



Labor Quality in Market Services in India: Challenges in Constructing a Quality Index

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Abstract

The services sector in India has been growing at the fastest and now contributes more than half of GDP. The services sector employs the highest percentage of the 'educated' manpower. The focus of the paper is on estimating labour quality in broad sectors of the Indian economy, especially market services. Further, it also highlights data limitations and data challenges faced while calculating the index. In addition, the paper explores the drivers of labour quality growth in the market services. The components included in the aggregate labour quality index are the number of workers by education levels, age (experience) and gender. The preliminary results of labour quality indices show that the quality changes have been highest during the period- 2001-2011 and it has been driven by educational attainment. Services have also experienced the highest growth in labour quality and it has been driven more by market services than the non-market services. Finally, within market services, growth in labour quality has been quite slow in transport services, and hotels & restaurants whereas relatively faster in post & telecommunication, and financial services.

Key words: educational composition, labour quality index, market services

JEL classification: J21; J24 and L80

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1. Introduction

Indian economy experienced a “Hindu rate of growth”¹ in the initial four decades of development. However, since 1991 the Indian economy started moving on the path of liberalization, and globalization to achieve high growth trajectory. Since then the Indian economy has been on a high growth trajectory. This growth however, has been led by the service sector rather than the traditional route of manufacturing led growth. Since 1990s the service contribution to GDP is on the rise. This has been the case across the board, as the share of services in GDP of different Indian states has also increased.² And with the faster growth in the sector since the 1990s, its share has increased considerably to more than half of the GDP, bypassing its manufacturing expansion (Figure 1). The emergence of services as the most dynamic sector of the Indian economy has in many ways been a revolution and it has been broad-based (Gordon and Gupta, 2004). Clearly, India’s service sector expansion has attracted much attention in the literature (see for e.g. Eichengreen and Gupta 2009, 2010), and has often led researchers and commentators question whether the service sector momentum is sustainable and whether the continued expansion of service sector bypassing manufacturing is good for long term macroeconomic health of the economy. While studies on structural transformation suggest that the observed structural transformation in India has been growth enhancing (McMillan and Rodrik, 2011; Bosworth and Collins, 2008; Vries et al, 2012), evidence on services sector suggest that the observed growth surge is mainly due to higher productivity growth in this sector (Verma, 2012). However, high productivity growth in the economy in general and service sector in particular needs focus on the development of a high level of physical infrastructure and skilled manpower, which is adequately educated and trained in latest developments in technology. India has tried to use to its advantage it’s one of the most fundamental resource - manpower³. High

¹ Hindu rate of growth was defined by the eminent Indian economist Prof Raj Krishna as sub 2% growth in GDP.

² Economic Survey, Government of India, various issues.

³ The importance of skill in future economic growth and the large disparity in skill levels has also been highlighted recently by Rodrik and Subramanian (2005).

education and skill⁴, levels have become essential factors in achieving competitiveness and growth. The quality of labour force and its composition is also the matter of concern in the context of productivity measurement, as it provides not only a more accurate indication of the contribution of labour to production but also the impact of compositional changes on productivity. Measurement of labour quality is perhaps more important in the service sector where a large part of the output is not physical output and requires higher degree of education and training.

The current paper attempts to measure labour quality in the service sector of the Indian economy and compares it with manufacturing (secondary sector) and agriculture (primary sector). To have a better understanding of the service sector, it has been sub-divided into market services and non-market services⁵ separately. Subsequently, an attempt is made to explore all sectors within the market services.

The paper is structured as follows. Following the introduction, section 2 provides an overview of service sector in India. The methodology and dataset including the measurement of quality and the challenges involved in it are outlined in section 3. Trends in labour quality are analyzed in Section 4. The final section concludes the paper.

2. Overview of the Service sector in India

The service sector in India is a heterogeneous group as the activities range from traditional services (barber shops and neighbourhood retailing) to those based on new technology and standardization of delivery. Further given, India's quasi federal governance structure, services come under the union list (federal government), the states as well as joint administration of both.⁶

Service sector in India is classified according to National Industrial classification (NIC) 2008. Disaggregated data for many services is not available for India, though different organizations of

⁴ The meaning of skills has over the period widened. There is a tendency to include personal attributes, which once would not have been thought of in this manner (Payne, 2000). Skill has also been used to refer to general and technical education, and training (Singh, 2002; Agrawal and Naqvi, 2002; and Mathur and Mangain, 2002).

⁵ The sectors which are categorized as market services are: Trade, Financial Services, Post and Telecommunication, Hotels & Restaurants and Transport & Storage; and non-market services are: Public Administration & Defense, Education, Health & Social Work and Other Services.

⁶ For the lists of services under different jurisdictions according to the Constitution of India, see Mukerjee, A (2013)

government of India have been involved in developing the database. The India KLEMS dataset makes an attempt to classify services into 9 sub sectors- namely trade inclusive of wholesale and retail, hotels and restaurants, transport and storage, post and telecommunication, financial services, public administration, defence and social security, education, health and social work and other services. The service sector in India therefore can be classified under two broad heads- market based services and non market services. In the present paper, our focus is on the first categorization.

In Table 1 we provide the sectoral composition of Indian economy in order to see how economic structure has been evolving in Indian economy over time. The table shows that the value added share of primary sector has declined steadily from 31.3 percent in 1985 to 18.8 percent in 2005. The share of manufacturing increased marginally from 16.7 percent to 17.9 per cent; however it declined to 15.4 percent in 2005. Further, given the wide array of manufacturing activities in India, it is important to categorize manufacturing according to the levels of technological sophistication. Therefore within manufacturing we also looked into labor intensive and non-labor intensive manufacturing (See Appendix Table 1 for the industry classifications).

