Skill premium: What caused the 'mismatch'?

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Abstract:

Increasing returns to skill is often attributed to the rising relative demand for skilled workers driven by advancement in skill-complementary technology. In the context of India this paper argues that fluctuations in skill-premia in different sectors are primarily because of the shift in the relative supply of skilled labour that has hardly any relation to technological advancements. In the long run the paper argues that there seems to be little possibilities of endogenous growth in technology outpacing the rising supply of educated workers because of the existence of large labour reserves. Hence, conjectures such as increasing spiral of demand and supply for skilled workers mutually determining each other, often conceived in the context of developed countries do not hold in countries such as India.

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INTRODUCTION

Globalisation is conceived as the process that results in convergence of relative price, increased trade and factor movements and governance of production systems or value-chains spread across the world. Despite the fact that large asymmetries exist in mobility between capital and labour as well as that between skilled and unskilled labour standard trade theory argues free flow of goods may substitute movements in factors. Increased trade in goods and services, technology and knowledge as well as relocation of production sites in the global value chain in any case changes the relative demands of factors in national economies. This in a way gives rise to asymmetries and divergence in factor incomes within a country.

In the context of labour market, rising divergence between wages of skilled and unskilled workers in both developed and developing countries has been viewed as signs of such short-run shocks. Availability of foreign goods within the domestic market and the quality standards they impose affect producers both producing traded and non-traded goods and have to respond to the rising demands for international quality standards. Introducing new technologies as a result alters the relative demands of different grades of labour and favour those having higher levels of skills. This standard narrative presumes that there has been a rise in the relative demand for skills across countries and sectors. And if the relative endowment of skill for a specific country, that although grows over time, lags behind the enhanced requirements there will be a 'mismatch' manifested in a rise in the relative wages for skilled workers. Impressionistic perceptions built upon the wage movements of a small section of information workers in countries such as India often indulge in deriving such gross inferences.

In the context of India, this paper aims to review the changes in skill premium, defined as relative wage of skilled workers to unskilled ones in various industries in the post-reform period and the way it is related to the changes in relative demand and supply of skills in

the respective sectors. Models linking technology changes and supply of skills, mostly conceived in the context of developed economies, argue that in the long run there would be a simultaneous growth of both demand and supply of skills mutually determining each other resulting in a post-industrial society, a case where job performance would require more brains than brawn. Similar trajectories are often considered relevant in explaining rising skill premium in developing countries.

This paper argues that in the case of India rise and fall of skill premium in different sectors can be explained by shifts in the relative supply of skilled labour and that has little relation to advancement in skill-complementary technology those raise the demand for higher skills. In the long run this paper argues that conjectures could be different in countries such as India from those conceived in the context of developed economies. There seems to be little possibilities of endogenous growth in technology outpacing the rising supply of educated workers in the long run.

In the following section a brief review of the debates relating to the concept and measurement of skill as well as that to the skill-technology relationship is discussed. In the next the trends in skill premium in India in reference to sectors and occupations are shown and in the fourth section these trends are explained by using the simple demand-supply framework. In the fifth section we discuss the broader aspects of future trajectories of skill and technology and the reasons why arguments proposing long run rise in demand for skills at a rate high enough to take care of the growth of supply do not hold in countries such as India. Finally we conclude.

THE SKILL DEBATE

Skills refer to human capacities obtained by individual workers or to the specific demands that individual jobs require. Although it is difficult to define skill in a way that captures all its dimensions but studies on skill begin with the assumption that there is an average skill requirement associated with each job in the economy. This however does not imply that the functional requirements of a specific job are always congruent to the hiring requirements of the same. Convergence and divergence in this regard basically

depends upon the demand and supply of skills in a specific labour market and also on the cost of screening.

