ESSAYS ON IMPACT OF SERVICE TRADE ON LABOUR MARKET IN INDIA

DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN ECONOMICS OF JADAVPUR UNIVERSITY, KOLKATA

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Certified that the thesis entitled **Essays on Impact of Service Trade on Labour Market in India** submitted by me for the award of Doctor of Philosophy in Arts at Jadavpur University is based upon my work carried out under the supervision of Dr. Saikat Sinha Roy, Professor, Department of Economics, Jadavpur University, Kolkata, and that neither this thesis nor any part of it has been submitted before for any degree or diploma anywhere/elsewhere.

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CHAPTER 1

OVERVIEW

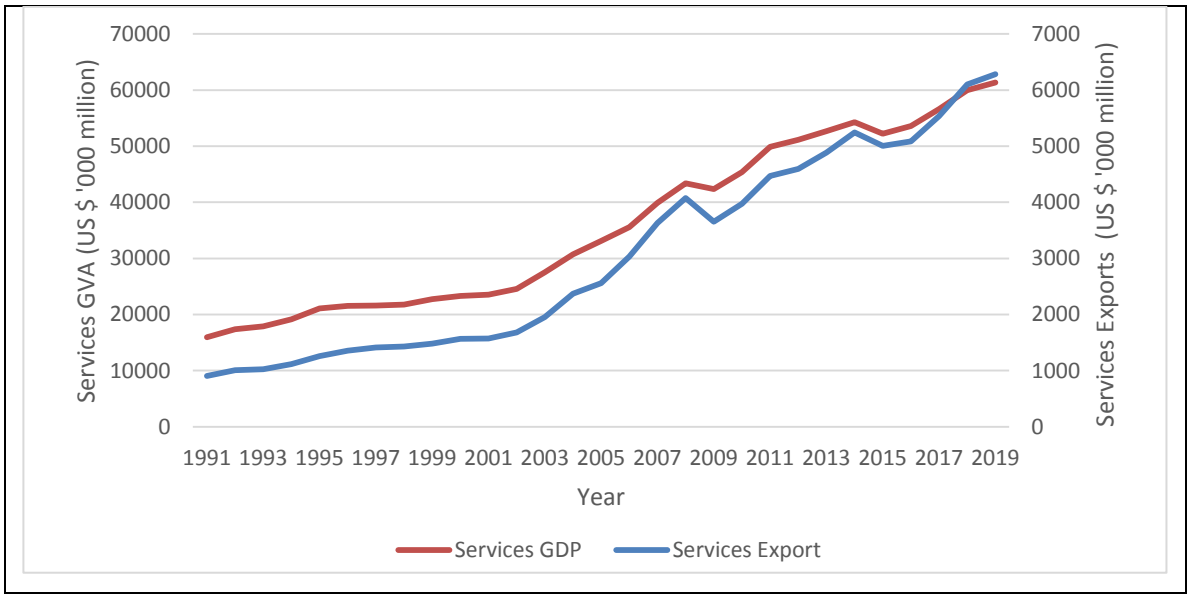
1.1 Statement of the Problem

This dissertation is a collection of essays on the impact of growing trade in services on different aspects of the labour market in India. A study on services is imperative with the sector's growing importance in the global as well as the Indian economy, the varied range of services contributing positively to the process of development of the economy (Mattoo & Stern, 2008). Globally, the services output and exports increased secularly since 1991 barring 2009 and 2015 (see Figure 1.1), leading to a high share (about 74 per cent) of services in global value-added and proportionately about a quarter of total world trade in goods and services in 2019. ILO (2019) shows a proportionate increase in world employment in marketed services and construction services during the same period. While the share of services and construction together in world employment increased from 39 per cent to 56 per cent between 1991 and 2018,the corresponding increase in the share of marketed services was from 20 per cent to 31 per cent.

The Indian experience with regards to services output growth and employment is somewhat different from the global pattern. Despite unprecedented growth in the services sector in India since 1991 (Rakshit, 2007; Gordon & Gupta, 2004)[1], with most sub-sectors participating in the boom, the pattern of employment growth is not commensurate with changes in sectoral output. In particular, as Eichengreen & Gupta (2011) and Nayyar (2012) argue, employment grew more in those services sub-sectors with low educational requirement.

[1]Even though the structural shift towards services started since the eighties in India, services sector growth in India accelerated in the 1990s (Balakrishnan & Parameswaran, 2007; Kotwal et al., 2011).

Figure 1.1: Trends in Global Production and Export of Services (US $ Thousand Million)



Source: Services Export data: https://unctadstat.unctad.org/EN/
Services GDP data: https://unstats.un.org/unsd/snaama/downloads

In contrast to agricultural and industrial production activities, traditional services are unique in their characteristics as they are essentially intangible, non-storable and non-separable. The characteristic of simultaneity of production and consumption rendered services non-tradable across border till early-1990s. With fragmentation in production, custom-made delivery of final products has become possible by passing out the orders to foreign sub-contractors and differences in time zones make fragmentation and outsourcing of production blocks from developed western countries to the developing world a feasible option (Jones & Kierzkowski, 2001). Further, as Jones & Kierzkowski (2001) suggest, with price of international service links falling and the knowledge of potential international suppliers and legal systems becoming more widespread, and with scope of setting up various production blocks under the ownership of MNCs getting reduced, there is enhanced scope of services exports from the developing world. With

fragmentation and splintering of production blocks into the developing world, Deardorff (2001) identifies 'trade services' as a special category of services and shows how services trade liberalization may benefit services including transportation, insurance, communication, travel, professional services and finance.

With advancements in information and telecommunication technologies (ICT) since mid-1980s, a large array of services became digitally storable as well as transferable which made cross-border trade in services possible. Further, advances in digital technology led to wide ranging changes in the mode of business and transactions[2], production and distribution systems, along with the emergence of new tradable services. The use of ICT has made remote execution of certain services including book-keeping, accounting, standardized financial services, and thus making these services tradable. On the other hand, certain other services, using more complex computer and software applications, have increasingly become more tailored thus making the process of producing and delivering such services more dependent on face-to-face contact with the customer and hence these services are less likely to be traded. With changing pattern of trade in services, newer dimensions of linkages between international trade and labour market have emerged, which are necessarily complex working through several channels. There is a surge in demand for skilled workers in countries across the globe with impact on employment and the occupational structure of the labour market world over. Of particular importance are the issues on intergenerational choices of jobs and occupations of workers as well as task intensities of jobs. This is not to demean the importance of the traditional issue of employment *per se* in the context of expanding trade in services.

[2]Jones (2008), while making a comparative study of trade environments in China and India, highlights that Indian workers are more engaged in types of services trade that are performed on-line.

Further, Autor et al. (2003) emphasize on the changing "Task Content" of jobs where 'task' is defined as a unit of work activity that goes into production of goods and services, and 'skill' is defined as the stock of capabilities of the worker that is used to perform tasks. The study defines four broad categories of task measures as Non-Routine Cognitive, Routine Cognitive, Routine Manual and Non-Routine Manual Tasks, with each of them being categorized into routine and non-routine. As defined by Autor et al. (2003), the two types of non-routine tasks[3] lie in the two extreme ends of the occupational-skill distribution. Routine tasks involve organizing, storing, arranging and retrieving information and such other clerical and mechanical work activity, while production related tasks that are primarily performed by middle-skilled workers. Routine tasks can again be cognitive or manual and both Routine Cognitive (RC) and Routine Manual (RM) tasks can be codified and then performed by machines through automation of production activities.[4]Also, reduction in cost of offshoring the information-oriented routine tasks to low-cost destinations owing to technological breakthroughs in ICT made these jobs offshorable (Jensen et al., 2005; Blinder, 2007, 2009; Blinder & Krueger, 2008; Oldenski, 2009). Such automation and offshoring have led to substitution of middle-skilled workers and the relative demand for workers performing non-routine tasks has started increasing. This has generated a pattern of employment in the labour markets world over which is termed as job polarisation. In what follows is an understanding of certain stylized facts on these issues with regards to India's labour market.

[3] Non-routine cognitive tasks are the activities that require abstract skills like creative skills, complex communicative skills, problem solving skills etc. whereas non-routine manual tasks are the activities that require personal interactions, physical proximity, visual and language skills and situational adaptability (Acemoglu & Autor, 2011).

[4] Autor et al. (2003) show that while the non-routine cognitive tasks require high levels of education and analytical abilities and hence complemented by ICT, the non-routine manual tasks require physical adaptability and communication skills.

1.2 Stylized Facts on Services Trade and Labour Market Outcomes

In the context of this emerging pattern of global trade in services and employment, and significant liberalization of services trade in India, it is of vital importance to observe certain stylized facts on India's trade in services and employment. A snapshot account on changes in structure in terms of trade, employment and occupation of the Indian economy since 1991 helps to determine the different aspects of service trade and labour market outcomes to focus at.

Services trade not only entails cross-border movement of services but also includes foreign capital flow and movement of persons. Further, many services in various economies are provided by the public sector and hence are subject to domestic regulations, which are often qualitative in nature (Hoekman & Braga, 1997) As a result, measurement of barriers to trade in services is complex (Copeland & Mattoo, 2008). For services trade, though 'tariff equivalent' is treated a good measure to quantify trade barrier, but it is a complex and difficult measure. Also, it varies for different modes of services trade. As services are of diverse nature, the barriers to services trade are also diverse, and hence liberalization measures are also wide ranging.

As against the traditional trade theories which focus on trade in final products, fragmentation and outsourcing have opened up trade in intermediate service inputs. With services trade liberalisation, a new trade pattern has emerged that does not fit into the basic assumptions of traditional trade theories, and instead is more aligned with the 'New New Trade Theory' that takes into account scale effect, imperfect market structure and differential productivity at firm level (UNCTAD, 2018).

Changing Policy Regime: Opening up of services sector in India

The impressive performance of the services sector in terms of output growth in the post-liberalization period has been largely attributable to changes in the policy regime that ensured a liberalization of services sectors along with greater access to the external market (World Bank, 2004; Chanda & Gupta, 2011). The policy changes in the services sector in India were essentially in terms of allowing domestic private sector participation, regulatory reforms and relaxation of foreign equity holding. As Chanda & Gupta (2011) delineate the process of liberalization and regulatory reforms in certain services sectors including telecommunication, banking, distribution services and higher education were in terms of institutional changes and step-by-step liberalization in equity holding, which was selective and sector specific. As a result, the services sector (including construction) in India, based on information published by the Department for Promotion of Industry & Internal Trade (DPIIT), Government of India, received nearly 60 per cent of total foreign equity investment during the period April 2000 to March 2021. This was largely accounted for by the financial sector, business services, information and broadcasting, telecommunication, trading and outsourcing R&D.

The Services Trade Restrictiveness Index[5] for India during 2014 to 2019 published in the OECD database shows highest restriction in rail freight transport to the lowest restriction in sound recording under other business services in 2019 (see Appendix

[5]The Services Trade Restrictions Index (STRI) of World Bank, following Borchert, et al. (2012) and using the Services Trade Restrictions Database of World Bank, measures overall openness of a country's trade policy regime with respect to services trade. A country, using the STRI score, can be assigned in five categories: score 0 implies completely open or no restrictions at all, score 25 entails virtually open with minor restrictions, score 50 implies existence of major or non-trivial restrictions, score 75 means virtually closed with very limited opportunities to enter and operate, and score 100 shows a completely closed services economy. However, Raychaudhuri & De (2012) point out that restrictiveness of services trade for foreign players comes from domestic regulations only. The study argues, along with improvements in SRTI, Services Trade Facilitation Index needs to improve for higher growth in services trade.

Table A1.1). The comparatively open sectors are computer services and construction services. Among other business services, accounting, legal and architecture services are highly restrictive, and motion pictures, sound recording and engineering are much less restricted, the telecom and broadcasting and banking and insurance are moderately restricted. The degree of restriction varies from moderate to high levels across modes of transport. Nonetheless, with India opening up the services sector to foreign equity participation cautiously and other complementary policy reforms since the early 1990s, Indian services have been increasingly outsourced by the developed world.

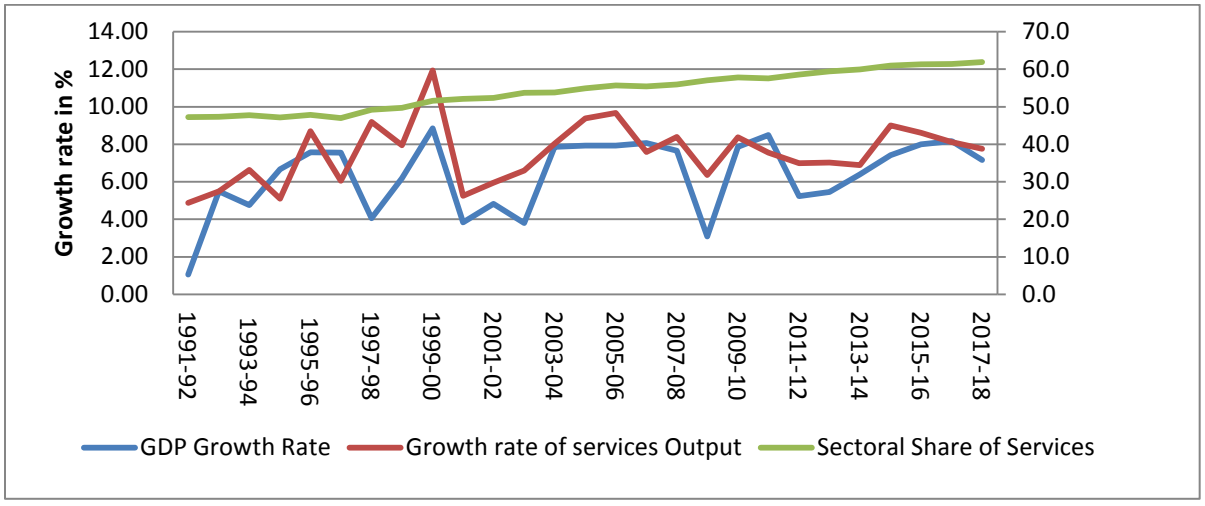
Changes in structure towards services production, trade and employment

With higher GDP growth since 1991, and especially after 2000, growth rate of GVA in the services sector surpassed that of the GDP for most of the years. The share of services in GDP increased from around 47% in 1991-92 to nearly 62% in 2017-18 (see Figure 1.2). The entire range of services has participated in the boom since 1991 (Gordon & Gupta, 2004)[6]. Figure 1.3 shows that 'real estate, ownership of dwellings & professional services', 'trade, repair, hotels and restaurants', construction services', have emerged predominant by 2017-18, while 'transport, storage and communication', and 'financial services' are the emerging sub-sectors.[7]

Exports of services increased steadily since 1991 (see Figure 1.4) with an observed structural break in 2004-05[8], indicating higher growth in services exports from India since then. Using the UN Services Trade Data on export performance, compound

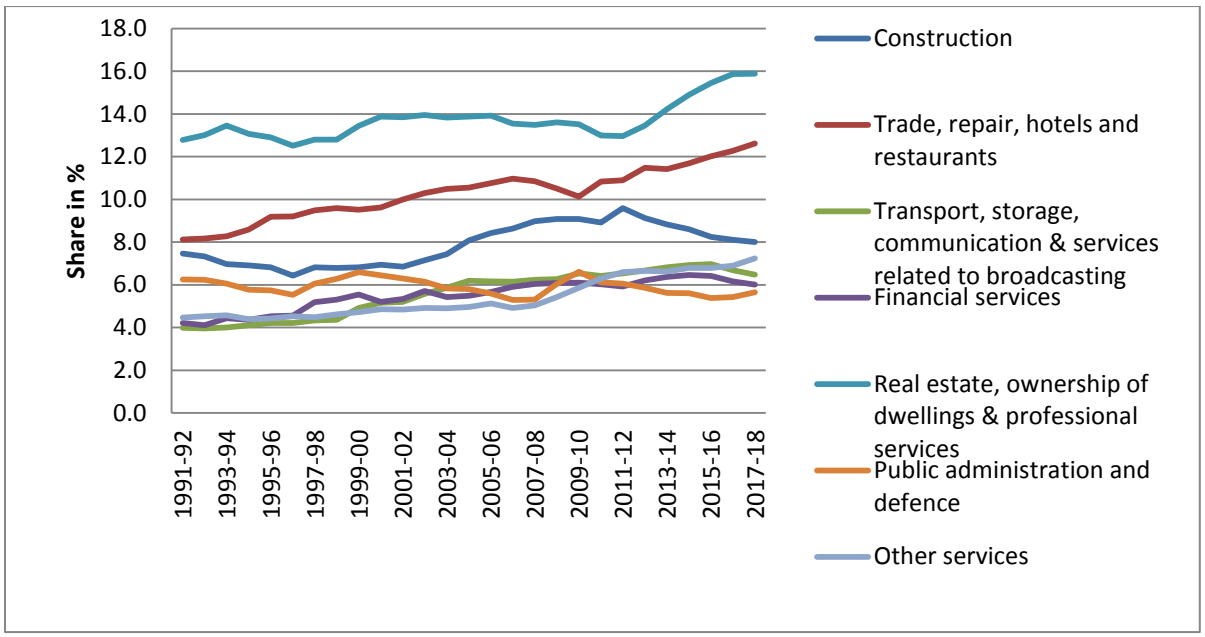
[6] For detailed NIC based service sector classification, see Appendix Table A1.2.
[7] Chanda & Gupta (2011) argue that the impressive performance of the services sector output since the early 1990s in India is largely attributable to changes in the policy regime.
[8] Zivot-Andrews test is used on India's services exports for the period 1950-51 to 2019-20.

Figure 1.2: GDP Growth Rate and Share of Services sector in GDP (in per cent)



Source: Based on calculation from NAS data

Figure 1.3: Share of Different Services Sub-sectors in Services GVA



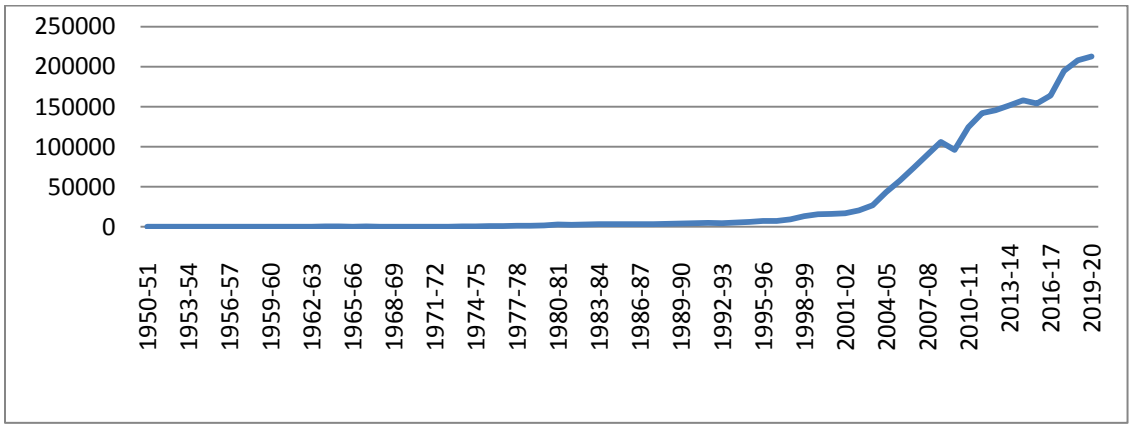
Source: Based on calculation from NAS data

annual growth rates are calculated for disaggregated services for the period 2000-2001 to 2018-19.[9] Other commercial services, for instance, personal, cultural and recreational

[9] It is to be noted that services trade in US $ million, reported in RBI data is greater compared to the data reported in UN Services Trade database, but both datasets reflect same trend.

services and other business services grew at high compound annual growth rate of about 28 per cent and 22 per cent respectively during 2000-01 to 2018-19, followed by financial services registering 15 per cent growth and computer and information services registering 14 per cent growth approximately (see Figure 1.5). Except for exports of communications and construction services, all other sub-sectors including transport, travel, insurance and royalties and license fees sector registered more than 10 per cent growth rates. In India's services export basket, while non-traditional commercial services like other business services have remained predominant, traditional services like travel and transport have a declining share during the period.

Figure 1.4: Services exports from India (US $ Million)



Source: RBI Database on Indian Economy (https://dbie.rbi.org.in/)

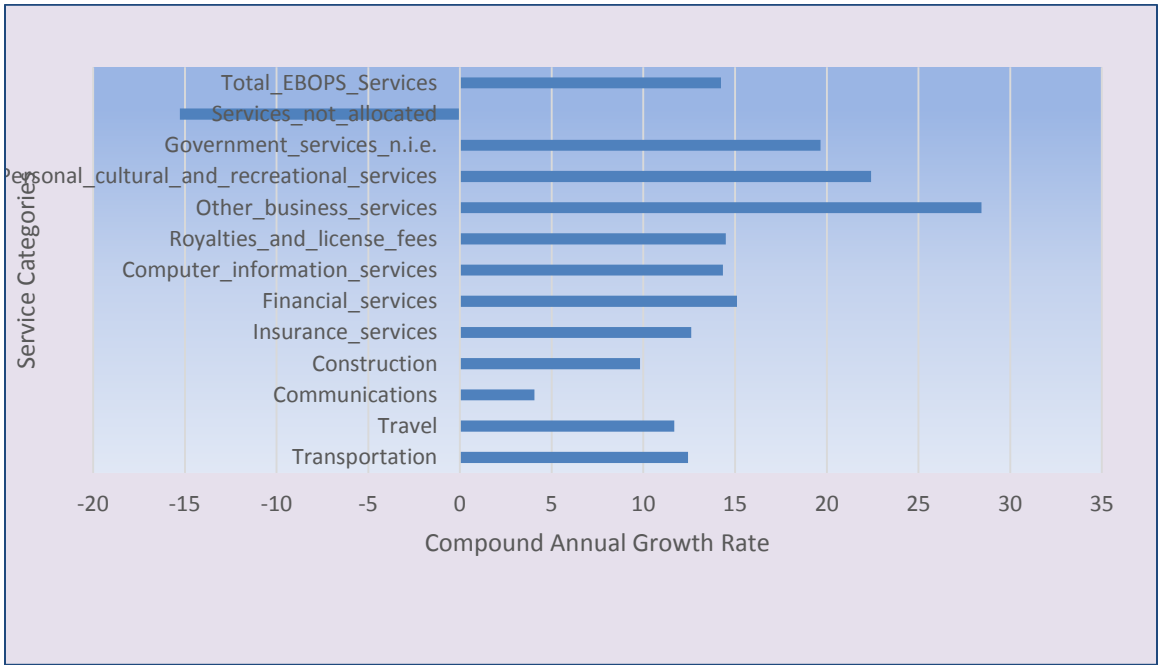
The advancements in ICT along with economic reforms pursued since early 1990s helped India reap the benefit of fragmentation of production processes and outsourcing of production activities from the developed world, thereby leading to services export boom in India especially since early 2000 (Raychaudhuri & De, 2012). As Eichengreen & Gupta (2010) observe, tradable and liberalized services have grown faster than non-

tradable and controlled services. Such high growth in overall services, and especially services exports, as argued by Gordon & Gupta (2004) and Ghose (2019) is largely driven by skill intensive sectors. Such changing pattern of services exports is expected to impact on employment and occupational structures along with task intensities of jobs.

In any labour-surplus economy like India, employment is critically dependent on the pattern of economy's real growth. However, the link between economic growth and employment has been weak in India since independence. For instance, while Papola (2012) shows that high growth of services output and export has not been reflected on the employment structure at the aggregate level, Rangarajan et al. (2007), Mukherjee & Majumder (2008) and Ghose (2019) observe that employment elasticity of services has remained low or declined since 1991. For the purpose of analysis here, the changes in employment pattern can be studied in terms of the changing share of employment by sector or by type. Looking at NSSO unit level records for rural and urban sectors, urban employment in specific, during 1999-2000 to 2011-12, changes in employment pattern in the services sector are observed.

The share of services sector employment in total increased from 28 per cent to around 40 per cent during 1999-2000 to 2011-12 (see Table 1.1). Within the services sector, as the NSSO database show, 'wholesale and retail trade', 'construction services', 'transport and storage', and 'public administration and defense' employ relatively more workers. Further, among the workers reporting principal industry of appointment, self-employed workers account for over half the total workers, while that of wage-earners increased marginally during 1999-2000 to 2011-12. The share of casual workers in total employment remained high at above 30 per cent during the period (see Table 1.1). Nayyar (2009) and Chanda (2011) observe rising informal and contract-based employment in services.

Figure 1.5: Growth of Disaggregated Services Exports from India since 2000-01



Source: Calculations based on UN Services Trade Data

Table 1.1: Employment: Sectoral Share & Categories of Workers (in per cent)

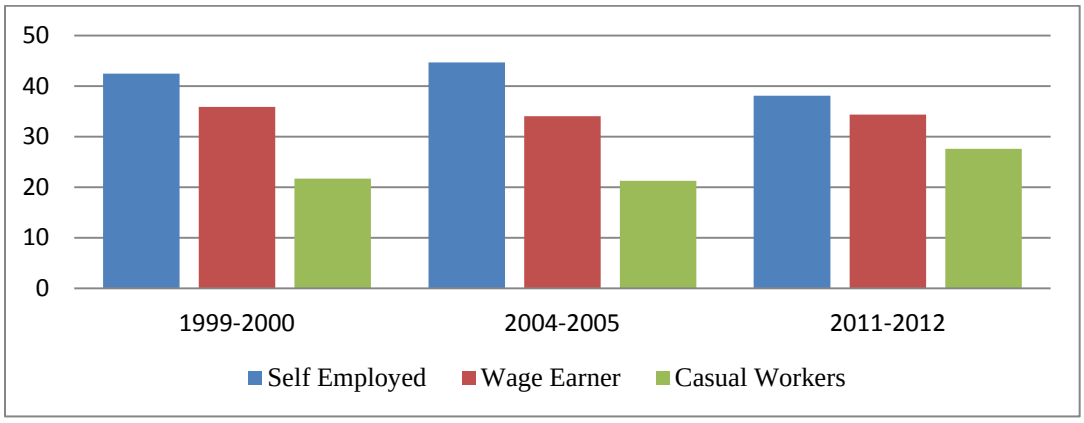
Sectors	**1999-2000**	**2004-2005**	**2011-2012**
Agriculture	60.53	56.76	47.62
Manufacturing	11.05	12.12	12.71
Services	28.41	31.14	39.67
Categories			
Self Employed	50.11	54.13	50.27
Wage Earners	15.12	15.53	19.27
Casual Workers	34.77	30.33	30.45

Source: Calculations based on NSSO 'Employment Unemployment Survey', various rounds

The pattern of employment is however different in the services sector. Considering employment in services sector, both rural and urban together, the share of wage employment is higher while that of casual workers is lower (see Figure 1.6a). This is despite the increase in casual employment in 2011-12. For urban services industries in

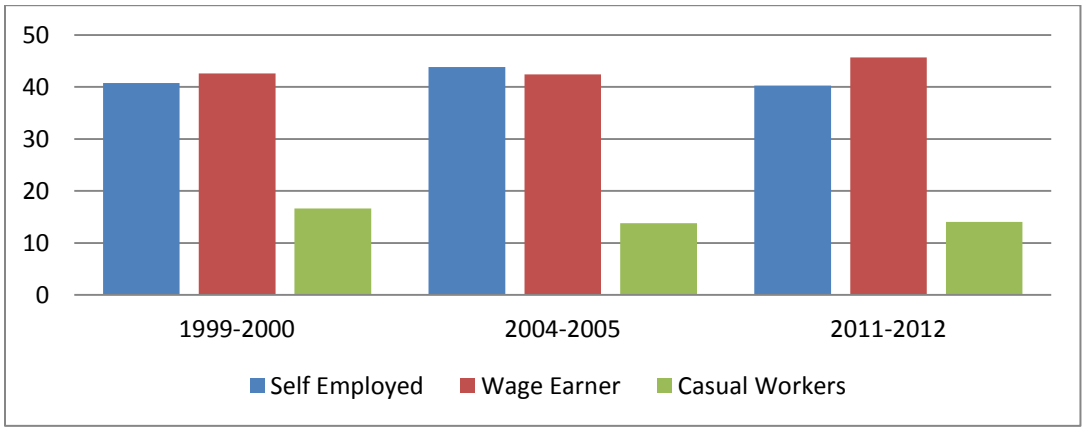
specific, the share of wage employment in total is higher than that of self-employed and casual workers. It is important to note that the share of wage employment is high during the period, in specific above 44 per cent in 2011-12 (Figure 1.6b). Employment of casual workers in urban services is relatively less.

Figure1.6a: Employment structure: India's Services sector (in per cent)



Source: Calculations based on NSSO 'Employment Unemployment Survey' Data

Figure 1.6b: Employment structure: India's Urban Services Sector (in per cent)



Source: Calculations based on NSSO 'Employment Unemployment Survey', various rounds

Along with changes in employment structure, changes in occupation structure are also possible with rising services trade. Using occupational categories of services sector workers based on NCO classification 1968 and 2004 (see Appendix Table A1.3), it is found that in rural and urban services sectors taken together, there is a declining

importance of clerical and services jobs along with a rising importance of white collar jobs during 1999-2000 to 2011-12 (see Table 1.2a and Figure 1.7a). For urban services, increase in the share of white-collar jobs is more prominent (see Table 1.2b and Figure 1.7b). Further, the respective shares of all other categories of occupation in the urban sector show a declining trend. These changes with regards to occupational categories took place especially after 2004-05 to 2011-12. It is noted that the observed changes in occupational structure coincide with the structural break in services exports in 2004-05. As white-collar jobs are non-routine cognitive task intensive in nature, the observed increase in share of such workers in services implies the rising demand of skilled workers with the sector's growth.

As regards task intensity of jobs, with economic liberalization pursued since mid-1980s and advances in information and telecommunication technologies, India has also been experiencing a change in the skill content of occupations. Vashisht & Dubey (2018) analyze the evolution of task content of jobs in India between 1983 and 2011. The study show that, following the global trend, both non-routine cognitive and analytical task intensities of jobs have increased and the manual task intensities have declined in India, but, unlike the developed world, the routine cognitive task content has not declined. The paper further asserts that increase in non-routine cognitive task intensities are owing to technological developments. However, Sarkar (2018) finds evidence of job polarization i.e., rising employment in both high as well as low-skill jobs and falling employment in medium-skilled, routine task oriented jobs during 1990s and 2000s. It appears that with advances in ICT, rising digitization, and automation of routine jobs in the manufacturing sector is leading to job polarization in India.

Table 1.2a: Occupational Categories of Services (Rural + Urban) workers

Occupational Categories	1999-2000	2004-2005	2011-2012
White Collar Jobs	22.06	22.29	29.43
Clerical and service job	33.11	32.59	23.22
Skilled agricultural and manufacturing jobs	23.08	24.53	25.34
Elementary Jobs	21.75	20.6	22.01

Figure 1.7a: Occupational Categories of Services (Rural + Urban) workers

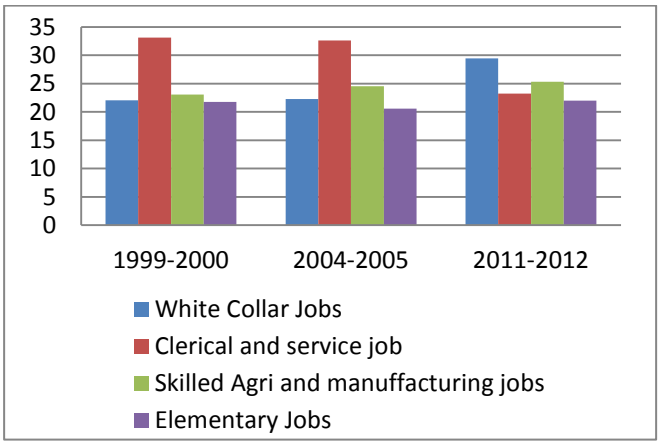
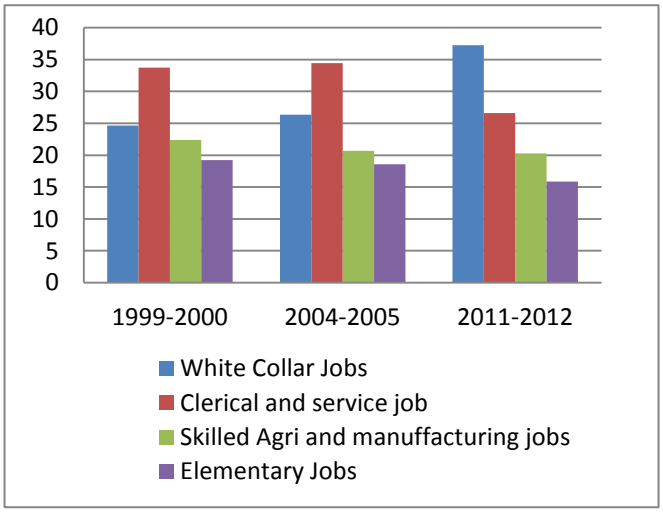


Table 1.2b: Occupational Categories of Urban Services workers

Occupational Categories	1999-2000	2004-2005	2011-2012
White Collar Jobs	24.64	26.35	37.24
Clerical and service job	33.74	34.43	26.62
Skilled agricultural and manufacturing jobs	22.39	20.66	20.28
Elementary Jobs	19.23	18.56	15.87

Figure 1.7b: Occupational Categories of Urban Services workers



Source: Calculations based on NSSO Employment & Unemployment Survey Database

On the whole, the above stylized facts show that along with observed changes in employment structure towards services, distinct changes in occupational structure within services industry, especially urban services, can be observed in India between 1999-2000 and 2011-12. The changing employment share in urban India is possibly being driven by skill-biased technical progress rather than routine-biased technical progress. Such

changes in sectoral employment and occupational structure over time are indicative of intergenerational sectoral mobility of jobs along with intergenerational occupational mobility towards and within the services sector. The literature emphasizes that sectoral choices of jobs and occupational choices of workers can be aligned with emergence of new tradable services on the demand side and also with schooling or the level of education on the supply side. Further, the stylized facts are also indicative of changing task intensities of jobs in India's labour market.

Three issues relating to labour market outcomes have emerged important along with high growth in output and unprecedented growth in exports in the services sector since 1991, and especially after 2000. These issues are:

a) whether there exists any change in the pattern of choice of industries across generations with growth in services trade;
b) whether there is intergenerational mobility towards and within services occupations with growth in services trade; and
c) whether the employment pattern in the services sector show changing task-intensity of services jobs and exhibit job polarization.

At this juncture, it is vital to critically review the literature on services trade and studies on intergenerational mobility.

1.3 Review of Literature

We review two strands of literature here. First, the theoretical conjectures and the empirical literature on trade and labour market with special emphasis on services sector are discussed. Second, literature on various aspects of intergenerational mobility is also reviewed.

1.3.1 Theoretical Underpinnings and Empirical Evidence: Services Trade, Offshoring and Labour Market Implications

From 1980s onwards, fragmentation of production activities and outsourcing of tasks to low-wage developing countries have opened up new modes of international trade for developing countries. Traditionally, as theories draw links between trade and growth and trade and employment, it is justified to look deeper into the impact of this new form of services trade on other economic indicators including employment. There exists a large literature on the impact of trade liberalisation on economic growth and employment. For the purpose here, it is pertinent to highlight some relevant studies.

The traditional trade theory that draws connection between trade and employment is the Heckscher-Ohlin Model supplemented by the Stolper-Samuelson Theorem. The theoretical results suggest that trade will benefit the abundant factor of a country. The developing economies being labour abundant, it is predicted that the labour would benefit from larger volume of trade following trade liberalisation. Many new theoretical as well as empirical studies show a positive relationship between trade and employment (see, for instance, Matusz, 1996; Kletzer, 2000, 2001; Winters et al., 2004; Davidson & Matusz, 2005; Dutt et al., 2009; Gorg, 2011). However, this prediction does not match the actual experience of the developing economies in recent decades. Rodriguez and Rodrik (2000) are skeptic about the positive relation between trade openness and economic growth, and hence employment. Several studies show that developing countries have experienced increased income inequality after trade liberalisation (Chamarbagwala, 2006; Meschi & Vivarelli, 2009). Hoekman & Winters (2005) present an extensive survey of literature on labour market implications of trade liberalization.

Further, Wacziarg & Wallac (2004), exploring the liberalisation experience of a set of twenty-five liberalisation episodes across developing countries, show that liberalisation has weakly negative effect on the extent of intersectoral labour shift and it is the broad based reforms including domestic deregulation and privatisation that has greater effect on intersectoral labour movement. In the event of services trade and investment liberalization, Shingal & Sauve (2019) show that unilateral liberalization of services does not lead to net labour displacement in OECD and non-OECD countries during 2014-16. The characteristics of various services might lead to differential impact of services trade liberalisation on employment. Further, impact of services trade liberalization on employment depends on the mode through which services are traded.

The literature on outsourcing and jobs is large. There is a large set of theoretical and empirical papers (Francois, 1990; Bhagwati et al. 2004; Amiti & Wei, 2005; Van Long et al., 2005; Crino, 2009; Grozierd et al., 2014) studying the impact of outsourcing on the labour market in the developed world. Hijzen & Swaim (2007) and Gorg (2011) explain the employment impact of offshoring. Even though relocation effect might have a negative impact on employment, there is likely to be a scale effect with offshoring, which raises productivity and efficiency level of the firm, raising its output and employment. If scale effect outweighs the relocation effect, then offshoring may have a positive impact on employment in the developed countries.

The literature on services trade and employment, and especially on outsourcing and employment, in the context of the developing countries, is however not large. Jones (2001) suggests that with more fragmentation of the production process, the developing economies gain comparative advantage in producing some blocks of a previously

integrated production process. Thus, the developing countries can actively participate in international trade and thereby acquire skills and knowledge about new techniques. In another paper Jones (2008) argues that the question is not about having comparative advantage in any production blocks to participate in international trade, but to find out how to make use of lower-cost services in promoting production of fragments that can fit into a global production network.

Feenstra (2007), in a model of outsourcing with the help of a value chain that arranges activities as per the skill content, argues that the developed countries offshore the activities lying in the lowest slab of the skill ladder to developing nations, and perform the activities requiring more skilled labour at home. If some more activities are to be offshored, the developed countries choose the activities lying at the middle slab of the skill ladder. As a result, the activities performed at home become even more skill oriented. From the perspective of the developing nations, the new offshore activities are more skill-oriented than the previous lot, and this increases the relative demand for skilled labour even in the developing countries. This proves that services trade liberalisation leads to increase in demand for skilled workers. The literature on the subject considers two prime causes for this outcome: a) fragmentation and offshoring, and b) Skill-Biased Technological Change (SBTC) and Routine Biased Technical Progress (RBTC) leading to trade in tasks.

In recent years, many studies have looked into the employment impact of FDI liberalization, which has become a major vehicle of technology transfer into the developing world (Lee & Vivarelli, 2006; Meschi & Vivarelli, 2009; Goldberg & Pavcnik, 2007; Gorg, 2011; Vivarelli, 2018). Dee et al. (2011) find that FDI in services

can have beneficial impact on labour market outcomes for G20 nations by raising productivity of the foreign firm, and causing a dampening effect on the labour requirement there in the first round. In the next round, two mechanisms work towards a positive labour market impact. First, liberalization of investment reduces the cost of production in foreign firms that in turn reduces the price. As a result, demand for the product will increase in both local and foreign markets. Such increased scale of operation can lead to higher employment. Second, expansion of foreign invested firms will lead to increase in labour intensity in production to reap the benefit of low-cost labour in developing economies. With FDI liberalisation the developing countries adopt new technology which raises demand for skilled workers. Most of the reallocation of labour is within the sectors from domestic to foreign invested firms.

1.3.2 Literature on Intergenerational Mobility: Income and Educational Mobility

In this sub-section, the focus is on the literature on intergenerational mobility.[10] There exists a vast literature on intergenerational mobility that studies whether the structural change in the economy has brought about mobility across generations in income, education or occupational choices. While talking about mobility, there are intra-generational or intergenerational mobility studies capturing the movement of workers up or down the social ladder as a result of the structural changes experienced by the economy (Iversen et al., 2017). In this sub-section, the literature on intergenerational mobility of income and education is reviewed, while the existing literature on intergenerational occupational mobility is reviewed in Chapter 4.