The share of high-labour intensive sectors has declined rapidly in 2000s as compared to the previous decade of 1990s; whereas share of low-labor intensive manufacturing has increased over the years. The value added share of non-manufacturing industries, which includes utilities (electricity, gas and water supply), mining and construction, has also increased from 9.6 percent in 1985 to 12.8 percent in 2005. But the most important feature of structural transformation in Indian economy is the emergence of service sector, which makes India defy the conventional structural change hypothesis of moving from primary to secondary and then to services sector (also see Erumban, Das and Aggarwal, 2012). Service sector remains as the single largest contributor to value added in post 1980 period. The share of service sector increased rapidly from 42.5 percent in 1985 to 53.1 percent in 2005, with greater acceleration being observed in market services share in value added growth. The distinction of market and non-market services is of high significance, as most reforms were oriented towards the development of a solid private market sector in Indian economy. The observed high value added share of service sector, however does not appear to have translated to an increasing employment generation of similar magnitude. The primary sector remains the leading contributor to employment generation in all three decades although their share has declined steadily over time by about 10 percent from 66.9

percent in 1985 to about 55.9 percent in 2005. The employment generation by manufacturing sector has been rather stagnant over the years, however it is interesting to observe that there is a sharp rise in employment share in non-manufacturing sector in the decade of 2000s, as compared to previous decade due to large employment generation in construction sector. Services on the other hand see an employment gain of only 7.5 per cent (18.4 to 25.9), while its output share increased by 10.6 percent.

Table 1: Gross value added and employment Shares in GDP, 1980-2011 (%)

Sector	Value added			Employment		
	1985	1995	2005	1985	1995	2005
Agriculture	31.3	26.2	18.8	66.9	63.2	55.9
Industry	26.3	28	28.2	14.6	15.2	18.2
Manufacturing	16.7	17.9	15.4	10.8	10.7	11.2
<i>High labour intensive</i>	8.7	8.3	6	8.7	8.1	8.5
<i>Medium labour intensive</i>	4.6	5.1	4.5	1.2	1.6	1.6
<i>Low labour intensive</i>	3.3	4.6	4.9	0.9	0.9	1.1
Non-manufacturing industries	9.6	10.1	12.8	3.8	4.5	7.0
Services	42.5	45.9	53.1	18.4	21.7	25.9
Market services	21.3	26	30.4	10.6	12.7	15.7
Non market services	21.2	19.9	22.7	7.9	9.0	10.2

Note: The time points 1985, 1995 and 2005 represent the midpoints of the sub-periods 1980 to 1990, 1991 to 2000 and 2001 to 2012 respectively

Source: Authors calculations

The increasing share of services in GDP has clear implications for its role in driving growth in Indian economy, and several studies have attributed economic growth in India to service sector (Gorden and Gupta 2003; Eichengreen and Gupta 2009 among others). The declining share of manufacturing, and increasing role of service sector in the Indian economy however raises the question of what is the impact of economic reforms, which were primarily aimed at increasing efficiency and competitiveness of the manufacturing sector, on boosting economic growth in India. Many studies assert that for a developing country like India, it is important to maintain a high manufacturing growth and without a growing manufacturing sector, the pace of growth of service sector cannot be sustained (Acharya 2003; Panagariya 2008 among others). On the contrary, the faster growth of service sector may serve as a way to overcome the jobless growth of manufacturing sector and move to higher employment shares in service sector.

3. Methodology and Dataset

Methodology

To accurately measure labour input used in the production process, it is desirable to estimate labour quality along with the number of workers. Especially in growth accounting methodology of measurement of total factor productivity (TFP) when output growth is decomposed in to growth of inputs and the residual TFP, then labour input is measured as an index of labour service flows. Constructing a labour quality index helps in relaxing the assumption of input (labour) homogeneity and would consider each labour input as heterogeneous. The construction of an index of labour quality which captures the changes in the labour composition, i.e. changes in education levels, age, gender, employment status, geographical location, industry of employment, etc. by using Jorgenson, Gollop and Fraumeni (JGF) (1987) methodology though is very data intensive but has an advantage of including all the labour characteristics and acknowledging the fact that each labour is different and its contribution to output would also be therefore different. The alternative approach of including labour heterogeneity by adjusting for years of schooling is restrictive to education alone and ignores the importance of all other labour characteristics like experience, etc. In this method the aggregate labour input L_j of sector 'j' is defined as a Törnqvist volume index of persons worked by individual labour types 'l' as follows:⁷

$$\Delta \ln L_j = \sum_l \bar{v}_{l,j} \Delta \ln L_{l,j} \quad (1)$$

Where the value share of each type of labour is given by

$$v_{l,j} = \frac{p_{l,j} L_{l,j}}{\sum_l p_{l,j} L_{l,j}} \quad (2)$$

where $\Delta \ln L_{l,j}$ indicates the growth of persons worked by labour type 'l' for sector 'j' and weights are given by the period average shares of each type in the value of labour compensation, such that the sum of shares over all labour types is unity. It is assumed that the persons employed

⁷Aggregate input is measured as a translog index of its individual components. Then the corresponding index is a Törnqvist volume index (see Jorgenson, Gollop and Fraumeni 1987). For all aggregation of quantities we use the Törnqvist quantity index, which is a discrete time approximation to a Divisia index. This aggregation approach uses annual moving weights based on averages of adjacent points in time. The advantage of the Törnqvist index is that it belongs to the preferred class of superlative indices (Diewert 1976). Moreover, it exactly replicates a translog model which is highly flexible, that is, a model where the aggregate is a linear and quadratic function of the components and time.

are paid their marginal productivities⁸ and since we also assume that marginal revenues are equal to marginal costs, the weighting procedure ensures that inputs which have a higher price also have a larger influence in the input index. So for example a doubling of high-skilled persons worked gets a bigger weight than a doubling of low-skilled persons worked. So, the volume growth of labour input is split into the growth of persons worked and the changes in labour quality. Labour quality is thus defined as the difference between weighted and unweighted growth rate of labour employed.

