensure high productivity, thereby restricting the employment generation potential of the output. He attributes part of the decline in the organised manufacturing to this change. Organised manufacturing will therefore not help in creating substantial employment in the near future, according to him. Moreover, in the late 1990s, many industries in the manufacturing sector adopted business process re-engineering (BPR), where plant is redesigned in such a way that one worker can operate two to three machines simultaneously. This also led to the reduction in the workforce previously required.

The tertiary sector on the other hand, displays better performance during post-reforms, with the impetus coming mainly from the private sector. The share of the public sector on the other hand is dismal. The process of liberalisation triggered services led growth in India and the contribution of services to the total output is continuously heightening since then. The service sector also rules the foreign direct investment inflows of the country (GOI, 2011b). Despite of this, most of the studies (Gordon and Gupta, 2003; Joshi, 2004; Joshi, 2008) indicate that the contribution of the service sector to the employment generation is very less compared to its share in the total output. They further point out that, unlike manufacturing, the service sector is also comprised of massive informal sector in the industries like trade and personal services (beauty shops, laundry, tailors, barbers, hawkers, dressers, washermen, maids etc). The main impulse to the growth in organised services comes from the financial and business services, followed by transport and communication and wholesale and retail trade. Within the financial services, banking (especially the NBFCs) leads the growth, while road transport and telecommunications dominate the transport and communication industry. On the other hand, the contribution of public administration, defence, storage and dwellings in real estate is very less as compared to the others. In the social services segment however, education and health care are the frontrunners, followed by other services like recreation, radio, TV broadcast, sanitary services etc. (Gordon and Gupta, 2003; Joshi, 2004; Joshi, 2008; Eichengreen and Gupta, 2010). Therefore, employment in these segments is considerable as depicted in Table 7. In addition to it, foreign direct investment in these sectors is also enormous, lending a supportive hand in employment generation.

An important implication arising out of this investigation is the rising preference for contracting and outsourcing activities by the organised sector firms. Pieters et al (2010) argue that, as the demand and the competition among the formal sector firms for the intermediate products increase, firms relent to outsource their production to minimise the labour costs. Using the ASI data at the two digit level for Indian manufacturing, for the period 2000-01 to 2005-06, they found that, as the output of the formal sector grew, their linkages with the informal sector; particularly modern informal sector (relatively capital intensive, but less than the formal sector) surged. The traditional informal sector however did not benefit from this growth. However, as pointed out by Trivedi et al (2011), though the informal sector employs about 80 percent of the total labour force in the manufacturing sector, the income generated is only about 32 percent. Bairagya (2010) has also put forth similar view that the informal sector employs more than it produces, while the formal sector is characterised by high output rates and low level of employment. Thus, the informal sector is daunted by low productivity and under developed human skills, making its output contribution to the nation's product very low. Under these circumstances, if the contracting activities of the formal sector continue to rise, the subsequent rise in the informal sector employment will contribute meagrely to the total output. In addition to it, outsourcing will not lead to the qualitative upliftment of the unorganised workers to an extent that will make them as competitive as the formal sector employees. Therefore, the outsourcing activities are in reality burdening the informal sector by increasing the number of employees, without actually influencing or altering its structure. Instead, if these activities are internalised within the organised sector, it will help to generate additional employment opportunities which will be qualitative and productivity enhancing. In addition, internalising will also lead to increase in the proportion of labour enjoying prudent wages and help maintain a decent standard of living.

6. CONCLUSIONS:

The examination of the employment in the organised sector of India brings out its deteriorating condition throughout the entire analysis period from 1961 to 2010. The sector has never displayed an improving trend, inspite of the adoption of numerous dynamic policy measures for its upliftment. The maximum burden of employment generation in the economy is therefore borne by the informal sector. The period of socialistic growth was contributive towards the public sector development. However, in exception to the initial years, its performance was not up to the mark in this period too. The private sector employment was also dismal during this phase; especially during the 1960s and the 1970s, as a consequence of the rigid approach towards it. With the initiation of the reforms, the organised employment was expected to take-off, with the private sector leading this change. The analysis has revealed a further deterioration instead of an improvement. The public sector employment has been severely hit due to the reforms, which may be to keep the fiscal deficit under control despite huge employment backlog in the Central and State Government. The private sector employment has enhanced after 13 years of liberalisation, that is, since 2004. The rise is mainly in the tertiary segment but has failed to fill the huge employment gap in the industrial sector.

The era of liberalisation is therefore engulfed by jobless growth in most of the sectors. The industrial sector, particularly manufacturing, is not contributing enough towards generating employment in the economy. The employment in the service sector is modest since 2004, but the whole responsibility is carried out by the private sector and not the public sector. It can be further argued that, India being a labour abundant country, the technology implemented in order to ensure high efficiency, has worked against the employment due to its capital-intensive nature. This in turn has added to the growing informalisation and casualisation of work. Many firms are relenting to contract labour and outsourcing to bypass the labour laws which make the application of 'Hire and Fire' principle difficult. The added pressures from the international firms have also made most of the private sector firms to embrace these methods. Under these circumstances, as India marches upwards its economic ladder, the employment generation potential of the organised sector is expected to worsen further and is bound to be limited.