[10] Black & Devereaux (2011) provide an early review of the literature and methodology on Intergenerational mobility.

Altonji & Dunn (1991), using National Longitudinal Survey for labour market for relatives either by birth or through marriage in the United States, find strong correlation between income of brothers' pair, sisters' pair, brother-sister pair, as well as father-son pairs. It is found that sons born to fathers in high wage industry is more likely to be entering a high-wage industry. Both Zimmerman (1992) and Solon (1992) using different databases find that the intergenerational income correlation is at least 0.4 and they conclude that relatively less intergenerational income mobility in the US labour market. Solon (1999) also shows that most of the intergenerational impact is unrelated to parental income and depends on the neighbourhood effect. On the other hand, Chetty et al. (2014a) find that the level of intergenerational earnings mobility (national rank-rank slope) has remained stable for the 1971–1993 birth cohorts in the United States. This implies that children entering the current labor market have the same chances of moving up in the income distribution (relative to their parents) as children born in the 1970s.[11] Corak et al. (2014) show that, using a new measure, directional earnings mobility does not differ much across developed countries. However, there are differences in the extent of the movement with larger cross-country differences in downward mobility from the top of the distribution than upward mobility from the bottom.

Neidhofer (2016) study the effect of income inequality on intergenerational mobility within and between country set up for 18 Latin American countries and conclude that a person experiencing higher income inequality in childhood has a negative effect in intergenerational mobility in his adulthood. The paper further asserts that

[11]Chetty et al. (2014b) observes three features of intergenerational mobility in the United States. First, the conditional expectation of child income given parent income is linear in percentile ranks. Second, intergenerational mobility varies substantially across areas within the United States. Third, high mobility areas have (i) less residential segregation, (ii) less income inequality, (iii)better primary schools, (iv) greater social capital, and (v) greater family stability.

economic growth and spread of public education has a positive and significant impact on intergenerational mobility. Galor & Tsidon (1997) show that technological progress leads to increase in return to ability that causes increase in income inequality and a decline in the relative importance of initial condition. This induces greater mobility.

Maoz & Moav (1999), on the other hand, analyse the relation between mobility and income inequality in the presence of liquidity constraint. They find that the correlation between education and ability increases with economic development. The decision of the uneducated section to buy education depends on the wage gap between educated and uneducated. With growth, the liquidity constraints on the poor are eased and that leads to higher mobility in education choices. Bauer & Riphahn (2013) studies the association between educational institutions and intergenerational educational mobility for 26 Swiss cantons. The paper concludes that entering kindergarten and primary school at an early age and tracking of students' ability at a later age are positively correlated with educational mobility. They find supporting arguments that early exposure to schooling may stimulate cognitive abilities, generates positive attitudes towards learning, gives them higher self-esteem, and makes them familiar with the language spoken in school (Currie & Thomas, 1999; Heckman, 2006). This helps the children from less educated parents even more. Also, tracking the students' ability at a later age reduces the possibility of misallocating them. Aydemir & Yazici (2019), using a survey data spanning three generations in Turkey during 2014-15, find that intergenerational educational mobility is higher among the daughters growing up in more developed regions. However, similar relation between development and intergenerational educational mobility is not found for males. Further, it is found that the impact of the

level of development of region of residence has stronger impact on early childhood than adolescence. The paper hints at the probable causal factors like higher degree of availability of schools in the region, availability of social capital, favourable cultural attitude towards women and lower educational inequality in the region to lead to their results. Black et al. (2005) study the causal relationship between parental education and children's education, considering an educational reform in Norway during 1960s through early 70s that led to increased level of parent's education. The paper finds little causal relation between parents' education and child's education except for the case of mother-son pair.

Maitra & Sharma (2009), in their attempt to study educational mobility in India, find that the years of schooling of children does not depend significantly on parental education, thus implying increased educational mobility. With regards to aspect of school progression, it is found that continuing post-secondary schooling or college is dependent on parental education in a positive and significant manner. Hnatkovska et al. (2013), in their endeavour to explore intergenerational mobility rates of the scheduled castes and tribes (SC/ST) in India with the rest of the workforce in terms of their education attainment and wages using several rounds of NSSO data between 1983 and 2005, find convergence in the intergenerational mobility rates of SC / STs to non- SC / ST levels in both education attainment and wages with sharpest change in intergenerational income mobility being observed for middle income households. Further it is observed that intra-generational gaps in education attainment levels, wages and consumption also declined between 1983 and 2004–2005. The paper concludes that, both aggregate growth and reservations for SC / STs in higher education and public sector employment have played

important roles for education mobility convergence. Also, the competitive environment created by economic reforms, strengthening of caste- based networks of SC / STs and the increasing political empowerment of the lower castes over the past 30 years may have played a significant role as well.

Azam & Bhatt (2015), use India Human Development Survey (IHDS) data, prepare a unique son-father matched data for the entire adult male population aged between 20 to 65 years to study intergenerational educational mobility across castes and states in India for successive birth cohorts from 1940 to 1985. They found that father's education as a predictor of son's education has declined significantly across all the birth cohorts and across all social groups and geographic locations. Also, they conclude that the correlation between father and son's education level has declined for the lower end of father's education distribution but has increased for the higher end of father's education distribution. Azam (2016), using IHDS dataset, extends the analysis to intergenerational education mobility among father (mother) and daughters born between 1962 to 1991 and shows that the probability of a daughter remaining illiterate or below primary has declined significantly irrespective of fathers' level of education. Kundu & Sen (2021), using a double difference method on IHDS 2011-12 dataset spanning three generations, find increase in multigenerational education mobility over time i.e., educational mobility is greater among the father-son pair compared to grandfather-father pair. The paper finds higher educational mobility among SC/ST or OBC compared to general caste.

The review of literature on the theoretical underpinning of trade liberalisation and its impact on labour market outcomes with special reference to services trade, reveals that trade liberalisation has a positive impact on employment generation in developing

economies and with skill biased technical change (SBTC) there is an increase in demand for skilled labour in developed as well as developing nations.

The literature on intergenerational income and education mobility reveals that economic development leads to educational mobility by relaxing the financial constraints for the poor, less educated parents and scope of higher education broadens the scope of moving out of father's network and choosing the right industry or occupation for the younger generation. As the theory suggests a positive relation between trade liberalisation and economic growth, connecting the dots of trade, economic growth and intergenerational mobility, there arises a possibility that services trade liberalisation in India, might have led to increased intergenerational mobility regarding choice of industry or occupation. This might be so, as services trade liberalisation might generate increased demand for skilled workers and the younger generation being more adaptive towards trade induced changes in labour demand, are capable and willing to move out of the father's network or traditional family occupation. So, there is a possibility of intergenerational mobility regarding choice of industry and/or occupation in the light of services trade liberalisation in India in the post liberalisation period.

A large part of the existing literature on employment in services sector in India does not base their results on rigorous econometric analysis. . Further, these studies view the services sector as a composite whole, thus ignoring the heterogeneity within the sector. Above all, most studies do not link labour market outcomes with service sector trade in India. Even though the existing literature suggests that India is experiencing job polarization at the aggregate level, no sector specific studies exist. The empirical literature on intergenerational income and educational mobility for India also does not

link such mobility with trade liberalization. Whether services trade liberalisation has any impact on intergenerational sectoral or occupational mobility or whether employment in the services industries also face polarization similar to that of manufacturing sector has not been studied at a disaggregated level.

1.4 Objective of the Study and Summary of Findings

The research objectives of the thesis are:

(1) to understand whether growth in services trade in India has led to any significant change in the choice of industries across generations of workers during 1999-2000 to 2011-12;

(2) to investigate whether there is any significant impact of the growth of services output and exports on the occupational choices across generations in urban India.

(3) to study whether technological advancements and possibility of offshoring of jobs from the developed world in the presence of the structural shift in the economy towards services output and trade create the possibility of changing task intensities of services jobs.

The analyses in the three essays are based on the NSSO 'Employment Unemployment Survey' data for three large sample rounds viz. 55th Round (1999-2000), 61st Round (2004-05) and 68th Round (2011-12). The details of the employment data are provided in the section 1.5. For linking labour market outcomes with services export performance, the services export data at a disaggregated level are taken from Trade in Services Database (TSD_February 2015) version 8.9., the details of which are discussed in the next section. The analysis of intergenerational choice of industry shows persistence in choices of sectors despite services trade liberalisation, as the sons prefer to remain in the same industry as that of their fathers. The probit regression estimation results indicate that father's occupation and status has significant positive impact on persistence. Father's

education above higher secondary level also has a significant positive impact on persistence. However, higher level of son's education and services export performance of the industry sector reduce the degree of persistence.

Using different measures of intergenerational occupational mobility, it is found that there is high degree of persistence among sons regarding their choice of occupation as well. However, the Altham measure of relative mobility shows an upward mobility among sons between 1999-2000 and 2011-12. The multinomial logistic regression results establish that, controlling for other covariates, improved services export performance has played a significant role in ensuring upward intergenerational occupational mobility in India in recent times.

The essay studying the impact of a surge in services export from India on the employment pattern finds the following results: a) the occupational skill distribution measured in terms of median wage earned by the workers, show that the share of employment in the services sector in India has experienced a growth in the jobs belonging to the upper tail of occupational skill distribution (60th percentile and above) during 1999-2000 to 2011-12. However, this study does not find any significant rise in the lower-end jobs; b) the task-based analysis indicates a shift towards higher-end, better quality and non-routine cognitive task intensive jobs. The shift-share analysis confirms that this shift in task intensities is primarily explained by change in occupational structure within the services sector. The probit regression estimation results indicate that among other explanatory variables, improved services export performance have significant positive impact on increasing share of jobs belonging to upper tail of occupational skill distribution.

1.5 Database

For the empirical analyses in this dissertation, two types of data are used: services export data for India in the post liberalization period and employment data of Indian workers. In what follows is a detailed discussion of the databases for these two sets of data used in the empirical analyses.

1.5.1 Services Export Data

The services sector of an economy comprises of diverse economic activities like travel and tourism, transport and storage, information and communication, wholesale and retail trade, financial and insurance services, computer related services, legal, accounting and other business services, and also education, health, and other social, cultural and personal services. A detailed industrial classification the services sector data is given in Appendix Table A1.2.

Services export data at disaggregated level is not available prior to the year 2000. The data provided by Reserve Bank of India, UN Services Trade database, UNCTAD database are explored. After compiling and comparing the Indian services export data from all these sources, Trade in Services Database (TSD_February 2015) version 8.9 is used. Francois & Pindyck (2013), in a discussion paper on an update to the Trade in Services Database, mentioned that this database provides a consolidated and reconciled version of multiple sources of bilateral trade data. The data spans from 1981 to 2010, however, it is mentioned in the paper that the data on early years and 2010 are relatively incomplete as a substantial share of South-South Trade is unreported. This data series serves the purpose here, as the time period for the analysis spans from 1995 to 2011-12.

Alternate to the existing data on trade in services, the General Agreement on Trade in Services (GATS) defines the following four modes of trade in services:

- Mode 1 (Cross-Border): Services supplied from the territory of one Member into the territory of another.
- Mode 2 (Consumption abroad): Services supplied in the territory of one Member to the consumers of another.
- Mode 3 (Commercial presence): Services supplied through any type of business or professional establishment of one Member in the territory of another.
- Mode 4 (Presence of natural persons): Services supplied by nationals of one Member in the territory of another.

However, none of the sources of data provide services trade data based on the modes of service delivery.

Construction of Services Export Tables

For an in-depth analysis of labour market outcomes, export performance of the service industries are matched with employment data. For the purpose, the export data are taken for a five-year span preceding every employment survey rounds i.e., 1995-96 to 1999-2000 for the 55th Round, 2001-02 to 2004-05 for the 61st round, and 2007-08 to 2011-12 for the 68th round (details on the employment database is provided in section 1.5.2). The share of the service industries in total services exports are calculated along with the compound annual growth rate of services export for a previous five-year band (see Appendix Tables A1.4, A1.5 and A1.6).

To analyse the task intensities of services jobs, as the change in share of employment is studied across the three rounds, the share of each service industry in total services export is considered along with the compound annual growth rate of services

exports for the three phases 1999-2000 to 2004-05, 2004-05 to 2011-12 and the entire period 1999-2000 to 2011-2012.

1.5.2 Employment Data

For employment data, 'employment-unemployment' surveys (EUS) conducted by National Sample Survey Organization of India are used. Three of the large sample rounds of survey viz. the 55th Round (1999-2000), the 61st Round (2004-05) and the 68th Round (2011-12) are considered for the current study. It must be mentioned here that after 2011-12, the EUS survey was discontinued and a new format of survey called the Periodic Labour Force Survey (PLFS) was introduced since 2017-18. This was done to solve the problem of low frequency data of NSSO EUS which came out on a quinquennial basis. PLFS data comes out on an annual basis for the rural sector and on an annual and quarterly basis for urban sector. Many studies, for instance, Mehrotra & Parida (2019)[12] and Mitra & Singh (2019), have used both the databases to observe the process of change in the Indian labour market. However, following Jajoria & Jatav (2020) and Jatav & Jajoria (2022), this dissertation refrains from using the two databases in conjunction and restricts itself to the use of the EUS database only.

With regards to employment and occupational structure, unit level records from the quinquennial NSSO 'Employment-Unemployment' surveys are considered. NSSO uses a stratified multi-stage design of sampling. For the first stage, the first stage units

[12] Mehrotra & Parida (2019) argue that the two databases are comparable because of (a) similar interview schedule for collecting employment data as well as other socio-economic and demographic information, (b) almost similar the coverage of number of households, (c) use of multi-stage stratified random sampling method and collection of data in four phases. The paper asserts that as the selection of first stage units and the hamlet groups (sub-blocks of large FSUs) in both these surveys are based on same population size criteria, the overall composition of the samples in the two databases remain comparable. However, the criterion for second stage stratification has changed in the PLFS from the NSSO EUS.

(FSU) are the villages in the rural sector and Urban Frame Survey (UFS) blocks in the urban sector as per 1991 census for the 55th round and as per 2001 census for the 61st and 68th rounds. The ultimate stage units are households in both the sectors. The large FSUs are further sub-divided into hamlet-groups (hgs) in rural areas and sub-blocks (sbs) in urban areas. Within each district of a State/ UT, generally speaking, two basic strata are formed: i) rural stratum comprising of all rural areas of the district and (ii) urban stratum comprising of all the urban areas of the district. However, within the urban areas of a district, wherever there are one or more towns with population 10 lakhs or more as per population census 1991 for the 55th round and as per census 2001 for the 61st, and 68th round in a district, each of them is considered as a separate basic stratum and the remaining urban areas of the district are considered as another basic stratum. In the 55th round, hamlet-groups (hgs) and sub-blocks (sbs) are divided into segment 1 comprising of hg/sb having maximum concentration of non-agricultural enterprises and segment 2comprising two more hg/sb selected from the rest. Then, the households in each segment are stratified into two second stage strata. Affluent households are clubbed as second stage stratum 1 and the rest are clubbed as second stage stratum 2. Sample households are then selected from the respective frames by circular systematic sampling with equal probability. For 61st, and 68th rounds of survey, households in the selected FSU/ hamlet-group/ sub-block are stratified into three second stage strata (SSS). Required number of sample villages for the rural sector is selected from each stratum/ sub-stratum by probability proportional to size with replacement (PPSWR), size being the population of the village as per Census 2001. For urban sector, from each stratum FSUs are selected by using Simple Random Sampling Without Replacement (SRSWOR).

Households listed in the selected FSU/ hamlet-group/ sub-block are stratified into three second stage strata (SSS). From each SSS the sample households for each of the schedules are selected by SRSWOR.

Methodology for construction of the sample dataset: Construction of Intergenerational Employment Tables

To study intergenerational choice of industries, father-son paired up data for the three rounds of NSSO surveys are constructed. For that, the methodology of extracting the data are adopted from Ahsan & Chatterjee (2017). The working sample consists of urban men in the age group of 16 to 35, who are a part of the workforce and are not attending any educational institution. Also, they report their principal industry and principal occupation. They have been paired up with their fathers, who have been identified as the male head of the household. The working sample includes only those father-son pairs who report their principal industry as well as their principal occupation. Construction of this dataset requires a few clarifications.

First of all, we have considered the urban population only, as services trade liberalization is expected to have its impact more on urban people than their rural counterpart. Second, following Hnatkovska et al. (2013) and Ahsan & Chatterjee (2017), co-resident households are considered for this study. As NSSO does not ask for information about the fathers of the individuals surveyed, therefore paired up data on father-son duo can only be generated for the household where father and son co-reside in the same family. Again, families where the father is the head of the household are only considered. This is so, because, households where the son is the head of the household, NSSO does not distinguish between the father or the father-in-law who is co-residing in

the same household and put them under the same code. As a result, sons who are head of the household are dropped from the dataset. Third, like Hnatkovska et al. (2013) and Ahsan & Chatterjee (2017), male population is only considered. The logic behind this draws from the societal norms: after marriage, the daughter leaves the family and becomes a member of another household. So, it is difficult to pair up daughters with their fathers to carry out any effective analysis. Also, female headed households are dropped from the dataset as such households when matched up with their sons comprise of only about 1 per cent of the population under consideration. Last, the upper age limit of a son is kept at 35 years so that his father remains within the working population.

Summary Statistics of the Working Sample

The number of individuals, at various stages of construction of the working samples, in the three rounds is as follows:

Table 1.3: Size of the working sample

	55th Round (1999-2000)	61st Round (2004-05)	68th Round (2011-12)
Urban Population	225500	204808	176236
Population reporting Principal Industry and Occupation	72550	68906	58365
Father-Son Pairs	9134	8586	6980

Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

Table 1.4 depicts the summary statistics on the basic characteristics of the working sample for all three rounds of surveys. Panel A reports the mean age, level of general education, marital status, principal industry and occupation of the son and Panel B reports mean age, level of general education, principal industry and occupation of the father for the whole sample, Non-SC/STs and SC/STs. The figure in the parenthesis reports standard error of coefficients. It shows that on an average, sons are approximately

Table 1.4: Sample Summary Statistics

Variables	Panel A: Son					Panel B: Father			
	Age	Education	Marital Status	Principal Industry Group	Principal Occupation	Age	Education	Principal Industry Group	Principal Occupation
Panel A: All									
1999-2000	23.86 (0.05)	7.32 (0.03)	1.38 (0.01)	4.65 (0.04)	5.79 (0.02)	53.79 (0.08)	5.65 (0.04)	5.20 (0.05)	5.59 (0.03)
2004-05	23.95 (0.05)	7.45 (0.03)	1.38 (0.01)	4.71 (0.04)	5.90 (0.03)	53.16 (0.08)	5.61 (0.04)	5.08 (0.05)	5.79 (0.03)
2011-12	24.93 (0.06)	8.16 (0.04)	1.40 (0.01)	5.25 (0.05)	5.38 (0.03)	54.07 (0.08)	6.01 (0.04)	5.23 (0.06)	5.25 (0.03)
Panel B: Non-SC/ST									
1999-2000	24.54 (0.07)	8.13 (0.05)	1.39 (0.01)	4.76 (0.06)	5.27 (0.04)	54.55 (0.11)	6.63 (0.05)	5.26 (0.07)	5.00 (0.04)
2004-05	24.56 (0.08)	8.19 (0.05)	1.39 (0.01)	4.85 (0.07)	5.30 (0.04)	53.77 (0.12)	6.54 (0.06)	5.21 (0.08)	5.13 (0.04)
2011-12	25.67 (0.09)	8.91 (0.06)	1.44 (0.01)	5.52 (0.08)	4.73 (0.05)	54.83 (0.14)	6.95 (0.07)	5.36 (0.09)	4.56 (0.06)
Panel C: SC/ST									
1999-2000	23.20 (0.07)	6.52 (0.04)	1.36 (0.01)	4.53 (0.06)	6.31 (0.03)	53.05 (0.12)	4.70 (0.05)	5.14 (0.07)	6.16 (0.04)
2004-05	23.55 (0.07)	6.96 (0.04)	1.37 (0.01)	4.61 (0.06)	6.29 (0.03)	52.76 (0.11)	5.00 (0.04)	5.00 (0.07)	6.22 (0.03)
2011-12	24.48 (0.07)	7.71 (0.04)	1.38 (0.01)	5.09 (0.07)	5.77 (0.04)	53.61 (0.11)	5.44 (0.05)	5.15 (0.07)	5.67 (0.04)

Source: Calculations based on NSSO Employment Unemployment Survey database.

24 years of age across groups and the average age of the father across groups is around 53. The average level of education is higher among sons than their fathers for the full sample, non-SC/STs as well as SC/STs. However, the level of education of the general caste is much higher than that of SC/STs, and for all three categories, the level of education has gradually increased over time. The wholesale and retail trade sector occupies the maximum share in son's choice of principal industry for all three groups. In the following two chapters, viz. chapters 2 and 3, intergenerational choice of industries as well as occupation are studied. For the industrial transition matrices, NSSO provides industrial classifications for the 55th and 61st rounds as per National Industrial

Classification NIC 1998 and as per NIC 2008 for the 68th round. The 5-digit industry codes are suitably rearranged and clubbed to form 18 industry groups with agriculture and allied activities as group 1, manufacturing as group 2 and different service industries at disaggregated level as groups 3 to 18 (refer to Appendix Table A1.2). Father's industry groups are arranged column-wise and son's industry groups are arranged row-wise to form the transition matrices presented in Appendix Tables A2.2, A2.3 and A2.4. Each cell P_{ij} represents the number of sons engaged in the j^{th} industry whose father is from the i^{th} industry. The diagonal elements in the matrix reflect persistence of sons in their father's industry and the off-diagonal cells reflect mobility.

Coming next to the occupational choices, NSSO provides occupational classifications for the 55th and 61st rounds as per National Classification of Occupations NCO 1968 and as per NCO 2004 for the 68th round. As per the concordance table for occupational codes for the years 1968 and 2004 published by NCO, the three-digit occupation codes for NCO 1968 are rearranged to form ten occupational groups which are comparable across the three rounds of surveys (refer to Appendix Table A1.3). These ten occupational codes are further grouped as per the nature of task performed to create four smaller groups. Group 1 signifies white collar jobs comprising of legislators, senior officials, managers, professionals, associate professionals, group 2 signifies clerks and service workers that include jobs like personal service providers, shop and market sales workers etc., group 3 signifies skilled agricultural workers, craft and related trade workers and manufacturing labour and assemblers, and group 4 clubs agricultural labourers, mining and construction workers, transport labourers and freight handlers and other elementary occupations. To construct the intergenerational occupational mobility

matrices, father's occupation is put along the columns and son's occupation along the rows (see Appendix Tables A3.1, A3.2 and A3.3 for the three rounds). Here, a cell P_{ij} in the matrix shows the number of sons engaged in j^{th} occupation having fathers in the i^{th} occupation.

As chapter 4 looks into task intensity of jobs in the services sector where jobs are defined as cells of an industry-occupation matrix, the same industry classification of 18 industry groups as defined for chapters 2 and 3 are used here, however, for the occupation codes, the occupation codes of NCO 1968 at 4-digit level are concorded with the113 occupation codes of NCO 2004 at three digit level, and then the 113 occupation codes are suitably regrouped to form 74 occupation codes for the purpose of the analysis (see Appendix Table A4.11). The detailed methodology is discussed in the respective chapter.

1.6 Chapter Scheme

In line with the three objectives presented above, the thesis has three core chapters. The structure of the thesis is as follows: Chapter 2, the first essay, explores impact of growing services trade on the intergenerational job choice of the Indian households/workers towards as well as within services industry. Chapter 3, the second essay, analyses whether there is intergenerational mobility towards service-oriented jobs and more skill-oriented jobs in India in the wake of the structural shift of the economy towards services industry and whether growing services trade has any impact on intergenerational occupational mobility in India. Chapter 4, the third essay, studies the task intensities of services jobs in India. Chapter 5 concludes the thesis with summary of major findings and implications for policy.

Appendix to Chapter 1

Table A1.1: Services Trade Restrictiveness Index for India

	2014	2015	2016	2017	2018	2019
Logistics cargo-handling	0.450	0.440	0.390	0.400	0.400	0.400
Logistics storage and warehouse	0.390	0.380	0.380	0.400	0.400	0.400
Logistics freight forwarding	0.310	0.300	0.300	0.320	0.320	0.320
Logistics customs brokerage	0.320	0.310	0.310	0.330	0.330	0.330
Accounting	0.830	0.830	0.830	0.830	0.830	0.830
Architecture	0.660	0.660	0.660	0.680	0.680	0.680
Engineering	0.290	0.280	0.280	0.300	0.300	0.300
Legal	0.890	0.890	0.890	0.890	0.890	0.890
Motion pictures	0.310	0.300	0.300	0.320	0.320	0.320
Broadcasting	0.430	0.420	0.420	0.440	0.440	0.440
Sound recording	0.270	0.250	0.250	0.280	0.280	0.280
Telecom	0.420	0.420	0.420	0.420	0.420	0.420
Air transport	0.600	0.600	0.540	0.570	0.570	0.570
Maritime transport	0.410	0.400	0.400	0.410	0.400	0.400
Road freight transport	0.310	0.300	0.300	0.320	0.320	0.320
Rail freight transport	1.000	1.000	1.000	1.000	1.000	1.000
Courier	0.560	0.560	0.560	0.570	0.570	0.570
Distribution	0.440	0.430	0.430	0.440	0.440	0.440
Commercial banking	0.500	0.500	0.500	0.520	0.520	0.520
Insurance	0.570	0.550	0.550	0.570	0.570	0.570
Computer	0.360	0.350	0.350	0.380	0.380	0.380
Construction	0.340	0.320	0.320	0.370	0.370	0.350

Source: Compilation based on stats.oecd.org

Table A1.2: Industry Groups

Industry Group	Description	NIC 1998 (For 55th and 61st Rounds)		NIC 2008 (For 68th Round)	
		Tabulation Category	Division (5-digit level)	Tabulation Category	Division (5-digit level)
1	Agriculture	A, B, C	01111-14299	A, B	01111-09900
2	Manufacturing	D, E	15111-22219 22300-41000	C, D, E, J	10101-17099 19101-32909 35101-36000 38300 58111-58132
3	Construction	F	45101-45500	F	41001-43900
4	Wholesale and Retail Trade	G	50101-52609	G	45101-47990 92001-92002
5	Hotel and Restaurant	H	55101-55209	I	55101-56304
6	Transport and Storage	I	60100-63033 63090	H	49110-52294
7	Travel	I	63040	N	79110-79900
8	Post and Telecommunication	I	64110-64204	H, J	53100-53200 61101-61900
9	Financial Services	J	65110-65999 67110-67190	K	64110-64990 66110-66190 66301, 66309
10	Insurance and Pension	J	66010-66030 67200	K	65110-65300 66210-66290 66302
11	Real Estate and Renting	K	70101-71309	L, N	68100-68200 77100-77400
12	Computer and Related Activities	K	72100-72900	J, S	62011-62099 63111-63122 63991-63999 58191-58203 95111
13	Other Business Services	K	73100-74999 22221 22222	C, M, N, P, S	18111-18200 33111-33200 69100-74909 78100-78300 80100-81299 82110-82990 85500 95112-95299
14	Public Administration and Defence	L	75111-75302	O	84111-84300
15	Education	M	80101-80904	P	85101-85307 85420-85499
16	Health and Social Work	N	85110-85320	Q, M	86100-87900 88100, 88900 75000
17	Other Community, Social and Personal Services	O	90001-93090	E, J, N, O, R, S	37001-39000 59111-59202 60100, 60200 63910, 81300 85410 90001- 94990 96010-96908
18	Other Services	P, Q	95000, 99000	T	97000-99000

Source: Based on NIC-1998 and NIC-2004 at 5-digit level

Table A1.3: Occupation Groups

Smaller Occupation Group	Occupation Group	Description	NCO 1968	NCO 2004 (3-digit level)
White Collar jobs (W)	1	Legislators, Senior Officials, Managers	200-299, 360, 600-609.	111-130
	2	Professionals	000-009, 020-029, 050-059, 070-075, 078, 079, 100-103, 109, 110, 119-137, 140-151, 159-170, 180-183, 190, 191, 301.	211-246
	3	Associate Professionals	010, 030-049, 060, 076, 077, 080-090, 104, 111, 139, 152-156, 171-179, 184-189, 193-199, 300, 302, 309, 391, 392, 410, 411, 420-429, 440-449, 570-572, 369, 860-869.	311-348
Clerical & Service-oriented jobs (S)	4	Clerks and Supervisors	310-356, 359, 361, 379, 380, 390, 450-459.	411-422
	5	Service Workers	192, 357, 358, 370, 371, 400-409, 412, 419, 430, 439, 490, 500-530, 539, 560, 573, 590-599.	511-523
Skilled agricultural and manufacturing works (P)	6	Skilled Agricultural and Fishery Workers	610-649, 651-689.	611-620, 920
	7	Craft and related Trade Workers, Manufacturing Labour	399, 711, 712, 714, 715, 718, 719, 731, 739, 751, 752, 755, 756, 761, 762, 769, 770, 774, 776, 777, 781, 782, 784-801, 803, 809, 811=819, 820-834=7, 836, 840, 841, 843, 844-852, 854-859, 870-889, 891, 892, 894, 895, 899, 920-922, 924-943, 950-959, 972.	711-744, 932
	8	Plant and Machine Operators and Assemblers	650, 710, 713, 716, 717, 720-730, 732-734, 740-750, 753, 754, 757-760, 771-773, 775, 778-780, 783, 802, 810, 835, 839, 842, 853, 890, 893, 900-919, 923, 949, 960-970, 973, 974, 979, 981-986.	811-834
Elementary jobs (E)	9	Elementary Occupation	381, 389, 431,499, 531, 540-559, 574, 579.	911-916
	10	Service Labourers	971, 975, 976, 980, 987-999.	931, 933

Source: Compilation from NCO 1968 and NCO 2004 at 3-digit level

Table A1.4: Export Performance of Indian Services Industries for the 55th Round

Panel A:India's Services Export Volume (in US $ million)												
	Transport ation	Travel	Commun ications	Construc tion	Insurance services	Financial services	Computer Information services	Other Business Services	Personal, Cultural & recreational services	Government Services n.i.e.	Services not allocated	Total EBOPS Services
1995-96	1890	2582	56	49	170	15	14	2122		34	30	6932
1996-97	1989	2831	55	103	210	35	30	2149		75	66	7482
1997-98	1942	2890	42	103	229	32	51	3865	8	185	61	9346
1998-99	1773	2949	40	98	230	21	61	6115	8	624	61	11919
1999-00	1844	3010	50	161	238	63	59	8972	4	503	58	14903
Total	9438	14261	242	514	1077	166	214	23224	20	1422	276	50583

Panel B: Percentage Share of the Sector in Total Services Export												
	Transport ation	Travel	Commun ications	Construc tion	Insurance services	Financial services	Computer Information services	Other Business Services	Personal, Cultural & recreational services	Government services n.i.e.	Services not allocated	Total EBOPS Services
1995-96	27.27	37.24	0.81	0.71	2.45	0.21	0.20	30.62	0.00	0.49	0.43	100
1996-97	26.58	37.84	0.73	1.37	2.81	0.47	0.40	28.72	0.00	1.01	0.89	100
1997-98	20.78	30.92	0.45	1.10	2.45	0.34	0.54	41.35	0.08	1.98	0.65	100
1998-99	14.88	24.74	0.34	0.82	1.93	0.18	0.51	51.31	0.07	5.24	0.51	100
1999-00	12.37	20.19	0.33	1.08	1.60	0.42	0.39	60.20	0.03	3.38	0.39	100
Average Share of sector	20.38	30.19	0.53	1.02	2.25	0.32	0.41	42.44	0.04	2.42	0.57	

Source: Calculations based on Trade in Services Database (TSD_February 2015) version 8.9.
https://datacatalog.worldbank.org/dataset/trade-services-database

Table A1.5: Export Performance of Indian Services Industries for the 61st Round

Panel A: India's Services Export Volume (in US $ million)												
	Transport ation	Travel	Commun ications	Construc tion	Insurance services	Financial services	Computer Information services	Other Business Services	Personal, Cultural & recreational services	Government services n.i.e.	Services not allocated	Total EBOPS Services
2000-01	1979	3460	599	502	257	276	4727	4253	7	654	87	16713
2001-02	2050	3198	1104	104	282	306	7407	2451	8	538	77	17449
2002-03	2473	3263	779	231	332	598	8889	2803	9	353	64	19731
2003-04	3022	4463	969	276	408	367	11876	2277	50	269	4881	23975
2004-05	4373	6170	1094	516	842	341	16344	8325	46	350	5740	38400
Total	13897	20553	4545	1630	2121	1888	49244	20109	119	2163	10850	116269
CAGR	17.2%	12.3%	12.8%	0.6%	26.8%	4.3%	28.2%	14.4%	45.6%	-11.7%	130.9%	18.1%

Panel B: Percentage Share of the Sector in Total Services Export												
	Transport ation	Travel	Commun ications	Construc tion	Insurance services	Financial services	Computer Information services	Other Business Services	Personal, Cultural & recreational services	Government services n.i.e.	Services not allocated	Total EBOPS Services
2000-01	11.84	20.70	3.58	3.00	1.54	1.65	28.29	25.45	0.04	3.91	0.52	100
2001-02	11.75	18.33	6.33	0.60	1.62	1.75	42.45	14.05	0.04	3.08	0.44	100
2002-03	12.54	16.54	3.95	1.17	1.68	3.03	45.05	14.21	0.04	1.79	0.33	100
2003-04	12.60	18.61	4.04	1.15	1.70	1.53	49.53	9.50	0.21	1.12	20.36	100
2004-05	11.39	16.07	2.85	1.34	2.19	0.89	42.56	21.68	0.12	0.91	14.95	100
Average Share of sector	12.02	18.05	4.15	1.45	1.75	1.77	41.58	16.98	0.09	2.16	7.32	

Source: Calculations based on Trade in Services Database (TSD_February 2015) version 8.9https://datacatalog.worldbank.org/dataset/trade-services-database

Table A1.6: Export Performance of Indian Services Industries for the 68th Round

Panel A:India's Services Export Volume (in US $ million)												
	Transportation	Travel	Communications	Construction	Insurance services	Financial services	Computer Information services	Other Business Services	Personal, Cultural & recreational services	Government services n.i.e.	Services not allocated	Total EBOPS Services
2007-08	9036	10729	2348	753	1506	3379	37491	40870	510	317	15490	86927
2008-09	11565	11832	2478	841	1559	4291	49112	53403	707	387	19949	107230
2009-10	10980	11136	1486	837	1526	3661	46656	50317	467	406	19877	93036
2010-11	13248	14160	1412	525	1782	5834	56878	62712	335	485	19904	124309
2011-12	17678	17707	1671	838	2585	6249	60446	66695	346	596	8948	138536
Total	44829	47857	7724	2956	6373	17165	190137	207302	2019	1595	75221	411502
CAGR	14.4%	10.5%	-6.6%	2.2%	11.4%	13.1%	10.0%	3.0%	-7.5%	13.5%	-10.4%	9.8%

Panel B: Percentage Share of the Sector in Total Services Export												
	Transportation	Travel	Communications	Construction	Insurance services	Financial services	Computer Information services	Other Business Services	Personal, Cultural & recreational services	Government services n.i.e.	Services not allocated	Total EBOPS Services
2007-08	10.39	12.34	2.70	0.87	1.73	3.89	43.13	23.99	0.59	0.36	17.82	100
2008-09	10.79	11.03	2.31	0.78	1.45	4.00	45.80	17.74	0.66	0.36	18.60	100
2009-10	11.80	11.97	1.60	0.90	1.64	3.94	50.15	12.90	0.50	0.44	21.36	100
2010-11	10.66	11.39	1.14	0.42	1.43	4.69	45.76	17.53	0.27	0.39	16.01	100
2011-12	12.76	12.78	1.21	0.60	1.87	4.51	43.63	17.49	0.25	0.43	6.46	100
Average Share of sector	11.28	11.90	1.79	0.72	1.63	4.21	45.69	17.93	0.45	0.40	16.05	

Source: Calculations based on Trade in Services Database (TSD_February 2015) version 8.9
https://datacatalog.worldbank.org/dataset/trade-services-database

CHAPTER 2

SERVICES TRADE AND CHOICE OF INDUSTRIES: *STUDYING INTERGENERATIONAL MOBILITY OF INDIAN WORKERS*

2.1 Introduction

The Indian economy, as is observed in chapter 1, has experienced wide ranging changes in structure towards the services sector in the past decades, especially since the early 1990s. Along with growth, trade in overall services as well as traditional and non-traditional services witnessed rapid growth during the period. Such growth in services trade has been attributable to fragmentation of production processes in the developed nation, advances in information and telecommunication technologies that have made a large array of services tradable across borders as well as trade and economic reforms that India has pursued since then. Despite lack of commensurate growth in employment and low elasticity of employment in the services sector, the structure of employment has changed towards marketed urban services during 1999-2000 to 2011-12. Such changes in sectoral employment over time are indicative of changing choice of sectors for urban services employment across generations. This chapter, using data on trade in disaggregated services and unit level records on employment, explores whether growing trade in services across sub-sectors impact on the choice of industry for urban male workers leading to intergenerational mobility of workers towards and within service industry in India.

The existing literature (Artuc, 2009; Galor & Tsiddon, 1997; Jones, 2008) shows that services trade liberalisation in the presence of technological advancements in telecommunication services, have tended to widen the range of opportunities to the

younger generation. Trade liberalisation and technological changes relaxes the relative importance of initial conditions and there lies a possibility of improvement in mobility of high ability individuals to technologically more advanced sectors. Discussing the literature on choice of industry across generations is a natural extension of the ideas on structural change developed empirically in the earlier chapter. The literature on workers' choice of industry is however rare.

Artuc (2009) builds a dynamic structural general equilibrium model to study the welfare effect of free trade on workers of different age group. Simulating a hypothetical trade liberalisation to study the impact of trade shock on worker mobility, they find that the estimated cost of moving is large and increases with age and psychological and unobserved factors like ability to move to other sectors play a crucial role in mobility decisions. The high moving cost may arise due to search friction and persistence of shocks. In the simulation study the young workers in the liberalized sector are less affected due to their ability to move.

Further, with economic development, financial constraint of parents often get relaxed, leading to higher educational mobility, and with increasing access to knowledge and skill, there is scope of moving out of father's network in search of better industry of engagement. The intergenerational mobility studies for India have primarily looked at income, educational or occupational mobility but not on mobility across industrial sector of employment. Intergenerational mobility studies on India find increased educational mobility among Indian households in the post liberalisation period (Gang et al., 2012; Iversen et al., 2017; Maitra & Sharma, 2009; Hnatkovska et al., 2013; Azam & Bhatt, 2015; Azam, 2016; Kundu & Sen, 2021).

There are only a couple of studies [Nandi (2015) and Lahiri & Nandi (2020)] focusing on industrial mobility across generations in India. These papers find strong persistence between two generations of workers in choosing industrial sector to work in. Nandi, (2015), studies the effect of education, ownership of productive assets and father's network on the intergenerational persistence of industry. It is observed that educational attainment is an important factor determining intergenerational mobility across industries only when an individual has more than higher secondary level of education. Ownership of productive assets, at the bottom end of asset distribution, has a positive effect on intergenerational persistence. However, it loses importance with increase in asset size as it eases credit constraints to invest in the higher education of sons that leads to mobility across industries. The father's occupational status however, positively affects intergenerational persistence of industry. Using NSSO data for 2004-05, 2009-10 and 2011-12, Lahiri & Nandi, (2020) study intergenerational persistence across Indian States. The probit regression estimates show that higher education level of the son reduces the degree of persistence, however, father's education and ownership of productive assets has greater influence on son's occupational choice compared to his own education and it leads to higher degree of persistence in rural India.

However, these studies based on sectoral mobility for the economy do not necessarily focus on the services sector and trace the impact of growth of services trade on employment and choice of industry for households in the economy. With this backdrop from existing literature, this essay explores whether growing services trade across sub-sectors has any significant impact on the choice of industry of the Indian households/workers leading to intergenerational mobility towards and within services.