Let L_j indicate total persons worked in sector 'j' by all types $L_j = \sum_l L_{l,j}$ then we can define growth rate of labour productivity as:

$$\Delta \ln Q_j^l = \sum_l \bar{v}_{l,j} \Delta \ln L_{l,j} - \Delta \ln L_j \quad (3)$$

So, while the first expression on the right side gives the growth of adjusted labour; the second expression provides the growth of unadjusted labour. It can be easily seen that if proportions of each labour type in the labour force change, this will have an impact on the growth of labour input beyond any change in total persons worked. The index of aggregate labour quality thus measures the changes in the sex-age-education-occupation composition of the economy. It is the *partial* index corresponding to all characteristics and can be called *grand index* for a particular sector. However, we can decompose the growth in labour quality by its sources and define *first – order contribution* of each characteristic. These first order contributions by education-age- sex - occupation are defined similar to *grand index*⁹. If higher order contributions are ignored, then first order approximation can be denoted by

$$Q^g = Q^e Q^a Q^s Q^o$$

The measures of labour quality were constructed earlier in the context of industrialized countries by Denison (1962), and Jorgenson and Grilliches (1967) and more recently by Ho and Jorgenson (1999), Jorgenson and Stiroh (2000) and Fosgerau, et al (2002). Using this methodology Sailaja (1988) obtained similar index for output, labour and price in the case of Indian railways and Aggarwal (2004) estimated labour quality for the Indian manufacturing labour force. In case of India, despite data deficiencies the use of JGF approach is more suitable because all its data

⁸ The assumption basically requires perfect competition in labour market, which does not exist in countries like India. It thus restricts the applicability of such a method in situations where there may be widespread monopsony power or bilateral monopoly within an industry.

⁹ Refer to Jorgenson (2005), chapter 6 for details.

requirements may be met by the same data source consistently for a long duration. Since the use of this method is data intensive¹⁰ the current paper has however calculated only education, age, sex and grand index for the broad sectors,(agriculture, secondary sector, and tertiary sector) sub-sectors of services (market services and non-market services), and all sub-sectors¹¹ of market services of the Indian economy. For constructing the labour quality index we have taken five education categories¹², three age categories and two gender categories for each sector.

Thus for labour quality index the data required is employment by sex by age by education by sectors and earnings for each cell. There are thus $2*3*5=30$ types of workers for each of the sectors (Table 2).

Table 2: Classification Categories of Labour Force for each Industry

Classification	No	Categories
Gender	2	Males, Females
Age groups	3	<29, 29-50, >50
Education	5	Below Primary, Primary, Middle, Secondary and Higher Secondary , above Higher Secondary
Sectors	10	agriculture, secondary sector, and tertiary sector [market services (Trade, Hotels and Restaurants , Transport and Storage, Post and Telecommunication, Financial Services) and non-market services]

Dataset and challenges

The source of data for the current paper is various rounds of surveys on employment & unemployment (EUS) by National Sample Survey Organization (NSSO). The major rounds of surveys are conducted generally every five years (also known as Quinquennial rounds). Since the period covered in the paper is from 1983 to 2011-12, we have data for seven rounds- 38th (1983), 43rd (1987-88), 50th (1993-94), 55th (1999-2000), 61st (2007-08), 66th (2009-10), and 68th (2011-12). The survey provides information about the demographic profile-age, sex, education¹³, etc. and the employment profile of all the survey households in rural as well as urban areas. Wage estimates are also provided by employment status (regular salaried employees, casual employees

¹⁰ Data limitations and challenges are discussed in the subsequent section.

¹¹ The classification is given in the Appendix.

¹² As compared to only three education categories in EU KLEMS, we have included five education categories so as to capture the very diverse distribution of education in India.

¹³ The educational details are not provided by each year of schooling but by levels of education. So we have to rely on it. There are other sources of information on education by years of schooling but to match each surveyed respondent from different sources is impossible. It is therefore preferred to use the same source with its limitations.

and self-employed). NSSO basically uses National Industrial Classification for classification of workers by industry. This entire information about the households (HHs), known as HH unit level data is made available by NSSO in the form of CD-ROMS.

In the NSS surveys, the workers are classified on the basis of their activity status into usual principal status (UPS), usual principal and subsidiary status (UPSS), current weekly status (CWS) and current daily status (CDS) for Quinquennial rounds (also known as major rounds) and Usual Status & CWS for annual rounds (also known as thin rounds). While UPS, UPSS and CWS measure number of persons, the CDS gives number of person days.

Though EUS by NSSO gives us information about employment however, these data sets pose many challenges before the users, some of which are highlighted here. The first limitation of using EUS is the time period of the survey. Many doubts have been expressed by the researchers about the reliability of the estimates of employment given by the EUS survey based on a particular year of survey being a normal or an abnormal year (Himanshu(2010); Sundaram(2006)¹⁴).

There are also some conceptual differences between NSSO major rounds in the way employment and unemployment status of a person is defined. Thus doubts have been expressed about the comparability of the employment trends in different major rounds because of changes in definition of employment status of persons over different rounds. These doubts arise from the fact that in earlier rounds (before 50th) major time criterion was used to distinguish persons who are 'employed'; 'not working but seeking and/or available for work'; and 'not in the labour force'. But in subsequent rounds based on the major time criterion, first a person was categorized as belonging to the labour force or not. For persons belonging to the labour force, the broad activity status of either 'working' or 'not working but seeking and /or available for work' was ascertained based on the major time criterion-thus 'employed' were distinguished from 'unemployed'.

¹⁴ While 43rd round year is described as the severe drought year, Sundaram (2006) has termed 50th round year as an outlier in employment trends. Similarly while Sundaram (2006) and Unni (2007) do not agree with the employment trends of the 61st round, Himanshu (2010) finds them in line with 50th and 55th rounds.