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Appendix: A

Kinked Exponential Models:

The kinked exponential models (Boyce, 1986) are useful to estimate the 'discontinuous' growth rates of the various sub-periods in the time series. In the conventional method, the growth rates for each sub-period are computed separately through OLS techniques, which lead to a discontinuous trend line. The kinked model eliminates this discontinuity between the segments by imposing linear restrictions on them. If the time series is then estimated with the help of log linear models, this approach yields kinked exponential functions and the resulting growth rate is connoted as the kinked exponential growth rate.

In the first step, the time series to be estimated is broken at point 'k', that is, it is separated from one sub-period to the other and each sub-period is assigned a dummy variable 'D_j'. This dummy variable takes the value 1 in the j^{th} period and 0 otherwise. The discontinuity between the trend lines of the sub-periods is then eliminated through a linear restriction, that make these lines intersect at the break point 'k'.

Let't' be the time series such that t = 1, 2..., n. If the number of sub-periods are m, we will derive at m – 1 kinks which can be denoted as k_1, k_2, ..., k_{m-1}. The sub periods dummies accordingly will be D_1, D_2, ..., D_m. If the general unrestricted model is,

$$\ln Y_t = \alpha_1 D_1 + \alpha_2 D_2 + \cdots + \alpha_m D_m + \left(\beta_1 D_1 + \beta_2 D_2 + \cdots + \beta_m D_m\right) t + u_t$$

Applying the m-1 restrictions as, $\propto_i + \beta_i k_i = \propto_{i+1} + \beta_{i+1} k_i$, the generalised kinked exponential model can be expressed as,

$$\ln Y_t = \alpha_1 + \beta_1 \left(D_1 t + \sum_{j=2}^{m} D_j k_1 \right) + \beta_2 \left(D_2 t - \sum_{j=2}^{m} D_j k_1 + \sum_{j=3}^{m} D_j k_2 \right) + \cdots$$

$$\ldots + \beta_i \left(D_i t - \sum_{j=i}^{m} D_j k_{i-1} + \sum_{j=i+1}^{m} D_j k_i \right) + \cdots + \beta_m \left(D_m t - D_m k_{m-1} \right) + u_t$$

This model can be estimated with the help of standard OLS techniques. There is a kink between the two trend lines whenever $\widehat{\beta_1} \neq \widehat{\beta_2}$ and so on, depending upon the number of sub-periods. The advantage of this model over the simple OLS model is that, it is less affected by instability and cyclical fluctuations as it eliminates the discontinuity bias. Moreover, it takes in to account the full set of information of the time series to be analysed.

The paper makes use of the kinked exponential model up to four kinks, where Y_t is the number of persons employed in the time period t. The CAGR are calculated from the OLS values of the slope coefficients by first taking their antilog and then subtracting one from it. This value is then multiplied by 100, to express it in the percentage form.

Appendix: B

The Hodrick-Prescott Filter:

The Hodrick – Prescott filter is a tool designed to represent a given time series as the sum of a growth component that varies smoothly over the period of time and a cyclical component. A smoothed non linear time series trend is obtained as a result of it. This tool was first devised by Robert Hodrick and Edward Prescott in the year 1997 (Hodrick and Prescott, 1997). The time series can be stated as,

$$Y_t = g_t + c_t \qquad \text{for } t = 1, 2, \ldots\ldots, T$$

Where, g_t is the growth component and c_t is the cyclical component.

If the smoothness of g_t is measured by the sum of the squares of its second difference and c_t is the deviations from g_t whose average value nears zero over long time periods, then the decomposition procedure for determining the growth process can be stated as,

$$\min_{\{g_t\}_{t=-1}^{T}} \left\{ \sum_{t=1}^{T} c_t^2 + \lambda \sum_{t=1}^{T} \left[(g_t - g_{t-1}) - (g_{t-1} - g_{t-2}) \right]^2 \right\}$$

Where, $c_t = Y_t - g_t$

The parameter λ is a positive number which penalizes the variability in the growth component. It determines the smoothness of the series. Hodrick and Prescott (1997) argue that larger the value of λ, smoother is the obtained filtered series. If the value of λ is close to zero the growth trend is equivalent to the original series and it converges to a linear trend as the value of λ reaches infinity. Hodrick and Prescott used 1600 as the value of λ for the quarterly data in their analysis. But often for the annual data a λ value of 100 is used. The paper makes use of this value for the calculation of the HP filtered series using Microsoft Office Excel Add in package.