The rest of the chapter is as follows. Section 2.2 delineates the methodology for empirical estimation and Section 2.3 presents the estimation results of the Probit model for intergenerational choice of industry. Section 2.4 provides the summary of findings.

2.2 Methodology of Studying Intergenerational Choice of Industries

This chapter uses data for Indian households from the NSSO Employment-Unemployment Survey for the period 1999-2000 to 2011-12 and services export data for India at disaggregated level for the same period. The details of the databases used and the methodology for preparing the working samples of father-son paired data as well as the tables on services export performance for the analysis are detailed in chapter 1. The services export performance tables corresponding to the three rounds of employment data are presented in the Appendix Tables A1.4, A1.5 and A1.6 respectively in chapter1. The size of the working samples and the summary statistics are presented in Table 1.3 and 1.4 respectively in chapter 1.

In the NSSO survey design there is a concept of interpenetrating sub-samples, which needs to be carefully detailed out. In every round, two independent samples are drawn as per the sampling strategy. In the urban sector, simple random sampling without replacement (SRSWOR) is followed. The samples within a sub-sample are drawn independently and separate estimates can be obtained from each of the sub-samples. These sub-sample wise estimates are combined together to arrive at the final estimates. The final multiplier values are computed in a manner so that simple aggregation can generate the estimates. As NSSO calculates the multiplier values as per the sample design

of the survey and posts it in the unit level records, the degree of persistence with and without incorporating the sample weight are tabulated. It is seen that the degree of persistence has gradually declined in all three rounds with higher level of education in sons. Also, the degree of persistence is lowest among the sons belonging to scheduled caste and highest among the sons belonging to general caste in all three rounds of data.

To study intergenerational industry choices, 18 industry groups are considered which are constructed from the 5-digit NIC codes provided by the NSSO, the details of which are presented in Appendix Table A1.2 in chapter 1. The industrial transition matrices are formed by taking fathers' principal industry along the rows and sons' principal industry along the columns. The row-sum represents the number of sons engaged in all 18 industry categories for any particular category of father's industry. The column sum represents the number of fathers for each of son's industry-groups. Clearly, the off-diagonal elements reflect the degree of intergenerational mobility across industry groups. The diagonal elements in the industry transition matrix show the degree of persistence.

From the working sample presented in sub-section 1.5.2 in chapter 1, it can be observed that around 55 per cent of the sons are engaged in the same industry as that of their fathers on an average. Appendix Table A2.1 depicts the degree of industrial persistence among sons in different age groups, with different levels of education, and for sons belonging to different caste and religion.

The industry transition matrices are presented in Appendix Tables A2.2, A2.3, and A2.4 for the NSSO 55th, 61st and 68th rounds respectively. As the industry groups cannot be arranged in ascending or descending order, so calculation of upward or

downward mobility is not possible. It is clear from the transition matrices that there is high degree of persistence among the sons regarding choice of industries in all three rounds of data. Based on the figures in the parentheses representing the percentage of sons engaged in various industries with respect to the row total, it can be observed that barring a few services industry groups like travel, post and telecommunication, financial services, insurance and pension services, public administration and defense, education, health and social work and other elementary services, 50 to 70 percent of sons are engaged in the same industries like their fathers. For the sectors mentioned above, sons have moved towards manufacturing and wholesale and retail trade sectors in all the three years, 1999-2000, 2004-05 and 2011-12. These facts essentially reveal that, despite phenomenal growth in services exports during the 2000s, there is persistence in son's choice of industry for work. This implies that there is lack of intergenerational mobility of workers towards and within services industries. Mobility towards and within services is limited.

In what follows is the presentation of deterministic model, a Probit model, investigating into the factors explaining this pattern of intergenerational persistence of industries and whether growing services export has any influence on choice of industries for the younger generation during 1999-2000 to 2011-12.

2.2.1 The Probit Model

The intergenerational choice-theoretic model is expressed in terms of a Probit Model for econometric estimation purpose. In this model, the son of a worker either chooses to be in the same industry as the father or moves to a different industry. In the

econometric model, the dependent variable (y_i) is defined as 'persistence', which takes a value 1 if both the father and the son are engaged in the same industry and the value 0 otherwise:

$$y_i = \begin{cases} 1 \; if \; son's \; industry \; group \; is \; same \; as \; his \; father's \; industry \; group \\ 0 \; if \; son's \; industry \; group \; differs \; from \; that \; of \; his \; father \end{cases}$$

As explanatory variables, individual characteristics of father and son, household characteristics, and services export performance are important. Household characteristics include household type, religion and caste status of the household. The individual characteristics considered are age, age squared and the marital status of the son, father's age, education level of father and son, principal activity status and type of occupation of both the father and the son. The average share of the service sector on total services export and CAGR of service export industries are considered to account for the impact of service trade on son's choice of industry. The Probit model is specified as:

$$p_i = \Pr[y_i = 1|x_i] = \varphi(x_i' \beta)$$

where $\varphi(.)$ is the standard normal cumulative distribution function.

and

$$x_i' \beta = \beta_\circ + \beta_1 age_i + \beta_2 age_i^2 + \beta_3 Fatherage_i + \beta_4 married_i + \theta' E + \alpha' R + \gamma' SG + \delta' HT + \varepsilon' FE + \mu' FO + \rho' FS + \sigma' SSE + \tau' SEG$$

where, E, R, SG, HT, FE, FO, FS, SSE and SEG represent complete sets of explanatory variables including dummies for education category, religion, social group, household type, father's education, father's occupation, father's activity status, share of services exports in total and service export growth respectively.

2.3 The Empirical Results

Before analysing the probit estimation results, it is instructive to note from results on industry transition matrices presented above that there is persistence in son's choice of industries indicating lack of mobility towards and within the services sector. The industry transition matrices do not reflect any significant employment switches among sons towards liberalized and trade-oriented services sectors. This is despite high growth services GDP and exports in India. Three sets of the probit estimation results essentially explain this pattern of persistence during 1999-2000 to 2011-12. The probit estimation results are presented for the three rounds of data in panel A, B and C respectively in Appendix Tables A2.5, A2.6, and A2.7. In the first set, as the baseline results show, only the individual characteristics of the son and household characteristics as the explanatory variables are considered. In the second, the father's education, occupation and employment status are taken into account along with to check its impact on son's choice of industry. Finally, in the third set of regression, variables relating export performance of service industries are added to the set of explanatory variables to check its impact on intergenerational mobility of sons.

The baseline estimates show that age and age squared do not have any significant effect on intergenerational persistence of industries in all three rounds. Age of the father also does not play any significant role in any of the rounds except during 2004-05 (61st round) when the father's age has a significant negative impact on intergenerational persistence. Marital status plays a significant role in the 61st and 68th rounds, where the married sons are more likely to be employed in the same industry as their fathers. As regards educational characteristics, primary education of sons does not play any

significant role except for the 55th round (1999-2000). However, an education level above higher secondary has significant negative impact on persistence in all three rounds of survey.

It is important to observe, religion is not a significant explanatory variable for the last two rounds but it has a significant impact in the 55th round. It is seen that compared to Hindus, Muslims and Christians are less likely to be engaged in the same industry as that of their fathers. As for the 'social group' as an explanatory variable, it is also seen that incidence of intergenerational persistence is more among the sons belonging to the General category, compared to SC, ST or OBC. This impact is significant in the previous two rounds but it turns out to be insignificant in 2011-12. Household type is a significant explanatory variable in all the three rounds. Compared to the self-employed type of households, the wage earners and casual workers are less likely to be persistent in their choice of industries over the generations.

In the second set of estimation to check father's impact on son's choice of industries, father's education, occupation and employment status are taken into account as explanatory variables along with the ones in the first set of estimation. While the baseline explanatory variables are observed to remain the same for the 55th and 61st rounds, son's education above secondary level has significant negative impact on persistence in the 68th round. Father's level of education does not have any significant impact on son's choice of industries in the previous two rounds, but is significant for secondary or level of education or above in the 68th round. It is seen that compared to illiterate fathers, sons of fathers with higher education are more persistent in their choice of industries. Considering father's occupation as an explanatory variable, we see that

compared to elementary occupation, if a father is engaged in white-collar, clerical and service-oriented jobs or skilled agricultural and manufacturing jobs, there is higher probability of intergenerational persistence. As far as father's employment status is concerned, compared to a self-employed father, it is less likely for the sons of wage-earners to remain in the same industry as that of their fathers, but it is more likely for the sons of casual workers. These results hold good for the 55th and 61st rounds of survey, but father's employment status becomes insignificant in the 68th round, i.e., in 2011-12.

Coming next to the third set of estimation, two dummy variables are introduced for two export performance indicators. For estimation purposes, 18 industry groups are clubbed into three categories depending on whether the sector has low, moderate or high share in services export performance in preceding five years for each round. The compound annual growth rates of services exports are also considered and the 18 industry groups are categorized into three depending on whether the sector experiences low, moderate or high export growth rate. The export growth variable is not introduced in the estimation for the 55th round on account of insufficient data to calculate export growth rates for several services sectors. Both the variables capturing export performance of the services industry have significant negative impact on intergenerational persistence in all three rounds, i.e., 1999-2000 to 2011-12, indicating that higher the compound annual growth rate of export of the service sector or higher the share of the service sector in total services export for each round, it is less likely for the son to be employed in his father's industry. The impacts of other explanatory variables are found to remain the same as in the second set of estimation results.

To sum up the estimation results, the explanatory variables that have significant positive impact on persistence are:

(1) Marital status: married sons are more persistent in their choice of industries than unmarried sons.
(2) Father's Occupation: compared to the fathers engaged in elementary occupation, the sons of fathers belonging to White collar jobs, clerical or service jobs are more likely to be persistent.
(3) Father's status: compared to self-employed fathers, sons of casual workers are more likely to stick to their father's profession.
(4) Father's Education: though this variable is not found to be significant in the previous two rounds of survey, it has a significant positive impact on persistence in 2011-12. Fathers who are educated up to or above higher secondary level are more likely to have their sons in the same industry.

The explanatory variables that are responsible for the observed mobility, though to a lesser extent, are:

(1) Son's Education: son's level of education has significant negative impact on persistence. Sons with higher degree of education are more likely to move out of their father's network. Primary education has significant negative effect on intergenerational persistence of industries in all the rounds except for the 68th round (2011-12). Secondary and higher secondary education became significant driver of mobility during 2004-05 onwards. However, in 2011-12, son's education has no impact on persistence as in the baseline estimates, but is found to have

significant negative impact on persistence when father's network and services trade performance are taken into consideration. Considering all the rounds, sons with more than higher secondary level of education are more likely to switch industry of employment.

(2) Social Group: compared to general category, sons of fathers belonging to SC/ST or other backward classes are more likely to choose industry of work different from their fathers. The social security measures extended by the government towards these social groups has probably widened the scope of employment for the younger generation compared to their fathers. This might explain the reason behind the significance of this variable in explaining mobility. However, it no longer a significant variable in the 68th round. This can be explained by the argument that, over the years, the gap in the facilities available to the two generations has gradually died down, and thus the variable loses its significance.

(3) Household Type: in all three rounds of survey, compared to the self-employed type of households, the wage earners and casual workers are less likely to be persistent in their choice of industries over the generations.

(4) Performance of the service sector in total Services Export: two measures are used to study the impact of this variable, viz.,

(a) Average Share of the sector in total services export

(b) Compound Annual Growth Rate of export of the services sectors

Controlling for individual and household characteristics and father's network, services export performance is found to play a significant negative role on persistence. Compared to non-tradable services, higher the export performance of

the service sectors, greater is the chance of sons moving out of their traditional choice of industries and move into the sectors where new type of employment is being generated.

In the following sub-section, an attempt has been made to provide some intuitive explanations for the trend of employment mobility that is being observed among the younger generation.

2.3.1 An Intuitive Explanation

One plausible explanation to the observed persistence in choice of industries could be that the service sectors experiencing high compound annual growth rates are actually having negligible share in total services export on an average, as shown in Chapter 1. The sectors with higher share in total services exports are computer and information services (42 per cent), other business services (20 per cent), travel (12 per cent) and transport (11 per cent)in 2009-10. Employment in the computer and information services sector is available only to the group of educated youth with some specialized technical knowledge-base. So, this sector might not have generated much employment to the younger generation, even though expansion of this sector has generated employment in other non-traded service sectors through the following channels.

A spurt in growth in IT and IT-enabled services has introduced flexible timings for the workers engaged in IT-BPO services. To match the working hours with that of their foreign clients the working hours has spread from usual formal office hours to a 24-hour flexi-timing set up. This in turn has created demand for transportation services

catering to these new age workers that would run throughout the day. Also, serving office for long hours has led to rise in demand for food joints and food delivery services as well. It has further given a spurt to construction business as the flexible and long working hours compels the workers from suburban areas to stay in the city rather than commuting from distant areas. Therefore, though employment in the computer and information services sector are knowledge-centric and low employment generating, it has linkages with other non-traded services including transport and logistics as well as manufacturing sector that creates employment in these sectors in turn.

As per the IMF Balance of Payments Manual, travel comprises of lodging, food and beverages, entertainment, and transportation consumed by the foreigners within the economy visited—all of which are consumed in the providing economy—and gifts, souvenirs, and articles (irrespective of value) purchased for travelers' own uses and taken out of the economies visited. So, it may be the case that the fruits of export growth in this sector are spread over a number of other non-tradable services as well as goods sectors.

On the whole, as regards son's choice of industry of work, high degree persistence is observed. It can be largely explained by the individual characteristic such as marital status of the son, the household characteristics like the social group, father's network including his education, occupation and activity status. Education level of fathers as well as sons explains persistence/mobility to a significant extent. Comparing the regression results with the observations from the industry transition matrices for the three rounds, it can be inferred that not many sons have entered the tradable services sector by moving out of their father's industry of work. The mobile sons may have primarily been absorbed in the manufacturing sector or wholesale and retail trade sector

and, in some cases, in the transport and construction sector. Intergenerational mobility has remained restricted to a few sectors. At best, intergenerational mobility, though evident on a smaller scale, can be explained by the rapid growth of services exports in the economy along with employment growth in other sectors during the period since 2000. These results are thus nuanced from those of Nandi (2015) and Lahiri & Nandi (2020).

2.4 Summary of Findings

In this essay, whether growing services trade has any impact on the intergenerational mobility among Indian households/workers relating to choice of industry leading to intergenerational employment switches towards service industry is explored. For that, a working sample of father-son duo based on certain characteristics is constructed from the NSSO database along with industrial transition matrices to study the intergenerational choice of industries of the younger generation compared to the older ones. Persistence among sons to remain in the same industry as that of their fathers has been observed between 1999-2000 and 2011-12. This indicates that the industry transition matrices do not reflect any significant switches in industry of employment by workers towards liberalized and trade-oriented services sectors. However, it is found that the degree of persistence, though predominant, is showing a declining trend over the years. Further, it can be observed that sons in general have moved towards manufacturing and whole-sale and retail trade sector irrespective of the industry where their fathers are employed.

The probit regression estimation results delineate the factors underlying such observed persistence in the choice of industries. It is found that marital status has

significant impact on the degree of persistence. Similarly, father's occupation and status has significant positive impact on persistence. It needs to be stressed that if the father is engaged in a better occupation as compared to elementary occupation, there is greater chance that the son will remain in the same industry. However, compared to illiterate sons, higher education level of sons has significant impact on their industry mobility. Educated sons are more mobile in terms of choosing their sector of employment. And finally, it is observed that rising importance of services exports in total, as well as compound annual growth rate of the services exports, has significant negative impact on persistence.

Even though the pace of employment generation is low in services sector, the results do not undermine the role of services trade liberalisation in generating employment in India. However, it might well be the case that services trade liberalisation has generated employment in manufacturing as well as a number of other services sectors through backward and forward linkages. In fact, the concept of embodied services that comes as a package with sales of durable manufactured goods, which is difficult to separate from the manufacturing sector, may have absorbed the employment potential of services sector into manufacturing.

Appendix to Chapter 2

Table A2.1: Incidence of Intergenerational Persistence

	55th Round (1999-2000)	61st Round (2004-2005)	68th Round (2011-2012)	55th Round (1999-2000)	61st Round (2004-2005)	68th Round (2011-2012)
	Without Sample weight			With Sample weight		
All	56.93	54.02	53.72	53.86	51.21	51.12
Age						
16-20 Years	55.56	55.13	55.83	52.39	49.40	55.76
21-25 Years	57.04	52.95	51.23	53.42	51.34	49.79
26-30 Years	56.16	52.99	54.16	55.28	52.23	48.62
31-35 Years	62.46	56.98	56.04	57.74	54.35	52.56
Education						
No Education	61.56	60.48	59.01	60.78	56.89	57.75
Primary Education	55.94	55.38	57.50	54.82	50.81	59.29
Secondary Education	56.95	55.19	55.2	53.12	53.03	52.27
Higher Secondary Education	53.49	53.62	55.15	61.58	51.27	51.78
More than Higher Secondary Education	52.74	45.68	46.1	45.89	43.74	40.79
Caste						
General	59.86	56.87	54.67	55.25	54.07	52.45
Scheduled Caste	50.04	47.22	48.27	50.58	43.57	48.86
Scheduled Tribe	51.47	50.46	52.23	42.48	45.82	46.77
Other Backward Class	55.98	43.57	55.01	54.49	51.69	51.13
Religion						
Hindu	56.39	52.71	52.79	52.65	49.56	48.87
Muslim	58.79	58.34	56.04	58.52	56.21	58.36
Christian	44.19	55.05	51.41	29.67	49.73	38.06
Others	64.46	54.18	59.11	63.16	49.73	55.90

Source: Calculations based on NSSO Employment Unemployment Survey, various rounds.

Table A2.2: Mobility across Principal Industry Groups: 55th Round (1999-2000) (Number of individuals) (weighted)

	Son Industry Group																		
Father Industry Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total
1	600	99	108	180	20	58	0	1	2	0	5	0	6	22	16	5	8	0	1132
	(53)	(9)	(10)	(16)	(2)	(5)	(0)	(0)	(0)	(0)	(0)	(0)	(1)	(2)	(1)	(0)	(1)	(0)	(12)
2	16	1284	105	341	19	72	1	10	20	2	4	13	26	9	16	9	26	0	1972
	(1)	(65)	(5)	(17)	(1)	(4)	(0)	(0)	(1)	(0)	(0)	(1)	(1)	(0)	(1)	(0)	(1)	(0)	(22)
3	14	89	433	130	8	37	0	1	5	0	3	0	5	1	7	2	22	2	759
	(2)	(12)	(57)	(17)	(1)	(5)	(0)	(0)	(1)	(0)	(0)	(0)	(1)	(0)	(1)	(0)	(3)	(0)	(8)
4	42	227	117	1775	24	117	1	13	22	3	3	12	23	10	30	12	16	3	2450
	(2)	(9)	(5)	(72)	(1)	(5)	(0)	(1)	(1)	(0)	(0)	(1)	(1)	(0)	(1)	(1)	(1)	(0)	(27)
5	5	42	13	50	173	16	0	0	1	0	0	0	0	2	1	0	3	0	307
	(2)	(14)	(4)	(16)	(56)	(5)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(1)	(0)	(0)	(1)	(0)	(3)
6	20	159	73	260	20	266	3	5	5	0	2	8	7	2	12	4	9	4	860
	(2)	(19)	(8)	(30)	(2)	(31)	(0)	(1)	(1)	(0)	(0)	(1)	(1)	(0)	(1)	(0)	(1)	(0)	(9)
7	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	4
	(0)	(0)	(0)	(0)	(0)	(0)	(7)	(0)	(0)	(0)	(0)	(75)	(17)	(0)	(0)	(0)	(1)	(0)	(0)
8	1	10	1	8	3	6	0	9	0	1	0	0	6	1	1	1	1	0	48
	(1)	(22)	(2)	(16)	(7)	(13)	(0)	(18)	(0)	(1)	(0)	(0)	(13)	(1)	(1)	(3)	(2)	(0)	(1)
9	2	19	0	25	2	3	0	2	17	2	0	3	8	0	4	0	1	0	88
	(2)	(21)	(0)	(28)	(3)	(4)	(0)	(2)	(19)	(2)	(0)	(3)	(9)	(0)	(5)	(0)	(2)	(0)	(1)

1-Agriculture, 2-manufacturing, 3-Construction, 4-Wholesale and Retail Trade, 5- Hotel and Restaurant, 6- Transport and Storage, 7- Travel, 8-Post and Telecommunication, 9- Financial Services, 10-Insurance and Pension, 11-Real Estate and Renting, 12- Computer and Related Activities, 13- Other Business Services, 14- Public Administration and Defense, 15- Education, 16- Health and Social Work, 17- Other Community, Social and Personal Services, 18- Other Services

Table A2.2: Mobility across Principal Industry Groups: 55th Round (1999-2000) (Number of individuals) (weighted) Continued…

	Son Industry Group																		
Father Industry Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total
10	0	3	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	5
	(0)	(66)	(0)	(15)	(0)	(0)	(0)	(0)	(17)	(2)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
11	0	2	0	13	2	5	0	0	1	0	14	0	1	0	1	0	1	0	39
	(0)	(5)	(0)	(33)	(4)	(13)	(0)	(0)	(1)	(0)	(36)	(0)	(2)	(0)	(3)	(0)	(3)	(0)	(0)
13	5	12	4	20	3	7	0	0	1	1	0	1	41	1	7	2	2	0	108
	(5)	(11)	(4)	(19)	(2)	(6)	(0)	(0)	(1)	(1)	(0)	(1)	(38)	(1)	(6)	(2)	(2)	(0)	(1)
14	18	99	66	179	9	48	0	6	16	0	5	18	20	85	40	12	20	1	640
	(3)	(15)	(10)	(28)	(1)	(7)	(0)	(1)	(3)	(0)	(1)	(3)	(3)	(13)	(6)	(2)	(3)	(0)	(7)
15	5	51	5	89	1	11	0	6	0	0	2	1	14	2	24	3	5	0	218
	(2)	(23)	(2)	(41)	(1)	(5)	(0)	(3)	(0)	(0)	(1)	(0)	(6)	(1)	(11)	(2)	(2)	(0)	(2)
16	1	23	3	22	1	3	1	1	0	0	2	1	2	2	2	12	1	0	77
	(2)	(30)	(4)	(29)	(1)	(4)	(1)	(1)	(0)	(0)	(2)	(1)	(3)	(3)	(3)	(15)	(2)	(0)	(1)
17	8	39	33	60	1	13	0	0	2	1	1	0	5	5	5	6	174	2	355
	(2)	(11)	(9)	(17)	(0)	(4)	(0)	(0)	(0)	(0)	(0)	(0)	(1)	(1)	(1)	(2)	(49)	(0)	(4)
18	0	17	0	21	2	6	0	0	3	0	0	0	0	0	0	3	8	13	72
	(0)	(24)	(0)	(30)	(2)	(8)	(0)	(0)	(4)	(0)	(0)	(0)	(0)	(0)	(0)	(4)	(11)	(18)	(1)
Total	737	2176	962	3173	288	668	6	54	95	10	41	59	166	142	167	71	297	24	9134
	(8)	(24)	(11)	(35)	(3)	(7)	(0)	(1)	(1)	(0)	(0)	(1)	(2)	(2)	(2)	(1)	(3)	(0)	

1-Agriculture, 2-manufacturing, 3-Construction, 4-Wholesale and Retail Trade, 5- Hotel and Restaurant, 6- Transport and Storage, 7- Travel, 8-Post and Telecommunication, 9- Financial Services, 10-Insurance and Pension, 11-Real Estate and Renting, 12- Computer and Related Activities, 13- Other Business Services, 14- Public Administration and Defense, 15- Education, 16- Health and Social Work, 17- Other Community, Social and Personal Services, 18- Other Services

Source: Calculations based on NSSO Employment Unemployment Survey-55th Round
(Figures in the parenthesis of each row show percentage of sons engaged in various industries for each of father's category)
(Figures in the parenthesis of the last column depicts the percentage of fathers belonging to different industries)

Table A2.3: Mobility across Principal Industry Groups: 61st Round (2004-05) (Number of individuals) (weighted)

	Son Industry Group																		
Father Industry Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total
1	475	142	106	193	16	94	0	7	14	2	9	1	7	9	10	19	17	0	1121
	(42)	(13)	(9)	(17)	(1)	(8)	(0)	(1)	(1)	(0)	(1)	(0)	(1)	(1)	(1)	(2)	(2)	(0)	(13)
2	27	1297	123	256	20	94	0	13	19	2	9	11	17	12	22	14	26	1	1963
	(1)	(66)	(6)	(13)	(1)	(5)	(0)	(1)	(1)	(0)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(0)	(23)
3	10	124	401	120	10	26	0	7	1	0	2	3	18	4	4	30	15	1	777
	(1)	(16)	(52)	(15)	(1)	(3)	(0)	(1)	(0)	(0)	(0)	(0)	(2)	(1)	(1)	(4)	(2)	(0)	(9)
4	47	309	118	1566	20	76	2	22	14	0	17	8	21	4	15	16	11	2	2269
	(2)	(14)	(5)	(69)	(1)	(3)	(0)	(1)	(1)	(0)	(1)	(0)	(1)	(0)	(1)	(1)	(0)	(0)	(26)
5	6	40	22	48	152	16	0	3	0	0	3	0	6	3	1	2	1	0	304
	(2)	(13)	(7)	(16)	(50)	(5)	(0)	(1)	(0)	(0)	(1)	(0)	(2)	(1)	(0)	(1)	(0)	(0)	(4)
6	10	121	87	171	27	186	0	17	10	5	1	4	12	0	21	1	18	5	694
	(1)	(17)	(13)	(25)	(4)	(27)	(0)	(2)	(1)	(1)	(0)	(1)	(2)	(0)	(3)	(0)	(3)	(1)	(8)
7	0	1	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	5
	(0)	(28)	(0)	(28)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(29)	(0)	(15)	(0)	(0)	(0)	(0)
8	3	16	2	14	0	9	0	9	5	0	0	1	10	0	9	1	1	0	80
	(4)	(20)	(3)	(17)	(0)	(11)	(0)	(11)	(7)	(0)	(0)	(1)	(12)	(0)	(11)	(2)	(2)	(0)	(1)
9	0	7	1	20	2	3	0	2	10	0	0	3	4	0	1	0	0	2	55
	(0)	(13)	(3)	(35)	(3)	(5)	(0)	(4)	(17)	(0)	(0)	(6)	(7)	(1)	(1)	(1)	(0)	(4)	(1)

1-Agriculture, 2-manufacturing, 3-Construction, 4-Wholesale and Retail Trade, 5- Hotel and Restaurant, 6- Transport and Storage, 7- Travel, 8-Post and Telecommunication, 9- Financial Services, 10-Insurance and Pension, 11-Real Estate and Renting, 12- Computer and Related Activities, 13- Other Business Services, 14- Public Administration and Defense, 15- Education, 16- Health and Social Work, 17- Other Community, Social and Personal Services, 18- Other Services

Table A2.3: Mobility across Principal Industry Groups: 61st Round (2004-05) (Number of individuals) (weighted) Continued…

	Son Industry Group																		
Father Industry Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total
10	0	2	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	5
	(0)	(33)	(0)	(11)	(0)	(0)	(0)	(0)	(26)	(3)	(0)	(20)	(0)	(4)	(0)	(3)	(0)	(0)	(0)
11	0	14	1	15	3	4	0	0	8	2	15	3	1	0	4	0	0	0	69
	(0)	(21)	(2)	(21)	(4)	(6)	(0)	(0)	(11)	(3)	(22)	(4)	(1)	(0)	(6)	(0)	(0)	(0)	(1)
12	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	9
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(100)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
13	2	24	5	27	0	2	0	3	8	0	0	3	25	6	2	0	2	0	108
	(2)	(22)	(4)	(25)	(0)	(2)	(0)	(2)	(7)	(0)	(0)	(3)	(23)	(5)	(2)	(0)	(2)	(0)	(1)
14	21	76	37	88	7	60	2	21	14	0	1	11	23	63	23	9	11	4	471
	(4)	(16)	(8)	(19)	(2)	(13)	(0)	(4)	(3)	(0)	(0)	(2)	(5)	(13)	(5)	(2)	(2)	(1)	(5)
15	8	45	3	36	6	4	0	12	2	1	0	5	2	7	34	0	21	0	186
	(4)	(24)	(2)	(19)	(3)	(2)	(0)	(7)	(1)	(1)	(0)	(3)	(1)	(4)	(18)	(0)	(11)	(0)	(2)
16	1	9	12	26	6	6	0	2	0	0	0	1	4	2	7	10	1	0	86
	(1)	(10)	(14)	(30)	(7)	(7)	(0)	(3)	(0)	(0)	(0)	(1)	(5)	(2)	(8)	(11)	(1)	(0)	(1)
17	0	41	12	60	4	30	0	1	5	0	1	0	8	1	3	0	144	0	312
	(0)	(13)	(4)	(19)	(1)	(10)	(0)	(0)	(1)	(0)	(0)	(0)	(3)	(0)	(1)	(0)	(46)	(0)	(4)
18	1	18	15	9	1	13	0	3	2	0	0	5	0	3	0	1	1	2	73
	(1)	(24)	(21)	(13)	(1)	(17)	(0)	(4)	(2)	(0)	(0)	(7)	(0)	(4)	(0)	(1)	(1)	(3)	(1)
Total	611	2287	945	2651	274	622	4	121	112	13	58	68	158	114	157	103	269	19	8586
	(7)	(27)	(11)	(31)	(3)	(7)	(0)	(1)	(1)	(0)	(1)	(1)	(2)	(1)	(2)	(1)	(3)	(0)	

1-Agriculture, 2-manufacturing, 3-Construction, 4-Wholesale and Retail Trade, 5- Hotel and Restaurant, 6- Transport and Storage, 7- Travel, 8-Post and Telecommunication, 9- Financial Services, 10-Insurance and Pension, 11-Real Estate and Renting, 12- Computer and Related Activities, 13- Other Business Services, 14- Public Administration and Defense, 15- Education, 16- Health and Social Work, 17- Other Community, Social and Personal Services, 18- Other Services

Source: Calculations based on NSSO Employment Unemployment Survey-61st Round

(Figures in the parenthesis of each row show percentage of sons engaged in various industries for each of father's category)

(Figures in the parenthesis of the last column depicts the percentage of fathers belonging to different industries)

Table A2.4: Mobility across Principal Industry Groups: 68th Round (2011-12) (Number of individuals) (weighted)

	Son Industry Group																		
Father Industry Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total
1	395	86	65	73	14	48	0	7	4	5	5	3	19	7	14	5	7	2	757
	(52)	(11)	(9)	(10)	(2)	(6)	(0)	(1)	(1)	(1)	(1)	(0)	(2)	(1)	(2)	(1)	(1)	(0)	(11)
2	13	1075	78	153	9	45	8	21	26	16	13	48	36	8	25	4	13	4	1593
	(1)	(67)	(5)	(10)	(1)	(3)	(1)	(1)	(2)	(1)	(1)	(3)	(2)	(1)	(2)	(0)	(1)	(0)	(23)
3	7	119	431	69	12	40	0	5	1	0	2	13	16	5	5	10	13	0	748
	(1)	(16)	(58)	(9)	(2)	(5)	(0)	(1)	(0)	(0)	(0)	(2)	(2)	(1)	(1)	(1)	(2)	(0)	(11)
4	11	219	73	1068	26	68	0	19	25	11	8	25	74	4	22	12	16	12	1694
	(1)	(13)	(4)	(63)	(2)	(4)	(0)	(1)	(1)	(1)	(0)	(1)	(4)	(0)	(1)	(1)	(1)	(1)	(24)
5	2	39	14	31	98	16	0	0	4	0	2	8	4	4	3	2	8	0	235
	(1)	(16)	(6)	(13)	(42)	(7)	(0)	(0)	(2)	(0)	(1)	(4)	(2)	(2)	(1)	(1)	(4)	(0)	(3)
6	7	103	66	132	10	177	6	16	9	15	3	5	61	2	15	8	22	15	673
	(1)	(15)	(10)	(20)	(2)	(26)	(1)	(2)	(1)	(2)	(0)	(1)	(9)	(0)	(2)	(1)	(3)	(2)	(10)
7	0	0	0	0	0	0	1	0	0	0	0	1	2	0	0	3	0	0	6
	(0)	(0)	(0)	(0)	(0)	(0)	(13)	(0)	(0)	(0)	(0)	(9)	(27)	(0)	(0)	(51)	(0)	(0)	(0)
8	1	3	1	9	1	3	0	2	2	0	0	4	4	0	2	2	3	0	37
	(2)	(8)	(2)	(24)	(2)	(9)	(0)	(6)	(6)	(0)	(0)	(12)	(10)	(0)	(4)	(7)	(9)	(0)	(1)
9	0	10	1	6	4	8	3	0	7	0	1	11	7	1	4	6	0	0	70
	(0)	(15)	(1)	(9)	(5)	(11)	(5)	(0)	(10)	(0)	(2)	(16)	(9)	(2)	(6)	(9)	(0)	(0)	(1)

1-Agriculture, 2-manufacturing, 3-Construction, 4-Wholesale and Retail Trade, 5- Hotel and Restaurant, 6- Transport and Storage, 7- Travel, 8-Post and Telecommunication, 9- Financial Services, 10-Insurance and Pension, 11-Real Estate and Renting, 12- Computer and Related Activities, 13- Other Business Services, 14- Public Administration and Defense, 15- Education, 16- Health and Social Work, 17- Other Community, Social and Personal Services, 18- Other Services

Table A2.4: Mobility across Principal Industry Groups: 68th Round (2011-12) (Number of individuals) (weighted) Continued…

	Son Industry Group																		
Father Industry Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total
10	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	4	0	6
	(0)	(9)	(0)	(22)	(0)	(0)	(0)	(0)	(0)	(4)	(0)	(0)	(0)	(0)	(3)	(0)	(62)	(0)	(0)
11	0	12	0	6	2	6	0	0	1	0	39	0	7	0	0	6	4	0	85
	(0)	(15)	(0)	(7)	(2)	(7)	(0)	(0)	(1)	(0)	(46)	(0)	(9)	(0)	(0)	(7)	(5)	(0)	(1)
12	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	(0)	(0)	(0)	(87)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(13)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
13	4	48	16	58	6	10	0	2	21	6	5	17	112	5	21	9	3	0	342
	(1)	(14)	(5)	(17)	(2)	(3)	(0)	(1)	(6)	(2)	(1)	(5)	(33)	(1)	(6)	(3)	(1)	(0)	(5)
14	3	29	27	48	4	23	0	11	19	6	1	10	21	40	28	7	3	1	281
	(1)	(10)	(10)	(17)	(1)	(8)	(0)	(4)	(7)	(2)	(0)	(4)	(8)	(14)	(10)	(2)	(1)	(0)	(4)
15	2	13	4	15	2	5	1	12	6	0	0	19	9	0	17	2	0	2	108
	(2)	(12)	(3)	(14)	(2)	(5)	(1)	(11)	(5)	(0)	(0)	(18)	(9)	(0)	(15)	(2)	(0)	(2)	(2)
16	0	22	1	12	4	4	0	2	1	1	0	1	13	1	1	20	1	0	85
	(0)	(26)	(1)	(14)	(5)	(5)	(0)	(3)	(1)	(1)	(0)	(1)	(16)	(1)	(1)	(24)	(1)	(0)	(1)
17	4	20	26	24	2	12	0	0	8	0	0	8	7	4	5	0	76	1	197
	(2)	(10)	(13)	(12)	(1)	(6)	(0)	(0)	(4)	(0)	(0)	(4)	(3)	(2)	(2)	(0)	(39)	(0)	(3)
18	0	4	2	22	0	4	0	0	0	0	0	1	7	4	2	0	5	9	62
	(0)	(7)	(4)	(36)	(0)	(6)	(0)	(0)	(0)	(0)	(0)	(1)	(11)	(7)	(3)	(0)	(8)	(15)	(1)
Total	448	1802	804	1729	193	469	19	98	133	61	80	175	399	86	163	98	177	46	6980
	(6)	(26)	(12)	(25)	(3)	(7)	(0)	(1)	(2)	(1)	(1)	(3)	(6)	(1)	(2)	(1)	(3)	(1)	

1-Agriculture, 2-manufacturing, 3-Construction, 4-Wholesale and Retail Trade, 5- Hotel and Restaurant, 6- Transport and Storage, 7- Travel, 8-Post and Telecommunication, 9- Financial Services, 10-Insurance and Pension, 11-Real Estate and Renting, 12- Computer and Related Activities, 13- Other Business Services, 14- Public Administration and Defense, 15- Education, 16- Health and Social Work, 17- Other Community, Social and Personal Services, 18- Other Services

Source: Calculations based on NSSO Employment Unemployment Survey-61st Round

(Figures in the parenthesis of each row show percentage of sons engaged in various industries for each of father's category)

(Figures in the parenthesis of the last column depicts the percentage of fathers belonging to different industries)

Table A2.5: Probit Estimation Results: Household Characteristics

Variables	1999-2000		2004-05		2011-12	
	Coefficient	Robust Standard Error	Coefficient	Robust Standard Error	Coefficient	Robust Standard Error
Age	0.0147	0.028	-0.0331	0.028	-0.0365	0.032
Age Squared	-0.0002	0.001	0.0005	0.001	0.0007	0.001
Father's Age	-0.0017	0.002	-0.0049**	0.002	-0.0012	0.003
Married	0.0414	0.038	0.2160***	0.038	0.1316***	0.040
Education						
Primary Education	-0.1165**	0.052	-0.0982*	0.055	-0.0364	0.073
Secondary Education	-0.062	0.048	-0.0768	0.052	-0.078	0.069
Higher Secondary Education	-0.1419	0.202	-0.1218*	0.066	-0.0869	0.079
More than Higher Secondary Education	-0.1682***	0.062	-0.2702***	0.063	-0.2557***	0.076
Religion						
Muslim	-0.0893**	0.038	-0.0494	0.039	-0.0775*	0.041
Christian	-0.1789**	0.089	0.2482***	0.092	-0.0241	0.093
Others	0.1845**	0.071	0.0822	0.070	0.1042	0.078
Social Group						
Scheduled Tribe	-0.0534	0.080	-0.2625***	0.082	-0.0167	0.080
Scheduled Caste	-0.1983***	0.049	-0.2031***	0.047	-0.1298**	0.053
Other Backward Class	-0.1187***	0.034	-0.1367***	0.033	-0.0494	0.036
Household Type						
Wage Earners	-1.0609***	0.035	-1.0990***	0.035	-0.8903***	0.037
Casual Labour	-0.3106***	0.044	-0.3361***	0.044	-0.1390***	0.047
Other	-0.3593***	0.106	-0.0754	0.116	0.4462**	0.194
Log pseudolikelihood	-5015.03		-5303.2959		-4443.0808	
Number of observations	8105		8573		6975	

* Denotes estimate is significant at 10 per cent level.,
** Denotes estimate is significant at 5 per cent level,
*** Denotes estimate is significant at 1 per cent level,
Blank space denotes estimate is not significant.