The choice of an appropriate measure of employment is another decision a researcher has to make. UPSS¹⁵ is the most liberal and widely used of these concepts and despite its limitations¹⁶ this seems to be the best available measure to use given the data. Some of the advantages of using UPSS, which gives number of persons employed, are: i) It provides more consistent and long term trend, ii) More comparable over the different EUS rounds, iii) NAS's Labour Input Method (LIM) is also now based on Principal and Subsidiary Status, iv) Wider agreement on its use for measuring employment (Visaria, 1996; Bosworth, Collins & Virmani (BCV), 2007; Sundaram, 2009; Rangarajan, 2009). Hence, the paper has also preferred to use UPSS to measure employed persons.

Another limitation of comparability is for categories of educational levels. The educational categories in the 38th and 43rd round did not have a separate classification of Higher Secondary (Hr.Sec.) and was introduced for the first time in the 50th round. Hence the categories are not exactly comparable in the earlier rounds. For this reason, we combined the secondary and Higher Secondary categories into one category of 'secondary and higher secondary' for the purpose of our analysis. Though information about technical education is available but in India not only the proportion of such employed persons is very small; just around 2% in different rounds (Table 4), all these persons have education level of 'above Higher -secondary' and are included in this category for labour quality measurement. So taking them separately is not feasible.

Another significant limitation of EUS data is lack of information on exact number of hours worked by each worker. The survey only asks the question whether a worker is working full intensity (4 hours or more during the day) or half intensity (less than 4 hours during the day). Though information is thus available on the number of days worked by a person but to get such information at the disaggregate level of different types of labour is not very reliable and consistent over time. Thus it is difficult on the basis of the available information to measure

¹⁵ NSSO measure employment on the basis of activity pursued during a reference period- which is one year, one week and each day of the reference week and defines the corresponding activity status as usual activity status; current weekly status (CWS) and current daily status (CDS). Within Usual activity status a person may be engaged in a principal activity for a major time of the year (UPS) and also in some subsidiary activity during a part of the reference period (usas). Usual principal and subsidiary status (UPSS) includes all workers who have worked for a longer time of the preceding 365 days in either the principal or in one or more subsidiary economic activity.

¹⁶ Problems in using UPSS are: The UPSS seeks to place as many persons as possible under the category of employed by assigning priority to work; no single long-term activity status for many as they move between statuses over a long period of one year, and Usual status requires a recall over a whole year of what the person did, which is not easy for those who take whatever work opportunities they can find over the year or have prolonged spells out of the labour force.

labour by the total number of hours worked and we have used number of persons employed by UPSS as the unit of measurement of quantity of labour.

The most important challenge in constructing the labour quality index in India is the availability of data on wages of employed persons, which are used as weights to find out the adjusted employment. The problem is that in India about 50% of the employed persons are self-employed and their income or wage information is almost completely missing from the EUS. Hence, it is being estimated. The second related problem is that even for many regular salaried workers and casual workers the wage information is missing in different rounds, which is then also to be estimated. The third related handicap is the reliability of wage data provided by different rounds. It may be mentioned that in the 43rd round for the year 1987-88, such wage data was found to be unsatisfactory. Therefore 43rd round has not been included for labour quality index calculations.

Another major limitation while constructing the labour quality index is that the data is still good at the aggregate level but at the disaggregate level of different categories of workers there is the problem of its size. Even when we do not include the employment status, which would increase the type of workers from 30 to 90, we still need data for 30 categories of workers for each sector (Table 2). This puts an enormous demand on data. While Table 3 gives a brief summary of the sample points by sex for all the major rounds during 1983-2011 along with the corresponding work force participation rates, Appendix Table 2 shows how the data points are limited for each of these categories for the 68th EUS round of 2011-12. One may notice from Appendix Table 2 that not only we have missing observations for some of the categories in Post & Telegraph and Financial Services but we also have very few data points for some of the market services e.g. Transport, Post & Telegraph and Financial services especially for females in the age group of above 50 years with higher educational levels. So if we add another characteristic of employment status then data points would be missing or be very small for many more cells. Thus due to data limitation, employment status has not been included in constructing the labour quality index.

Another challenge before the researchers is that since NSSO uses different National Industrial Classification (NIC) for classification of persons employed by industry in different rounds – NIC 1970 in 38th and 43rd rounds, NIC 1987 for 50th round, NIC 1998 for 55th and 61st rounds, NIC 2004 for 66th round, and NIC 2008 for 68th round therefore as a starting point for construction of

a labour quality index for different sectors a *concordance between NIC-1970, 1987, 1998, 2004 and 2008 with industry classification has to be done.*

Construction of labour quality index

The index has been constructed by performing the following steps:

- i) Employment by industry by sex by age-groups and by education-categories has been obtained for each round for all employed persons above the age 14.
- ii) Since earnings data is also required for labour quality index, it is estimated from NSSO which relates it mainly to regular and casual workers.
- iii) For earnings of self-employed persons¹⁷, a Mincer wage equation has been estimated and the sample selection bias is corrected for by using the Heckman's¹⁸ two step procedure. The function has been used to the earnings of casual and regular employees where the earnings have been regressed on the dummies of age, sex, education, location, marital status, social exclusion and industry. The identification factors used in the first stage are age, sex, and marital status, type of household /size of households. The corresponding earnings of the self-employed are obtained as the predicted value with similar traits. The same procedure is also used to predict the wages of those regular and casual workers whose wages are not available. The average wages per day are then computed for workers of different type of employment, i.e. self-employed, regular and casual combined together.
- iv) Once the above steps are taken to find out the sex, age and educational distribution of all employed persons in all the six rounds, the computation of the labour quality index is carried based on the JGF (1987) methodology with 38th round (July 1983) equal to 100.

¹⁷ In EU KLEMS (Timmer,2010 p 67) it is assumed that the earnings of the self-employed is equal to the earnings of 'regular' employees.

¹⁸ The details of the function can be obtained from the Stata software and from Appendix 2.

IV: Trends in labour quality

Before describing the trend of labour quality in India, a brief profile of labour is given here.