Rising premium in wages for those having college degrees in the US labour market during the 1970s and 1980s drew attention of economists giving rise to a large volume of literature on changing skill requirements driven by improved technology. For that matter in the wake of globalization a popular perspective emerged even in developing countries that the labour market has shifted in favour of higher skills because of increasing use of technology and trade driven demand for high-skilled employees. The change has been addressed in two ways: occupation literature tries to locate the changes within individual jobs and compositional studies indicate how labour force composition changes across occupations. Often there is a disconnect between the two strands of literature and this is primarily because of the lack of appropriate data set that helps capture both the content and distribution of skills. In any case this is required because if the skill content of an individual job declines together with a significant shift away from this job to jobs demanding higher skills the net effect would be a considerable up-scaling of skills for the workforce on the whole. Conversely, even if an individual job requires much higher skills but involves a significantly small share of the workforce, there would be no significant rise in skill requirements for the entire workforce. There are other problems as well. While analyzing compositional changes it is assumed that the skill requirements of individual jobs remain constant over time although that may not be the case. Similarly going by proxies like job titles may not always reflect the actual differentials in skill requirements because occupational hierarchies are getting blurred in changing work organizations and there can be 'grade drifts' for reasons other than skill requirements. The concept of skill has wider ramifications as well. Beyond the techno-economic determinants there are aspects of autonomy and complexity of jobs relating to issues such as power and control embedded in the relations between workers and management. Skill in a sense evolves as a social category that also draws in political and ideological determinations often reflected in biases such as those that privilege mental over manual work and indulges in proxies such as educational attainments that might not always

reflect skills. In the context of developing countries this is even more true since we find around large number of people working in different occupations with great proficiency but might not have any formal training or education. And hence could not be captured in the narrow concept of 'skilled workers' defined in terms of educational attainments. However it is quite difficult to get data that appropriately captures all the dimensions of skill.

To economists the issue of changing requirements of skill became important in view of explaining the differential returns that these skill endowments might fetch. If skill requirements increase other things remaining same, one should expect a higher equilibrium price for skilled labour. Changes in the wage premium associated with skill therefore, might be interpreted as evidence of a change in skill requirements. However, gauging skills by price measures faces obvious limitations. First, there is always an identification problem because price of a certain skill may rise not only because of higher requirements or demand but because of shortage in supply. In that case rise in the price of skill may not actually reflect up-scaling. Second, the value of skill depends on the average value of reproducing such skill and the price fluctuates around this socially determined value depending on the demand and supply. Hence, at least in the short run and for individual occupation it is possible that the value of skill although keeps increasing might at the same time fetch a lower price because of the demand-supply conditions. And such movements in price do not in any case imply that the job requires lower skill content.

The other facet of the debate relates to the link between technology and skills. Those who view technology as exogenous presumes that technologies are outcomes of advances of science driven by factors other than profit motives and skill requirements follow the technology path. The underlying assumption in this argument is that technological changes are so overwhelming that the effects on employment could not be treated as endogenous. Some observers subscribing this view assume the steady demand hypothesis that says, advancements in technology takes place at a constant pace and hence price differentials related to skills can be explained by changes in the supply of skills. On the

other hand acceleration hypothesis assumes a growing demand for higher skills basically driven by advances in information technology.

The endogenous view on the other hand argues that new technologies are outcomes of changing incentives. When skill based techniques are more profitable firms would be inclined to produce such technologies. In other words, if there is a rise in the supply of skills, machines complementary to such skills would be produced more because there would be more skilled workers to use them. Other strand of literature although subscribes to the endogenous view goes beyond the demand-supply framework. Braverman (1974) argued in the context of mass production that technologies are devised in a way to increase control of managers over the work process. In order to convert labour power into actual labour at its maximum a capitalist economy indulges on technologies that help continual appropriation of workers skills and knowledge by management. Because of this control incentive complicated tasks are divided into simpler routinised ones that involve cheap unskilled labour and the majority of the workforce gets dispossessed of their skills.