Table A2.6: Probit Estimation Results: Household Characteristics & Father's Network

Variables	1999-2000		2004-05		2011-12	
	Coefficient	Robust S.E	Coefficient	Robust S.E	Coefficient	Robust S.E
Age	0.031	0.029	-0.0303	0.028	-0.0441	0.032
Age Squared	-0.0005	0.001	0.0005	0.001	0.0008	0.001
Father's Age	-0.0034	0.002	-0.0059**	0.002	-0.0011	0.003
Married	0.0544	0.040	0.2176***	0.038	0.1397***	0.040
Education						
Primary Education	-0.1371**	0.054	-0.1181**	0.057	-0.0692	0.075
Secondary Education	-0.0814	0.052	-0.1096**	0.056	-0.1577**	0.072
Higher Secondary Education	-0.0996	0.242	-0.1487**	0.070	-0.2161***	0.083
More than Higher Secondary Education	-0.1380*	0.072	-0.2858***	0.071	-0.4232***	0.084
Religion						
Muslim	-0.1040***	0.039	-0.053	0.039	-0.061	0.041
Christian	-0.1451	0.092	0.2545***	0.092	-0.0328	0.094
Others	0.1910***	0.072	0.0764	0.070	0.1059	0.078
Social Group						
Scheduled Tribe	-0.0756	0.082	-0.2517***	0.083	-0.0014	0.080
Scheduled Caste	-0.1858***	0.051	-0.1764***	0.048	-0.0771	0.054
Other Backward Class	-0.1284***	0.035	-0.1282***	0.033	-0.0306	0.036
Household Type						
Wage Earners	-0.6194***	0.070	-0.8442***	0.061	-0.8233***	0.070
Casual Labour	-0.3893***	0.080	-0.3554***	0.076	-0.1046	0.093
Other	-0.2450**	0.109	0.0188	0.117	0.4822**	0.194
Father's education						
Primary Education	0.0516	0.041	0.0537	0.040	0.0754	0.046
Secondary Education	-0.0129	0.046	-0.0074	0.044	0.1327***	0.049
Higher Secondary Education	-0.3147	0.357	0.056	0.074	0.3369***	0.076
More than Higher Secondary Education	0.0505	0.077	-0.025	0.070	0.1387*	0.071
Father's Occupation						
White-collar Jobs	0.037	0.060	0.0752	0.055	0.2637***	0.060
Clerical and service-oriented Jobs	0.2655***	0.054	0.2675***	0.050	0.2328***	0.060
Skilled agricultural and manufacturing Jobs	0.1657***	0.048	0.0881**	0.044	0.1570***	0.051
Father's Activity Status						
Wage Earners	-0.4836***	0.071	-0.3077***	0.064	-0.0754	0.074
Casual Labour	0.1668**	0.081	0.0852	0.076	0.0686	0.091
Log pseudolikelihood	-4751.22		-5233.8715		-4417.9344	
Number of observations	7731		8572		6975	

* Denotes estimate is significant at 10 per cent level., ** Denotes estimate is significant at 5 per cent level, *** Denotes estimate is significant at 1 per cent level. Blank space denotes estimate is not significant.

Table A2.7: Probit Estimation Results: Household Characteristics + Father's Network + Impact of Services Trade

Variables	1999-2000		2004-05		2011-12	
	Coefficient	Robust Standard Error	Coefficient	Robust Standard Error	Coefficient	Robust Standard Error
Age	0.0464	0.029	-0.014	0.029	-0.014	0.032
Age Squared	-0.0008	0.001	0.0002	0.001	0.0002	0.001
Father's Age	-0.0037	0.002	-0.0062**	0.002	-0.0013	0.003
Married	0.0493	0.040	0.1995***	0.038	0.1355***	0.040
Education						
Primary Education	-0.1514***	0.054	-0.1209**	0.057	-0.0724	0.076
Secondary Education	-0.1001*	0.053	-0.1115**	0.056	-0.1319*	0.073
Higher Secondary Education	-0.1876	0.239	-0.1638**	0.071	-0.2071**	0.084
More than Higher Secondary Education	-0.1303*	0.074	-0.2895***	0.072	-0.3678***	0.085
Religion						
Muslim	-0.0970***	0.039	-0.0473	0.039	-0.0564	0.042
Christian	-0.1525*	0.093	0.2676***	0.092	0.0005	0.096
Others	0.1956***	0.073	0.073	0.072	0.1048	0.078
Social Group						
Scheduled Tribe	-0.0951	0.082	-0.2785***	0.084	-0.0168	0.081
Scheduled Caste	-0.1909***	0.051	-0.1688***	0.049	-0.0947*	0.054
Other Backward Class	-0.1317***	0.036	-0.1337***	0.034	-0.0273	0.037
Household Type						
Wage Earners	-0.6227***	0.071	-0.8391***	0.062	-0.8045***	0.072
Casual Labour	-0.4194***	0.079	-0.3841***	0.076	-0.1632*	0.094
Other	-0.2618**	0.110	0.0659	0.117	0.4866**	0.193
Father's education						
Primary Education	0.0568	0.041	0.0546	0.041	0.0656	0.046
Secondary Education	-0.0053	0.046	-0.0186	0.044	0.1259**	0.049
Higher Secondary Education	-0.2737	0.352	0.0679	0.076	0.3187***	0.078
More than Higher Secondary Education	0.0919	0.079	0.0075	0.071	0.1460**	0.073
Father's Occupation						
White-collar Jobs	-0.0012	0.061	0.0554	0.057	0.2547***	0.061
Clerical and service-oriented Jobs	0.2134***	0.055	0.2063***	0.051	0.2034***	0.061
Skilled agricultural and manufacturing Jobs	0.1275***	0.049	0.3580**	0.045	0.1338***	0.052
Father's Activity Status						
Wage Earners	-0.4637***	0.072	-0.3018***	0.065	-0.0479	0.076

Casual Labour	0.2023**	0.081	0.094	0.076	0.0996	0.092
Share of Sector in Total Services Export						
Moderate	-0.5095***	0.060	0.3648***	0.128	-0.4584***	0.061
High	-1.0218***	0.123	-1.1554***	0.250	-2.3513***	0.411
Services Export Growth Rate						
Moderate	---		-1.0082***	0.119	-0.2658***	0.064
High	---		-0.2288***	0.076	---	
Log pseudolikelihood	-4675.06		-5105.5296		-4278.5325	
Number of observations	7731		8572		6975	

* Denotes estimate is significant at 10 per cent level,
** Denotes estimate is significant at 5 per cent,
*** Denotes estimate is significant at 1 per cent level.
Blank space denotes estimate is not significant.

CHAPTER 3

SERVICES TRADE AND INTERGENERATIONAL OCCUPATIONAL MOBILITY IN INDIA: *SOME EVIDENCE*

3.1 Introduction

This essay investigates into whether unprecedented growth in services exports since the 1990s in India leads to intergenerational occupational mobility towards and within services sector. With high growth, the services export basket has diversified with the emergence of non-traditional services. Despite growth and structural changes in services exports, as has observed in earlier chapters, employment growth in the services sector has remained low. Self-employed and wage earners account for a larger proportion of total employment in the services sector. It has been observed in Chapter 2 that even though younger urban male have largely continued to work in their father's industry, there is evidence of the new generation of workers being increasingly mobile with regards to their choice of industry of work. Further, as Ramaswamy & Agrawal (2012) highlight, young male workers in the services sector improved their share in regular jobs while middle-aged men lost their share in regular jobs and moved to self-employment.

Along with intergenerational mobility with regards to choice of industry, liberalisation of services in the presence of fragmentation of global production and automation of production processes widens the scope of occupational diversity and thereby leading to mobility of new generation working population of the economy. In India, as has been observed in Chapter 1, there is increasing occupational diversity for urban services jobs, with increase in the share of white-collar jobs as against a decline in the share of all other occupational categories. Chanda (2011) is of the view that growth in

outsourcing and establishment of offshore development centers in India has important spillover effects on Indian labour market in terms of occupational diversity and mobility. Jones (2008) delves into the link between services trade liberalization and occupational choice by highlighting that services trade liberalization tends to increase competition between generations. It is argued by Jones (2008) that greater access to foreign education and sources for credit along with services trade liberalisation and easy access to information obtained through better information and communication network have tended to widen the range of occupational choices for the younger generations who are better endowed with human capital compared to the older generation.

This essay tries to focus on the intergenerational occupational mobility of Indian workers in the wake of the structural shift of the economy towards services industry. It is commonly understood that advancements in information and telecommunication technologies widen the scope of employment for the younger generations and creates new types of jobs which were not available for the previous generations. In specific, the paper explores whether young working population in India is shifting to service-oriented or skill-oriented jobs thus leading to intergenerational occupational mobility towards and within services industry.

The rest of the chapter is as follows. Section 3.2 presents a brief review of literature on occupational mobility. Section 3.3 explains in somewhat detail the methodology used in the empirical exercise. Section 3.4 discusses the results on intergenerational occupational mobility towards and in India's services sector. Section 3.6 summarizes the findings of the chapter.

3.2 Review of literature

There is a vast literature on occupational choice. An in-depth review of the existing literature will make the issues relating to intergenerational occupational mobility clearer. The initial theoretical work by Banerjee and Newman (1993) builds a model where occupational choice is made on the basis of initial wealth distribution among workers. This study places self-employment above wage employment highlighting that it is the poorest segment of the population who, being unable to get capital from the credit market in absence of any collaterals, go for wage employment. On the contrary, as Jacob (2007) argues, large proportion of the self-employed workforce in developing countries are engaged in activities providing only subsistence level of income and are poorer than the wage-earners. Accordingly, occupational choice depends on three explanatory variables including human capital, risk aversion and initial wealth. Jacob's paper proposes that agents, who choose self-employment over wage-employment, have lower educational level and belong to lower income level, and that, high-skilled entrepreneurs have the highest level of schooling and are the richest group in the economy. Munshi (2011), in a theoretical model along with an empirical analysis based on India, highlights the role of newly established community network in facilitating occupational mobility. Such network grows rapidly in communities with least outside option and that it reduces the impact of parental network and wealth and strengthens the possibility of intergenerational mobility. However, historically disadvantaged communities are found to lack financial capital to build such network, which acts as a constraint for such community-based mobility. For such community network to become successful, it is observed that the initial number of entrants must be sufficiently large.

Early empirical analysis by Dunn & Eakin (1996), using National Longitudinal Survey to study the impact of parental wealth and human capital on the probability of switching from wage earners to self-employment, find that son's own financial asset has significant but quantitatively modest impact, while parents' capital is found to have greater influence on son's choice of occupation. However, the strongest effect is through the parents' human capital. It is seen that offspring of a self-employed father has greater propensity to become an entrepreneur, as capital constraints are relaxed for them and, more importantly, parents transmit valuable experience and managerial knowledge.

Emran & Shilpi (2011), studying intergenerational occupational mobility in Nepal and Vietnam, find intergenerational occupational persistence is not driven by unobserved genetic correlations across generations and gender effects in occupational mobility, and also observe that the degree of intergenerational occupational mobility in developing countries is both gender and country specific. Bello & Morchio (2022), using British household panel data for the period 1991 to 2008, find that people pursuing same occupation as their father's usually put more emphasis on factors other than productive advantage of their own, thereby leading to misallocation of resources. The observed 78 per cent of persistence in occupation choice is explained by parental network along with social contacts. In the absence of parental network and preference, welfare gains are higher for the sons. Also, parental network loses importance as search friction vanishes. For a skill-based dual sector developing economy like India, Banerjee (2021), using data on current weekly status of persons between 15 to 60 years of age from NSSO 2011-12 in a partial equilibrium framework, finds that capital constraint and possession of human capital play the pivotal role in occupational choices.

Hnatkovska et al. (2013), along with studying educational and wage mobility as is elaborated in chapter 1, find decline in intra-generational gaps in occupation choices among SC/ST population in India between 1983 and 2004–2005. Gang et al. (2012) show significant occupational diversification in India, with socially backward households in rural India catching up non-scheduled occupations indicating occupational mobility. Iversen et al. (2017), using the India Human Development Survey (IHDS)-II conducted in 2011–12 and opting for 'fine-grained categorization of occupations' by taking into account the differences in skill levels across occupations as well as their place in India's social hierarchy of labour, find that there is substantial persistence in occupation type and income category in India. In contrast to previous studies, Iverson et al. (2017) find higher occupational mobility among forward castes than among SCs and STs and greater mobility in urban than in rural areas. Compared to 2004-05, there is greater occupational mobility among individuals in the lowest ranked occupational category but there is less mobility in the second lowest ranked occupational category in 2011-12. Simultaneously, the prospects for downward mobility are large in India, larger among rural residents and among SCs and STs. Kundu & Sen (2021), in addition to studying educational mobility as discussed in chapter 1, find that multigenerational occupational mobility has not increased over time. The paper also finds that occupational mobility has not taken place over three generations in SC/ST or OBC groups compared to general caste. However, none of the above studies on India, except Ahsan & Chatterjee (2017), have investigated into the impact of intergenerational occupational mobility.

Ahsan & Chatterjee (2017) study the impact of trade liberalization on intergenerational mobility in urban India and find that a son residing in a district more

exposed to trade liberalization is more likely to be in a higher ranked occupation than that of his father. This holds for a father belonging to the below-median income distribution. This study, like Hnatkovska et al. (2013), shows that trade-induced innovation in high-tech firms raises the employment share of high-skill occupations. Though it might have negative impact on cross-sectional equality, it allows an increasing number of individuals to enter occupations that are better than their parents. To empirically examine the relationship between trade and intergenerational occupational mobility, exploiting the geographic variations in exposure to trade liberalization, the paper finds that a son residing in a district in India more exposed to trade liberalization is more likely to be in a higher ranked occupation than that of his father. This holds for a father belonging to the below-median income distribution. Additionally, they find that increased investment in education does not explain the observed results but only facilitates upward occupational mobility in urban districts.

There is another strand of literature on occupational mobility that relies on Altham Statistic[1] to measure the extent of mobility across time and across nations. To start with, Altham & Ferrie (2007), in order to compare intergenerational occupational mobility in the United States in the period between 1850 and 1880 with that between 1880 and 1910, explain the process of arriving at and analyzing the mobility measures from the two contingency tables. Long & Ferrie (2013), using nationally representative data of 10,000 father-son pairs for United States and Britain for the period 1850 to 1900 and 1950 to 1970, find that US had higher intergenerational occupational mobility compared to Britain during the 19th century and US in the late 20th century.

[1] This follows Long & Ferrie (2007, 2013), Altham & Ferrie (2007), and Ferrie (2005).

Intergenerational occupational mobility in the US is found to have declined in the 20th century and is no greater than mobility observed in similar other developed nations.

Xie & Killewald (2013), presenting a critique of Long & Ferrie (2013), conclude that mobility in US market has not declined in the post-1900 period. According to them, Long & Ferrie (2013) data are more limiting than acknowledged by the authors and the Altham measure based on odds-ratio to get a measure of social mobility is not appropriate for studying the occupation group. Farmers are qualitatively distinct from other categories of workers in keeping their original social distribution intact. Modalsli (2015), using multinomial logistic regression models to an intergenerational sample of Norwegian data to estimate Altham measure by incorporating individual covariates, concludes that the age controls have only moderate impact on the estimated Altham measure. Perez (2019) also uses Altham Measure to compare rates of intergenerational occupational mobility across four countries in the late 19th-century and concludes that Argentina and US had greater mobility than Britain and Norway.

This methodology has also been used by a number of researchers to study in intergenerational occupational mobility in Indian labour market. Reddy (2015), using Altham measure as in Long & Ferrie (2013) on NSSO Employment Unemployment Survey data for male workers in India for the period 1983 to 2012, shows that association between sons' occupations and fathers' occupations was significantly higher in 2012 than in 1983. It is also found that men in the SC/ST categories had lower occupational mobility in 2012 compared to 1983 and they experienced a higher decline in mobility compared to the aggregate decline in mobility between 1983 and 2012. Azam (2015), using Altham Statistic on India Human Development Survey (IHDS) data among men

born between 1945 and 1985 in India, show higher degree of occupational mobility in the 1975-84 birth cohort compared with mobility in the 1945-54 birth cohort. The paper has also focused on mobility among different social groups. The existing literature on this issue considers schooling or level of education as the most important variable in occupational choice decisions in developing economies. Sinha (2018), using Altham measure on six rounds of NSSO data between 1983 and 2010, finds that at the same level of father's outcome, there are significant gaps across caste groups in terms of intergenerational mobility rates. There is weak convergence of gap in educational mobility at the lower level of father's educational outcome but the same is not reflected in occupational mobility. Also, the convergence is weaker in relatively faster growing states. Finally, comparing across disadvantaged groups it is seen that STs lag behind SCs in realising the benefits of reservation policies for attaining higher education or high skilled occupation.

The literature focusing on intergenerational occupational mobility in India, primarily conclude that there is high degree of association between the fathers and son's occupational choices. The existing literature has considered the standard categorization of the occupations including white-collar, farmer, skilled and semi-skilled and unskilled workers for studying intergenerational occupational mobility with no special emphasis on services categories. Further, existing studies are rare, except Ahsan & Chatterjee (2017), that have looked into intergenerational occupational mobility in the context of trade liberalization and growing trade in India. There is no study that has looked into the impact growing services trade on son's occupational choice in India. With this backdrop of existing literature, this essay investigates into the intergenerational job choice in India

for urban male population since the late 1990s with growing trade in services. For the purpose, using NSSO database, a new classification of occupations is considered here, for instance. white-collar jobs, clerical and service–oriented jobs, skilled agricultural and manufacturing jobs and elementary jobs. It has to be in reckoning that any study on intergenerational mobility is usually carried out using panel data on parents and their children, but constructing panel data on labour mobility in India is not quite available.

3.3 The Methodology for Studying Intergenerational Choice of Occupation

As in chapter 2, this chapter also uses the same dataset, the NSSO Employment-Unemployment Survey for the 55th (1999-2000), 61st (2004-05) and 68th (2011-12) rounds. This chapter also relies on the same set of working samples of father-son duo for the three rounds and the same services export performance indicators as used in chapter 2. To recollect, the size of the working samples and the summary statistics are presented in Tables 1.3 and 1.4 respectively in chapter 1. To study intergenerational occupational choices, ten occupation categories are formed initially on the basis of the 3-digit occupation codes provided by NSSO as per NCO 1968 for the 55th and 61st rounds and NCO 2004 for the 68th round, and thereafter the ten 10 occupation categories are regrouped to form the four occupation categories including white-collar jobs, clerical and service–oriented jobs, skilled agricultural and manufacturing jobs, and elementary jobs. The occupation categories used in this analysis are on the basis of NCO codes presented in Table A 1.3 in chapter 1.

The intergenerational occupational mobility matrices are constructed by putting father's occupation along the rows and son's occupation along the columns. The 4 x 4

occupational transition matrices for the three rounds are presented in Appendix Tables A3.1, A3.2 and A3.3. The off-diagonal elements in the matrix reflect the degree of intergenerational mobility across occupation groups, while the diagonal elements show the degree of persistence. From the occupation transition matrices, using the simple measure of mobility[2], the upward and downward occupational mobility of the sons are calculated as follows: as the occupation categories are arranged in terms of skill-orientation of the occupations, the sum of the cells to the left of the diagonal elements as a percentage of total number of father-son pairs denote upward occupational mobility. Similarly, the sum of the cells to the right of the diagonal elements as a percentage of total number of father-son pairs gives downward occupational mobility. Along with occupation transition matrices, Altham measure is used to observe intergenerational occupational mobility in India.

3.3.1 Methodology for estimation of Altham Measure

Altham & Ferrie (2007) elaborately discuss the tools to compare contingency tables generated through cross-classification of data by two characteristics, a measure of the association between rows and columns in a two-way table and a measure of how the row and column associations differ across two such tables, together with a test of the hypothesis that the associations are identical. It explains the way to standardize two tables to have same marginal frequencies depicting same occupational distribution across the two time periods to make the study of association between two tables more meaningful. Long & Ferrie (2013) also use the same methodology.

[2]This is expressed as a ratio of sum of off-diagonal elements to total number of father-son pairs in the respective transition matrix.

The methodology used in Long & Ferrie (2007, 2013), Altham & Ferrie (2007), and Ferrie (2005), is used in this paper to compare mobility across time. The fundamental measure of association between rows and columns in a mobility table is the cross-product ratio, which for a mobility matrix, P=$\begin{bmatrix} P11 & P12 \\ P21 & P22 \end{bmatrix}$, is (P_{11}*P_{22}) / (P_{12}*P_{21}) that can be rearranged to give (P_{11}/P_{12})/(P_{21}/P_{22}). This gives the ratio of the odds that sons of fathers in job 1 get job 1 rather than job 2 to the odds that sons of fathers in job 2 get job 1 rather than job 2. If there is perfect mobility, the cross-product ratio would be one: sons of job 1 fathers would have no advantage in getting job 1 relative to sons of job 2 fathers. The more the cross-product ratio exceeds one, the greater the relative advantage of having a job 1 father in getting job 1 (Long & Ferrie 2013).For contingency tables with more than two rows and columns, there can be a number of such odds ratios that can be used to compare two mobility matrices. As proposed by Altham (1970), for two tables P and Q with r rows and s columns, the Altham statistic *d(P,Q)* is expressed as

$$d(P,Q) = \left[\sum_{i=1}^{r}\sum_{j=1}^{s}\sum_{l=1}^{r}\sum_{m=1}^{s}\left|log\left(\frac{p_{ij}p_{lm}q_{im}q_{lj}}{p_{im}p_{lj}q_{ij}q_{lm}}\right)^{2}\right|\right]^{1/2}$$

The Altham statistic d(P,Q) measures the distance between the row-column association in Table P with that of in Table Q. As this measure cannot reflect which table has stronger association, we can replace one table with an identity matrix of the (r x s) order and calculate d(P,I) and d(Q, I) to get the distance of table P or Q from a matrix representing perfect mobility. If d(P,Q) ≠ 0, and d (P,I) < d (Q, I) then Table P is closer to the identity matrix depicting perfect mobility compared to Table Q and in that case, Table P is said to have greater mobility compared to Table Q. A likelihood-ratio chi-square test

statistic G^2 with (r-1) (s-1) degrees of freedom is then used to test the null hypothesis that the association between the two tables do not differ (Altham & Ferrie, 2007). If the null hypothesis is rejected, the alternate hypothesis $d(P,Q) \neq 0$ is accepted, which proves that the degree of association between rows and columns of table P differ from the degree of association of rows and columns of table Q significantly (Long & Ferrie, 2013).

As the Altham measure is a pure function of odds-ratios, it is not affected by differences in the marginal frequencies (Ferrie 2005). Since $[d (P,Q)]^2$ is the sum of square of log odd-ratio contrasts, it can be decomposed into its constituent elements. For (r x s) contingency tables, there are [r(r-1)/2][s(s-1)/2] odds ratios in d(P,Q) and it will be possible to calculate how much each odds ratio contributes to $[d(P,Q)]^2$ and in the process, identify the locations where the distance between P and Q are the greatest (Long & Ferrie, 2013). The Altham measure, thus, helps to find whether there is occupational mobility between fathers and sons and the occupational switches that explain the occupational mobility the most. However, the Altham measure thus arrived at does not include the impact of other covariates on mobility.

3.3.2 Methodology for estimating Altham Measure with Covariates

Following Modalsli (2015), a Multinomial Logistic Regression model is used to understand the impact of covariates on Altham Measure for the three rounds of employment data. Treating the son's choice of occupation as the dependent variable, the model is constructed with a set of N occupations with the first one set as the reference outcome. Occupations are denoted by 'o', with superscript 'f' and 's' denoting father and

son respectively, and 'q' represents individuals. The model tries to estimate a system of N-1 equations for son's occupation, indexed by k. The model is presented as

$\log(\frac{\Pr(o=k)}{\Pr(o=1)}) = \alpha_k + \beta_k' D_q + \gamma_k' X_q$, k= 2,3,….,N , for our present purpose, N = 4.

where $D_q = \{D_{2;q}; D_{3;q}; \ldots\ldots D_{N,q}\}$ is a vector of dummy variables where $D_{z;q} = 1$ if father's occupation is z and $D_{z;q} = 0$ otherwise. β_k and γ_k are parameter vectors; β_k^i refers to the i^{th} element of β_k. For the sake of completeness, the parameters for the reference group are also defined, with α_1 set to zero and β_1' and γ_1' as vectors of zeros. Estimated probability ratios do not depend on the choice of reference category. β_k' represents the slope coefficient for the dummy variable for father's occupation, and γ_k' represent the vector of slope coefficients for the full set of covariates. Individual characteristics of both the son and the father including age of the son as well as the father, dummy variables for marital status of the son, education level of the son and the father, employment status of the father along with dummy variables for religion, social group and household type to represent the household characteristics are introduced in the set of covariates. To check whether services trade performance has any impact on son's choice of occupation, dummy variables representing export performance of service industries are introduced. Here, the same set of dummies are used as used in chapter 2 to control for the services export performance in estimating the Altham measure with covariates.

In a generalized form, the log odds ratio of son's occupation choices between Occupation j and m, against father's occupation choice between occupation i and l, given occupation 1 as the base outcome is expressed as the following:

$\log(\frac{(Pij/Pim)}{(Plj/Plm)}) = (\beta_j^i - \beta_m^i) - (\beta_j^l - \beta_m^l)$

As the Altham statistic measuring distance from an identity matrix or perfect mobility matrix defined by Altham & Ferrie (2007), Long & Ferrie (2013) and Ferrie (2005) as

$$D(P,I) = \left(\sum_{i=1}^{N} \sum_{j=1}^{N} \sum_{l=1}^{N} \sum_{m=1}^{N} \left[\log\left(\frac{(Pij/Pim)}{(Plj/Plm)} \right) \right]^2 \right)^{1/2}$$

Therefore, the estimated Altham ratio without covariates is measured by

$$D(P,J) = \left(\sum_{i=1}^{N} \sum_{j=1}^{N} \sum_{l=1}^{N} \sum_{m=1}^{N} [(\beta ji - \beta mi) - (\beta jl - \beta ml)]^2 \right)^{1/2}$$

It can be proved that the Altham measure estimated without covariates would generate identical measure as derived from the contingency table.[3] Further, using the standard errors of estimation of the parameters $\beta_{k,}$ the confidence intervals are calculated through a parametric bootstrapping technique.[4]

The Altham measure is calculated from the estimated values of $\beta_{k,}$ i.e., the slope coefficient of the dummy variable D_q representing father's occupation. Four sets of MLM are run taking each of four occupation categories as the base outcome each time, to get the full set of β- values for estimating the Altham measure. As the NSSO data uses weights, so it is checked that the Altham measure estimated with β- values from the MLM run without covariates and with frequency weight generate identical Altham measure as derived from the contingency table. However, the bootstrap sampling technique could not be applied with frequency weight in Stata, so for comparing the Altham measures with and without covariates, the MLM is run with bootstrap sampling and without frequency weight. Following Modalsli (2015), this chapter investigates into the impact of a set of covariates on the estimated Altham measure and shows whether the introduction of the control variables, especially services trade performance, impact on intergenerational occupational choice of sons as compared to their fathers.

[3]Refer to Appendix in Modalsli (2015) for proof.
[4]Refer to Appendix in Modalsli (2015) for the detailed process.

3.4 The Empirical Results

The analyses that follow is based on the empirical results on intergenerational occupation mobility in India during 1999-2000 and 2011-12. Further, the analyses look into whether growing services trade has impacted on occupational choice of children as against their parents. The results presented in Table 3.1 show that, for all three rounds of household survey, there is high degree of persistence in choice of occupation between father and son. More than 60 per cent of sons are engaged in their father's occupation only. On an average 37 per cent sons have moved out of their father's network and a distinct pattern of choice can be observed for all three rounds of survey. Further, based on Appendix Tables A3.1 to A3.3, it is observed that sons of fathers engaged in skilled agricultural and manufacturing related occupations have primarily moved towards clerical and service-related jobs. The rate of upward mobility has marginally improved over the years.

Table 3.1: Occupational Mobility Measure (in per cent)

	Persistence	Mobility	Upward Mobility	Downward Mobility
1999-2000	63.2	36.8	17.67	19.13
2004-2005	61.97	38.03	19.55	18.49
2011-2012	62.15	37.85	20.67	17.18

Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

The Altham measure d(P, Q) shows relative mobility between two points of time. In this exercise, the points of time considered are 1999-2000 vis-à-vis 2004-05 and 2004-05 vis-à-vis 2011-12, as well as between the initial year, 1999-2000, and the terminal year, 2011-12. For each set, the transition matrix of the initial year is termed as Table P and that of the later year is termed as Table Q. For relative mobility to exist, the distance between the tables P and Q, [d(P,Q)] has to be non-zero. The condition d(P,I) < d(Q, I)

indicates that sons in the initial round of survey has greater mobility than sons in the later round of survey. It is found from Table 3.2 that relative mobility in all the three pairs of time are significant at 1 per cent (see Panel 1 for 1999-2000 vis-à-vis 2004-05, Panel 2 for 2004-05 vis-à-vis 2011-12, and Panel 3 1999-2000 vis-à-vis 2011-12). The results in Table 3.2, Panel 1, shows there is significant difference in son's mobility between 1999-2000 and 2004-05, with sons in 1999-2000 having relatively higher degree of mobility compared to sons in 2004-05.In contrast, the results in Table 3.2, Panel 2, show that along with significant difference in degree of association between the two tables, there is greater degree of mobility among sons in 2011-12 compared to 2004-05. When the initial and terminal years are compared, it is observed from Table 3.2, Panel 3, that the distance between the occupation transition matrices of 1999-2000 and 2011-12 is significant, and mobility is higher in 2011-12 as compared to 1999-2000.

Table 3.2: Summary Measure of Mobility

		d(P,I)	d(Q,I)	d(P,Q)
Panel 1	55th Round (P) vs. 61st Round (Q)	25.48***		6.16***
			26.41***	
Panel 2	61st Round (P) vs. 68th Round (Q)	26.41***		5.87***
			24.73***	
Panel 3	**55th Round (P) vs. 68th Round (Q)**	**25.48*** **		**4.46*** **
			24.73* **	

*, **, and ***denote significance at 10 per cent, 5 per cent and 1 per cent respectively.
Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

The odds ratio contrasts are estimated which explain the specific interactions between father's and son's occupations and how much each of these ratios do contribute to the distance between the two matrices. For matrices with r rows and s columns, there

can be {r(r-1)/2}{s(s-1)/2} odds ratios. As a result, for the 4 x 4 matrices in this study, there are 36 such odds ratio contrasts.[5] In Table 3.3, only those 12 odds ratio contrasts are presented that have contributed up to 80 per cent of the difference in associations in Table P (1999-2000) and Table Q (2011-12).

Table 3.3: Components of d(P,I), d(Q,I), and d(P,Q): 1999-2000 vis-à-vis 2011-12

Contrast	d(p,I)	Odds Ratio	d(q,I)	Odds Ratio	d(p,q)	Percentage of Total d(p,q)	Cumulative percentage
(WW/WE)/(SW/SE)	4.56***	9.78	2.75***	3.95	1.82***	16.58	16.58
(SW/SE)/(EW/EE)	5.26***	13.88	6.73***	28.99	1.47***	10.92	27.51
(WW/WP)/(SW/SP)	3.81***	6.71	2.46***	3.42	1.35***	9.16	36.66
(WW/WE)/(PW/PE)	6.22***	22.47	4.90***	11.58	1.33***	8.85	45.52
(SW/SS)/(EW/ES)	2.40***	0.30	1.27***	0.53	1.13***	6.43	51.95
(WW/WS)/(SW/SS)	5.91***	19.17	4.86***	11.37	1.04***	5.49	57.44
(WS/WE)/(PS/PE)	2.39***	3.31	1.39***	2.01	1.00**	5.05	62.48
(PW/PE)/(EW/EE)	3.60***	6.04	4.58***	9.88	0.98***	4.88	67.36
(SW/SP)/(EW/EP)	1.77***	2.42	2.65***	3.77	0.88**	3.94	71.30
(WW/WP)/(PW/PP)	7.14***	35.50	6.31***	23.42	0.83***	3.48	74.78
(WS/WE)/(SS/SE)	1.35***	0.51	2.12***	0.35	0.77*	2.99	77.77
(SW/SS)/(PW/PS)	2.08***	0.35	1.36***	0.51	0.72**	2.61	80.38

*, **, and ***denote significance at 10 per cent, 5 per cent and 1 per cent respectively.
Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

The first element (WW/WE)/(SW/SE) measures the ratio of odds that the son of a white collar father would take up white collar job as against elementary unskilled job to the odds that the son of a service worker would enter white collar job rather than elementary job. The distance between this odds ratio from independence is greater in 1999-2000 than in 2011-12. This implies that sons of white collar fathers had greater

[5] The full set of 36 odds-ratio contrasts is provided in the Appendix Table A3.4.

advantage over sons of service workers in entering white collar job rather than elementary job in 1999-2000. That relative advantage came down significantly in 2011-12 with increasing chance of upward mobility for the sons of service workers. The distance between the two tables for this particular ratio is significantly different from zero and the square of this distance explains 16.6 per cent of square of the total distance between tables P and Q. The distance between this odds ratio and independence is greater in 1999-2000 compared to 2011-12. This indicates that, sons of white collar fathers had greater advantage in entering white collar job rather than elementary job in 1999-2000. Thus, mobility has increased in 2011-12 with regards to this odds ratio.

The second entry [(SW/SE)/(EW/EE)] in Table 3.3 contributes 10.92 per cent of total difference in association between Tables P and Q. It measures the relative advantage of sons of service workers than elementary unskilled workers in entering white collar job as against elementary job. The odds ratio suggests that the relative advantage increased from 13.88 times to 28.99 times between 1999-2000 and 2011-12 for taking up a white collar job as against elementary jobs for the sons of service workers compared to sons of unskilled elementary workers. The distance between this odds ratio and independence is significant at 1 per cent level and is greater in 2011-12 compared to 1999-2000, which indicates that sons of service workers get more advantage than sons of elementary workers in attaining white collar job rather than elementary job. Even though mobility is observed to have declined over the years for this particular odds ratio, it clearly signifies the advantage of clerical and service-oriented jobs over elementary jobs for the fathers to ensure upward mobility for their sons.

The third element is (WW/WP)/(SW/SP) measures the ratio of odds that the son of a white collar father would take up white collar job as against skilled agricultural or manufacturing jobs to the odds that the son of a service worker would enter white collar job rather than skilled agricultural or manufacturing jobs. The odds ratio contrasts for the two rounds of household survey show that the relative advantage of sons of white collar workers than service workers in entering a white collar job to a production oriented job came down from 6.7 times to 3.4 times. This particular odds ratio shows greater mobility in 2011-12 than in 1999-2000. This ratio contributes 9.2 per cent of overall distance between P and Q.

The fourth element (WW/WE)/(PW/PE) contributes 8.85 per cent of total distance between 1999-2000 and 2011-12. The odds ratio in tables P and Q indicate that for getting a white collar job rather than an elementary job, the relative advantage of sons having a white collar father as against a father engaged in production of agricultural or manufacturing sector came down from 22.5 time to 11.6 times. Comparing the distance of association of tables P and Q from independence, it can be observed that the degree of mobility increased over the 10-year period.

Among other odds ratios, the sixth and the tenth ones, need special mention. For the sixth one, i.e. (WW/WS)/(SW/SS), which contributes 5.5 per cent of the total difference, the relative advantage of sons having white collar fathers than service or clerical worker as father in getting a white collar job as against clerical or service-oriented job, declined from 19.17 times to 11.37 times. This implies that upward mobility in occupation improved over the years. This result is supported by the evidence that the distance from independence is significantly lower in 2011-12 than in 1999-2000

suggesting improved degree of mobility over the years. For the tenth entry, i.e. (WW/WP)/(PW/PP), though it contributes only 3.5 per cent of the total difference, the relative advantage of sons of white collar fathers compared to fathers in the production sector, in choosing a white collar job rather jobs in production of agricultural or manufacturing goods, came down from 35.5 times to 23.4 times. This also indicates improved upward mobility for the sons of non-white collar workers. The distance measure for this odds ratio also suggests the same as the distance of association from independence is less in 2011-12 than in 1999-2000.

The Multinomial Logistic regression model results show differences in the Altham measure without covariates estimated with and without frequency weights (see Table 3.4). It can also be observed from the table that controlling for covariates lead to decline in the Altham measure which would imply increase in mobility of sons in choosing occupations different from their fathers. It is seen that in all three rounds, after controlling for covariates including services trade, sons choose occupations different from their fathers in a bigger way.

Table 3.4: Estimated Altham Measure with control variables

	1999-2000		2004-2005		2011-2012	
	d(P,I)	Confidence Interval	d(P,I)	Confidence Interval	d(P,I)	Confidence Interval
With Freq weight (no Covariates_ Actual)	25.48		26.41		24.75	
Without Freq weight (no Covariates)	26.26	(25.80 - 26.90)	26.88	(26.29 - 27.64)	24.97	(24.43 - 25.69)
Without Freq weight (including Covariates)	22.51	(22.00 - 23.29)	22.61	(22.10 - 23.42)	20.94	(20.45 - 21.68)

Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

To analyze the impact of covariates on son's occupation outcomes, the log odds ratio of sons opting for a specific occupation against various base outcomes are considered. The estimation results are presented in Appendix Tables A3.5, A3.6 and A3.7. It is seen that neither the age of the son nor that of the father had any significant impact on son's occupation choice in any of the rounds. Marital status of the sons also did not have any significant impact on son's occupation choices in either 1999-2000 or 2004-05, but marital status impacted in the choice of skilled agricultural and manufacturing related jobs versus elementary jobs in 2011-12. However, age group of sons has come out important in the job choice of sons in 2004-05. The results show that sons in the age group of 21 to 25 years and 26 to 30 years are more likely to be in white collar jobs as compared to other three occupational categories.

Further, as regards religious characteristics, sons belonging to either Muslim or Christian or other communities are more likely to be in production related occupations or in elementary jobs than in white collar jobs or service-oriented or clerical jobs as compared to Hindus and their chances of getting engaged in elementary jobs is more than white-collar or service oriented jobs compared to Hindus.

Considering social group as a covariate and the impact being studied with Scheduled Tribe as the base outcome, the sons from general caste families are more likely to be in white-collar jobs and service-oriented or clerical jobs and less likely to be in production oriented or elementary jobs in all the three years, with sons belonging to general caste households are more likely to be in production oriented jobs rather than elementary jobs in 2011-12. While sons from Other Backward Caste families are more

likely to be in service-oriented or clerical jobs over production oriented or elementary jobs in 1999-2000, a distinct upward mobility can be observed with sons belonging to OBC families as they are more likely to be in service-oriented or clerical jobs and production oriented jobs than in elementary jobs in 2004-05 and they are more likely to be in white-collar job or service-oriented or clerical jobs or production oriented jobs than elementary jobs and in white-collar jobs over production oriented occupations in 2011-12. The sons belonging to scheduled caste community are more likely to be in service-oriented or clerical jobs over production-oriented jobs in 1999-2000, while this pattern is not significant in other years.

The general education level of the sons, represented by five dummy variables, have significant impact on the choice of occupation of sons in all three rounds. In 1999-2000, sons with secondary education and more than higher-secondary level education, are more likely to be in white-collar jobs or service-oriented or clerical jobs and less likely to be in elementary occupations compared to sons with no literacy. Comparing production related jobs and elementary jobs, sons with the above mentioned qualification, are more likely to be in production related jobs than elementary jobs compared to illiterate sons. However, the results are not significant for sons with higher secondary level of education. In 2004-05, for sons with secondary level of education and above, they are more likely to be in white collar jobs and less likely to be in other occupations as compared to sons with no education. Again, sons with secondary and above education are more likely to be in service-oriented or clerical jobs over production related jobs or elementary occupations. Further, sons with secondary level of education and above are more likely to be in production related jobs. Almost same pattern is observed in 2011-12, except for a) sons

with primary education are not significant, b) sons having education up to higher secondary level, the choice between white-collar jobs and service-oriented or clerical jobs is not significant anymore, c) regarding choice between production related jobs and elementary jobs, the sons with secondary and higher secondary education prefer production related jobs over elementary jobs, and this pattern of choice is only weakly significant for graduate sons.

Father's education level, however, had no significant impact in 1999-2000, but was significant for certain pair of occupational choices in 2004-05 and 2011-12. In 2004-05, sons of the fathers with secondary level education were more likely to be in service-oriented or clerical jobs and less likely to be in elementary menial jobs compared to the sons of the fathers with no education. In 2011-12, sons of the fathers with secondary level education were more likely to be in white-collar jobs and service-oriented or clerical jobs and less likely to be in production related jobs or elementary menial jobs compared to the sons of the fathers with no education. In both the rounds, sons of the fathers with more than higher secondary level education were more likely to be in white-collar jobs and service-oriented or clerical jobs and less likely to be in production related jobs compared to the sons of the fathers with no education. Father's education is thus likely to have an impact on upward mobility with regards to son's occupation.