IV.1. Work force participation rates (WFPR) during different rounds (UPSS)

The WFPR during different rounds has been quite low and has been between 38 to 42% (Table 3). The rates have been higher for males at around 52% and at only 22-29% for females¹⁹. One noticeable fact is the very low workforce participation rates by females in India. The Table also gives a glimpse of the total sample size of employed persons in each of the NSSO rounds where it is observed that over the rounds the sample points have reduced for both males as well as females indicating the data challenges one faces when using it at the disaggregate level.

Table 3: Total sample size and WFPR (%) (UPSS) in different NSSO rounds

NSS Round(Year)	Total Males	Total Females	Total Persons
38 th (1983)	161,538 (53.87)	74,433 (29.6)	42.05
43 rd (1987-88)	174,740 (53.15)	78,236 (28.51)	41.21
50 th (1993-94)	153,840 (54.49)	65,852 (28.56)	41.97
55 th (1999-00)	218,442 (52.73)	87,946 (25.89)	39.67
61 st (2004-05)	164,680 (54.68)	76,440 (28.67)	42.01
66 th (2009-10)	126,603 (54.58)	45,370 (22.77)	39.20
68 th (2011-12)	125,408 (54.43)	46,002 (21.95)	38.64

*Note: 1.UPSS is usual principal and subsidiary status. WFPR is the workforce participation rate.
Source: NSSO, 38th, 43rd, 50th, 55th, 61st, 66th and 68th rounds-authors calculations.*

IV.2 Education Profile of UPSS workers during different rounds

Table 4 clearly shows that the proportion of educated workers – above higher education has increased from around 2% to more than 10%- a more than four -fold increase. However despite this impressive increase there are still more than four in ten workers who have a very low level (below primary- less than 5 years of schooling) of education. The share of employed persons with technical education may have increased by around 1 percentage point but is still very low- just 2.9%. A close look at the Appendix Table 3²⁰ clearly shows that percentage of employed persons with education level of ‘above Hr Sec’ are lower in agriculture and construction and

¹⁹ The reasons for these trends in employment are discussed in detail by many scholars (Sundaram(2006), Himanshu(2011), Srinivasan(2008), Papola(2012)).

²⁰ Education profile for broad industrial sectors is given in Appendix Table 3.

higher in manufacturing and Services. It is thus clear that skill intensity is highest in the services sector.

Table 4: Education Profile of workers in India over different major rounds (Percent distribution)

Education categories↓\Rounds→	38 Round (1983)	43 Round (1987- 88)	50 Round (1993- 94)	55 Round (1999- 2000)	61 st Round (2004- 2005)	66 th Round (2009- 2010)	68 th Round (2011- 2012)
Below Primary	69.68	67.19	62.42	56.76	50.78	41.91	41.61
Primary	12.54	12.82	11.90	11.71	13.94	14.64	13.33
Middle	8.87	9.17	11.20	13.52	15.27	16.91	16.45
Secondary and Hr Sec	6.47	7.83	10.39	12.78	12.89	17.60	18.41
Above Hr Sec	2.44	2.99	4.09	5.23	7.12	8.94	10.21
Total	100	100	100	100	100	100	100
% with technical education*	1.84	1.73	na	na	2.60	2.35	2.90

Source: Authors' Calculations

*Note: In India primary is 5 years of education; middle is 8 years; secondary and Hr Sec is 10-12 years and above Hr Sec is more than 12 years of education- all starting from 1st year of school excluding pre-school, like nursery etc. * persons with technical education are with above Hr Sec level education.*

IV.3 Growth rate of labour quality in the Indian Economy

The growth rate of labour quality in the Indian economy during the period 1983 to 2011-12 is summarized in Table 5. The growth rate is included for the three sub periods of 1980's, 1990's and 2000's for a detailed view of the underlying trend. Table 5 gives both the aggregate index and the first order indices also. The Table shows that for the entire period the growth rate has been around 1.1% and has been almost stagnant for the first 20 years but has picked up some momentum in the new millennium's first decade. This could be possibly due to the faster growth of GDP and higher education in the economy and also due to higher wages. The driver to labour quality is education is supported by first order quality indices where it is observed that not only during the last decade but throughout the entire period, education index grew fastest among the three-education; age- a proxy for experience; and gender. In fact the last decade saw an increasing growth in all the indices.

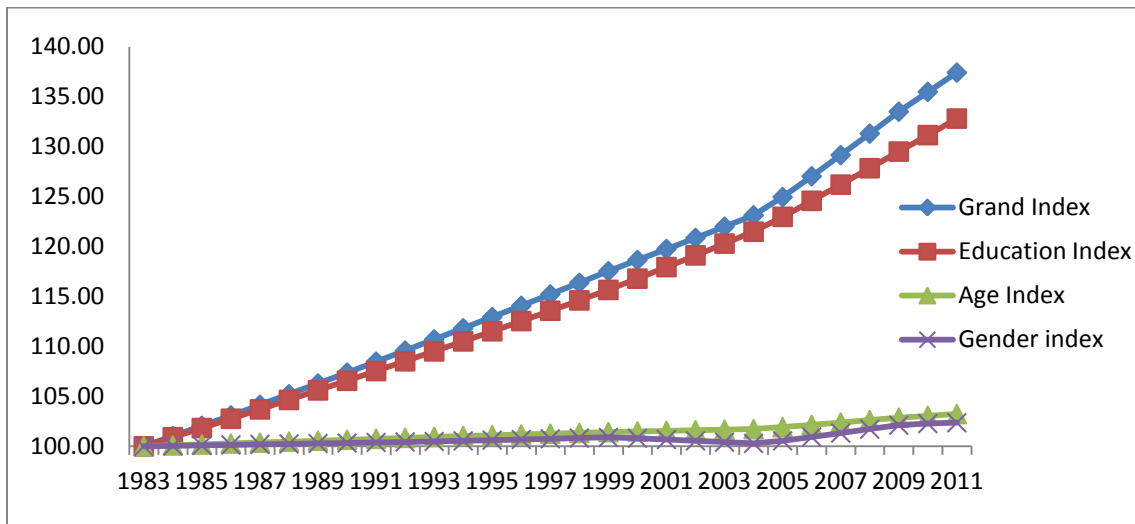
Table 5: Growth Rates of Labour Quality in India during 1983-2011

	1983 to 2011	1983 to 1990	1991 to 2000	2001 to 2011
Labour Quality	1.14	1.02	1.00	1.33
First order Quality Indices				
Q _s (Gender)	0.08	0.05	0.05	0.14
Q _a (Age)	0.11	0.09	0.08	0.16
Q _e (Education)	1.01	0.91	0.92	1.17

Source: Author's calculations

Chart 1 depicts the journey of these indices. It seems that the upward journey for all the indices has been quite smooth. While grand index follows the trajectory of the education index, age and gender index have grown relatively very slowly.