It is generally held that technology and skills are relative complements and the demand for skills increases with the rise in technology impacting upon relative wages. The rise in wage inequality in recent times following increased use of computer driven technologies substantiates the above impression and indulges assuming complementarities between skill and technology. However Goldin and Katz (1998) argues that technology-skill complementarity emerged in manufacturing early in the twentieth century particularly because of the spread of technologies known as batch and continuous process methods of production. The transition from artisanal shop to factory production although increased the capital-output ratio, nevertheless, it possibly reduced the relative demand for skilled labour. Shifts in production from assembly lines to batch processes raised both the capital-output ratio and relative demand for skilled labour in manufacturing. There are two stages in manufacturing: a machine installation and maintenance segment and the production and assembly segment. Technology and skill are always complementary in the first stage of manufacturing while operations related to assembly require relatively lesser amounts of skills. Hence, what follows that the net effect of introducing new technology in manufacturing would be determined by the relative expansion of the two segments.

Globalisation narratives however assume complementary relation between skill and technology and rising wage inequalities are attributed to a 'skill-mismatch'—— a gap in the demand and supply of required skills. There is a rise in skill requirements that may be technology and/or trade driven as the argument goes, and the current supply of skills somehow lags the relative increase in demand resulting in a gap. This gap in turn drives wages up for skilled workers relative to unskilled workers. If the mismatch persists for a longer time it would affect competitiveness, hence policies should be aimed to reduce the gap by increasing the supply of required skills. The other response could be increased efforts to introduce technologies those deskill jobs and minimize the skill gap by employing the excess supply of unskilled labour.

Within the broad contours of the skill debate, we look into the Indian scenario of changing skill requirements across industries and identify resulting trends in the skill premium.

TRENDS IN SKILL PREMIUM IN INDIA

Despite the fact that the notion of skill could not be monotonically related to educational attainments, nevertheless, educational markers are possibly the second best proxies when comprehensive data capturing the different dimensions of skill are not available. NSSO provides data on proportion of workers by educational categories within industry groups and also wages per day received by workers having different education levels. In this paper we define skilled workers those attaining education equivalent to secondary level and above and those below are considered as unskilled workers.

Table 1 shows the ratio of skilled to unskilled workers and the shares of skilled workers within industries for the years 1993/94, 1999/2000 and 2004/05. Sectors having higher proportios of skilled workers are electricity, gas, water; other services; trade and transport storage and communications. During the period 1993/94 to 1999/2000 the share of skilled workers increased in all the sectors, the rise being relatively higher in sectors such as trade, hotels and restaurants, transport storage and communications and other services. In the second period that is between 1999/2000 to 2004/05 the share of skilled workers increased in the case of agriculture and allied sector as well as in construction and electricity, gas, water. During the same period the proportion of skilled workers declined

in the case of manufacturing, hotels and restaurants, transport storage and communications and other services. In comparison to 1993/94 the share of skilled workers declined in 2004/05 in two sectors namely, manufacturing and other services. Considering all sectors the share of skilled workers increased from 18 per cent to 20 per cent and further to 20.6 per cent respectively in the three reference periods.

Table1: Proportion of Skilled to Unskilled Workers by Industry and Share of Skilled Workers within Industry

	Proportion of Skilled to Unskilled Workers			Share of Skilled Workers Within Industry		
	1993/94	1999/2000	2004/05	1993/94	1999/2000	2004/05
A&A	0.03	0.04	0.11	2.9	3.8	9.9
M&Q	0.19	0.2	0.24	16.0	16.7	19.4
MANUT	0.36	0.48	0.32	26.5	32.4	24.2
EGW	1	1.42	1.51	50.0	58.7	60.2
CONST	0.08	0.11	0.14	7.4	9.9	12.3
THR	0.46	0.59	0.60	31.5	37.1	37.5
TSC	0.17	0.28	0.25	14.5	21.9	20.0
OS	1.45	1.58	1.23	59.2	61.2	55.2
All	0.22	0.25	0.26	18.0	20.0	20.6