For household groups, in 1999-2000, only the dummy variable for casual worker household type was significant. Sons belonging to casual labour household were more likely to be in production jobs and elementary jobs and less likely to be in white-collar jobs and service-oriented or clerical jobs compared to sons belonging to self-employed household. For the sons belonging to household types other than self-employed, salaried

or casual labour, they are more likely to be in production oriented jobs and less likely to be in services oriented jobs compared to sons from self-employed households. Same pattern is observed in 2004-05 and 2011-12 as far as casual labour household is concerned. However, in 2011-12, dummy variable for regular salaried household have significant role in determining son's occupation choice. Sons belonging to regular salaried household are more likely to be in service-oriented or clerical jobs and production oriented jobs and less likely to be in white-collar jobs compared to sons coming from self-employed household. Apart from household groups, father's employment status is important in determining son's choice of occupation.

The employment status of the father as a covariate is also significant in son's choice of occupation for certain pair of occupation groups in certain rounds. In 1999-2000, as compared to sons of self-employed fathers, the sons of wage earners are likely to be in production related jobs and less likely to be in white collar jobs. The sons of casual workers are more likely to be in white-collar jobs and service-oriented and clerical jobs than production oriented jobs. In 2004-05, sons of wage earners are more likely to be in white-collar jobs than service-oriented or clerical jobs compared to sons of self-employed fathers, though the relationship is weak. However, it is significant that sons of wage earners are more likely to be in production oriented jobs and less likely to be in service-oriented or clerical jobs compared to sons of self-employed fathers. However, in 2011-12, sons of wage earners choose to be in white-collar jobs and less likely to be in service-oriented or clerical jobs and production oriented jobs compared to sons of self-employed fathers. Also, the sons of casual labour, are more likely to be in either white collar jobs,

service-oriented or clerical jobs, or even elementary jobs and less likely to be in production oriented occupations compared to sons of self-employed fathers.

With regards to the impact of trade, it can be observed that son's choice of occupations depends significantly on services export performance. In 1999-2000, if the industry in which the sons are employed have moderate share in services export, they are more likely to be in either white collar jobs, production oriented jobs or even elementary jobs and less likely to be in service-oriented or clerical jobs compared to industry sectors with low or zero services export share. Considering elementary occupation as the base outcome, it can be seen that, for industry in which the sons are employed are having moderate share in services export, they are more likely to be in elementary occupation over white collar jobs or service-oriented or clerical jobs or production oriented jobs compared to the sons engaged in industry sector with no services export. In this year, 1999-2000, it is transport and storage and travel industries with moderate services trade, where the job type is primarily of elementary types.

For the 61st and 68th rounds of survey, two sets of dummies indicating services exports performance are included, one being the sectoral share in services export and the other being the rate of growth of services export. Considering the export performance of services industries in 2004-05, it is seen that the sons employed in services industries with moderate share in exports are more likely to be engaged in production oriented jobs and elementary jobs and less likely to be engaged in white-collar jobs and service-oriented or clerical jobs taken as base outcome each. Again, comparing production oriented jobs and elementary jobs, sons employed in services industries with moderate share in exports, are more likely to be engaged in production oriented jobs and less likely

to be engaged in elementary jobs compared to the sons engaged in industries not participating in services trade. However, sons engaged in services industries with high export share are more likely to be in service-oriented or clerical jobs and less likely to be in white-collar jobs compared to the sons engaged in industries not participating in services trade.

In 2011-12, considering export performance of services industries, it is observed that the sons employed in industries with moderate share in services export, are more likely to be engaged in white-collar jobs, production oriented jobs or even elementary jobs when compared with service-oriented and clerical jobs as the base outcome, compared to sons in services industries with no trade. Taking production related occupations jobs as the base outcome, it is seen that sons employed in services industries with moderate export share, are more likely to be engaged in production related jobs over white-collar, service-oriented or clerical jobs or even elementary jobs, compared to sons in services industries not engaged in trade. It must be noted that, the comparison of white-collar jobs with elementary jobs, the result is not significant in this round. For sons engaged in services sectors with high export shares are more likely to be in white-collar jobs and less likely to be in any other three occupation categories compared to sons in industries not engaged in services trade. Comparing services-oriented occupation with elementary ones, sons are more likely to be in the former. The same pattern is seen when comparing production oriented occupations with elementary jobs. However, the sons are indifferent between service-oriented and clerical jobs and production related jobs.

In 2004-05, it is found that sons engaged in industries with moderate or high services export growth rate are more likely to be in white-collar jobs than service-

oriented or clerical jobs compared to the sons engaged in services industries with no trade. Again, it is also seen that sons engaged in industries with moderate services export growth rate are more likely to be in white-collar jobs, service-oriented or clerical jobs, and even elementary jobs over production oriented jobs and less likely to be in production oriented jobs as compared to sons engaged in services industries with no trade. It is further seen that if elementary jobs are taken as the base outcome, sons engaged in services export industries with moderate or high growth are more likely to be engaged in elementary occupation over production related jobs or even services oriented jobs in high growth industries. The services industries registering moderate export growth rate in 2004-05 are transport and storage, travel, post and telecommunication, real estate and renting, other business services and insurance and pension, computer and related services, while community, social and personal services register high export growth rates. On the other hand, transport and storage, travel, financial services, insurance and pension, computer and related services and public administration and defense services registered moderate export growth rate.

In 2011-12, services export performance has impacted the son's occupation choices in a different manner. Comparing the occupation choices with service-oriented or clerical jobs as the base outcome, it is seen that the sons engaged in industries with moderate services export growth rate are more likely to be in service oriented occupations when compared with white-collar jobs, production oriented jobs or elementary jobs compared to sons engaged in services sectors with no trade. Taking production oriented jobs as the base outcome, it is seen that sons in the moderate services trade performing industries are more likely to be in white-collar jobs and comparing with

elementary occupations, the sons are more likely to be in production oriented jobs over elementary jobs.

On the whole, comparing the impact of sectoral share in services exports for all the three rounds, it can be observed that for sons engaged in services industries with moderate performance, there is greater likelihood of choosing elementary jobs over the three other categories in 1999-2000, which was gradually replaced by increasing choice of production oriented jobs over the elementary ones in 2011-12. Also, the greater chance of choosing elementary over white-collar jobs by sons is no longer significant in 2011-12. Comparing the impact of services export growth rates in 2004-05 and 2011-12, service-oriented and clerical jobs have gained importance compared to other occupation choices in 2011-12.

3.6 Summary of Findings

In this essay, occupational movements of workers across generations are studied in the context of a structural shift of the Indian economy towards services sector. The analysis is done in two parts. First, a simple measure of mobility M is used which shows that despite more than 60 per cent of sons prefer to remain in their father's occupation, the rate of upward mobility has marginally improved over the years. It is observed that the simple measure of mobility fails to capture the finer details of any occupational transition. So, the Altham measure of relative mobility is resorted to following Altham & Ferrie (2007) and others, and the full set of log odds ratio are calculated, and identified those making the greatest contribution to the overall distance of association between two tables P and Q. It is seen that the degree of association between father's and son's occupation gradually increased between 1999-2000 and 2004-05. However, this

association declined significantly during 2004-05 to 2011-12, thus showing improved degree of mobility over these years. Considering this pattern, it can be concluded that the degree of association between father's and son's occupation differ significantly and the results indicate greater intergenerational occupational mobility. Looking into the individual odds ratio contrasts over the period 1999-2000 to 2011-12, it is found that there is a significant decline in the relative advantage of sons of white collar fathers in getting white collar jobs. This improved the chance of upward mobility for the sons of fathers engaged in occupations other than white collar ones.

In the second part of the analysis, the multinomial logistic regression estimating the Altham measure with covariates show that services trade performance in the post liberalisation period has significant impact on son's choice of occupation. It is found that the sons engaged in moderate services export performing industries, are less likely to be in services-oriented and clerical jobs compared to other three types of occupations and sons engaged in high services export performing industries are more likely to be in white-collar jobs. Here, it is to be noted that transport, storage and travel industries have moderate shares in exports and computer and related activities and other business services experienced high growth as well as high share in services exports.

Further, age or marital status of sons do not have significant impact on son's choice of occupation. However, during 2004-05, sons of younger age group (between 20 to 30 years) had greater chance of being in white-collar jobs. The social group or caste category of sons also plays an important role as a covariate with better opportunities opening up for the sons of general category and other backward class categories, in entering white-collar jobs and service-oriented or clerical jobs over production related or

elementary jobs. The education level of sons above secondary level opens up scope for the sons to enter white-collar or service-oriented and clerical jobs. Also, higher level of education of fathers ensure better chances for sons getting into white collar jobs. It is interesting to note that household type as a covariate show that sons from salaried households are less likely to choose service-oriented occupations over production related occupations. Also, sons from self-employed households stand a greater chance of choosing white-collar occupation.

The multinomial regression estimates with covariates thus strengthen the results observed in the first part of the analysis. This indicates that after controlling for covariates, the estimated Altham measure show increased mobility in son's choice of occupation. Also, the impact of almost all the covariates can be summarized to lead to improved chances of sons to enter white-collar and service-oriented or clerical jobs over production related jobs or elementary jobs. This pattern ascertains the proposition of upward mobility among sons regarding their choice of occupation compared to their fathers in a period of improved services exports.

Appendix to Chapter 3

Table A3.1: Mobility across Occupation Groups: 55th Round (1999-2000)
(Weighted sample of individuals along with per cent share in the parenthesis)

	Son's Occupation Group				
Father's Occupation Group	W	S	P	E	Row Sum
W	865 (50.3)	419 (24.4)	372 (21.6)	63 (3.7)	1719
S	167 (7.2)	1551 (66.9)	482 (20.8)	119 (5.1)	2319
P	179 (4.7)	589 (15.5)	2733 (72.0)	293 (7.7)	3794
E	63 (4.8)	176 (13.5)	440 (33.8)	623 (47.8)	1302
Column Sum	1274	2735	4028	1097	9134

Table A3.2: Mobility across Occupation Groups: 61st Round (2004-2005)
(Weighted sample of individuals along with per cent share in the parenthesis)

	Son's Occupation Group				
Father's Occupation Group	W	S	P	E	Row Sum
W	880 (54.0)	377 (23.1)	308 (18.9)	64 (3.9)	1629
S	174 (8.5)	1300 (63.3)	484 (23.6)	95 (4.6)	2053
P	257 (7.0)	565 (15.4)	2582 (70.5)	259 (7.1)	3664
E	32 (2.6)	193 (15.5)	458 (36.9)	558 (45.0)	1240
Column Sum	1342	2435	3832	976	8586

Table A3.3: Mobility across Occupation Groups: 68th Round (2011-2012)
(Weighted sample of individuals along with per cent share in the parenthesis)

	Son's Occupation Group				
Father's Occupation Group	W	S	P	E	Row Sum
W	1,359 (64.0)	318 (15.0)	385 (18.1)	61 (2.9)	2,122
S	254 (20.8)	676 (55.4)	246 (20.1)	45 (3.7)	1,221
P	279 (10.5)	377 (14.2)	1,851 (69.8)	145 (5.5)	2,651
E	88 (8.9)	124 (12.6)	321 (32.6)	452 (45.9)	985
Column Sum	1,980	1,495	2,803	702	6,980

W: White collar jobs comprising of legislators, senior officials, managers, professionals, associate professionals,
S: Clerical and Service-oriented jobs
P: Skilled agricultural and manufacturing related jobs
E: Other elementary jobs
Source: Calculations based on NSSO Employment Unemployment Survey, various years

Table A3.4: Estimated Full Set of Odds-ratio Contrasts

Contrast	d(P,I)	G^2	prob	Odds Ratio	d(Q,I)	G^2	p	Odds Ratio	d(p,q)	G^2	p	Percentage of total	Cumulative percentage
(WW/WE)/(SW/SE)	4.56	177.05	0.00	9.78	2.75	39.33	0.00	3.95	1.82	11.22	0.00	16.58	16.58
(SW/SE)/(EW/EE)	5.26	254.41	0.00	13.88	6.73	400.89	0.00	28.99	1.47	7.67	0.01	10.92	27.51
(WW/WP)/(SW/SP)	3.81	344.76	0.00	6.71	2.46	132.01	0.00	3.42	1.35	19.80	0.00	9.16	36.66
(WW/WE)/(PW/PE)	6.22	500.51	0.00	22.47	4.90	243.06	0.00	11.58	1.33	8.19	0.00	8.85	45.52
(SW/SS)/(EW/ES)	2.40	45.30	0.00	0.30	1.27	15.86	0.00	0.53	1.13	5.96	0.01	6.43	51.95
(WW/WS)/(SW/SS)	5.91	1146.06	0.00	19.17	4.86	746.13	0.00	11.37	1.04	14.09	0.00	5.49	57.44
(WS/WE)/(PS/PE)	2.39	70.95	0.00	3.31	1.39	17.49	0.00	2.01	1.00	4.77	0.03	5.05	62.48
(PW/PE)/(EW/EE)	3.60	139.78	0.00	6.04	4.58	256.16	0.00	9.88	0.98	4.76	0.03	4.88	67.36
(SW/SP)/(EW/EP)	1.77	32.14	0.00	2.42	2.65	84.90	0.00	3.77	0.88	3.99	0.05	3.94	71.30
(WW/WP)/(PW/PP)	7.14	1822.93	0.00	35.50	6.31	1782.66	0.00	23.42	0.83	10.11	0.00	3.48	74.78
(WS/WE)/(SS/SE)	1.35	15.54	0.00	0.51	2.12	26.19	0.00	0.35	0.77	2.13	0.14	2.99	77.77
(SW/SS)/(PW/PS)	2.08	76.33	0.00	0.35	1.36	39.68	0.00	0.51	0.72	5.06	0.02	2.61	80.38
(PP/PE)/(EP/EE)	5.16	983.39	0.00	13.21	5.78	797.94	0.00	17.98	0.62	4.69	0.03	1.91	82.29
(SP/SE)/(EP/EE)	3.49	247.17	0.00	5.74	4.08	170.46	0.00	7.70	0.59	1.92	0.17	1.74	84.03
(PS/PE)/(ES/EE)	3.92	352.80	0.00	7.12	4.50	296.87	0.00	9.48	0.57	2.56	0.11	1.65	85.69
(WS/WP)/(ES/EP)	2.07	86.08	0.00	2.82	1.52	35.45	0.00	2.14	0.55	2.52	0.11	1.53	87.21
(SW/SP)/(PW/PP)	3.33	185.07	0.00	5.29	3.85	304.42	0.00	6.85	0.52	2.56	0.11	1.34	88.56
(WS/WP)/(PS/PP)	3.31	382.38	0.00	5.23	2.80	216.83	0.00	4.06	0.51	4.00	0.05	1.29	89.85
(WP/WE)/(PP/PE)	0.91	8.68	0.00	0.63	1.41	17.27	0.00	0.49	0.49	1.25	0.26	1.23	91.08
(SW/SE)/(PW/PE)	1.66	30.15	0.00	2.30	2.15	34.83	0.00	2.93	0.49	1.00	0.32	1.20	92.28
(WP/WE)/(SP/SE)	0.75	5.01	0.03	1.46	0.29	0.45	0.50	1.15	0.47	0.74	0.39	1.09	93.38
(WW/WP)/(EW/EP)	5.57	512.10	0.00	16.24	5.11	457.24	0.00	12.88	0.46	1.36	0.24	1.08	94.46
(WS/WE)/(ES/EE)	6.32	553.05	0.00	23.54	5.89	384.13	0.00	19.00	0.43	0.83	0.36	0.92	95.39

(PW/PS)/(EW/ES)	0.33	0.92	0.34	0.85	0.08	0.07	0.79	1.04	0.41	0.77	0.38	0.85	96.24
(PW/PP)/(EW/EP)	1.56	22.76	0.00	0.46	1.20	17.95	0.00	0.55	0.37	0.79	0.37	0.68	96.92
(SS/SE)/(ES/EE)	7.66	1318.11	0.00	46.14	8.01	789.75	0.00	54.76	0.34	0.59	0.44	0.59	97.51
(WW/WE)/(EW/EE)	9.82	1319.62	0.00	135.78	9.48	1270.01	0.00	114.43	0.34	0.45	0.50	0.59	98.10
(WW/WS)/(PW/PS)	3.83	388.25	0.00	6.79	3.51	318.26	0.00	5.77	0.32	1.26	0.26	0.53	98.63
(WS/WP)/(SS/SP)	2.10	140.89	0.00	0.35	2.40	133.15	0.00	0.30	0.30	1.22	0.27	0.47	99.10
(SS/SP)/(ES/EP)	4.17	459.74	0.00	8.04	3.92	258.93	0.00	7.11	0.25	0.55	0.46	0.30	99.40
(SS/SE)/(PS/PE)	3.74	276.84	0.00	6.48	3.51	109.46	0.00	5.78	0.23	0.28	0.60	0.27	99.67
(SS/SP)/(PS/PP)	5.41	1874.78	0.00	14.93	5.20	918.71	0.00	13.49	0.20	0.76	0.38	0.21	99.87
(WP/WE)/(EP/EE)	4.25	264.23	0.00	8.36	4.37	253.95	0.00	8.89	0.12	0.08	0.78	0.08	99.95
(WW/WS)/(EW/ES)	3.50	140.41	0.00	5.77	3.59	138.70	0.00	6.02	0.09	0.04	0.84	0.04	99.99
(PS/PP)/(ES/EP)	1.24	36.02	0.00	0.54	1.28	26.88	0.00	0.53	0.04	0.02	0.89	0.01	100.00
(SP/SE)/(PP/PE)	1.67	44.62	0.00	0.43	1.70	18.91	0.00	0.43	0.03	0.00	0.95	0.00	100.00

Source: Calculations based on NSSO Employment Unemployment Survey, various years

Table A3.5: Multinomial Logistic Regression Results: 1999-2000

55Th round (1999-2000)												
	1 (Base Outcome)						2 (Base Outcome)					
	Occupation 2		Occupation 3		Occupation 4			Occupation 1		Occupation 3		Occupation 4	
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.		Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
D2	3.168***	0.125	1.839***	0.133	2.167***	0.211	D1	3.168***	0.122	1.329***	0.105	1.000***	0.199
D3	1.791***	0.132	3.321***	0.130	2.558***	0.203	D3	1.376***	0.142	2.859***	0.088	1.767***	0.136
D4	1.926***	0.199	2.276***	0.189	4.014***	0.236	D4	1.242***	0.203	1.679***	0.125	3.089***	0.152
Age	-0.019	0.034	-0.027	0.033	-0.058	0.042	Age	0.019	0.033	-0.008	0.025	-0.039	0.035
Father's Age	-0.003	0.007	0.001	0.007	0.004	0.009	Father's Age	0.003	0.007	0.004	0.005	0.007	0.007
1.Married	0.014	0.111	-0.012	0.112	0.184	0.153	1.Married	-0.014	0.120	-0.026	0.090	0.171	0.135
Age Group							Age Group						
21-25 Years	-0.401**	0.200	-0.310	0.198	-0.227	0.241	21-25 Years	0.401	0.201	0.090	0.141	0.174	0.198
26-30 Years	-0.461	0.327	-0.412	0.330	-0.297	0.403	26-30 Years	0.461	0.333	0.048	0.259	0.164	0.352
31-35 Years	-0.429	0.490	-0.422	0.486	-0.227	0.614	31-35 Years	0.429	0.492	0.007	0.378	0.201	0.529
Religion							Religion						
Muslim	0.093	0.125	0.428***	0.124	0.348**	0.150	Muslim	-0.093	0.123	0.335***	0.085	0.255**	0.128
Christian	0.102	0.299	0.508*	0.280	0.676*	0.353	Christian	-0.102	0.318	0.407	0.246	0.574*	0.318
Others	0.092	0.197	0.217	0.195	0.137	0.267	Others	-0.092	0.194	0.126	0.149	0.046	0.241
Social Group							Social Group						
Scheduled Caste	0.253	0.312	-0.169	0.283	0.040	0.315	Scheduled Caste	-0.253	0.313	-0.422*	0.223	-0.213	0.266
Other Backward Class	0.231	0.283	-0.335	0.257	-0.523*	0.288	Other Backward Class	-0.231	0.286	-0.566***	0.210	-0.754***	0.252
General	0.297	0.276	-0.526**	0.248	-0.739***	0.278	General	-0.297	0.278	-0.824***	0.206	-1.036***	0.250
Education							Education						
Primary Education	-0.043	0.245	-0.135	0.240	-0.308	0.254	Primary Education	0.043	0.241	-0.092	0.116	-0.265*	0.153
Secondary Education	-0.432*	0.230	-0.863***	0.220	-1.147***	0.238	Secondary Education	0.432**	0.222	-0.431***	0.109	-0.715***	0.152

Higher Secondary Education	-1.232**	0.584	-2.741***	0.653	-2.424	5.365	Higher Secondary Education	1.232**	0.567	-1.509	1.040	-1.192	4.610
More than Higher Secondary Education	-0.991***	0.260	-2.601***	0.256	-3.467***	0.392	More than Higher Secondary Education	0.991***	0.245	-1.610***	0.163	-2.476***	0.333
Father's Education							Father's Education						
Primary Education	-0.155	0.139	-0.091	0.134	-0.063	0.154	Primary Education	0.155	0.146	0.064	0.087	0.093	0.122
Secondary Education	-0.012	0.145	-0.183	0.145	-0.142	0.173	Secondary Education	0.012	0.148	-0.171*	0.099	-0.130	0.143
Higher Secondary Education	-0.509	1.928	-0.991	3.431	-0.386	7.292	Higher Secondary Education	0.509	2.374	-0.482	3.913	0.123	7.092
More than Higher Secondary Education	0.209	0.207	0.170	0.223	-0.084	0.429	More than Higher Secondary Education	-0.209	0.206	-0.040	0.195	-0.293	0.419
Household Type							Household Type						
Wage Earners	-0.298	0.255	-0.067	0.244	-0.033	0.293	Wage Earners	0.298	0.248	0.231	0.183	0.265	0.246
Casual Labour	0.304	0.356	1.279***	0.353	1.408***	0.381	Casual Labour	-0.304	0.368	0.974***	0.213	1.103***	0.261
Other	-0.666	0.502	0.147	0.448	-0.175	0.589	Other	0.666	0.485	0.812***	0.323	0.490	0.454
Father's Activity Status							Father's Activity Status						
Wage Earners	0.295	0.272	0.466*	0.256	0.255	0.304	Wage Earners	-0.295	0.258	0.171	0.186	-0.040	0.259
Casual Labour	-0.302	0.343	-0.750**	0.336	-0.455	0.369	Casual Labour	0.302	0.339	-0.448	0.216	-0.153	0.253
Share of Sector in Total Services Export							Share of Sector in Total Services Export						
Moderate	-1.119***	0.244	0.151	0.201	1.265***	0.208	Moderate	1.119***	0.239	1.271***	0.198	2.384***	0.208
High	-1.282***	0.273	-1.580***	0.354	-1.259**	0.532	High	1.282***	0.291	-0.298	0.369	0.023	0.500
_cons	0.537	0.745	1.436	0.724	0.472	0.867	_cons	-3.705	0.741	-0.429	0.531	-1.065	0.712
	3 (Base Outcome)							**4 (Base Outcome)**					
	Occupation 1		Occupation 2		Occupation 4			Occupation 1		Occupation 2		Occupation 3	
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.		Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
D1	3.321***	0.128	1.530***	0.108	0.763***	0.170	D1	4.014***	0.230	2.088***	0.196	1.738***	0.184
D2	1.482***	0.151	2.859***	0.087	1.091***	0.133	D2	1.847***	0.215	3.089***	0.148	1.410***	0.144
D4	1.046***	0.192	1.180***	0.110	2.501***	0.103	D3	1.456***	0.190	1.322***	0.133	2.501***	0.104
Age	0.027	0.033	0.008	0.024	-0.031	0.031	Age	0.058	0.041	0.039	0.034	0.031	0.031

Father's Age	-0.001	0.007	-0.004	0.005	0.003	0.006	Father's Age	-0.004	0.009	-0.007	0.007	-0.003	0.006
1.Married	0.012	0.119	0.026	0.091	0.196	0.115	1.Married	-0.184	0.154	-0.171	0.135	-0.196	0.117
Age Group							Age Group						
21-25 Years	0.310	0.198	-0.090	0.136	0.084	0.175	21-25 Years	0.227	0.239	-0.174	0.195	-0.084	0.169
26-30 Years	0.412	0.330	-0.048	0.239	0.116	0.313	26-30 Years	0.297	0.392	-0.164	0.337	-0.116	0.298
31-35 Years	0.422	0.492	-0.007	0.353	0.195	0.468	31-35 Years	0.227	0.611	-0.201	0.515	-0.195	0.462
Religion							Religion						
Muslim	-0.428***	0.125	-0.335***	0.084	-0.080	0.111	Muslim	-0.348**	0.153	-0.255**	0.126	0.080	0.113
Christian	-0.508*	0.277	-0.407*	0.234	0.168	0.235	Christian	-0.676**	0.326	-0.574**	0.287	-0.168	0.229
Others	-0.217	0.198	-0.126	0.148	-0.080	0.217	Others	-0.137	0.263	-0.046	0.233	0.080	0.215
Social Group							Social Group						
Scheduled Caste	0.169	0.297	0.422*	0.231	0.209	0.204	Scheduled Caste	-0.040	0.333	0.213	0.270	-0.209	0.202
Other Backward Class	0.335	0.266	0.566***	0.215	-0.188	0.194	Other Backward Class	0.523*	0.301	0.754***	0.247	0.188	0.198
General	0.526**	0.261	0.824***	0.212	-0.213	0.203	General	0.739***	0.293	1.036***	0.249	0.213	0.198
Education							Education						
Primary Education	0.135	0.228	0.092	0.119	-0.173	0.125	Primary Education	0.308	0.252	0.265*	0.148	0.173	0.125
Secondary Education	0.863***	0.211	0.431***	0.114	-0.284**	0.128	Secondary Education	1.147***	0.238	0.715***	0.149	0.284**	0.129
Higher Secondary Education	2.741***	1.068	1.509	1.051	0.317	5.171	Higher Secondary Education	2.424	4.929	1.192	4.877	-0.317	4.940
More than Higher Secondary Education	2.601***	0.248	1.610***	0.171	-0.866***	0.309	More than Higher Secondary Education	3.467***	0.391	2.476***	0.331	0.866***	0.321
Father's Education							Father's Education						
Primary Education	0.091	0.135	-0.064	0.088	0.029	0.104	Primary Education	0.063	0.157	-0.093	0.121	-0.029	0.101
Secondary Education	0.183	0.139	0.171	0.098	0.041	0.137	Secondary Education	0.142	0.184	0.130	0.153	-0.041	0.134
Higher Secondary Education	0.991	3.151	0.482	3.696	0.605	7.520	Higher Secondary Education	0.386	7.046	-0.123	7.234	-0.605	7.447
More than Higher Secondary	-0.170	0.227	0.040	0.197	-0.253	0.396	More than Higher Secondary	0.084	0.439	0.293	0.437	0.253	0.416

Education							Education						
Household Type							Household Type						
Wage Earners	0.067	0.249	-0.231	0.182	0.034	0.215	Wage Earners	0.033	0.301	-0.265	0.238	-0.034	0.217
Casual Labour	-1.279***	0.354	-0.974***	0.209	0.129	0.211	Casual Labour	-1.408***	0.386	-1.103***	0.258	-0.129	0.217
Other	-0.147	0.453	-0.812***	0.326	-0.322	0.394	Other	0.175	0.557	-0.490	0.474	0.322	0.384
Father's Activity Status							Father's Activity Status						
Wage Earners	-0.466*	0.265	-0.171	0.185	-0.211	0.220	Wage Earners	-0.255	0.317	0.040	0.250	0.211	0.221
Casual Labour	0.750**	0.337	0.448**	0.215	0.295	0.204	Casual Labour	0.455	0.370	0.153	0.251	-0.295	0.207
Share of Sector in Total Services Export							Share of Sector in Total Services Export						
Moderate	-0.151	0.189	-1.271***	0.192	1.114***	0.125	Moderate	-1.265***	0.213	-2.384***	0.200	-1.114***	0.130
High	1.580***	0.374	0.298	0.361	0.321	0.493	High	1.259**	0.515	-0.023	0.505	-0.321	0.506
_cons	-4.757	0.704	-2.429	0.497	-1.727	0.612	_cons	-4.486	0.849	-2.023	0.726	-0.774	0.618

* Denotes estimate is significant at 10 per cent level of significance.,
** Denotes estimate is significant at 5 per cent level of significance.,
*** Denotes estimate is significant at 1 per cent level of significance.,
Blank space denotes estimate is not significant.

Table A3.6: Multinomial Logistic Regression Results: 2004-2005

61st Round (2004-2005)												
	1 (Base Outcome)							2 (Base outcome)				
	Occupation 2		Occupation 3		Occupation 4			Occupation 1		Occupation 3		Occupation 4	
	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err		Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err
D2	2.974***	0.113	1.749***	0.127	2.093***	0.192	D1	2.974***	0.114	1.224***	0.102	0.881***	0.193
D2	1.610***	0.118	2.951***	0.114	2.139***	0.187	D3	1.364***	0.123	2.566***	0.082	1.410***	0.136
D4	2.354***	0.201	2.655***	0.200	4.469***	0.236	D4	0.620***	0.208	1.525***	0.118	2.996***	0.142
Age	-0.009	0.031	0.021	0.031	0.010	0.039	Age	0.009	0.030	0.030	0.023	0.019	0.033
Father's Age	0.005	0.007	0.005	0.007	0.000	0.009	Father's Age	-0.005	0.007	0.000	0.005	-0.005	0.007
1.Married	-0.068	0.109	-0.123	0.108	-0.002	0.143	1.Married	0.068	0.102	-0.055	0.080	0.066	0.121
Age Group							Age Group						
21-25 Years	-0.485***	0.179	-0.499***	0.188	-0.556***	0.224	21-25 Years	0.485***	0.180	-0.014	0.126	-0.071	0.181
26-30 Years	-0.620**	0.302	-0.603**	0.306	-0.716*	0.384	26-30 Years	0.620**	0.300	0.017	0.218	-0.095	0.321
31-35 Years	-0.778*	0.452	-1.161***	0.461	-1.067*	0.575	31-35 Years	0.778*	0.436	-0.384	0.329	-0.289	0.479
Religion							Religion						
Muslim	-0.116	0.115	0.294***	0.112	0.084	0.146	Muslim	0.116	0.112	0.411***	0.083	0.200	0.120
Christian	-0.085	0.319	0.440	0.286	0.335	0.341	Christian	0.085	0.335	0.525**	0.237	0.420	0.306
Others	0.263	0.190	-0.141	0.201	-0.553*	0.309	Others	-0.263	0.188	-0.405***	0.162	-0.816***	0.289
Social Group							Social Group						
Scheduled Caste	0.320	0.322	0.390	0.299	0.492	0.329	Scheduled Caste	-0.320	0.324	0.070	0.224	0.171	0.265
Other Backward Class	0.314	0.285	0.206	0.266	-0.124	0.297	Other Backward Class	-0.314	0.302	-0.107	0.211	-0.438*	0.253
General	0.329	0.284	-0.211	0.265	-0.489	0.301	General	-0.329	0.300	-0.540***	0.213	-0.818***	0.261
Education							Education						
Primary Education	-0.214	0.233	-0.327	0.215	-0.629***	0.231	Primary Education	0.214	0.240	-0.114	0.135	-0.415***	0.160
Secondary Education	-0.381*	0.224	-0.674***	0.211	-1.134***	0.230	Secondary Education	0.381*	0.222	-0.293***	0.126	-0.753***	0.157
Higher Secondary Education	-0.630***	0.244	-1.846***	0.240	-2.413***	0.294	Higher Secondary Education	0.630***	0.246	-1.216***	***0.158	-1.783***	0.232

More than Higher Secondary Education	-1.212***	0.245	-2.483***	0.238	-3.465***	0.341	More than Higher Secondary Education	1.212***	0.244	-1.272***	0.165	-2.253***	0.273
Father's Education							Father's Education						
Primary Education	0.014	0.132	-0.021	0.125	-0.095	0.148	Primary Education	-0.014	0.135	-0.036	0.089	-0.110	0.118
Secondary Education	0.009	0.138	-0.170	0.134	-0.268	0.167	Secondary Education	-0.009	0.136	-0.179*	0.095	-0.276**	0.135
Higher Secondary Education	0.267	0.193	-0.058	0.208	0.391	0.292	Higher Secondary Education	-0.267	0.202	-0.325*	0.174	0.124	0.253
More than Higher Secondary Education	0.488***	0.186	0.361*	0.197	-0.446	0.430	More than Higher Secondary Education	-0.488***	0.192	-0.127	0.157	-0.934**	0.400
Household Type							Household Type						
Wage Earners	0.346	0.232	0.290	0.224	0.431	0.259	Wage Earners	-0.346	0.232	-0.057	0.150	0.085	0.193
Casual Labour	0.439	0.331	1.453***	0.306	1.646***	0.336	Casual Labour	-0.439	0.348	1.013***	0.197	1.207***	0.246
Other	0.372	0.475	0.846**	0.430	0.976	0.559	Other	-0.372	0.708	0.475*	0.264	0.604	0.426
Father's Activity Status							Father's Activity Status						
Wage Earners	-0.419*	0.242	0.086	0.233	-0.206	0.265	Wage Earners	0.419*	0.243	0.506***	0.154	0.213	0.196
Casual Labour	-0.132	0.302	-0.356	0.277	-0.137	0.308	Casual Labour	0.132	0.299	-0.224	0.186	-0.005	0.232
Services Export Growth Rate							Services Export Growth Rate						
Moderate	-1.056***	0.248	-2.889***	0.370	-0.507	0.335	Moderate	1.056***	0.227	-1.833***	0.341	0.548	0.336
High	-0.983***	0.190	-2.908***	0.283	-0.130	0.213	High	0.983***	0.191	-1.925***	0.259	0.853***	0.184
Share of Sector in Total Services Export							Share of Sector in Total Services Export						
Moderate	-0.145	0.308	2.844***	0.397	1.344***	0.371	Moderate	0.145	0.288	2.989***	0.376	1.489	0.374
High	1.096***	0.392	0.835	3.187	-0.375	6.950	High	-1.096***	0.410	-0.261	3.050	-1.471	7.084
cons	0.028	0.713	0.018	0.708	-0.572	0.853	cons	-3.002	0.675	-1.234	0.483	-1.481	0.691
	3 (Base Outcome)							**4 (Base outcome)**					
	Occupation 1		Occupation 2		Occupation 4			Occupation 1		Occupation 2		Occupation 3	
	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err		Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err
D1	2.951***	0.113	1.342***	0.104	0.813***	0.171	D1	4.469***	0.238	2.116***	0.190	1.815***	0.175
D2	1.202***	0.119	2.566***	0.081	1.156***	0.138	D2	2.377***	0.224	2.996***	0.138	1.471***	0.137
D4	0.297	0.193	1.041***	0.106	2.627***	0.101	D3	2.331***	0.201	1.587***	0.125	2.627***	0.104

Age	-0.021	0.031	-0.030	0.023	-0.011	0.032	Age	-0.010	0.041	-0.019	0.034	0.011	0.030
Father's Age	-0.005	0.008	0.000	0.005	-0.005	0.006	Father's Age	0.000	0.009	0.005	0.007	0.005	0.007
1.Married	0.123	0.106	0.055	0.081	0.120	0.114	1.Married	0.002	0.136	-0.066	0.119	-0.120	0.109
Age Group							Age Group						
21-25 Years	0.499***	0.184	0.014	0.124	-0.057	0.172	21-25 Years	0.556**	0.230	0.071**	0.186	0.057	0.164
26-30 Years	0.603**	0.313	-0.017	0.219	-0.113	0.316	26-30 Years	0.716*	0.399	0.095*	0.338	0.113	0.304
31-35 Years	1.161***	0.461	0.384	0.336	0.094	0.486	31-35 Years	1.067*	0.597	0.289*	0.504	-0.094	0.453
Religion							Religion						
Muslim	-0.294	0.117	-0.411***	0.086	-0.210**	0.109	Muslim	-0.084	0.148	-0.200	0.124	0.210*	0.113
Christian	-0.440	0.293	-0.525**	0.234	-0.105	0.233	Christian	-0.335	0.360	-0.420	0.296	0.105	0.244
Others	0.141	0.199	0.405***	0.159	-0.411	0.272	Others	0.553*	0.315	0.816*	0.286	0.411	0.280
Social Group							Social Group						
Scheduled Caste	-0.390	0.289	-0.070	0.216	0.101	0.198	Scheduled Caste	-0.492	0.320	-0.171	0.251	-0.101	0.186
Other Backward Class	-0.206	0.265	0.107	0.206	-0.331*	0.189	Other Backward Class	0.124	0.293	0.438*	0.243	0.331*	0.184
General	0.211	0.259	0.540	0.208	-0.278	0.199	General	0.489	0.299	0.818***	0.246	0.278	0.190
Education							Education						
Primary Education	0.327	0.227	0.114	0.133	-0.302***	0.123	Primary Education	0.629***	0.242	0.415***	0.153	0.302***	0.119
Secondary Education	0.674***	0.218	0.293**	0.133	-0.460***	0.126	Secondary Education	1.134***	0.231	0.753***	0.154	0.460***	0.130
Higher Secondary Education	1.846***	0.242	1.216***	0.163	-0.567***	0.223	Higher Secondary Education	2.413***	0.299	1.783***	0.228	0.567***	0.213
More than Higher Secondary Education	2.483***	0.248	1.272***	0.166	-0.981***	0.262	More than Higher Secondary Education	3.465***	0.331	2.253***	0.272	0.981***	0.264
Father's education							Father's education						
Primary Education	0.021	0.129	0.036	0.090	-0.074	0.102	Primary Education	0.095	0.150	0.110	0.116	0.074	0.102
Secondary Education	0.170	0.136	0.179	0.096	-0.097	0.121	Secondary Education	0.268	0.161	0.276**	0.130	0.097	0.120
Higher Secondary Education	0.058	0.217	0.325	0.175	0.449	0.260	Higher Secondary Education	-0.391	0.296	-0.124	0.257	-0.449	0.261
More than Higher Secondary	-0.361*	0.202	0.127	0.158	-0.807	0.407	More than Higher Secondary	0.446	0.405	0.934	0.391	0.807	0.388

Education							Education						
Household Type							Household Type						
Wage Earners	-0.290	0.219	0.057	0.156	0.142	0.178	Wage Earners	-0.431	0.267	-0.085	0.193	-0.142	0.176
Casual Labour	-1.453***	0.323	-1.013***	0.189	0.194	0.201	Casual Labour	-1.646***	0.351	-1.207***	0.250	-0.194	0.199
Other	-0.846**	0.418	-0.475*	0.254	0.129	0.387	Other	-0.976	0.871	-0.604	0.450	-0.129	0.383
Father's Activity Status							Father's Activity Status						
Wage Earners	-0.086	0.226	-0.506***	0.162	-0.293	0.184	Wage Earners	0.206	0.278	-0.213	0.207	0.293	0.187
Casual Labour	0.356	0.271	0.224	0.190	0.219	0.194	Casual Labour	0.137	0.314	0.005	0.241	-0.219	0.199
Services Export Growth Rate							Services Export Growth Rate						
Moderate	2.889***	0.376	1.833***	0.359	2.382***	0.408	Moderate	0.507	0.345	-0.548	0.333	-2.382***	0.404
High	2.908***	0.289	1.925***	0.277	2.778***	0.261	High	0.130	0.219	-0.853***	0.192	-2.778	0.265
Share of Sector in Total Services Export							Share of Sector in Total Services Export						
Moderate	-2.844***	0.398	-2.989***	0.396	-1.500***	0.413	Moderate	-1.344***	0.377	-1.489***	0.359	1.500***	0.409
High	-0.835	3.243	0.261	3.245	-1.403	0.637	High	0.375	7.003	1.471	7.031	1.210	7.543
_cons	-2.970	0.676	-1.332	0.482			_cons	-3.897	0.866	-1.516	0.688	-1.224	0.587

* Denotes estimate is significant at 10 per cent level of significance.,
** Denotes estimate is significant at 5 per cent level of significance.,
*** Denotes estimate is significant at 1 per cent level of significance.,
Blank space denotes estimate is not significant.