CHART 1: Behaviour of labour quality-Q_g, Q_s, Q_a, and Q_e in total economy



Q_g is grand index; Q_s is gender index; Q_a is age index; and Q_e is education index

IV.4 Growth rate of labour quality in the broad sectors of the Indian Economy

In Table 6 we have tried to explore the drivers of labour quality in the Indian economy by looking at the contribution of the three major broad sectors; namely- agriculture, secondary sector which includes industry, construction, etc. and the tertiary sector which mainly

corresponds to the services sector. The service sector is further sub-divided in to market services and non-market services²¹.

We observe from the table that the main drivers of labour quality in the Indian economy are the services sector followed by secondary sector. This is true for grand as well as first order quality indices. While grand index has increased by 1.1% during the period, the education index has also grown substantially by around 1%. While the growth in the age (experience) index has been marginal, the growth in the gender/sex index is negligible. It indicates that there has been no substantial change in the gender-wise and age-wise workforce composition in India. We however observe a redistribution effect whereby the growth in grand index is higher than the growth in individual indices.

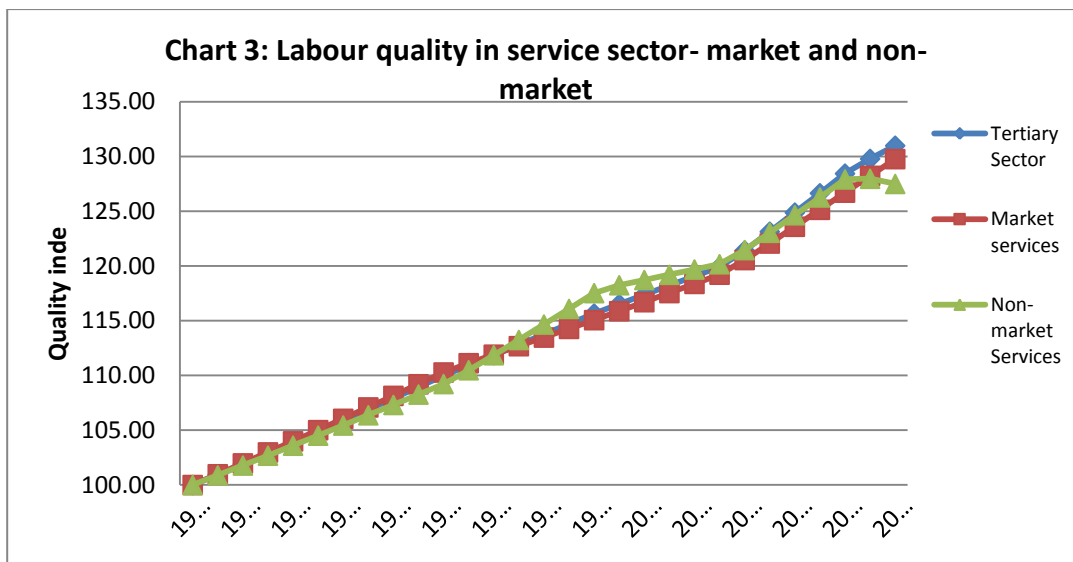
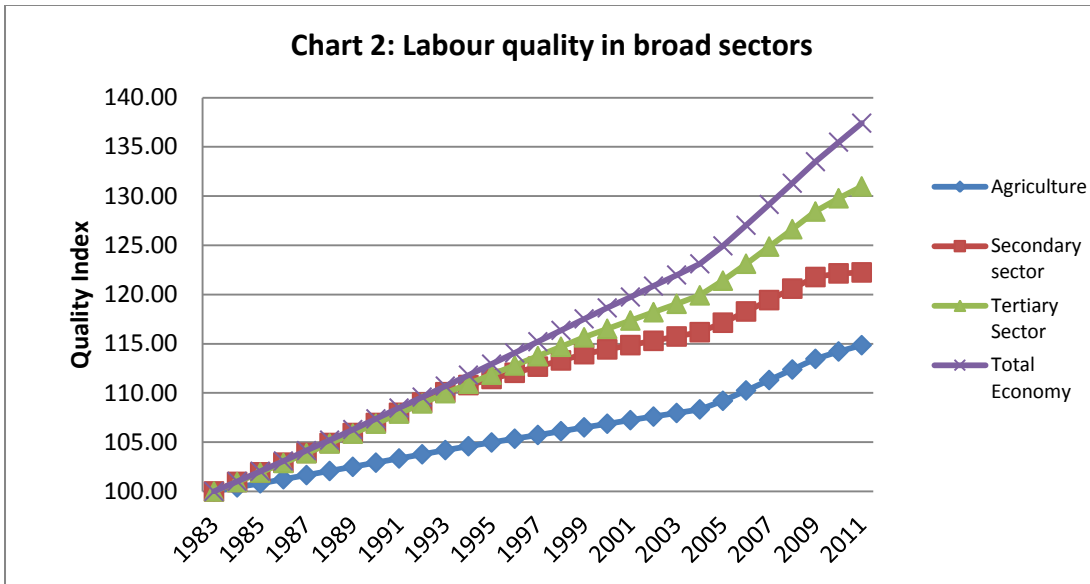
Table 6: Growth Rates of Labour Quality during 1983-2011 in broad sectors