Notes: Notes: A&A= Agriculture and Allied, M&Q= Mining and Quarrying, MANUT= Manufacturing, , EGW= electricity, Gas & Water Supply, CONST=Construction, THR= Trade, Hotels & restaurants, TSC= Transport, Storage & Communication, OS= Other Services.
Source: Computed from Unni and Rani (2008)

In Table 2 we calculate the wage premium for skilled workers defined as the average relative wages of skilled workers with respect to unskilled workers in various industries. During the period 1993/94 to 1999/2000 for the rural male skilled workers returns to skill declined in manufacturing, construction and the two categories of services. In the case of rural female skilled workers the skill premium declined in almost all the sectors except agriculture and mining and quarrying. There had been sharp rise in the skill premium in case of mining and quarrying and sharp declines in sectors such as trade, transport, storage and communications and both categories of services. In regard to urban male workers the skill premium declined in the case of mining and quarrying, electricity, gas and water, construction and public administration and social services, although there had been rise in the skill premium for those involved in agriculture and allied activities, manufacturing, trade and the rest of the service activities.

Considering urban female workers the skill premium increased in the case of registered manufacturing, construction, trade, transport, storage and communications and finance, insurance and other business activities while in the rest of the sectors it declined. Returns

to skill declined sharply in the case of agriculture, mining and quarrying and electricity, gas, water. In the second period for the rural male workers skill premium increased in almost all the sectors except agriculture and trade related activities finance, insurance and other business activities. There had been sharp increase in skill premium in the case of registered manufacturing and services. For rural female workers the skill premium declined in the majority of activities showing sharp decline in mining and quarrying, electricity, gas, water and construction.

Table 2: Skill Premium for Skilled Workers by Sectors and Sex in Various Industry Categories

	Rural Male			Rural Female			Urban Male			Urban Female		
	1993-94	99-2000	2004-2005	1993-94	99-2000	2004-2005	1993-94	99-2000	2004-2005	1993-94	99-2000	2004-2005
Agriculture (01-05)	2.774	3.824	2.923	2.240	3.661	2.398	2.904	4.177	3.007	3.265	1.554	2.323
Mining & Quarrying (10-14)	1.107	1.425	1.697	1.193	3.508	0.280	1.458	1.005	2.242	2.170	1.168	4.634
Manufacturing (15-22)	1.878	1.774	1.989	1.568	1.277	2.173	1.860	1.958	2.031	2.880	3.730	3.496
Manufacturing (23-37)	1.584	1.839	4.023	2.479	2.993	2.906	2.125	2.497	2.503	2.747	2.398	3.306
Electricity, Gas and Water (40 -41)	1.362	1.482	1.642	2.878	2.619	1.160	1.802	1.613	2.445	3.756	1.911	2.879
Construction (45)	2.270	1.702	1.799	2.811	2.725	1.875	2.242	2.214	2.459	3.082	3.584	2.096
Trade (50-55)	1.337	1.629	1.476	1.596	0.645	2.704	2.079	2.318	2.313	2.445	3.416	2.928
Transport & Storage etc. (60-64)	1.620	1.631	1.770	2.066	1.213	1.900	1.731	1.925	2.353	1.630	2.035	2.733
Services (65-74)	2.431	1.641	2.645	4.089	1.394	1.253	2.435	2.588	3.629	3.461	3.783	3.268
Services (75-93)	2.053	1.781	1.938	3.352	0.815	3.284	2.067	1.902	2.115	3.007	2.219	2.226
All	2.204	2.267	2.502	3.097	1.417	1.842	2.095	2.334	2.613	2.981	3.273	3.697

Source : Computed from Employment and Unemployment Situation in India, NSSO several years.

However it increased in activities related to trade, transport, storage and communications and public administration and social services. The urban male skilled workers experienced rise in skill premium in almost all the sectors except agriculture and trade. Relatively greater rise in the returns to skill was recorded in mining and quarrying, electricity, gas, water and finance and business related services. In the case of urban female workers skill premium increased in activities such as agriculture, mining and quarrying, unregistered manufacturing, electricity, gas, water, transport, storage and

communications and public administration and social services and declined in the rest of the sectors.