Table A3.7: Multinomial Logistic Regression Results: 2011-2012

68th Round (2011-2012)													
	1 (Base Outcome)							2 (Base outcome)					
	Occupation 2		Occupation 3		Occupation 4			Occupation 1		Occupation 3		Occupation 4	
	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err		Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err
D2	2.625***	0.106	1.430***	0.124	1.493***	0.201	D1	2.625***	0.110	1.195***	0.115	1.132***	0.197
D3	1.483***	0.112	2.949***	0.115	1.724***	0.175	D3	1.142***	0.117	2.660***	0.104	1.373***	0.189
D4	1.508***	0.176	1.901***	0.170	3.561***	0.195	D4	1.117***	0.178	1.588***	0.140	3.184***	0.196
Age	0.010	0.031	0.000	0.030	-0.031	0.040	Age	-0.010	0.030	-0.010	0.027	-0.041	0.039
Father's Age	-0.006	0.007	0.005	0.007	0.004	0.010	Father's Age	0.006	0.007	0.011	0.007	0.010	0.009
1.Married	-0.065	0.099	-0.100	0.100	0.208	0.151	1.Married	0.065	0.104	-0.035	0.092	0.273*	0.140
Age Group							Age Group						
21-25 Years	-0.193	0.187	-0.139	0.182	-0.107	0.236	21-25 Years	0.193	0.182	0.054	0.159	0.086	0.214
26-30 Years	-0.383	0.304	-0.414	0.293	-0.239	0.395	26-30 Years	0.383	0.297	-0.031	0.259	0.144	0.383
31-35 Years	-0.829*	0.444	-0.714	0.435	-0.548	0.595	31-35 Years	0.829*	0.433	0.115	0.386	0.281	0.582
Religion							Religion						
Muslim	-0.025	0.103	0.271***	0.103	0.347***	0.141	Muslim	0.025	0.109	0.296***	0.095	0.373***	0.138
Christian	0.073	0.313	0.750***	0.272	0.749**	0.324	Christian	-0.073	0.301	0.676***	0.251	0.676**	0.308
Others	-0.162	0.198	0.326*	0.189	-0.708*	0.395	Others	0.162	0.201	0.488***	0.198	-0.546	0.399
Social Group							Social Group						
Scheduled Caste	-0.164	0.280	-0.341	0.267	-0.485	0.297	Scheduled Caste	0.164	0.273	-0.177	0.224	-0.321	0.242
Other Backward Class	-0.274	0.258	-0.510**	0.242	-1.413***	0.277	Other Backward Class	0.274	0.249	-0.236	0.203	-1.139***	0.221
General	-0.052	0.253	-0.728***	0.242	-1.419***	0.275	General	0.052	0.247	-0.676***	0.205	-1.368***	0.229
Education							Education						
Primary Education	-0.156	0.247	-0.285	0.217	-0.427*	0.247	Primary Education	0.156	0.252	-0.129	0.183	-0.272	0.207
Secondary Education	-0.148	0.242	-0.504**	0.211	-0.855***	0.244	Secondary Education	0.148	0.239	-0.356**	0.175	-0.707***	0.212

Higher Secondary Education	-0.361	0.261	-1.213***	0.227	-1.749***	0.301	Higher Secondary Education	0.361	0.251	-0.852***	0.201	-1.388***	0.281
More than Higher Secondary Education	-1.087***	0.259	-2.315***	0.232	-2.838***	0.310	More than Higher Secondary Education	1.087***	0.255	-1.228***	0.205	-1.751***	0.288
Father's Education							Father's Education						
Primary Education	-0.112	0.131	-0.064	0.120	-0.042	0.160	Primary Education	0.112	0.130	0.049	0.106	0.070	0.140
Secondary Education	-0.064	0.133	-0.278**	0.124	-0.339**	0.169	Secondary Education	0.064	0.128	-0.213*	0.110	-0.275*	0.155
Higher Secondary Education	-0.233	0.191	-0.450**	0.205	-0.552	0.354	Higher Secondary Education	0.233	0.181	-0.217	0.188	-0.319	0.341
More than Higher Secondary Education	-0.077	0.173	-0.417**	0.192	-0.290	0.293	More than Higher Secondary Education	0.077	0.169	-0.340*	0.177	-0.213	0.289
Household Type							Household Type						
Wage Earners	0.480***	0.196	0.714***	0.203	0.299	0.268	Wage Earners	-0.480***	0.183	0.234	0.181	-0.181	0.241
Casual Labour	0.462	0.321	1.472***	0.297	1.365***	0.340	Casual Labour	-0.462	0.310	1.010***	0.236	0.903***	0.281
Other	-0.327	0.600	0.508	0.430	-0.171	3.310	Other	0.327	0.752	0.836	0.618	0.156	3.061
Father's Activity Status							Father's Activity Status						
Wage Earners	-0.649***	0.209	-0.788***	0.216	-0.364	0.270	Wage Earners	0.649***	0.206	-0.138	0.192	0.285	0.253
Casual Labour	-0.214	0.301	-0.640**	0.287	-0.049	0.325	Casual Labour	0.214	0.293	-0.426*	0.233	0.165	0.273
Services Export Growth Rate							Services Export Growth Rate						
Moderate	0.537***	0.177	-0.480***	0.164	0.178	0.229	Moderate	-0.537***	0.171	-1.017***	0.158	-0.358	0.215
Share of Sector in Total Services Export							Share of Sector in Total Services Export						
Moderate	-1.230***	0.211	0.951***	0.154	0.101	0.222	Moderate	1.230***	0.202	2.182***	0.190	1.331***	0.235
High	-0.991***	0.340	-1.730***	0.469	-14.132***	0.726	High	0.991***	0.335	-0.739	0.548	-13.141***	0.756
_cons	0.020	0.701	0.427	0.690	0.603	0.845	_cons	-2.645	0.673	-0.789	0.584	-0.549	0.819
	3 (Base Outcome)							**4 (Base outcome)**					
	Occupation 1		Occupation 2		Occupation 4			Occupation 1		Occupation 2		Occupation 3	
	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err		Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err
D1	2.949***	0.109	1.465***	0.108	1.224***	0.169	D1	3.561***	0.198	2.053***	0.183	1.660***	0.170

D2	1.519***	0.125	2.660***	0.107	1.288***	0.181	D2	2.067***	0.209	3.184***	0.181	1.597***	0.179
D4	1.048***	0.156	1.073***	0.132	2.884***	0.124	D3	1.837***	0.179	1.812***	0.153	2.884***	0.123
Age	0.000	0.030	0.010	0.027	-0.031	0.034	Age	0.031	0.041	0.041	0.040	0.031	0.036
Father's Age	-0.005	0.007	-0.011	0.007	-0.001	0.008	Father's Age	-0.004	0.009	-0.010	0.009	0.001	0.008
1.Married	0.100	0.097	0.035	0.095	0.308**	0.131	1.Married	-0.208	0.144	-0.273**	0.139	-0.308**	0.131
Age Group							Age Group						
21-25 Years	0.139	0.176	-0.054	0.158	0.032	0.191	21-25 Years	0.107	0.232	-0.086	0.219	-0.032	0.197
26-30 Years	0.414	0.290	0.031	0.261	0.175	0.345	26-30 Years	0.239	0.398	-0.144	0.391	-0.175	0.353
31-35 Years	0.714	0.433	-0.115	0.395	0.166	0.507	31-35 Years	0.548	0.594	-0.281	0.593	-0.166	0.539
Religion							Religion						
Muslim	-0.271***	0.100	-0.296***	0.092	0.076	0.127	Muslim	-0.347***	0.139	-0.373***	0.131	-0.076	0.122
Christian	-0.750***	0.273	-0.676***	0.259	-0.001	0.250	Christian	-0.749**	0.342	-0.676**	0.303	0.001	0.258
Others	-0.326*	0.186	-0.488**	0.202	-1.034***	0.375	Others	0.708	0.398	0.546	0.416	1.034***	0.386
Social Group							Social Group						
Scheduled Caste	0.341	0.245	0.177	0.232	-0.145	0.195	Scheduled Caste	0.485	0.291	0.321	0.247	0.145	0.209
Other Backward Class	0.510**	0.228	0.236	0.208	-0.902***	0.193	Other Backward Class	1.413***	0.269	1.139***	0.232	0.902***	0.196
General	0.728***	0.224	0.676***	0.211	-0.692***	0.201	General	1.419***	0.271	1.368***	0.237	0.692***	0.200
Education							Education						
Primary Education	0.285	0.231	0.129	0.186	-0.142	0.174	Primary Education	0.427*	0.255	0.272	0.216	0.142	0.169
Secondary Education	0.504**	0.224	0.356**	0.177	-0.351**	0.171	Secondary Education	0.855***	0.247	0.707***	0.210	0.351**	0.170
Higher Secondary Education	1.213***	0.238	0.852***	0.198	-0.536**	0.253	Higher Secondary Education	1.749***	0.310	1.388***	0.275	0.536**	0.240
More than Higher Secondary Education	2.315***	0.244	1.228***	0.206	-0.523*	0.279	More than Higher Secondary Education	2.838***	0.321	1.751***	0.300	0.523*	0.279
Father's education							Father's education						
Primary Education	0.064	0.121	-0.049	0.103	0.021	0.122	Primary Education	0.042	0.156	-0.070	0.140	-0.021	0.123
Secondary Education	0.278**	0.119	0.213**	0.104	-0.061	0.145	Secondary Education	0.339**	0.168	0.275	0.158	0.061	0.142

Higher Secondary Education	0.450**	0.207	0.217	0.192	-0.103	0.341	Higher Secondary Education	0.552	0.359	0.319	0.358	0.103	0.350
More than Higher Secondary Education	0.417**	0.180	0.340*	0.177	0.127	0.295	More than Higher Secondary Education	0.290	0.296	0.213	0.290	-0.127	0.289
Household Type							Household Type						
Wage Earners	-0.714***	0.204	-0.234	0.181	-0.415	0.240	Wage Earners	-0.299	0.250	0.181	0.232	0.415*	0.223
Casual Labour	-1.472***	0.309	-1.010***	0.259	-0.107	0.240	Casual Labour	-1.365***	0.324	-0.903***	0.286	0.107	0.232
Other	-0.508	0.408	-0.836	0.926	-0.680	3.418	Other	0.171	2.879	-0.156	2.943	0.680	2.833
Father's Activity Status							Father's Activity Status						
Wage Earners	0.788***	0.217	0.138	0.194	0.424*	0.241	Wage Earners	0.364	0.268	-0.285	0.253	-0.424	0.237
Casual Labour	0.640**	0.296	0.426*	0.249	0.591**	0.243	Casual Labour	0.049	0.319	-0.165	0.289	-0.591***	0.237
Services Export Growth Rate							Services Export Growth Rate						
Moderate	0.480***	0.166	1.017***	0.158	0.659***	0.185	Moderate	-0.178	0.219	0.358	0.220	-0.659***	0.188
Share of Sector in Total Services Export							Share of Sector in Total Services Export						
Moderate	-0.951***	0.155	-2.182***	0.194	-0.850***	0.180	Moderate	-0.101	0.219	-1.331***	0.237	0.850***	0.185
High	1.730***	0.471	0.739	0.503	-12.402***	0.887	High	14.132***	0.767	13.141***	0.776	12.402***	1.108
_cons	-3.375	0.660	-1.871	0.603	-1.048	0.694	_cons	-4.164	0.846	-2.636	0.802	-1.837	0.716

* Denotes estimate is significant at 10 per cent level of significance.,
** Denotes estimate is significant at 5 per cent level of significance.,
*** Denotes estimate is significant at 1 per cent level of significance.,
Blank space denotes estimate is not significant.

CHAPTER 4

TASK INTENSITY AND JOB POLARISATION IN SERVICES SECTOR

4.1 Introduction

This essay delves into the question of the emerging pattern of task intensity of jobs in the services sector with increasing diffusion of digital technology and trade orientation in India. Changes in task intensity of jobs can arise from shifts in the employment pattern and occupational choice, as is observed in earlier chapters, leading to increased skill requirement consequent upon changes in technology. Increasing supply of more educated workforce has been observed in India over the years. Preliminary estimates using NSSO 'Employment-Unemployment Survey' show lower persistence with increasing upward mobility in educational attainment among children and younger generations as compared to fathers between 1999-2000 and 2011-12[1]. Jalan & Murgai (2008), Majumder (2010), Ray & Majumder (2014) and Azam & Bhatt (2015) also arrive at similar conclusions. In addition, as observed in chapter 1, there has been increasing educational mobility for children whose father is less educated. Majumder (2010) finds upward mobility more among boys than girls[2]. Thus, despite inequality in educational attainment, there is evidence of rising educational mobility in India, which lies at the core of increasing skill formation and changing task intensity of jobs.

A new strand of literature came up in early nineties on increased skill intensity of jobs on account of increased used of ICT and digital technology. Globally, with

[1] However, Roy et al. (2022) observe a strong association between parental education and child's mean years of schooling in West Bengal.

[2]Jalan & Murgai (2008) find mobility in years of education across generations for different social groups and classes, Azam & Bhatt (2015) with greater mobility at the lower end of the educational distribution. However, Majumder (2010) show educational attainment varies across social groups i.e., SC, ST and OBC, Jalan & Murgai (2008) find striking gaps between rich and poor and not between castes.

computerization and increased automation of production activities since late 1990s, the employment trend exhibited a different pattern with rising demand for high skilled workers performing non-routine cognitive tasks on one hand depending on their ability to upgrade their skill set along with demand for non-routine manual task-oriented service jobs lying at the bottom of the skill ladder, while routine cognitive and routine manual work being increasingly codified and performed by machines.[3] This 'routinisation hypothesis', ascribed to the existing literature, holds key to the phenomenon of job polarisation, which will be taken up while discussing the existing literature on the issue.

The rest of the chapter is as follows. Section 4.2 presents a review of literature on task content and job polarisation with regards to India's services sector. Section 4.3 explains in somewhat detail the methodology used in the empirical estimation exercise. Section 4.4 discusses the empirical results on changing task intensities across jobs in India's services sector. Section 4.5 summarizes the major findings of the chapter.

4.2 Review of literature

Several studies came up with 'Routinisation Hypothesis' explaining employment polarisation experienced in many countries, especially, the developed ones. The Acemoglu & Autor (2011) model, allowing for shifts in boundary between 'labour tasks' and 'capital tasks', proposes that the novel tasks arising out of development of new products, technology or services, are first assigned to workers, and then, once codified, the routine task may be automated and assigned to machines. However, this assignment is

[3] For instance, Bound & Johnson (1992), Levy & Murnane (1992) and Katz & Murphy (1992), among others, explain changes in relative wages in terms of rising skill intensity of jobs following increased diffusion of digital technology. In particular, Katz & Murphy (1992) show the importance of both rising demand for skill from emerging sectors in world trade and supply of more educated workforce.

dependent on the cost advantage of the factor, domestic labour, foreign labour or capital. For the U.S. and many E.U. countries, Autor (2013) shows that routine tasks are the most subject to machine displacement and such tasks are mostly performed by medium-skilled workers. Thus, occupations like clerical, administrative support, sales, production and operative positions are automated and workers are replaced by machines and the workers in these occupations are thus reallocated to the two tails of the distribution viz. a) high skill jobs performing non-routine cognitive tasks and b) traditional in-person service jobs essentially involving non-routine manual tasks.

Autor & Dorn (2009), also relying on the task-based framework, find that aggregate employment in the US has shifted away from middle-skill, routine task-intensive work and toward the tails of the occupational skill distribution during 1980 to 2005. Even though occupations at both tails are non-routine, they differ greatly in skill content and pay. The contraction of routine occupations has varying impacts on workers across age and skill groups, depending on their ability to move upward or downward. Further, by comparing local labor markets, the paper finds differing degrees of occupational change between 1980 and 2005 with disproportionate rise in the share of workers employed in low-skilled non-routine jobs following contractions of routine employment within local markets. The paper observes that age groups other than the youngest category of workers exhibit only such downward mobility. In addition, educated workers are better prepared to adapt to changing occupational opportunities, with younger college workers shifting to in high-skill non-routine occupations.

Most studies on job polarisation look at the impact of computerization on skill composition of workers. Autor et al. (2003) predict, using the simple Autor-Levy-

Murnane (ALM) model on job task requirements data from Dictionary of Occupational Titles in the US for the period 1960 to 1998,that industries would substitute workers performing routine tasks with computers and increase demand for workers able to perform non-routine tasks which are complemented by computer capital. Goos & Manning (2007), for a comparative analysis of ALM hypothesis and SBTC (Skill-Biased Technical change) hypothesis using US data from Autor, Levy & Murnane (2003) and UK data for 1975 to 1999, show that these economies experience job polarisation with rise in non-routine jobs at the top and the bottom rank along with a fall in routine jobs lying at the middle of the job distribution. This is achieved with an upward shift in the educational attainment of the workers across all job types. However, supply-side factors like changing composition of labour force do not explain part of job polarisation. Wright & Dwyer (2003) show a strong expansion of jobs in the top tier with very less in the middle tier of the employment structure in the US between 1960s and 1990s. However, the gender difference in employment came down along with the polarisation of racial character of employment. Immigration added to the bottom tier of employment in the US during the period. Spitz-Oener (2006) finds a shift towards analytical and interactive occupational tasks and away from routine cognitive and manual tasks with increasing diffusion of computer technology in Germany.

Oesch & Rodriguez (2010) find that Britain, Germany, Spain and Switzerland experienced occupational upgrading with strongest occupational growth occurring among managers and professionals, which happened in tune with educational expansion in these countries during 1990 to 2008. Also, employment declined for average paid jobs including clerical and routine jobs. However, low-paid service jobs grew in Spain and

Britain but stagnated in Germany and Switzerland. The paper concludes that routinisation hypothesis best explained the job polarisation in these economies.

Similarly, Autor & Dorn (2013) also show that employment change in the US between 1980 and 2005 is U-shaped in skill-levels and also, the wage growth is U-shaped in skill-percentiles with highest growth for the upper tail, moderate growth for the lower tail and least growth for the middle of the distribution, thereby indicating job polarisation. Such growth in the lower tail of occupational skill distribution is primarily accounted for by the services occupations and the observed job polarisation is found to be driven by the interaction between consumer preferences and non-neutral technological progress which reduces cost of automating routine jobs but has little impact on cost of performing in-person service jobs. Workers experiencing eroding wages in routine jobs tend to shift to service occupations. Hardy et al. (2016), following the ALM model and the model by Acemoglu & Autor (2011) and using the O*NET data on US and Polish LFS data during 1996 to 2014, find that intensities of both routine and non-routine cognitive tasks increased and that of manual ones declined mainly on account of shifts in the employment structure between occupations. Shift in task intensity structure mainly occurred among cohorts born after 1970, which was largely driven by the tertiary education boom in Poland. However, for some cohorts like the tertiary graduates, there was a relative reduction of the non-routine content of jobs.

Murphy & Oesch (2017), using Census data for Ireland and Switzerland for the period 1970 to 2010, show that occupational upgrading occurred in both the countries with maximum gain in the top-tier of employment distribution and large losses in the bottom-tier. The paper argues that job polarisation is explained by routinisation

hypothesis and skill-biased technological change hypothesis, and it is also an outcome of institutional set-up of wage-setting and supply of specific types of labour in an economy. The supply of labour is dependent on factors like educational expansion, female labour force participation and immigration. Ariu & Mion (2017) find that the sectors experiencing increased interactive task intensities in Belgium were less likely to enter the export market, while the chances of entering the export market were larger for the services industries experiencing increase in cognitive analytical task intensities. The paper further suggests that change in IT use does not directly translate into a significantly higher or lower participation of firms to service export. Complexity of task and degree of personal communication needed for delivering the service play opposite roles in determining the margin of service exports, and technological change does not act as the key underlying force behind the increase in the extensive margin of service exports. Lewandowski et al. (2019), developing a survey based method of measuring task-intensity of jobs and applying it to 42 countries with varying levels of development to analyse the determinants of routine task intensity (RTI) of jobs at the worker level, find that higher use of computers, better education and literacy skills reduces RTI of work. Globalisation tends to increase RTI in poor countries but reduce it in richer countries.

Coming to literature on job polarisation in India, the literature base is thin as the study on this particular issue has started in recent years only. The pioneering works on job polarisation in India are by Vashisht & Dubey (2018) and Sarkar (2018),which are discussed in chapter 1. To recapitulate, Vashisht & Dubey (2018) and Sarkar (2018) provide evidence of job polarisation in India's manufacturing sector with increase jobs with non-routine cognitive task. Kuriakose & Kylasam (2018), using the disaggregated

data from NSSO for the period 1983 to 2012, argue that this phenomenon of job polarisation in Indian manufacturing can be explained by supply of educated workforce and the divergence between output and employment show that India has witnessed job polarisation and consequent wage polarization, but only the increased demand for high-skill jobs can be explained by technological upgradation. However, the increase in demand for low-skill manufacturing is mainly in sectors like construction and textiles, which may have arisen out of indirect demand following growth of high-skill services exports, which in turn created demand for construction and textiles industries.

On the whole, the above review of literature shows that, with increasing diffusion of ICT, it is changing task intensity of occupations that has led to job polarisation across countries, developed or developing including India. This is plausible with higher educational attainment and occupational mobility of sons. The literature delving into the issue of job polarisation in services is however rare, and there is perhaps no study investigating into whether growing services trade has led to job polarisation. It is to these issues of task intensity and possible job polarisation in service that this essay turns now.

4.3 Data Sources and Methodology

In analysing whether high growth in services trade has led to changing task intensities of service workers and job polarisation in India, it is important to understand the details of the existing database and the nuances in methodology. As elaborated in chapter 1, the data on employment of Indian workers, 'employment-unemployment' household surveys conducted by National Sample Survey Organization of India are used. Three of the large sample rounds of survey viz. the 55th Round (1999-2000), the 61st

Round (2004-05) and the 68th Round (2011-12) are considered for the current study. Apart from basic demographic characteristics of households and household members, the surveys report activity status of workers which includes principal activity status for full-time employment, subsidiary activity status for part-time employment and current daily activity status for employment in last seven days. Wage data of individuals are also available for last seven days of employment prior to the survey. On the other hand, data on services export for India in the post liberalisation period are obtained from Trade in Services Database (TSD_February 2015) version 8.9. The details of the database are provided in chapter 1.

The existing literature suggests that ranking of occupations on the basis of skills can be done in various ways like, on the basis of initial average income or average education (e.g., Autor et al., 2006, 2008; Goos & Manning, 2007), or by defining the task categories in terms of the tasks performed by the workers in different jobs, (e.g., Autor et al., 2003; Acemoglu & Autor, 2011).Both these methods of ranking occupations on the basis of average earning and by defining task categories are considered to study task intensities of services jobs in India. To trace the factors explaining the employment change across jobs in the occupational skill percentiles, and, in particular, whether growing services exports influences the observed changes in employment share across jobs, probit regression estimation is carried out for the whole period and the two sub-periods.

4.3.1. Methodology for preparing occupational skill distribution

For preparing occupational skill distribution, the methodology followed by Wright & Dwyer (2003), Murphy and Oesch (2017) and Sarkar (2018) is used. Wright & Dwyer (2003) and Murphy & Oesch (2017) determine quality of job considering the

median wage of that particular job with the idea that higher median wage for an occupation implies better occupation. For constructing the job matrix these studies vary to some extent. Sarkar (2018) however uses mean wage to rank occupations. While Wright & Dwyer (2003) exclude self-employed as the wage data are not available for them, Sarkar (2018) uses mean wage of salaried and casual workers as a proxy for incomes earned by the self-employed in that same occupation. Based on these studies, the following steps are used to create the job matrices from the NSSO surveys.

First, this essay considers only urban population as services jobs to be impacted by technological upgradation and offshoring from the developed world are primarily in the urban sector. Second, working age population aged between 15 to 65 years are taken into account. Third, workers with usual principal activity status code 11 to 51, implying full-time employment either being self-employed, salaried or casual workers are considered. Since self-employed comprises more than approximately 40 per cent of the total working sample, so this essay, following Sarkar (2018), uses wage data for the salaried and casual workers belonging to that same occupation as the proxy for earning of the self-employed and, unlike Sarkar, median wage is considered here. Since, NSSO does not ask the respondents about the task intensities of occupation, so wage data has to be used in this case. Fourth, NSSO provides occupational classifications for the 55th and 61st rounds as per NCO 1968 and as per NCO 2004 for the 68th round. For concordance, the three-digit occupation codes of NCO 1968 are mapped against 113 occupation codes of NCO 2004. These 113 codes are regrouped to form 74 occupation categories which are comparable across the three rounds of survey (see Appendix Table A4.11). Fifth, for the industry groups, 5-digit National Industrial Classification (NIC) codes are suitably re-

arranged and clubbed to form 18 industry groups with agriculture and allied activities as group 1, manufacturing as group 2 and different service industries at disaggregated level as groups 3 to 18 (refer to Appendix Table A1.2).

Since this essay focuses on the services sector, agriculture and manufacturing sectors are dropped. Finally, a job matrix of 16 industry groups by 74 occupation categories is created. Each cell of the job matrix refers to a particular job. To rank order the jobs, the cells with null values are eliminated and the cells with less than 10 wage observations are dropped as taking that median wage to represent the majority of self-employed in that cell might affect the job ranking. Only a few cells with less than 10 wage observations are retained, where the number of wage-earners is at least 50 per cent or more than the number of self-employed workers present in that cell. The size of the population at each stage of preparing the working sample for all the three rounds are presented in Tables 4.1, 4.2 and 4.3.

Table: 4.1: Size of population while constructing the working sample

	1999-2000	2004-05	2011-12
Urban Population with full-time engagement in weekly activity status	192046	198576	172659
Working age population (15 to 65 years)	120,410	130,669	119272
Population reporting full time employment activity status	46455	63203	55161
Population reporting Principal Industry and Occupation	45,970	62,923	54,934
Population reporting Principal Industry and Occupation in services sector	**32,934**	**44009**	**40,269**

Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

Table: 4.2: Size of the Working Sample for Task-based analysis

	1999-2000	2004-05	2011-12
No. of Cells in the Job Matrix	16X74=1184	16X74 = 1184	16X74 = 1184
Job Cells with at least 10 workers	237	258	276
Job Cells with at least 10 workers and at least 10 wage data per cell	196	227	240
Total No. of Workers with at least 10 wage data for each job cell	**31114**	**42284**	**38272**

Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

Table: 4.3: Size of the Working Sample for Occupational Skill Distribution

Total No. of Workers in common job cells across rounds					
Sub Period I 1999-2000 to 2004-2005		Sub Period II 2004-2005 to 2011-2012		Whole Period 1999-2000 to 2011-2012	
55th Round (1999-2000)	61st Round (2004-2005)	61st Round (2004-2005)	68th round (2011-2012)	55th Round (1999-2000)	68th round (2011-2012)
28,726	**41,065**	**28,253**	**36,320**	**28,348**	**35,219**

Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

Looking at the socio-demographic characteristics of the weighted working sample presented in Appendix Table A4.4,it can be observed that approximately 84 per cent are men and 16 per cent are women, the age distribution changed during the decade with the share of workers below 35 years of age declining and that above 35 years increasing. In the working sample, Hindus are predominant. Around 18 per cent of the working sample belongs to scheduled castes and tribes along with the share of other backward castes increasing from approximately 30 per cent to 39 per cent and that of the general category declining by 9 percentage points. The average level of education increased with share of workers with more than Higher Secondary education increasing from 19 to around 30 per cent of the working sample. Also, the distribution of the working sample across

employment status shows that more than 55 per cent of the workers are self-employed and around 40 per cent are regular salaried workers (see Appendix Table A4.5).

In this essay, the changes in employment across occupational groups or industry-occupation specific jobs are looked into. Following Wright & Dwyer (2003), Murphy & Oesch (2017), and Sarkar (2018), the job distribution from lowest to highest median wage is ranked. The entire distribution is then divided in 100 percentiles or 5 quintiles on the basis of median wage and the number of workers employed in each percentile or quintile for the three rounds of NSSO data is calculated. The change in employment share in services sector for periods 1999-2000 to 2004-05, 2004-05 to 2011-12 and 1999-2000 to 2011-12 are estimated. Following Acemoglu & Autor (2011), Autor & Dorn (2013) and Sarkar (2018), Local Polynomial Smoothing method is used for performing non-parametric analysis as compared to other estimators, as it has minimum variance and the lowest bias. As in the literature, 'locally weighted scatter-plot smoothing' (LOWESS) is used to plot the smooth graph of employment change across skill percentiles.

4.3.2 Methodology for Task-based analysis of jobs using Shift-Share Analysis

The task-based measures used by Autor et. al. (2003), Acemoglu & Autor (2011), Spitz-Oener (2006), Hardy et al. (2015), and Sarkar (2018) and Vashisht & Dubey (2018) in the literature on Indian economy, is discussed in detail. Autor et al. (2003) use the Dictionary of Occupational Titles (DOT) data, which contain the descriptions of occupations in the United States, and Occupational Information Network (O*NET) database that replaced DOT in 2003. Some studies like Spitz-Oener (2006) uses a unique survey-based dataset from West Germany, where, employees participating in the survey

indicate what they actually do in their jobs. This definitely gives a better understanding of the task intensities of jobs compared to the DOT or O*NET data where experts define task-intensity of jobs. However, in India, there is no such information base as the NSSO survey does not ask the respondents about the particular task performed by them in their regular jobs nor there is an expert-generated dataset like DOT or O*NET for India.

Regarding assigning task to specific occupations, be it DOT or O*NET data as used by Acemoglu & Autor (2011), Hardy et al. (2015) and others, or using country-specific survey data as used by Spitz-Oener (2006), Ariu & Mion (2017) and others, the method of assigning task intensities to the occupations is as follows:

$$Task_{ijt} = \frac{Number\ of\ activities\ in\ category\ j\ performed\ by\ individual\ i\ at\ time\ t}{Total\ number\ of\ activities\ in\ category\ j\ at\ time\ t}$$

where j=1(Non-routine Cognitive Analytical), 2 (Non-routine Cognitive Interactive), 3 (Routine Cognitive), 4 (Routine Manual), and 5 (Non-routine manual) stands for the five task intensities, t stands for time period and i stands for the individual worker (refer to Appendix Table A4.1 for task descriptions). Then, an aggregate measure of task ($Task_{ijt}$) is determined by taking average of task across workers in sector/industry k. Thus, T_{jkt} gives the average intensity of task j in sector k at time t. Task change over time is defined as $\Delta T_{jkt} = T_{jkt1} - T_{jkt2}$.

Vashisht & Dubey (2018) have used O*NET 2003 dataset for their study. The information about various task intensities in O*NET data is tabulated according to the Standard Occupation Classification (SOC) of the U.S. labour market. In order to make it comparable with Indian data, a concordance between SOC and NCO 2004 is done. However, Sarkar (2018) has classified 1968 NCO codes at 1-digit level into four task

categories viz. non-routine cognitive, routine cognitive, routine manual and non-routine manual tasks (refer to Appendix Table A4.2).

In this essay, following the occupational classification provided by Sarkar, (2018), a cross-tabulation of the socio-demographic attributes of the sample across four task groups, is presented to get an idea on employment in the services sectors (see Appendix Tables A4.4 and A4.5). Regarding gender distribution, it is observed that for both non-routine cognitive and manual task-based occupations, around 80 per cent of workers are men and the rest are women. For routine cognitive task-based occupations, the share of female workers was less at 12 per cent in 2011-12. However, the share of female workers came down to 3 per cent for routine manual task-based occupations. While the employment share of SC/ST has remained the same and that for general caste declined, the share of other backward castes for general caste for all 4 task-categories during the decade (see Appendix Table A4.4).

Further, it can be observed from Appendix Table A4.5 that among the male workers, the shares of routine and non-routine manual task declined marginally and that of routine cognitive tasks dropped by 10 percentage points, while that for non-routine cognitive task increased by 12 percentage points during 2004-05 to 2011-12. Across all age groups, the share of routine and non-routine manual task intensive jobs has remained almost the same. Considering the workers with different educational qualifications, the share of routine cognitive task intensive jobs declined and the share of non-routine cognitive task intensities of jobs increased during 2004-05 to 2011-12. Thus, an increase in the share of non-routine cognitive task intensive jobs along with a corresponding drop in that of routine cognitive task intensive jobs is observed during the same phase.

After assigning tasks to the occupations, a Shift-Share Analysis is conducted to see whether the changes in task intensities of service jobs have resulted from change in the occupational structure of employment (between-industry change) or, changes in skill requirements within occupations (within-industry change). For the Shift-Share analysis, following Acemoglu & Autor (2011), the procedure is as follows:

$\Delta E_{jt} = \Delta E_t^B + \Delta E_t^W$ ……..(4.1)

$\Delta E_t^B = \sum_k \Delta E_{kt} \, . \, \lambda_{jk}$ …….(4.2)

$\Delta E_t^W = \sum_j \Delta \lambda_{jkt} \, . E_k$ …….(4.3)

where,

ΔE_{jt} = Change in overall share in employment in occupation j, over time interval t.

ΔE_t^B = Change in occupation j's share of employment attributable to change in industrial composition. and,

ΔE_t^W = Change in occupation j's share of employment attributable to within-industry shift.

Now,

$\Delta E_{kt} = E_{kt1} - E_{kt0}$ = Change in industry k's employment share during time interval t.

$E_k = (E_{kt1} + E_{kt0}) / 2$ = average employment share of industry k over sample interval.

$\Delta \lambda_{jkt} = \lambda_{jkt1} - \lambda_{jkt0}$ = Change in occupation j's share in industry k's employment in time period t.
$\lambda_{jkt} = (\lambda_{jkt1} + \lambda_{jkt0}) / 2$ = Occupation j's average share in industry k's employment in time period t.

4.3.3 Methodology for Probit Estimation

In order to trace the factors explaining the employment share across jobs as per the occupational skill percentiles, for the whole period (1999-2000 to 2011-2012) and the two sub periods viz. Sub Period I (1999-2000 to 2004-2005) and Sub Period II (2004-2005 to 2011-2012), the following procedure is adopted for each set of the data. First, the jobs for the base period are

arranged as per the occupational skill percentiles and the number of workers are tabulated. The number of workers present in each of the cells in the other round of data (end period for each set) are tabulated. After arriving at the share of employment in each cell, the change in share for each job is calculated.

For the probit regression model, a dependent variable 'y_i' is defined which takes a value of 1 if share of employment has increased for a job cell and 0 otherwise. So,

$$y_i = \begin{cases} 1 \; if \; \text{share of employment increases for a job cell} \\ 0 \; if \; \text{share of employment falls for a job cell} \end{cases}$$

In the regression exercise, the average share of each service in total services export and the compound growth rate service export industries are taken to study the impact of the services sector export performance on the observed employment pattern in the services industries. In addition, household characteristics like household type, religion and caste status, and individual characteristics including age, age group, level of education, employment status are taken as control variables. The Probit model is specified as

$$p_i = \Pr[y_i = 1|x_i] = \varphi(x_i' \beta)$$

where $\varphi(.)$ is the standard normal cumulative distribution function, and,

$$x_i' \beta = \beta_\circ + \beta_1 age_i + \mu' AG + \theta' E + \alpha' R + \gamma' SG + \delta' HT + \rho' ES + \sigma' SSE + \tau' SEG$$

where, AG, E, R, SG, HT, FE, FO, FS, SSE and SEG represent complete sets of Age group dummies, Education category dummies, religion dummies, Social Group dummies, Household type dummies, Employment Activity Status dummies, share of export of service sector dummies and service export growth dummies respectively. This chapter uses export performance of the services sectors for the two sub periods viz. Sub Period I (1999-2000 to 2004-2005) and Sub Period II (2004-2005 to 2011-2012) and the whole period (1999-2000 to 2011-2012). As the data for the year 1999-2000 are not available for all the sectors, average export performance is estimated from the year 2000-2001. The export performance tables are presented in Appendix Table A4.12, A4.13 and A4.14 of this chapter.

4.4 The Empirical Results

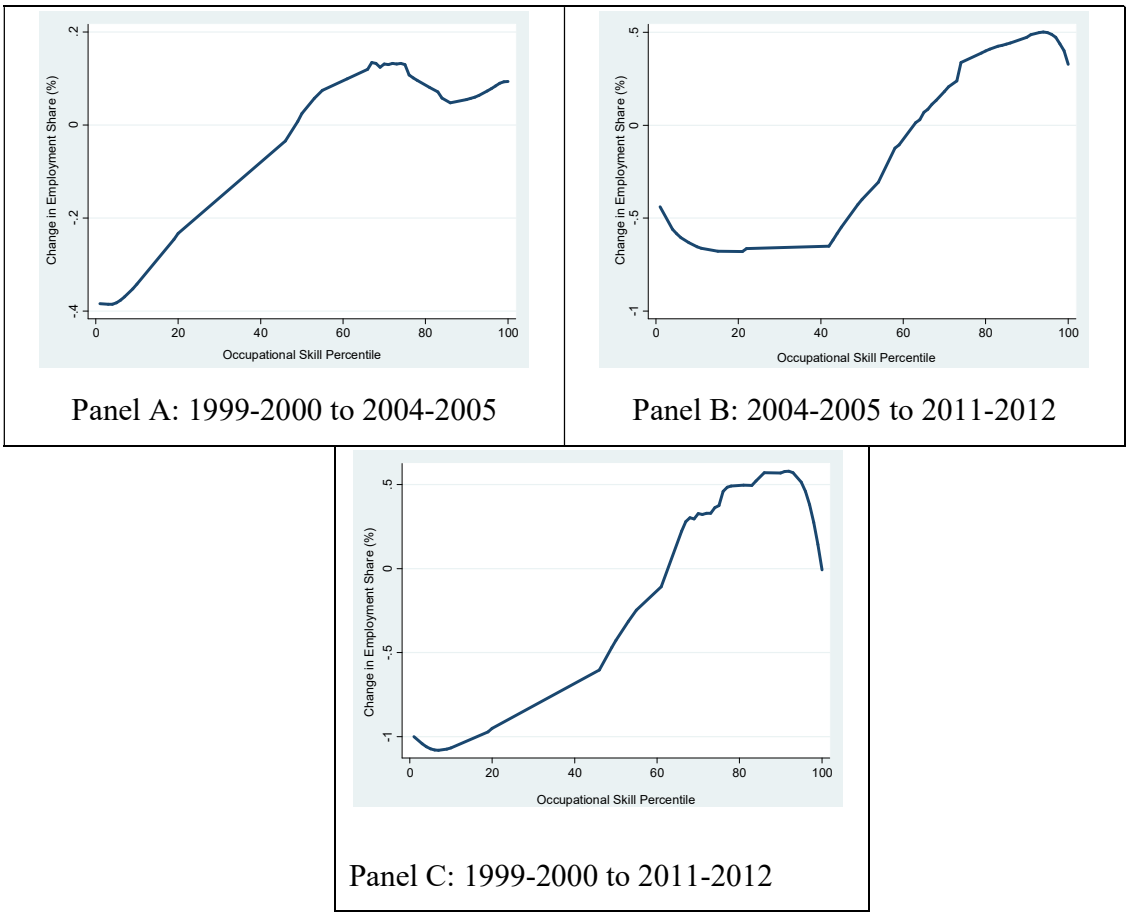
4.4.1 Employment change across skill percentiles and skill quintiles

To analyse the changes in employment share across skill percentiles during 1999-2000 to 2011-12, following the existing literature on the subject, the occupational skill percentile or quintiles are created by allocating approximately 1 per cent or 20 per cent of the workers equally into 100 or 5 groups respectively. The weekly median earning as available in the NSSO data in the initial period of the study, i.e., 1999-2000, is taken to rank occupations on the basis of skill of the workers. To study the changes in employment share in the services sectors, the period is divided in two sub-periods, 1999-2000 to 2004-05 and 2004-05 to 2011-12, and smoothed graph of employment change across skill percentiles are arrived at for the two sub-periods separately and the whole period. For the second sub-period, 2004-05 to 2011-12, the occupational skill percentiles are ranked as per the weekly median earning of full-time workers in 2004-05.

A rising share of employment is observed from Figure 4.1 over the occupational skill percentile in the services sector in India indicating growth in the jobs belonging to the upper tail of occupational skill distribution (60^{th} percentile and above) during 1999-2000 to 2011-12. The rise in the employment share of high-skill jobs has been more pronounced in the latter half of the decade, i.e., during 2004-05 to 2011-12 than in the former, along with a more pronounced decline in the employment share of low-skill jobs.