	Total	Agriculture	Secondary	Tertiary	Market	Non-Market
Labour Quality (Grand)	1.14	0.49	0.72	0.96	0.93	0.87
First order Quality						
Q_s (Gender)	0.08	0.04	0.05	-0.02	0.01	-0.09
Q_a (Age)	0.11	0.09	0.11	0.11	0.15	0.03
Q_e (Education)	1.01	0.34	0.63	0.87	0.73	0.88

Source: Author's calculations

The story of growth in labour quality for the entire time period is also narrated by graphs for broad sectors and for services and its two sub-parts market and non-market services. We find a gradual increase in all the indices in both the graphs. Within service sector it is observed that the greater push in labour quality growth at the aggregate level (grand index) is coming from market service. But we find that education index has grown faster in non-market services as compared to market services because education itself is part of non-market services in India and it is the sector which has flourished in recent years. But the growth pattern of market and non-market services during the period is almost same (refer to the second panel of the graphs).

²¹ Appendix Table 1 gives the details about the industrial classification.



In order to investigate the differences in the pattern of all the quality growth indices during different sub-periods, we have summarized the growth in labour quality for broad sectors along with market and non-market services in Table 7.

It is clear from Table 7 that the pattern of growth of labour quality's grand index is not uniform for all the broad sectors during the sub-periods. While for agriculture it grew fastest in the last sub-period of 2001 to 2011, its growth was higher for secondary sector in the first sub-period of

1983 to 1990 when the seeds of privatization had just been sown. After that the growth in this sector has been stagnant, which is a reflection of the stagnant share of this sector both in value added and in employment (Table 1). As stated earlier the service sector in general and the market

Table 7: Growth rate of labour quality and first order indices for broad sectors during the different sub-periods.

Grand Index				
Growth rates	1983-2011	1983-1990	1991-2000	2001-2011
Agriculture	0.49	0.41	0.38	0.65
Secondary Sector	0.72	0.96	0.68	0.60
Tertiary Sector	0.96	0.95	0.86	1.06
Market Services	0.93	0.98	0.79	1.03
Non-market Services	0.87	0.88	1.06	0.68
Total Economy	1.14	1.02	1.00	1.33
Education Index				
Growth rates	1983-2011	1983-1990	1991-2000	2001-2011
Agriculture	0.34	0.33	0.31	0.39
Secondary Sector	0.63	0.85	0.63	0.50
Tertiary Sector	0.87	0.81	0.77	0.99
Market Services	0.73	0.77	0.65	0.78
Non-market Services	0.88	0.78	0.95	0.87
Total Economy	1.01	0.91	0.92	1.17
Age Index				
Growth rates	1983-2011	1983-1990	1991-2000	2001-2011
Agriculture	0.09	0.05	0.04	0.15
Secondary Sector	0.11	0.12	0.04	0.17
Tertiary Sector	0.11	0.10	0.09	0.14
Market Services	0.15	0.13	0.07	0.23
Non-market Services	0.03	0.05	0.15	-0.08
Total Economy	0.11	0.09	0.08	0.16
Gender Index				
Growth rates	1983-2011	1983-1990	1991-2000	2001-2011
Agriculture	0.044	0.019	0.003	0.096
Secondary Sector	0.051	0.016	0.059	0.065
Tertiary Sector	-0.015	-0.014	-0.006	-0.024
Market Services	0.012	0.024	0.002	0.014
Non-market Services	-0.092	-0.096	-0.079	-0.101
Total Economy	0.08	0.05	0.05	0.14

Source: Author's calculations

services in particular have outperformed the other two sectors which is also evident from its success story whereby it is now contributing more than half to GDP of India. Non-market services grew faster in the first two sub-periods but have slackened in recent years. The story of education index for all the broad sectors during the three sub-periods is similar to the grand index as it is the main driver of grand index. However we find that the behaviour of age index is somewhat different. Its growth rate is higher for manufacturing sector and non-market services. The common thread between these is the availability of better job security and thus longer tenure of jobs due to rigid labour laws in the secondary sector and dominance of public sector in non-market services which includes public administration, education and health with almost permanent tenure of jobs. On the other hand in market services we find lot of turnover of manpower due to ever emerging new opportunities in it. This results in relatively younger manpower in the sector and thus a lower growth in age index. The growth of gender index is almost insignificant in all the sectors and all the sub-periods indicating rigid gender composition in the economy.

IV.5 Growth rate of labour quality in the market services of the Indian Economy

We have explored in Table 8 the growth of labour quality in market services by analysing the disaggregate sectors included in market services-i.e. trade; hotels and restaurants; transport services; post and telecommunication; and financial services during the period 1983-2011.

Table 8: Growth Rates of Labour Quality in market services during 1983-2011

	Market services	Trade	Hotels and Restaurants	Transport services	Post and Telecommunication	Financial services
Labour Quality	0.93	0.73	0.69	0.62	0.87	0.77
First order Quality Indices						
Q_s (Gender)	0.01	0.02	0.00	0.00	0.05	-0.02
Q_a (Age)	0.15	0.11	0.11	0.15	0.09	0.16
Q_e (Education)	0.73	0.58	0.50	0.48	0.73	0.43

Source: Author's calculations

Table 8 reveals that among sub-sectors included in market services, growth in labour quality has been quite slow in transport services, and hotels & restaurants and faster in post & telecommunication, trade and financial services. The main driver seems to be post and

telecommunication which also experienced the fastest growth in education index among the five market services sub-sectors. We also see evidence of some redistribution effect of labour moving from low quality to high quality sectors through higher growth of labour quality in market-services as a whole as compared to its components. The age sector has a uniform pattern across all the sub-sectors except telecommunication where its growth is relatively slow, possibly due to the young age of telecommunication in India. Gender index, as observed earlier has been stagnant for all the sub-sectors also. The behaviour of the labour quality in sub-periods for the sub-sectors is shown in Table 9. What is interesting to note is that while it is the latest sub-period of 2001-2011 which shows the highest growth rate for trade, Hotels and transport services, for other two sub-sectors of post & telecommunication and financial services the growth rate was highest during 1983-1990. In case of education index the trend is slightly mixed. While for trade it is 1991-2000 when some trade liberalization policies were started that we witness a faster growth of index, for hotels; transport services and post & telecommunication that we observe that growth spurt took place in the last phase of high growth of GDP. Only in case of financial services, the growth of education index started much earlier- in 1980's.