A decomposition analysis of changes in employment share for the four categories of workers viz. self-employed, regular salaried, casual and unpaid family workers, presented in Figure 4.2, brings out a more nuanced picture. For the self-employed and unpaid family workers, the changes in share of employment is low for lower-end jobs, the

Figure 4.1: Changes in employment share by occupational skill percentiles

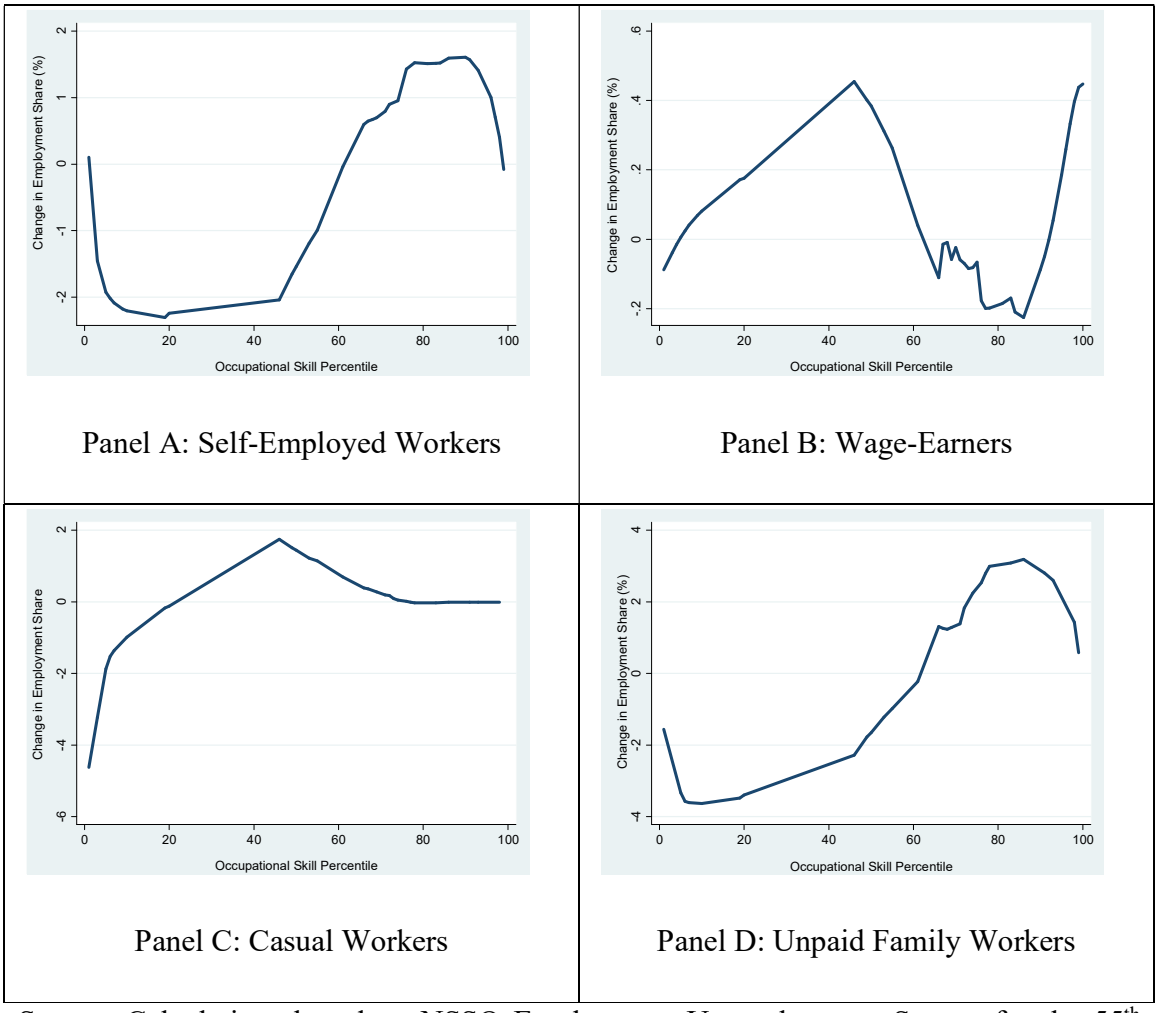


Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

unpaid family workers in particular. The changes in employment shares for these two groups of workers have been low especially between 10th to 50th percentiles, and the rate of decline is sharper for the jobs belonging to the upper tail of the skill distribution. For the self-employed group, the maximum growth is witnessed by the 'Directors, Chief Executives, General Managers, Production and Operations Department Managers and other Managers' in wholesale and retail trade sector (17.6 per cent)falling in the 86th percentile. For the regular salaried and casual workers, the pattern is just the opposite. For the wage-earners, share of employment has increased for the low and middle skilled jobs (10th to 60th percentile) and the jobs in the top-most tier (above 90th percentile).

However, the range of change in employment share is comparatively less, lying between -3 to 3 per cent approximately, for casual workers. The employment share of the casual workers has declined for the low-skill jobs (up to 30th percentile), and increased for the middle-skill jobs and has remained unchanged for the high-skill jobs (above the 80th percentile). It can thus be inferred that the overall trend during 1999-2000 to 2011-12 is primarily driven by the employment share of the self-employed workers.

Figure 4.2: Changes in employment share by occupational skill percentiles for four categories of workers during 1999-2000 to 2011-12



Source: Calculations based on NSSO Employment Unemployment Survey for the 55th and 68th Round

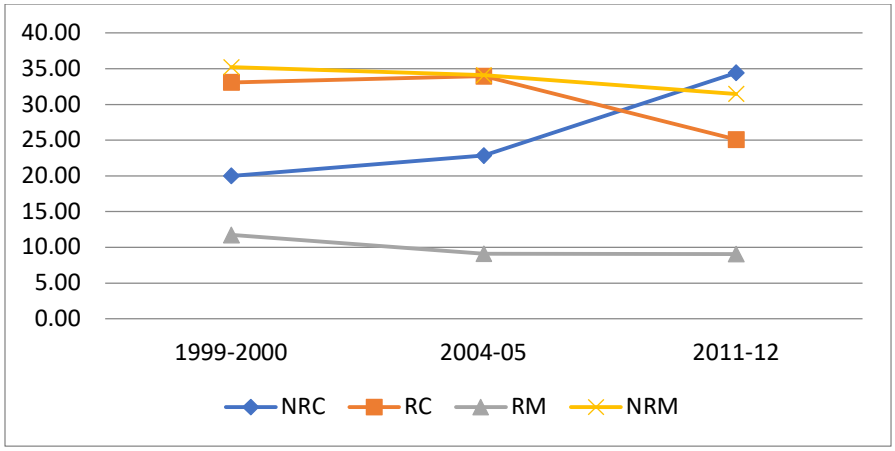
A further look into the job quintiles to identify the jobs registering the maximum change in their employment share shows greater changes in employment share of services sector during 2004-2005 to 2011-2012 as against that in the earlier sub-period (see Appendix Table A4.6). In wholesale and retail trade, the low skill occupations registered the largest decline in share of employment, while the high skill occupations gained the maximum. The other prominent sectors are transport and construction, where the motor vehicle drivers and construction workers gained share in employment.

4.4.2 The Empirical results for the task-based analysis

A clear picture of the share of occupational task intensity during 1999-2000 to 2011-12 can be seen from Figure 4.3.It can be observed that non-routine manual tasks have the highest share (35.2 per cent) in the service industry, followed by routine cognitive (33.08 per cent), non-routine cognitive (20 per cent) and routine manual (11.72 per cent) in 1999-2000(refer to Appendix Table A4.7, panel B). This task composition has remained almost the same in 2004-05 with increase in non-routine cognitive tasks by 2.83 percentage points and decline in routine manual tasks by 2.6 percentage points (refer to Appendix Table A4.7, Panel C). The task composition experienced a significant change during 2004-05 to 2011-12. While the share of non-routine cognitive tasks increased by about 12 percentage points in 2011-12, that of routine cognitive tasks declined substantially.

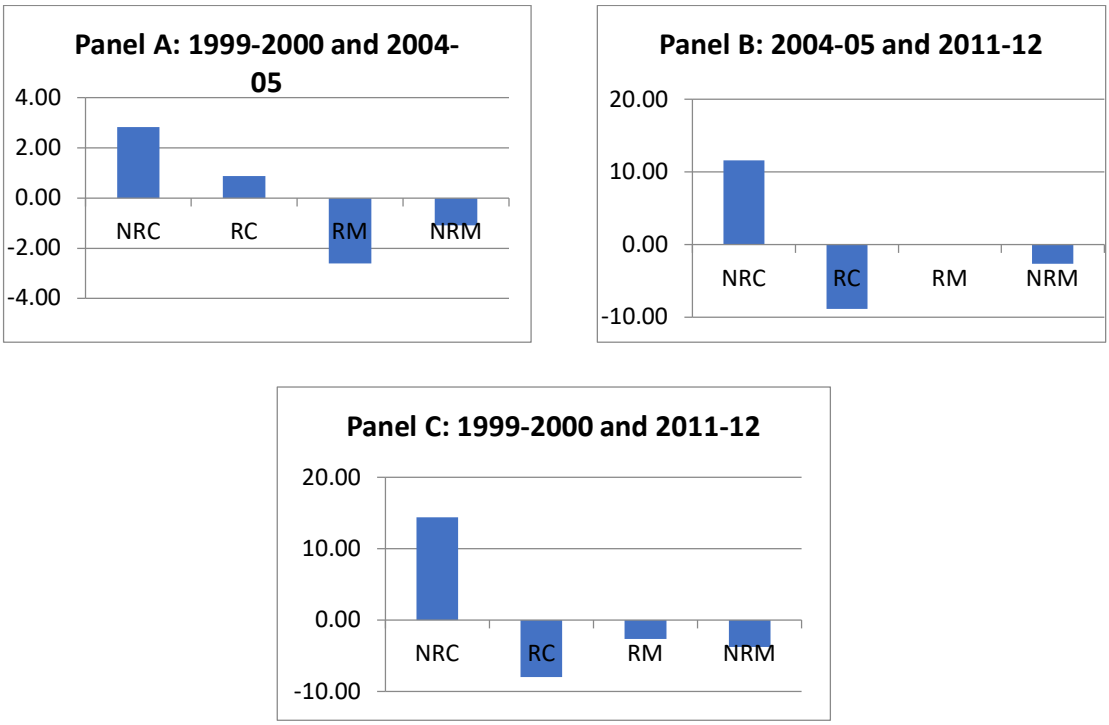
The change in the share of task intensities of occupations for the two sub-periods 1999-2000 to 2004-05 and 2004- 05 to 2011-12 are observed from Panels A, B and C of Figure 4.4. The task share of occupations did not change in a big way during the first half

Figure 4.3: Employment Share in Task-based Occupation Categories (per cent)



Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

Figure 4.4: Change in Task-Share of Employment (percentage points)



Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

of the decade. Routine and non-routine cognitive tasks registered a marginal increase in their respective shares, and the share of both routine and non-routine manual tasks

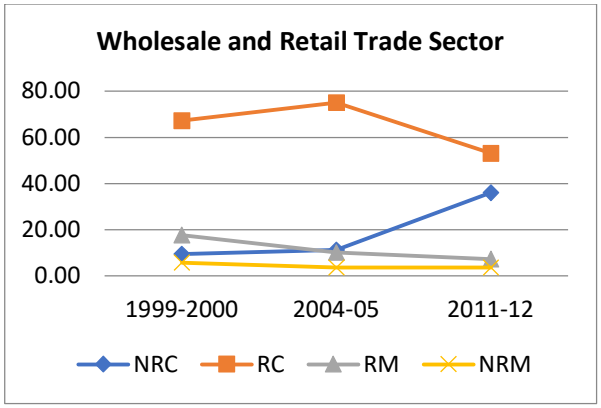
declined (see Appendix Table A4.7, panel C). It is during the second half (2004-05 to 2011-12) of the period under study that task intensities of service occupations changed significantly. For instance, non-routine cognitive task intensities registered the maximum positive change (11.6 percentage points), while routine cognitive task intensity of occupation declined by 8.89 percentage points. Routine manual task intensities have remained almost the same, but non-routine manual tasks declined by 2.6 percentage points. For the period as a whole, non-routine cognitive tasks intensity increased by 14.43 percentage points, while all other task categories registered a decline in their share.

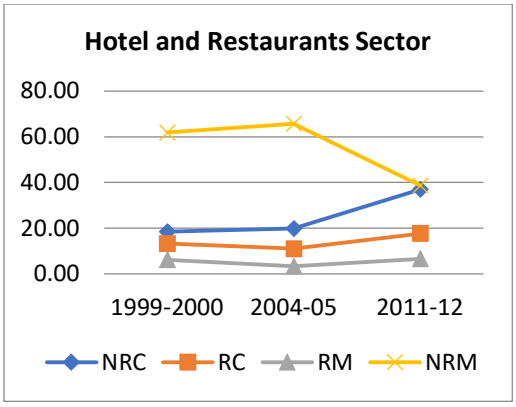
The total change in task share of service jobs may arise out of changes in occupational structure of employment and changes in skill demand within occupations. The total change in task share can be decomposed into changes within industry effect i.e., task changes within the occupational structure, and changes between industry effects i.e., changes in aggregate employment in task j due to changes in occupational distribution of employment (Spitz-Oener, 2006). The Shift-Share analysis, as presented in Appendix Table A4.8, shows that changes in the share of task arise primarily on account of changing skill requirements within occupations in the two sub-periods as well as the whole period. Panel C of Appendix Table A4.8 shows that out of the increase in share of non-routine cognitive tasks, a 10.25 percentage points is explained by changes in task composition within the occupational structure of the industry, while a 4.2 percentage points is explained by change in occupational structure across industry. For both routine and non-routine manual task intensities, with marginal increase in the shares in occupation structure between industries and stronger declining share of the two tasks within the occupational structure, the total effect became negative.

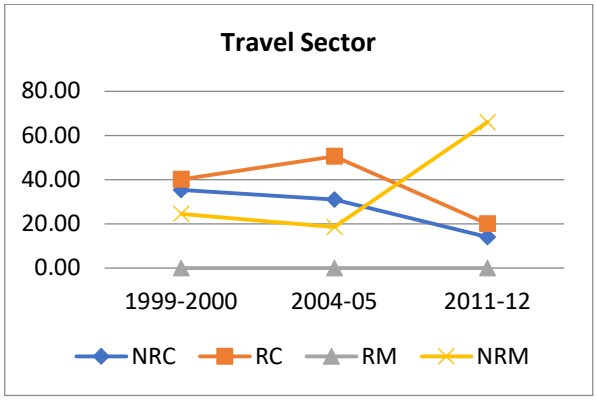
Considering change in task intensities of jobs at the sectoral level, out of the 16 services industry groups at the disaggregated level, six have registered major shifts in task intensities (refer to Appendix Table A4.9). Figures 4.5 and 4.6 suggest that, the wholesale and retail trade sector that was dominated by the routine cognitive task intensities, the share of routine cognitive task increased from 67 per cent in 1999-2000 to 75 per cent in 2004-05 but then dropped to 53 per cent in 2011-12. The share of non-routine cognitive task intensity increased marginally from around 9 per to 11 per cent between 1999-2000 and 2004-05 followed by a substantial increase to 36 per cent in 2011-12. For the hotel and restaurant sector, non-routine manual tasks, which predominated with around 67 per cent in 2004-05, fell sharply to 37 per cent in 2011-12. On the other hand, the share of non-routine cognitive task intensities in the hotel and restaurant sector almost doubled.

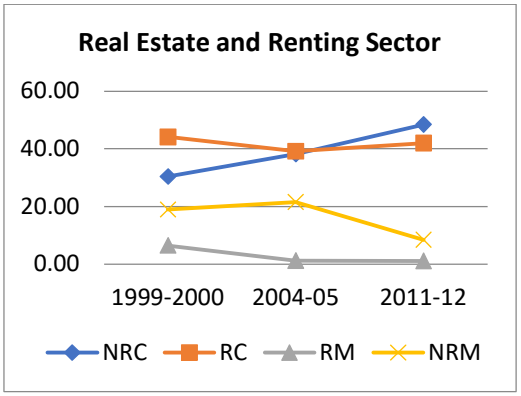
In the real estate and renting sector, routine cognitive task intensities occupied a larger share, while the non-routine task intensities increased steadily by about 18 percentage points between 1999-2000 and 2011-12, the shares of both routine and non-routine manual tasks declined. The share of manual tasks in computer and related activities sector was negligible and both routine and non-routine cognitive tasks accounted for 46and 48 per cent respectively in 1999-2000. However, the share of non-routine cognitive task intensities shot up to 82 per cent and that of routine cognitive tasks dropped to mere 14 per cent by 2011-12. The travel and other business services sectors, however, depict a different picture with decline in their respective shares of non-routine cognitive task intensities. Even though the share of non-routine cognitive task intensities of other business services sector declined, it continued to maintain the dominant position

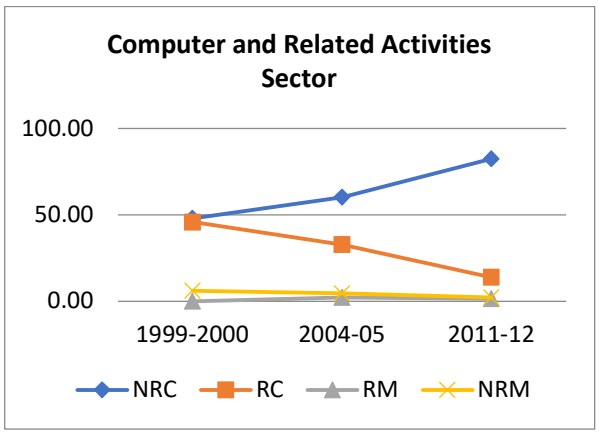
Figure 4.5: Employment Share in Task-based Occupation Categories (in per cent)

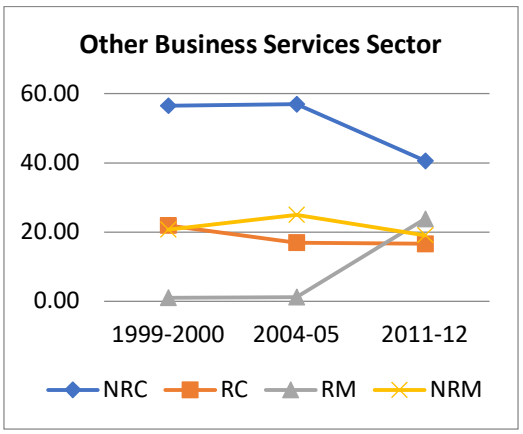






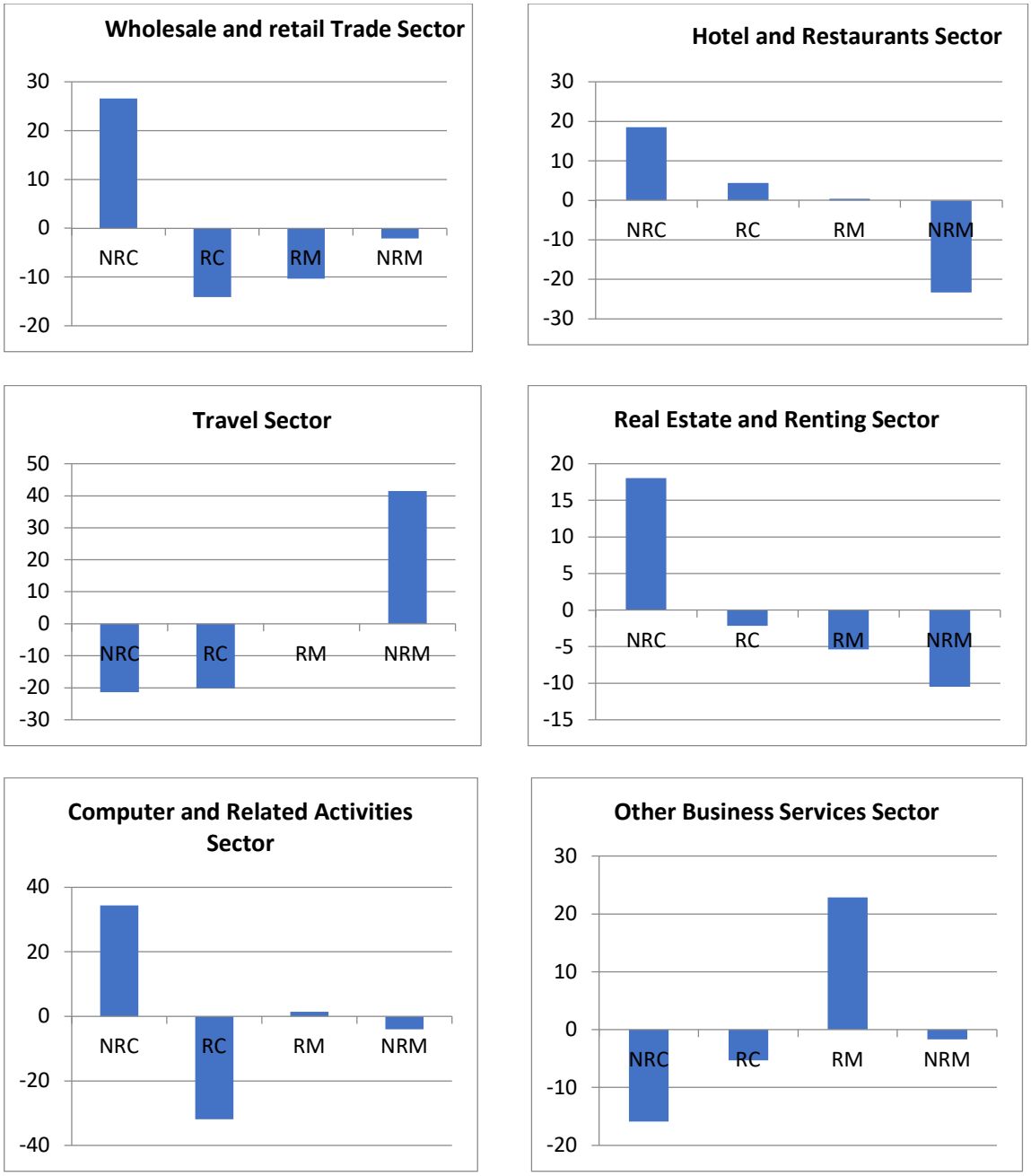






Source: Calculations based on NSSO Employment Unemployment Survey for the three rounds

Figure 4.6: Changes in Task-Share of Employment during 1999-2000 to 2011-12



Source: Calculations based on NSSO Employment Unemployment Survey for the three rounds

in the task-share table. The share of routine manual tasks observed large increases from 0.99to 24 per cent during the entire period. For travel, the share of routine and non-

routine cognitive tasks, comprising of 40 per cent and 35 per cent respectively in 1999-2000, dropped to 20 per cent and 14 per cent respectively in 2011-12. It was the share of non-routine manual task intensity that increased to 66 per cent from 24 per cent during the period (see Appendix Table A4.10).

Among the other services sectors, financial services registered an increase in share of non-routine cognitive task intensity by 6 percentage points, and decline in share of routine cognitive task intensity by 4 percentage points between 1999-2000 and 2011-12. The task share of rest of the services including construction, transport and storage, post and telecommunication, public administration, education, health and elementary services has remained almost the same.

4.4.3 The Estimation Results of Probit Regression

The Probit estimation results for the entire period along with the two sub periods show that services export performance, both in terms of average share of the sector in total services exports and export growth rate, has impacted on the sector's employment share. It is observed that the workers engaged in sectors with moderate share (10 to 20 per cent) in total services exports have greater chance of experiencing increased employment share than the sectors with no or low share in total services exports. However, for the second sub-period, 2004-05 to 2011-12, the sectors with high share in services exports (>20 per cent) stand a better chance of experiencing increase in employment share. With regards to services export growth rate as an explanatory variable, services sectors experiencing moderate or high compound annual growth rate of exports, have a better chance of gaining employment share compared to the workers in

sectors not participating in export activity or having low level of exports. These results are indicative of a threshold level of export activity beyond which there is a greater chance of improvement in the sector's employment share. This result, to a large extent, is dependent on a set of control variables of individual and household characteristics of workers.

It is found that the age of the worker did not have any significant impact on the choice of job. Compared to the 15 to 24 years age group, workers in the age group of 25 to 34 years are more likely to be engaged in jobs experiencing increased share in employment. For the entire period, workers with more than higher secondary education are more likely to be in jobs experiencing increased share in employment. Similar result is found for the period 2004-2005 to 2011-2012, even though higher level of education of the worker increases his chance of being in jobs with shrinking employment shares during the sub-period 1999-2000 to 2004-2005. Religion of the worker did not have any significant impact except for the case of Muslims having a lower chance of being in job with increasing employment shares compared to Hindus for the entire period. Social groups as an explanatory variable reveal that workers belonging to general category had better chance of being employed in jobs with increasing share of employment during 1999-2000 to 2011-12 and more prominently during the latter half of the decade.

As regards household characteristics, household type is a significant explanatory variable. Compared to self-employed type of households, the wage earners are less likely to be in jobs with increasing employment shares for the entire period as well as for sub period II. The results for sub period I and II are just the opposite as far as household type as an explanatory variable is concerned. Till 2004-05, workers from self-employed

household are less likely to be in better jobs than the other categories and during 2004-05 to 2011-12, they stand a better chance compared to other groups of being engaged in jobs with increasing share of employment. However, salaried people and casual workers are more likely to be in jobs with increasing share of employment than self-employed workers. This result is significant for the whole period as well as the two sub- periods.

On the whole, the above analyses shows that the share of employment in the services sector in India has experienced a growth in jobs belonging to the upper tail of occupational skill distribution (60th percentile and above) during 1999-2000 to 2011-12, with no significant rise in the lower-end jobs. Such a pattern of employment change is driven by self-employed workers and unpaid family workers especially during 2004-05 to 2011-12. The task-based analysis reveals a shift towards higher-end, better quality and essentially non-routine cognitive task intensive. The share of non-routine manual tasks, though showed a declining trend, but continued to remain important in the task table. The shift-share analysis confirms that this shift in task intensities is primarily explained by changes in occupational structure within the industrial sector.

The regression exercise clearly indicates that improved services export performance, among other factors, play a significant role in explaining this shift. The regression estimates further show that the age group of 25 to 34 years as against 15 to 24 years, general category as against reserved category of social groups, self-employed households as against salaried household, wage earners as against self-employed workers, have better chances of being in a sector experiencing increased share of employment during 1999-2000 to 2011-2012.

4.5 Summary of Findings

This chapter has investigated into the impact of growing services trade in the presence of major advancements in information and telecommunication technologies on task intensities in India's the services sector. In particular, the job profiles of service workers are explored from two perspectives, one from the supply side, considering the occupational skill distribution measured in terms of median wage earned by the workers, and, one from the demand side, by the changing task profiles of jobs owing to trade growth in the presence of diffusion of new technology.

It is found that the share of employment in the services sector in India has experienced a growth in the jobs belonging to the upper tail of occupational skill distribution (60^{th} percentile and above) during 1999-2000 to 2011-12. However, in contrary to the evidence in the literature, this study does not find any increase in the lower-end jobs. Further, a decomposition analysis reveals that this pattern of employment change is primarily driven by self-employed workers and unpaid family workers. Further, such changes in the employment share are observed to larger extent during the latter sub-period ending 2011-12. Looking deeper into the sector-specific occupation groups, wholesale and retail trade, transport and construction registered large changes in share of employment. In wholesale and retail trade, the low-skill occupations in the sector registered the greatest decline in share and the high-skill occupations gained the highest share of employment.

The results of the task-based analysis reveal that the task composition experienced a significant change during 2004-05 to 2011-12. The share of non-routine cognitive tasks increased, while that of routine cognitive tasks declined. The share of non-routine manual

tasks, though showed a declining trend, has remained high. The shift-share analysis confirms that such shifts in task intensities are primarily explained by change in occupational structure within the industrial sector. Controlling for the individual and household level characteristics, a probit estimation exercise further shows that workers engaged in sectors with good services export performance as against sectors not participating in services trade, have better chances of being in a sector experiencing increased share of employment during 1999-2000 to 2011-2012. It can be inferred that exposure to global trade along with advancements in information and telecommunication technologies has impacted the occupational structure of the service industries in India. The results thus indicate a shift towards higher-end, better quality and essentially non-routine cognitive task intensive jobs.

Appendix to Chapter 4

Table A4.1: Classification of Tasks

Non-Routine Analytic	Researching, analyzing, evaluating and planning, making plans/constructions, designing, sketching, working out rules/prescriptions, and using and interpreting rules
Non-Routine Interactive	Negotiating, lobbying, coordinating, organizing, teaching or training, selling, buying, advising customers, advertising, entertaining or presenting, and employing or managing personnel
Routine Cognitive	Calculating, bookkeeping, correcting texts/data, and measuring length/weight/temperature
Routine Manual	Operating or controlling machines and equipping machines
Non-Routine Manual	Repairing or renovating houses/apartments/machines/vehicles, restoring art/monuments, and serving or accommodating

Source: Spitz-Oener (2006)

Table A4.2: Task-based Categorization of occupation codes

Task-based categories	Broad NCO 1968	Specific tasks
Non-Routine Cognitive	1-Professional,technical and related 2-Administrative,executive and managerial	Analysing, interpreting, thinking creatively, guiding, directing, establishing relationship.
Routine Cognitive	3- Clerical and related 4-Sales workers	Calculating, bookkeeping, correcting texts/data, and measuring following a well-defined method.
Routine Manual	7-Production and related workers, transport workers 8-Plant and Machine Operators and Assemblers	Repetitive works which involve systematic physical movement, use of fingers and hands
Non-routine Manual	5-Service Workers 9-Elementary	Non-methodical, flexible use of brain, eyes, hands and legs Occupations

Source: Sarkar (2018)

Table A4.3: Summary Statistics of the working sample for Task-based Analysis

Variables	55th Round (1999-2000)	61st Round (2004-2005)	68th Round (2011-2012)
Gender			
Male	85.07	83.71	83.72
Female	14.93	16.29	16.28
Age Group			
15-24 years	18.21	17.61	13.16
25-34 years	29.24	29.14	30.83
35-44 years	28.03	27.57	28.03
45-54 years	17.35	18.23	19.5
55-65 years	7.17	7.44	8.48
Religion			
Hindu	77.46	79.38	78.77
Muslim	16.26	13.69	14.84
Christian	2.38	2.75	3.06
Other	3.9	4.18	3.33
Social Group			
ST	3.98	2.98	3.55
SC	15.64	15.44	15.62
OBC	30.23	33.79	39.16
General	50.15	47.79	41.67
General Education			
No Education	23.61	16.48	12.38
Primary Education	21.15	18.23	15.87
Secondary Education	35.62	30.92	30.79
Higher Secondary Education	0.54	9.48	11.31
More than Higher Secondary Education	19.08	24.89	29.65
Employment Status			
Self Employed	57.9	58.15	55.99
Wage Employed	37.42	35.11	40.67
Unpaid Family Workers	4.58	6.66	3.28
Casual Workers	0.1	0.08	0.07

Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

Table A4.4: Socio-demographic characteristics of different Task-based Occupation Categories

Variables	55th Round (1999-2000)				61st Round (2004-2005)				68th Round (2011-2012)			
	NRC	RC	RM	NRM	NRC	RC	RM	NRM	NRC	RC	RM	NRM
Gender												
Male	77.28	90.96	93.21	81.08	76.63	88.83	97.79	79.49	79.7	87.87	97.08	81.42
Female	22.72	9.04	6.79	18.92	23.37	11.17	2.21	20.51	20.3	12.13	2.92	18.58
Age Group												
15-24 years	9.74	18.23	28.13	19.57	9.4	18.32	24.43	20.41	8.41	14.71	18.82	15.55
25-34 years	28.46	29.56	27.03	30.03	29.84	30.44	28.63	27.54	31.4	29.81	31.01	30.98
35-44 years	30.14	27.84	24.77	28.11	28.82	26.5	25.12	28.48	30.04	26.85	26.14	27.28
45-54 years	22.94	17.2	14.27	15.51	22.47	17.58	16.35	16.64	20.66	19.59	17.8	18.66
55-65 years	8.71	7.17	5.8	6.78	9.47	7.15	5.48	6.93	9.5	9.04	6.23	7.53
Religion												
Hindu	81.84	76.48	69.4	78.6	81.1	77.13	74.85	81.7	78.94	80.79	72.69	78.57
Muslim	9.63	17.74	24.66	15.73	9.61	15.8	19.45	12.72	12.83	14.14	22.22	15.62
Christian	4.11	1.53	1.61	2.5	3.69	2.03	3.12	2.75	4.08	2.18	3.09	2.64
Other	4.43	4.24	4.33	3.17	5.61	5.04	2.57	2.82	4.14	2.88	2	3.16
Social Group												
ST	3.98	2.91	3.03	5.27	2.44	2.18	3.01	4.1	2.51	3.03	3.03	5.18
SC	8.75	9.67	17.77	24.21	6.82	9.25	20.69	25.79	8.63	11.08	21.09	25.05
OBC	21.19	29.65	35.4	33.93	25.56	33.57	42.69	36.99	35.51	38.48	47.91	41.3
General	66.09	57.78	43.8	36.58	65.18	55	33.61	33.12	53.35	47.41	27.98	28.47
General Education												
No Education	6.42	16.55	21.21	38.57	3.39	10.94	18.25	29.97	3.49	7.94	15.14	24.41
Primary Education	9.24	17.81	30.49	26.84	6.38	14.86	27.13	26.89	7.6	12.32	23.43	25.37
Secondary Education	28.07	42.18	43.07	31.22	18.58	34.56	39.21	33.1	21.69	31.58	42.67	36.77
Higher Secondary Education	1.53	0.59	0.34	0.1	10.34	13.71	5.76	5.7	12.39	16.69	7.77	6.97
More than Higher Secondary Education	54.73	22.87	4.89	3.26	61.31	25.92	9.66	4.33	54.83	31.47	10.99	6.48
Employment Status												
Self Employed	39.21	71.21	68.47	51.91	33.42	69.33	55.58	63.73	44.33	69.97	57.6	57.19
Wage Employed	53.53	28.22	18.81	43.39	51.88	30.29	20.08	33	49.66	29.76	29.32	42.38
Unpaid Family Workers	7.1	0.48	12.64	4.62	14.58	0.33	24.19	3.21	5.86	0.24	13.07	0.41
Casual Workers	0.16	0.09	0.08	0.08	0.12	0.05	0.14	0.06	0.15	0.03	0.01	0.02

Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

Table A4.5: Characteristics of the working sample across Task-based Occupation Categories

Variables	55th Round (1999-2000)				61st Round (2004-2005)				68th Round (2011-2012)			
	NRC	RC	RM	NRM	NRC	RC	RM	NRM	NRC	RC	RM	NRM
Gender												
Male	17.18	36.22	12.27	34.34	20.4	36.3	10.59	32.71	32.66	26.08	9.53	31.73
Female	28.78	20.49	5.09	45.64	31.96	23.45	1.23	43.36	42.78	18.52	1.47	37.23
Age Group												
15-24 years	10.12	33.89	17.29	38.71	11.89	35.6	12.57	39.94	21.92	27.78	11.76	38.54
25-34 years	18.41	34.24	10.35	37	22.81	35.74	8.9	32.55	34.94	24.02	8.27	32.77
35-44 years	20.34	33.64	9.89	36.13	23.29	32.88	8.25	35.58	36.77	23.8	7.67	31.76
45-54 years	25.01	33.57	9.21	32.21	27.47	32.98	8.12	31.43	36.34	24.95	7.5	31.21
55-65 years	22.99	33.88	9.06	34.08	28.36	32.9	6.67	32.07	38.47	26.49	6.04	29
Religion												
Hindu	19.98	33.44	10.03	36.55	22.76	33.24	8.54	35.45	34.39	25.49	7.59	32.54
Muslim	11.2	36.97	16.98	34.85	15.63	39.49	12.87	32.01	29.67	23.68	12.31	34.34
Christian	32.67	21.82	7.6	37.91	29.96	25.24	10.3	34.5	45.77	17.71	8.31	28.21
Other	21.46	36.82	12.42	29.3	29.9	41.25	5.58	23.27	42.64	21.5	4.92	30.93
Social Group												
ST	18.93	24.75	8.52	47.8	18.26	25.1	9.16	47.48	24.23	21.21	7.01	47.56
SC	10.58	20.94	12.71	55.77	9.84	20.5	12.14	57.52	18.96	17.62	11.1	52.32
OBC	13.26	33.21	13.11	40.43	16.85	33.99	11.45	37.71	31.12	24.42	10.06	34.41
General	24.92	39.02	9.78	26.28	30.39	39.37	6.37	23.87	43.93	28.27	5.52	22.29
General Education												
No Education	4.85	23.04	10.3	61.81	4.59	22.7	10.04	62.67	9.69	15.93	10.05	64.33
Primary Education	7.8	27.68	16.52	48.01	7.8	27.88	13.49	50.83	16.43	19.28	12.13	52.15
Secondary Education	14.06	38.92	13.86	33.16	13.39	38.23	11.49	36.89	24.17	25.48	11.39	38.96
Higher Secondary Education	50.2	35.61	7.18	7.01	24.3	49.46	5.5	20.74	37.58	36.66	5.65	20.11
More than Higher Secondary Education	51.19	39.4	2.94	6.47	54.89	35.61	3.52	5.99	63.46	26.37	3.05	7.12
Employment Status												
Self Employed	12.81	41.65	13.24	32.3	12.8	40.79	8.66	37.75	27.17	31.05	8.46	33.32
Wage Employed	27.06	25.54	5.63	41.77	32.93	29.51	5.18	32.38	41.9	18.18	5.93	33.99
Unpaid Family Workers	29.29	3.58	30.86	36.26	48.79	1.71	32.91	16.58	61.28	1.82	32.77	4.13
Casual Workers	31.06	29.66	9.36	29.93	32.56	23.01	16.39	28.04	78.88	11.47	1.55	8.1

Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

Table A4.6: Top 3 Increase and Decrease in Employment Share of Jobs (percentage)

Industry	Occupation	Quintile (beginning of the period)	Change in % share of Employment
Increase in Employment Share			
1999-2000 to 2011-2012			
Wholesale and Retail Trade	Directors, Chief Executives, General Managers, Production and Operations Department Managers and other Managers	5	7.42
Construction	Mining and Construction Labourers	1	2.2
Transport and Storage	Motor Vehicle Drivers	4	1.98
Sub period 1: 1999-2000 to 2004-2005			
Wholesale and Retail Trade	Street Vendors and Related Workers	1	1.82
Elementary Services	Domestic and Related Helpers, Cleaners and Launderers	1	1.17
Construction	Painters, Building Structure Cleaners and Related Trades Workers	3	1.12
Sub period 2: 2004-2005 to 2011-2012 (Quintile as per 61st Round)			
Wholesale and Retail Trade	Directors, Chief Executives, General Managers, Production and Operations Department Managers and other Managers	5	6.45
Construction	Mining and Construction Labourers	1	2.91
Transport and Storage	Motor Vehicle Drivers	3	1.32
Decrease in Employment Share			
1999-2000 to 2011-2012			
Wholesale and Retail Trade	Shop Salespersons and Demonstrators and Stall and Market Salespersons	1	-7.55
Transport and Storage	Transport Labourers and Freight Handlers	3	-2.18
Wholesale and Retail Trade	Potters, Glass Makers and Related Trades Workers, Handicraft Workers in Wood, Textile, Leather and Related Materials, Wood Treaters, Cabinet Makers and Related Trades, Pelt, Leather and Shoe Making Trades Workers Textile, Garment and Related Trades Workers, Glass, Ceramics and Related Plant Operators	1	-2.1
Sub period 1: 1999-2000 to 2004-2005			
Wholesale and Retail Trade	Potters, Glass Makers and Related Trades Workers, Handicraft Workers in Wood, Textile, Leather and Related Materials, Wood Treaters, Cabinet Makers and Related Trades, Pelt, Leather and Shoe Making Trades Workers, Textile, Garment and Related Trades Workers, Glass, Ceramics and Related Plant Operators	1	-1.94
Other Community, Social and Personal Services	Domestic and Related Helpers, Cleaners and Launderers	1	-1.23
Wholesale and Retail Trade	Shop Salespersons and Demonstrators and Stall and Market Salespersons	1	-1.12

Sub period 2: 2004-2005 to 2011-2012 (Quintile as per 61st Round)			
Wholesale and Retail Trade	Shop Salespersons and Demonstrators and Stall and Market Salespersons	2	-6.5
Wholesale and Retail Trade	Street Vendors and Related Workers	1	-2.42
Transport and Storage	Transport Labourers and Freight Handlers	3	-1.31

Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

Table A4.7: Task Based Analysis

Panel A: Task share in employment			
Task	55th Round (1999-2000)	61st Round (2004-05)	68th Round (2011-12)
NRC	6586	10047	13865
RC	10895	14947	10097
RM	3859	4006	3643
NRM	11594	15009	12664
Total	32934	44009	40269

Panel B: Task share in employment (per cent)			
Task	55th Round (1999-2000)	61st Round (2004-05)	68th Round (2011-12)
NRC	20.00	22.83	34.43
RC	33.08	33.96	25.07
RM	11.72	9.10	9.05
NRM	35.20	34.11	31.45

Panel C: Change in Task share in employment (per cent)			
Task	55th to 61st	61st to 68th	55th to 68th
NRC	2.83	11.60	14.43
RC	0.88	-8.89	-8.01
RM	-2.61	-0.06	-2.67
NRM	-1.10	-2.66	-3.76

Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

Table A4.8: Shift-Share Analysis of Tasks in India's Services Sector (in percent)

Task Categories	Panel A (1999-2000 to 2004-05)	Panel B (2004-05 to 2011-12)	Panel C (2004-05 to 2011-12)
Non-Routine Cognitive (NRC)			
Total Change	2.83	11.52	14.35
Industry Change	1.75	2.14	3.48
Occupational Change	1.08	9.38	10.87
Routine Cognitive (RC)			
Total Change	0.88	-8.89	-8.01
Industry Change	-1.53	-2.10	-2.99
Occupational Change	2.42	-6.79	-5.02
Routine Manual (RM)			
Total Change	-2.61	-0.59	-3.20
Industry Change	-0.14	0.60	0.31
Occupational Change	-2.47	-1.19	-3.51
Non-Routine Manual (NRM)			
Total Change	-1.10	-2.04	-3.14
Industry Change	-0.07	-0.64	-0.80
Occupational Change	-1.03	-1.41	-2.34

Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

Table A4.9: Task share in employment (in percent)

Industry Groups	Panel A (1999-2000)				Panel B (2004-2005)				Panel C (2011-2012)			
	NRC	RC	RM	NRM	NRC	RC	RM	NRM	NRC	RC	RM	NRM
3	11.83	0.95	29.08	58.14	9.89	1.28	36.63	52.20	12.03	1.68	25.16	61.14
4	9.42	67.24	17.62	5.72	11.22	75.01	10.12	3.65	35.96	53.08	6.52	4.44
5	18.55	13.27	6.22	61.96	19.87	11.05	3.38	65.70	37.07	17.62	6.59	38.72
6	8.89	7.13	6.50	77.48	9.59	5.97	5.04	79.39	13.58	5.00	5.28	76.13
7	35.37	40.14	0.00	24.50	30.95	50.54	0.00	18.51	13.98	20.04	0.00	65.98
8	27.57	40.52	20.09	11.82	30.44	39.41	13.02	17.13	28.87	47.41	13.98	9.74
9	32.21	55.27	0.00	12.51	28.19	57.57	0.14	14.10	39.15	51.27	0.01	9.57
10	16.27	79.45	0.00	4.28	23.08	66.72	0.44	9.76	19.36	80.53	0.02	0.09
11	30.45	44.15	6.46	18.94	38.15	39.18	1.17	21.51	48.42	41.99	0.89	8.69
12	47.97	45.88	0.00	6.14	60.29	32.91	2.21	4.60	82.38	13.94	1.49	2.18
13	56.40	21.89	0.99	20.72	56.88	16.95	1.23	24.95	40.53	16.60	23.42	19.45
14	21.39	31.84	6.15	40.61	21.06	31.49	5.64	41.81	14.72	33.61	4.15	47.52
15	82.27	5.58	0.56	11.59	83.16	6.77	0.62	9.44	86.06	6.12	0.49	7.33
16	72.74	6.92	3.18	17.16	66.79	6.99	0.83	25.39	73.95	7.78	2.88	15.38
17	16.98	3.11	3.51	76.39	25.14	5.89	1.88	67.09	31.19	4.71	2.51	61.59
18	1.08	0.18	1.01	97.73	1.64	0.34	0.81	97.22	1.20	0.57	1.73	96.50

Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

Table A4.10: Changes in task share in employment (in per cent)

Industry Groups	Panel A (1999-2000 to 2004-05)				Panel B (2004-05 to 2011-12)				Panel C (1999-2000 to 2011-12)			
	NRC	RC	RM	NRM	NRC	RC	RM	NRM	NRC	RC	RM	NRM
3	-1.9	0.3	7.6	-5.9	2.1	0.4	-11.5	8.9	0.2	0.7	-3.9	3.0
4	1.8	7.8	-7.5	-2.1	24.7	-21.9	-3.6	0.8	26.5	-14.2	-11.1	-1.3
5	1.3	-2.2	-2.8	3.7	17.2	6.6	3.2	-27.0	18.5	4.4	0.4	-23.2
6	0.7	-1.2	-1.5	1.9	4.0	-1.0	0.2	-3.3	4.7	-2.1	-1.2	-1.3
7	-4.4	10.4	0.0	-6.0	-17.0	-30.5	0.0	47.5	-21.4	-20.1	0.0	41.5
8	2.9	-1.1	-7.1	5.3	-1.6	8.0	1.0	-7.4	1.3	6.9	-6.1	-2.1
9	-4.0	2.3	0.1	1.6	11.0	-6.3	-0.1	-4.5	6.9	-4.0	0.0	-2.9
10	6.8	-12.7	0.4	5.5	-3.7	13.8	-0.4	-9.7	3.1	1.1	0.0	-4.2
11	7.7	-5.0	-5.3	2.6	10.3	2.8	-0.3	-12.8	18.0	-2.2	-5.6	-10.2
12	12.3	-13.0	2.2	-1.5	22.1	-19.0	-0.7	-2.4	34.4	-31.9	1.5	-4.0
13	0.5	-4.9	0.2	4.2	-16.3	-0.3	22.2	-5.5	-15.9	-5.3	22.4	-1.3
14	-0.3	-0.4	-0.5	1.2	-6.3	2.1	-1.5	5.7	-6.7	1.8	-2.0	6.9
15	0.9	1.2	0.1	-2.2	2.9	-0.7	-0.1	-2.1	3.8	0.5	-0.1	-4.3
16	-6.0	0.1	-2.3	8.2	7.2	0.8	2.0	-10.0	1.2	0.9	-0.3	-1.8
17	8.2	2.8	-1.6	-9.3	6.0	-1.2	0.6	-5.5	14.2	1.6	-1.0	-14.8
18	0.6	0.2	-0.2	-0.5	-0.4	0.2	0.9	-0.7	0.1	0.4	0.7	-1.2

Source: Calculations based on NSSO Employment Unemployment Survey, various rounds

Table A4.11: NCO Codes for studying task intensity of employment

Srl No	NCO 2004	Description	NCO 1968	Occupation Group	Task
1	111	Legislators	200/209	1	NRC
2	112	Administrative and Executive Officials	210/219		
3	113	Traditional Chiefs and Heads of Villages	---		
4	114	Senior Officials of Special- Interest Organisations	---		
5	121	Directors and Chief Executives		2	
6	122	Production and Operations Department Managers			
7	123	Other Department Managers	---		
8	130	General Managers	---		
9	211	Physicists, Chemists and Related Professionals	000/009	8	
10	212	Mathematicians, Statisticians and Related Professionals	100/102 109		
11	213	Computing Professionals	103	3	
*12	214	Architects, Engineers and Related Professionals	020/029	4	
13	221	Life Science Professionals	050/059	5	
14	222	Health Professionals (except nursing)	070/079	6	
15	223	Nursing Professionals	084	7	
16	231	College, University and Higher Education Teaching Professionals	150	8	
17	232	Secondary Education Teaching Professionals	151	9	
18	233	Other Teaching Professionals	159, 301	10	
19	241	Business Professionals	120/129, 136	11	
20	242	Legal Professionals	140/149	12	
21	243	Archivists, Librarians and Related Information Professionals	134	8	
22	244	Social Science and Related Professionals	110, 119, 130/133, 135, 137	8	
23	245	Writers and Creative or Performing Artists	160/169, 170, 180/183	13	
24	246	Religious Professionals	190, 191	14	
25	311	Physical and Engineering Science Technicians	010, 030/039, 199	15	
26	312	Computer Associate Professionals	103	3	
27	313	Optical and Electronic Equipment Operators	086, 172/179, 391, 392, 860/869	16	
28	314	Ship and Aircraft Controllers and Technicians	040/049	17	
29	315	Safety and Quality Inspectors	570	18	NRM
30	321	Life Science Technicians and Related Health Associate Professionals	060	19	NRC
31	322	Modern Health Associate Professionals (Except Nursing)	076, 077, 080/083, 087, 088	20	
32	323	Nursing and Midwifery Associate Professionals	084/089	7	

33	324	Traditional Medicine Practitioners and Faith Healers	---	6	
34	331	Middle & Primary Education Teaching Associate, Professionals	152, 153	21	
35	332	Pre-Primary Education Teaching Associate, Professionals	154	22	
36	333	Special Education Teaching Associate Professionals	155	23	
37	334	Other Teaching Associate Professionals	156	24	
38	341	Finance and Sales Associate Professionals	411, 420/429, 440/449	25	RC
39	342	Business Services Agents and Trade Brokers	---		
40	343	Administrative Associate Professionals	104, 111, 142, 300, 302, 309	26	
41	344	Customs, Tax and Related Govt. Associate Professionals	139, 572	27	
42	345	Police Inspectors and Detectives	571	28	NRM
43	346	Social Work Associate Professionals	137	8	NRC
44	347	Artistic, Entertainment and Sports Associate Professionals	171, 184, 189, 193	29	NRC
45	348	Religious Associate Professionals	---	14	NRC
46	411	Secretaries and Key Board- Operating Clerks	320/329,340/349	30	RC
47	412	Numerical Clerks	330, 339	31	
48	413	Material Recording and Transport Clerks	351	32	
49	414	Library, Mail and Related Clerks	353, 355, 361, 379, 380	33	
50	419	Other Office Clerks	310, 350, 354, 359	34	
51	421	Cashiers, Tellers and Related Clerks	331, 339, 356, 450/459	31	
52	422	Client Information Clerks	352, 390	35	
53	511	Travel Attendants, Guides and Related Workers	357, 370, 371, 539, 590	36	NRM
54	512	House Keeping and Restaurant Services Workers	500, 510, 520/529	37	
55	513	Personal Care and Related Workers	358, 530	38	
56	514	Other Personal Services Workers	560, 591	39	
57	515	Astrologers, Fortune- Tellers and Related Workers	192	40	NRC
58	516	Protective Services Workers	570, 573	18	NRM
59	521	Fashion and Other Models	430	41	RC
60	522	Shop Salespersons and Demonstrators	400/410, 412, 419, 430, 439		
61	523	Stall and Market Salespersons	439		
62	611	Market Gardeners & Crop Growers	610/620, 625, 641, 652	42	RM
63	612	Market –Oriented Animal Producers and Related Workers	621/624, 629, 651, 659	43	
64	613	Market- Oriented Crop and Animal Producers	---		

65	614	Forestry and Related Workers	660/669	44	
66	615	Fishery Workers, Hunters and Trappers	670/679, 680/689		
67	620	Subsistence Agricultural and Fishery Workers	---		
68	711	Miners, Shot -Firers, Stone Cutters and Carvers	711, 712, 714, 715, 718, 719, 821, 829	45	
69	712	Building Frame and Related Trades Workers	811, 816, 951, 952	46	
70	713	Building Finishers and Related Trades Workers	855, 871, 879, 950, 953/958	47	
71	714	Painters, Building Structure Cleaners and Related Trades Workers	930/939, 959	48	NRM
72	721	Metal Moulders, Welders, Sheet Metal Workers, Structural Metal Preparers and Related Trades Workers	725, 870, 872/874, 972	49	RM
73	722	Blacksmiths, Toolmakers and Related Trades Workers	830/836	50	
74	723	Machinery Mechanics and Fitters	840, 843/845, 963	51	
75	724	Electrical and Electronic Equipment Mechanics and Fitters	850/852, 854, 856, 857, 859, 399	52	
76	731	Precision Workers in Metal and Related Materials	880/889, 841, 849, 940, 941	53	
77	732	Potters, Glass Makers and Related Trades Workers	891, 892, 894, 895	50	
78	733	Handicraft Workers in Wood, Textile, Leather and Related Materials		50	
79	734	Printing and Related Trades Workers	920/922, 924/929	54	NRM
80	741	Food Processing and Related Trades Workers	770, 771, 774, 776, 777, 781, 782, 784, 789	55	RM
81	742	Wood Treaters, Cabinet Makers and Related Trades	731, 739, 812/815, 819, 942	50	RM
82	743	Textile, Garment and Related Trades Workers	751, 752, 755, 756, 790/799		
83	744	Pelt, Leather and Shoe Making Trades Workers	761, 762, 769, 801, 803, , 809		
84	811	Mining and Mineral Processing Plant Operators	710, 713, 716, 717	45	RM
85	812	Metal Processing Plant Operators	720/724, 726, 727	56	RM
86	813	Glass, Ceramics and Related Plant Operators	890, 893, 899	50	RM
87	814	Wood Processing and Paper Making Plant Operators	730, 732/734	56	RM
88	815	Chemical- Processing- Plant Operators	740/749		RM
89	816	Power Production and Related Plant Operators	960/962, 969, 982, 984	57	NRM
*90	817	Automated Assembly Line and Industrial Robot Operators	---	4	NRC
91	821	Metal and Mineral Products Machine Operators	820, 835, 839	56	RM
92	822	Chemical Products Machine Operators	728, 729, 949		
93	823	Rubber and Plastic Products Machine Operators	900/909	58	NRM

94	824	Wood Products Machine Operators	810	56	RM
95	825	Printing, Binding and Paper Products Machine Operators	910, 911, 919, 923	59	NRM
96	826	Textile, Fur and Leather Products Machine Operators	750, 753, 754, 757/760, 800, 802	50	RM
97	827	Food and Related Products Machine Operators	772, 773, 775, 778, 779, 780, 783	55	RM
98	828	Assemblers	842, 853	60	RM
99	829	Other Machine Operators and Assemblers	970	61	NRM
100	831	Locomotive Engine Drivers and Related Workers	983, 985	62	
101	832	Motor Vehicle Drivers	986	63	
102	833	Agricultural and Other Mobile Plant Operators	650, 973, 974, 979	64	
103	834	Ships' Deck Crews and Related Workers	981	65	
104	911	Street Vendors and Related Workers	431, 490, 499	66	RC
105	912	Shoe Cleaning and Other Street Services Elementary Occupations	599	67	NRM
106	913	Domestic and Related Helpers, Cleaners and Launderers	531, 550, 551, 559	68	
107	914	Building Caretakers, Window and Related Cleaners	540	69	
108	915	Messengers, Porters, Door Keepers and Related Workers	574, 579, 381, 389, 599	67	
109	916	Garbage Collectors and Related Labourers	541/549	70	
110	920	Agricultural, Fishery and Related Labourers	630, 640, 649	71	
111	931	Mining and Construction Labourers	999	72	
112	932	Manufacturing Labourers	943, 975, 976	73	
113	933	Transport Labourers and Freight Handlers	971, 980, 987/989	74	

Source: Compilation from NCO 1968 and NCO 2004 Codes

Table A4.12: Export Performance of Indian Services Industries for Sub Period I

	Transport ation	Travel	Communi cations	Constru ction	Insurance services	Financial services	Computer information services	Other business services	Personal, cultural & recreational services	Govern ment services n.i.e.	Services not allocated	Total EBOPS Services
2000-01	1979	3460	599	502	257	276	4727	4253	7	654	87	16713
2001-02	2050	3198	1104	104	282	306	7407	2451	8	538	77	17449
2002-03	2473	3263	779	231	332	598	8889	2803	9	353	64	19731
2003-04	3022	4463	969	276	408	367	11876	2277	50	269	4881	23975
2004-05	4373	6170	1094	516	842	341	16344	8325	46	350	5740	38400
CAGR	17.19%	12.26%	12.80%	0.56%	26.78%	4.33%	28.16%	14.38%	-4.34%	-11.74%	130.89%	18.10%

	Transport ation	Travel	Communi cations	Constru ction	Insurance services	Financial services	Computer information services	Other business services	Personal, cultural & recreational services	Govern ment services n.i.e.	Services not allocated	Total EBOPS Services
2000-01	11.84	20.70	3.58	3.00	1.54	1.65	28.29	25.45	0.04	3.91	0.52	100
2001-02	11.75	18.33	6.33	0.60	1.62	1.75	42.45	14.05	0.04	3.08	0.44	100
2002-03	12.54	16.54	3.95	1.17	1.68	3.03	45.05	14.21	0.04	1.79	0.33	100
2003-04	12.60	18.61	4.04	1.15	1.70	1.53	49.53	9.50	0.21	1.12	20.36	100
2004-05	11.39	16.07	2.85	1.34	2.19	0.89	42.56	21.68	0.12	0.91	14.95	100
Average Share of the Sector	12.02	18.05	4.15	1.45	1.75	1.77	41.58	16.98	0.09	2.16	7.32	

Source: Author's calculation based on Trade in Services Database (TSD_February 2015) version 8.9.
https://datacatalog.worldbank.org/dataset/trade-services-database

Table A4.13 Export Performance of Indian Services Industries for Sub Period II

	Transport ation	Travel	Communi cations	Constru ction	Insurance services	Financial services	Computer information services	Other business services	Personal, cultural & recreational services	Government services n.i.e.	Services not allocated	Total EBOPS Services
2004-05	4373	6170	1094	516	842	341	16344	8325	46	350	5740	38400
2005-06	5754	7493	1566	346	941	1143	21875	12970	111	328	8965	62273
2006-07	7561	8634	2181	619	1113	2357	29088	17605	306	274	12210	69738
2007-08	9035	10729	2348	753	1507	3379	37491	20911	510	317	15490	86980
2008-09	11318	11832	2423	722	1548	4059	49379	19038	707	387	19949	116693
2009-10	12921	11136	1486	837	1526	3661	46656	12001	467	406	19877	101460
2010-11	13248	14160	1412	525	1782	5834	56878	21795	335	485	19904	124309
2011-12	17678	17707	1671	838	2585	6249	60446	24232	346	596	8948	138536
CAGR	19.08%	14.09%	5.44%	6.24%	15.05%	43.83%	17.76%	14.29%	28.76%	6.89%	5.71%	17.40%
	Transport ation	Travel	Communi cations	Constru ction	Insurance services	Financial services	Computer information services	Other business services	Personal, cultural & recreational services	Government services n.i.e.	Services not allocated	Total EBOPS Services
2004-05	11.39	16.07	2.85	1.34	2.19	0.89	42.56	21.68	0.12	0.91	14.95	100
2005-06	9.24	12.03	2.51	0.56	1.51	1.84	35.13	20.83	0.18	0.53	14.40	100
2006-07	10.84	12.38	3.13	0.89	1.60	3.38	41.71	25.24	0.44	0.39	17.51	100
2007-08	10.39	12.34	2.70	0.87	1.73	3.88	43.10	24.04	0.59	0.36	17.81	100
2008-09	9.70	10.14	2.08	0.62	1.33	3.48	42.32	16.31	0.61	0.33	17.10	100
2009-10	12.74	10.98	1.46	0.82	1.50	3.61	45.98	11.83	0.46	0.40	19.59	100
2010-11	10.66	11.39	1.14	0.42	1.43	4.69	45.76	17.53	0.27	0.39	16.01	100
2011-12	12.76	12.78	1.21	0.60	1.87	4.51	43.63	17.49	0.25	0.43	6.46	100
Average Share of the Sector	10.96	12.26	2.13	0.77	1.65	3.28	42.52	19.37	0.36	0.47	15.48	

Source: Author's calculation based on Trade in Services Database (TSD_February 2015) version 8.9.
https://datacatalog.worldbank.org/dataset/trade-services-database

Table A4.14: Export Performance of Indian Services Industries for Whole Period

	Transport ation	Travel	Communi cations	Constru ction	Insurance services	Financial services	Computer informatio n services	Other business services	Personal, cultural &recreation al services	Government services n.i.e.	Services not allocated	Total EBOPS Services
2000-01	1979	3460	599	502	257	276	4727	4253	7	654	87	16713
2001-02	2050	3198	1104	104	282	306	7407	2451	8	538	77	17449
2002-03	2473	3263	779	231	332	598	8889	2803	9	353	64	19731
2003-04	3022	4463	969	276	408	367	11876	2277	50	269	4881	23975
2004-05	4373	6170	1094	516	842	341	16344	8325	46	350	5740	38400
2005-06	5754	7493	1566	346	941	1143	21875	12970	111	328	8965	62273
2006-07	7561	8634	2181	619	1113	2357	29088	17605	306	274	12210	69738
2007-08	9035	10729	2348	753	1507	3379	37491	20911	510	317	15490	86980
2008-09	11318	11832	2423	722	1548	4059	49379	19038	707	387	19949	116693
2009-10	12921	11136	1486	837	1526	3661	46656	12001	467	406	19877	101460
2010-11	13248	14160	1412	525	1782	5834	56878	21795	335	485	19904	124309
2011-12	17678	17707	1671	838	2585	6249	60446	24232	346	596	8948	138536
CAGR	20.02%	14.58%	8.93%	4.36%	21.21%	29.69%	23.66%	15.60%	23.97%	-0.76%	6.97%	19.27%

Table A4.14 Export Performance of Indian Services Industries for Whole Period (Continued…)

	Transportation	Travel	Communications	Construction	Insurance services	Financial services	Computer information services	Other business services	Personal, cultural & recreational services	Government services n.i.e.	Services not allocated	Total EBOPS Services
2000-01	11.84	20.70	3.58	3.00	1.54	1.65	28.29	25.45	0.04	3.91	0.52	100
2001-02	11.75	18.33	6.33	0.60	1.62	1.75	42.45	14.05	0.04	3.08	0.44	100
2002-03	12.54	16.54	3.95	1.17	1.68	3.03	45.05	14.21	0.04	1.79	0.33	100
2003-04	12.60	18.61	4.04	1.15	1.70	1.53	49.53	9.50	0.21	1.12	20.36	100
2004-05	11.39	16.07	2.85	1.34	2.19	0.89	42.56	21.68	0.12	0.91	14.95	100
2005-06	9.24	12.03	2.51	0.56	1.51	1.84	35.13	20.83	0.18	0.53	14.40	100
2006-07	10.84	12.38	3.13	0.89	1.60	3.38	41.71	25.24	0.44	0.39	17.51	100
2007-08	10.39	12.34	2.70	0.87	1.73	3.88	43.10	24.04	0.59	0.36	17.81	100
2008-09	9.70	10.14	2.08	0.62	1.33	3.48	42.32	16.31	0.61	0.33	17.10	100
2009-10	12.74	10.98	1.46	0.82	1.50	3.61	45.98	11.83	0.46	0.40	19.59	100
2010-11	10.66	11.39	1.14	0.42	1.43	4.69	45.76	17.53	0.27	0.39	16.01	100
2011-12	12.76	12.78	1.21	0.60	1.87	4.51	43.63	17.49	0.25	0.43	6.46	100
Average Share of the Sector	11.37	14.36	2.91	1.00	1.64	2.85	42.13	18.18	0.27	1.14	12.12	

Source: Author's calculation based on Trade in Services Database (TSD_February 2015) version 8.9.
https://datacatalog.worldbank.org/dataset/trade-services-database

Table A4.15: Probit Estimation Results

	Sub Period I		Sub Period II		Whole Period	
	(1999-2000 to 2004-05)		(2004-05 to 2011-12)		(1999-2000 to 2011-12)	
	Coefficient	Robust S.E	Coefficient	Robust S.E	Coefficient	Robust S.E
Age	0.004	0.002	0.004*	0.002	0.004	0.003
Age Group						
25-34 years	0.056**	0.028	0.093***	0.031	0.107***	0.032
35-44 years	0.020	0.046	0.053	0.049	0.068	0.052
45-54 years	-0.040	0.067	-0.035	0.071	-0.074	0.075
55-65 years	-0.097	0.090	-0.050	0.096	-0.115	0.102
Education						
Primary Education	-0.078***	0.021	-0.032	0.027	0.004	0.028
Secondary Education	-0.253***	0.020	0.030	0.024	-0.048	0.025
Higher Secondary Education	-0.396***	0.027	0.107***	0.030	-0.010	0.031
More than Higher Secondary Education	-0.076***	0.023	0.240***	0.027	0.206***	0.028
Religion						
Muslim	-0.171***	0.019	-0.037	0.020	-0.132***	0.020
Christian	-0.007	0.032	-0.044	0.033	-0.035	0.034
Others	-0.049	0.031	0.021	0.036	-0.035	0.038
Social Group						
Scheduled Tribe	-0.102***	0.030	-0.120***	0.031	-0.168***	0.032
Scheduled Caste	0.030	0.021	-0.095***	0.023	0.008	0.024
Other Backward Class	0.037	0.015	-0.066***	0.016	-0.035**	0.017
Household Type						
Wage Employed	0.148***	0.016	-0.435***	0.017	-0.365***	0.017
Casual Workers	0.117***	0.023	-0.316***	0.025	0.222***	0.028
Other	0.159***	0.055	-0.345***	0.073	-0.074	0.077
Employment Activity Status						
Wage Employed	0.246***	0.017	0.500***	0.018	0.820***	0.019
Unpaid Family Workers	1.258***	0.035	0.518***	0.041	1.243***	0.066
Casual Workers	0.390**	0.198	-0.107	0.267	0.155	0.273
Share of Sector in Total Services Export						
Moderate	0.327***	0.063	-0.049	0.056	0.594***	0.024
High	0.000	(empty)	0.268***	0.099	0	(empty)
Services Export Growth Rate						
Moderate	0.492***	0.061	0.896***	0.053	0	(omitted)
High	1.352***	0.145	0.782***	0.034	0.324***	0.029
_cons	-0.206	0.053	-0.358	0.062	-0.114	0.065
Log pseudolikelihood	-26828.603		-23132.462		-20538.063	
Number of observations	40873		36308		34897	

* Denotes estimate is significant at 10 per cent level of significance., ** Denotes estimate is significant at 5 per cent level of significance., *** Denotes estimate is significant at 1 per cent level of significance., Blank space denotes estimate is not significant.

CHAPTER 5

CONCLUSIONS

This thesis is a collection of three essays investigating into the impact of growing trade in services on different aspects of the labour market in India. Breakthrough and thereafter diffusion of information and communication technology has led to fragmentation of production blocks and offshoring of it to low-cost destinations, and wide-ranging changes in the mode of business, transactions, and distribution systems, thus making a large array of services tradable across borders. Globally, the services output and exports increased secularly since 1991, and have had immense impact on the labour market world over. In specific, the literature focuses on the impact of this new form of trade in services on labour market indicators including employment.

The link between trade and employment, as observed from the literature, is complex as it works through several channels. The literature suggests that services trade liberalisation and growing services trade lead to increase in outsourcing and higher demand for skilled along with unskilled workers for both developed as well as developing nations. The empirical literature on India suggests that tradable modern services, which are skill intensive in nature, have grown faster than traditional services and the literature on task intensity of jobs reveal that India is experiencing job polarisation as far as manufacturing sector is concerned. The literature on services trade and employment, and especially on outsourcing and employment, for the developing countries, including India, is however not large.

The stylized facts show that services employment did not grow commensurately with services production and trade in India. It is however observed that along with high services export performance and changes in employment structure towards services, distinct changes in occupational structure within services

industry, especially urban services, can be observed in India between 1999-2000 and 2011-12. The changing employment share in urban India is possibly being driven by skill-biased technical progress rather than routine-biased technical progress. Such changes in sectoral employment and occupational structure over time are indicative of intergenerational sectoral mobility along with intergenerational occupational mobility towards and within the services sector with the emergence of new tradable services. Further, the stylized facts are also indicative of changing task intensities of jobs in India's labour market.

With the idea derived from the literature that services trade liberalisation might generate increased demand for skilled workers, and the younger generation, being more adaptive towards trade-induced changes in labour demand, are capable and willing to move out of the father's network or traditional family occupation, there is a possibility of intergenerational mobility regarding choice of industry and/or occupation. The thesis intends to explore whether the Indian labour market has experienced any change in labour demand towards high-skilled workers, and whether services trade liberalisation has induced any change in the choice of industries across generations, whether it has caused any changes in the intergenerational occupational structure and with changing task-intensity of services jobs, whether the employment pattern in the services sector exhibit job polarisation.

The three essays, which follows from the stylized facts, have dealt with three important labour market issues. Essay 1 has explored the changes in the pattern of choice of services industries across generations following growth in services exports in India between 1999-2000 and 2011-12. The second essay has investigated into intergenerational mobility towards and within services occupations with rising

services trade. Essay 3 has examined whether the employment pattern in the services sector show changing task-intensity of services jobs and exhibit job polarisation.

This thesis has used the NSSO data on employment-unemployment surveys for the three rounds, viz. 55th (1999-2000), 61st (2004-05) and 68th (2011-12), together with TSD_February_2015 data and UN Services trade data on India's services exports for the period 1995-96 to 2011-12. For the employment data, following the literature, a working sample is constructed consisting of urban men in the age group of 16 to 35 years, who are a part of the workforce and are not attending any educational institution. Also, these workers report their principal industry and principal occupation. These workers (son) have been paired up with their fathers, who have been identified as the male head of the household. The working sample includes only those father-son pairs who report their principal industry as well as their principal occupation. The summary statistics of the working sample reveal that the average age of the sons and their fathers are 23 years and 53 years respectively. Sons are better educated than their fathers and the level of education of the general caste is much higher than that of SC/STs.

From the dataset, eighteen industry groups are formed by suitably clubbing the 5-digit industry codes provided by NSSO as per National Industrial Classification NIC 1998 for the 55th and 61st rounds and as per NIC 2008 for the 68th round to study the intergenerational industrial transition studied in the first essay. Further, four occupation categories are formed by clubbing the occupation codes provided by NSSO as per National Classification of Occupations NCO 1968 for the 55th and 61st rounds and as per NCO 2004 for the 68th round to study the intergenerational occupational mobility covered in the second essay. In order to analyse task intensity of jobs in the services sector in the third essay, jobs are defined as cells of an industry-

occupation matrix, the same industry classification of 18 industry groups as against 74 occupation codes arrived at from 113 occupation codes as per NCO 2004.

In order to understand services export behaviour in the first two essays and match it with the employment data for the period 1999-2000 to 2011-12, the export data are taken for a five-year span preceding every employment data rounds. The share of the each service industry in total services export and the compound annual growth rate of services export are calculated for a previous five-year band for each round. For the third essay, the share of the service industries in total services export and the compound annual growth rate of services export are calculated for the entire period and two sub periods, viz. 1999-2000 to 2004-05 and 2004-05 to 2011-12.

The first essay, as in chapter 2, has explored whether growing services trade has any impact on the intergenerational choice of industry among Indian households/workers leading to intergenerational switches towards service industry is explored. For that, a working sample of father-son duo based on certain characteristics is constructed from the NSSO database along with industrial transition matrices to study the intergenerational choice of industry of the younger generation compared to the older ones. Persistence among sons to remain in the same industry or occupation as that of their fathers has been observed between 1999-2000 and 2011-12. The industry transition matrices thus do not reflect any significant job switches towards liberalized and trade-oriented services sectors. However, it is found that the degree of persistence, though high, is showing a declining trend over the years. Further, it can be observed that sons in general have moved towards manufacturing and whole-sale and retail trade sector irrespective of the industry where their fathers are employed.

The probit regression estimation results delineate the factors underlying such observed persistence in job choice. It is found that marital status has significant

impact on the degree of persistence. Similarly, father's occupation and status has significant positive impact on persistence. It needs to be stressed that if the father is engaged in a better occupation as compared to elementary occupation, there is greater chance that the son will remain in the same industry. However, compared to illiterate sons, higher education level of sons has significant impact on their industry mobility. Educated sons are more mobile in terms of choosing jobs. And finally, it is observed that rising importance of services exports in total, as well as compound annual growth rate of the services export, has significant negative impact on persistence.

Even though the pace of employment generation is low in services sector, the results do not undermine the role of services trade in generating employment in India. However, it might well be the case that services trade liberalisation has generated employment in manufacturing as well as a number of other services sectors through backward and forward linkages. Despite splintering of the production process, there are certain services that are often inseparable from manufacturing, which may have absorbed rising employment into manufacturing.

The second essay investigates into intergenerational occupational mobility of Indian workers with rising services trade. The occupational transition matrices depicting the occupational choice of the father-son pair for the three rounds of the survey show high degree of persistence among sons regarding their choice of occupation as well. However, the simple measure of mobility calculated by taking the ratio of sum of off-diagonal elements to the sum of all the elements in a transition matrix, show upward occupational mobility during the period. The alternate Altham measure of relative mobility is used to measure the degree of association between occupational choice of fathers and sons. The Altham statistic d(P, Q) measures the distance between the row-column association in P (the transition matrix for the base

round) with that of Q (the transition matrix for the other round). A likelihood-ratio chi-squared test statistic G^2 with (r-1) (s-1) degrees of freedom is then used to test the null hypothesis of no difference in the association between the two matrices P & Q. If the alternate hypothesis $d(P,Q) \neq 0$ is accepted, the degree of association between rows and columns of P differ from the degree of association of rows and columns of Q significantly. The Altham measure of relative mobility is resorted to following the literature, and the full set of log odds ratio are calculated, and identified those making the greatest contribution to the overall distance of association between P and Q.

The results on intergenerational occupational mobility reveal that the degree of association between father's and son's occupation gradually increased between 1999-2000 and 2004-05. However, this association declined significantly during 2004-05 to 2011-12, thus showing improved degree of mobility over these years. Considering this pattern, it can be concluded that the degree of association between father's and son's occupations differ significantly indicating greater intergenerational occupational mobility. Individual odds ratio contrasts over the period 1999-2000 to 2011-12 reveal a significant decline in the relative advantage of sons of white-collar fathers in getting white collar jobs. This indicates improved chances of upward mobility for sons of fathers engaged in occupations other than white collar ones.

Further, to identify the factors underlying the son's occupational choice, a multinomial logistic regression model is set up to estimate Altham measure with covariates. The son's choice of occupation is treated as the dependent variable and the same set of dummy variables individual and household characteristics, as used in essay 1, are treated as the covariates. It is found that sons engaged in services industries with moderate trade performance are less likely to be in services-oriented and clerical jobs compared to other three types of occupation and sons engaged in

high performing services export industries are more likely to be in white-collar jobs. It is noteworthy here that transport, storage and travel industries have moderate shares in exports, while computer and related activities and other business services experienced high export growth as well as high share in services exports. These results are found to be contingent upon the covariates.

The multinomial regression estimates with covariates thus corroborate to the results observed in the first part of the analysis, and strengthen them further. This indicates that after controlling for covariates, the estimated Altham measure show increased mobility in son's choice of occupation. Also, the impact of almost all the covariates can be summarized to lead to improved chances of sons to enter into white-collar and service-oriented or clerical jobs over production related jobs or elementary jobs. This pattern ascertains the proposition of upward mobility among sons compared to their fathers in choice of occupations in a period of improved services exports.

The third essay explores the job profiles of service workers from two perspectives, from the supply side, considering the occupational skill distribution measured in terms of median wage earned by the workers, as well as the demand side being reflected by the changing task profiles of jobs owing to technological breakthroughs and/or growth in services exports. For the supply side analysis, an industry-occupation cross matrix is defined considering 16 services industry groups and 74 occupations for the three time points, 1999-2000, 2004-05 and 2011-12. The job cells in the matrix are identified having at least 10 wage earners in the cell, which are ranked in ascending order as per the median wage earned for a particular job. The entire distribution is divided in 100 percentiles and 5 quintiles on the basis of median wage and the number of workers employed in each percentile or quintile is calculated for each year. Local polynomial smoothing method is adopted for performing

nonparametric analysis as it is the least biased. Following the literature, locally weighted scatter-plot smoothing (LOWESS) is used for graphs on employment change across skill quintiles. For the demand side analysis, 10 NCO occupation codes provided in the NSSO survey are rearranged as per the task intensity of jobs to form 4 categories of jobs viz. non-routine cognitive, routine cognitive, routine manual and non-routine manual. A Shift-Share analysis observes whether the changes in task intensities result from change in the occupational structure of employment (i.e between-industry change) or, change in skill requirements within occupations (within-industry change). The changes in employment share in services industries are studied for the entire period, 1999-2000 to 2011-12, as well as two sub-periods, 1999-2000 to 2004-05 and 2004-05 to 2011-12.

The chapter 4 on task intensities and job polarisation in the services sector finds that the share of employment in the services sector in India has experienced a growth in the jobs belonging to the upper tail of occupational skill distribution (60th percentile and above) during 1999-2000 to 2011-12. This study however does not find any commendable rise in lower-end jobs. A decomposition analysis reveals that this pattern of employment change is primarily driven by self-employed workers and unpaid family workers. Though this study covers a decade or more from 1999-2000 to 2011-12, it is seen that the employment pattern remains almost the same up to 2004-05 followed by major changes during 2004-05 to 2011-12. Looking deeper into the sector-specific occupation groups that registered the maximum rise and fall in employment share, it comes out that the wholesale and retail trade sector registered the maximum change in share of employment i.e., the low-skill occupations of the sector registered the greatest decline in share and the high skill occupations of the same sector gained maximum share of employment. Also, transport and construction

came out to be the two other prominent sectors where the workers gained share of employment. The results of the task-based analysis reveal that the task composition experienced a significant change during 2004-05 to 2011-12. During this latter phase, while the share of non-routine cognitive tasks increased, the share of routine cognitive tasks declined. The share of non-routine manual tasks remained high despite notable decline. The shift-share analysis confirms that this shift in task intensities is primarily explained by change in occupational structure within the industrial sector.

In order to understand the factors underlying the employment trend across jobs as per the occupational skill percentiles, the change in the share of employment for each job are estimated. This sets the basis of a probit regression exercise, where the dependent variable 'job growth' takes a value of 1 if share of employment has increased for a job cell and the 0 otherwise. The same set of explanatory variables including services trade indicators, individual and household characteristics, as used in essays 1 and 2, are considered. The probit regression estimates in this essay show that the age group of 25 to 34 years as against 15 to 24 years, general category as against reserved category of social groups, self-employed households as against salaried household, wage earners as against self-employed workers, have better chances of being in a sector experiencing increased share of employment during 1999-2000 to 2011-2012. Controlling for the individual and household characteristics, the probit estimation results further show that there are better chances of increase in the share of employment for workers engaged in services export sectors performing well as against sectors not participating in services trade during the decade. The results indicate a shift towards higher-end and essentially non-routine cognitive task intensive jobs. This is indicative of improved services export performance, among other factors, playing a significant role in explaining this shift.

On the whole, despite growing services trade, persistence is observed in choice of industries by workers across generations. Similar pattern is observed for intergenerational occupational mobility. Growing services trade, however, has induced mobility in occupations across generations of workers during 1999-2000 to 2011-12. Expanding services exports have also led to changing task intensities of jobs more towards non-routine cognitive ones. From the three aspects of analysis covered in the thesis, the supply side factors like skill content of the workers, measured in terms of their education level, as well as the demand side factors in terms of skill requirement of the new age jobs that liberalized services trade are opening up, have a significant role to play in shaping up the labour market. Services exports have thus opened up opportunities for wide ranging changes in the Indian labour market, though with the downside risk of increasing inequality.

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