Table 9: Growth Rates of Labour Quality (grand and education) in sub-sectors of Market services during sub periods of 1983-2011

Growth rates	1983-2011	1983-1990	1991-2000	2001-2011
Grand Index				
Trade	0.73	0.65	0.71	0.80
Hotels and Restaurants	0.69	0.55	0.55	0.91
Transport services	0.62	0.55	0.57	0.70
Post and Telecommunication	0.87	1.12	0.67	0.90
Financial services	0.77	1.54	0.64	0.41
Education Index				
Trade	0.58	0.55	0.63	0.54
Hotels and Restaurants	0.50	0.25	0.47	0.69
Transport services	0.48	0.45	0.46	0.51
Post and Telecommunication	0.73	0.53	0.57	1.00
Financial services	0.43	0.67	0.12	0.56

Source: Author's calculations

V: Conclusion

The composition and quality of labour force has acquired a new importance in the context of productivity measurement and its usefulness in finding the competitive advantage of a state in attracting investment. Ho and Jorgenson (1999), and Jorgenson and Stiroh (2000) have used the JGF (1987) methodology to estimate labour quality for the US economy.

The present exercise is an attempt to construct a similar labour quality index for the services sector of the Indian economy. The NSSO data on employment has been used to estimate both the number of workers in each educational category and the average nominal daily wage rate for regular/salaried, casual and self-employed workers. While the wage rate for the first two categories namely regular workers and casual workers is obtained directly from NSSO data, but the same for self-employed persons is obtained by using the Heckman's procedure. The paper analyses the distribution of all educational categories. The results show that despite a fall in the proportion of not-literate over the rounds, even in 2011-12, 40% of the workers were almost illiterate in India and only 10% have education 'above Hr Sec' level.

The results of the analysis of growth of labour quality in India during the period of 1983-2011 clearly show that the main driver of its growth has been the Services sector. Within service sector we witness a relatively higher growth in the market services in general and in post & telecommunication; financial services and trade in particular. Among the first order indices, it is the education index which has pulled up the aggregate or grand index. Out of the entire period, however we find that the growth of labour quality index has been highest in the last sub-period of 2001 to 2011. This is partly evident from Table 1 also, where we find how the share of services has significantly increased both in value added and in employment during 1995 and 2005.

It may however be mentioned that the construction of labour quality index is very sensitive to the wage rate data for each status and educational category. The results are therefore to be viewed in the light of limitations of the NSSO data.

Appendix Table 1: Classification of Sectors

Sector Description
Agriculture, Hunting, Forestry and Fishing
Secondary Sector
Manufacturing
Mining and Quarrying
Electricity, Gas and Water Supply
Construction
Tertiary Sector
Services
<i>Market services</i>
Trade
Hotels and Restaurants
Transport and Storage
Post and Telecommunication
Financial Services
<i>Non market services</i>
Public Administration and Defense
Education
Health and Social Work
Other services
Total Economy

Appendix Table 2: Sample Size in 68th Round (2011-12) By Selected Characteristics

Sex	General education level	Age group	Agriculture	Secondary sector	Trade	Hotels and Restaurants	Transport	Post and Telecommunication	Financial services	Non-market services
Male	Below Primary	<29	1814	2506	568	150	421	6	1	379
Male	Below Primary	30-49	5156	5321	1485	370	1247	8	10	402
Male	Below Primary	50+	6050	2628	1126	230	441	13	8	737
Male	Primary	<29	1461	1991	623	147	360	4	4	1326
Male	Primary	30-49	2258	2506	1162	223	677	10	7	1553
Male	Primary	50+	1593	767	503	108	142	5	6	1076
Male	Middle	<29	2597	2832	1232	221	698	23	30	770
Male	Middle	30-49	3265	3355	2171	338	1246	40	36	1494
Male	Middle	50+	1597	670	740	97	180	32	24	3670
Male	Secondary and Hr Secondary	<29	3249	2553	2053	247	713	80	101	5736
Male	Secondary and Hr Secondary	30-49	3930	3507	3768	391	1454	165	278	806
Male	Secondary and Hr Secondary	50+	1683	823	1160	102	273	89	83	389
Male	above Hr Sec	<29	771	925	790	85	167	77	256	613
Male	above Hr Sec	30-49	1061	1805	1806	146	456	147	581	1317
Male	above Hr Sec	50+	551	541	455	29	135	40	225	1835
Female	Below Primary	<29	2293	948	104	31	6	0	0	299
Female	Below Primary	30-49	7864	2487	555	169	14	1	6	199
Female	Below Primary	50+	4501	1061	495	96	7	2	5	329
Female	Primary	<29	1023	452	80	19	3	0	2	755
Female	Primary	30-49	1800	624	248	54	6	2	5	1190
Female	Primary	50+	481	119	99	19	3	0	2	1076
Female	Middle	<29	1423	522	160	30	5	2	7	392
Female	Middle	30-49	1692	600	369	72	3	4	7	600
Female	Middle	50+	278	81	80	12	1	0	3	1195
Female	Secondary and Hr Secondary	<29	1412	418	213	32	10	4	9	1833
Female	Secondary and Hr Secondary	30-49	1264	427	352	46	17	18	53	556
Female	Secondary and Hr Secondary	50+	135	41	52	5	3	4	6	90
Female	above Hr Sec	<29	218	136	99	17	16	12	65	110
Female	above Hr Sec	30-49	147	125	120	19	8	13	87	252
Female	above Hr Sec	50+	35	18	18	5	3	4	28	370

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