In this context we also compute the changes in skill premium across occupation categories as shown in Table 3. In the case of professional and technical workers during the reference period 1999/2000 to 2004/2005 the skill premium declined for rural workers but it increased in the case of urban workers. Returns to skill increased sharply for urban male workers involved in administrative and executive works.

Table 3: Skill Premium for Rural and Urban Skilled Workers by occupation Categories

Occupation group	Rural Male		Urban Male		Rural Male	Urban Male
	1999/2000	2004/05	1999/2000	2004/05	99/00 to 04/05 +/-	99/00 to 04/05 +/-
Nursing and medical workers	2.05	1.633	1.813	1.735	-0.417	-0.08
Teachers	1.218	1.27	1.442	0.857	0.052	-0.59
Rest of professional, technical workers	2.932	3.084	2.478	4.324	0.152	1.85
Professional and Technical Workers	1.776	1.77	2.111	2.925	-0.006	0.81
Adminstrative And Executive Workers	NA	6.921	3.154	5.247	……	2.09
Clerks, typists, cashiers oth.	1.635	1.635	1.587	1.608	0	0.02
Transport conductor telephone operator	1.264	1.759	1.69	2.321	0.495	0.63
Clerical and Related Workers	1.605	1.646	1.612	1.838	0.041	0.23
Merchants,shopkeepers, Wholesale and retail dealers	1.916	2.72	2.065	3.774	0.804	1.71
Rest of sales workers	1.506	1.559	1.833	2.159	0.053	0.33
Sales Workers	1.519	1.539	1.843	2.186	0.02	0.34
Housekeeper, maid, caretaker Sweeper	1.537	1.063	1.397	1.371	-0.474	-0.03
Launderers, hair dressers	NA	0.752	1.047	1.354	……	0.31
Protective workers, Fire, Police	1.828	1.956	2.135	2.384	0.128	0.25
Service Workers, Shop and Sales Workers	1.848	2.036	2.051	2.171	0.188	0.12
Cultivator, general tenant	2.945	1.041	2.481	4.676	-1.904	2.20
Agricultural labourers	NA	0.541	0.192	2.358	……	2.17
Plantation labourers	2.049	1.263	0.902	-	-0.786	……
Rest of farmers and fisherman	2.525	2.357	2.494	2.514	-0.168	0.02
Farmers and Fisherman	3.135	1.938	1.31	2.769	-1.197	1.46
Miners, quarrymen, well drille	1.482	1.441	1.18	1.496	-0.041	0.32
Metal processors	1.034	1.255	2.264	2.532	0.221	0.27
Spinners, weavers, knitters	1.317	1.407	1.707	2.085	0.09	0.38
Food and Beaverage Processors	1.524	1.473	2.202	2.025	-0.051	-0.18
Tailors, dress Makers, sewers	2.411	1.656	1.592	1.599	-0.755	0.01
Stone cutters blacksmith Machinery fitters	1.293	1.8	1.921	1.875	0.507	-0.05
Brick layers, construction wks	1.15	1.274	2.084	1.884	0.124	-0.20
Transport equipment operators (Manual and Mech	1.566	1.565	1.747	1.676	-0.001	-0.07
	0.795	1.087	1.488	1.573	0.292	0.09
Rest of craft,plant,machine operators, assemblers, elementary occupations	1.609	1.52	1.814	1.72	-0.089	-0.09
Production and Related Workers	1.47	1.524	1.826	1.755	0.054	-0.07
all	2.267	2.502	2.334	2.613	0.235	0.28

Source: Same as Table 2

In the sphere of clerical and related works both the rural and urban skilled workers experienced a rise in the skill premium over the years. In occupations such as sales and service works the skill premium increased in both the rural and urban segment. In the rural segment skill premium declined in occupations related to farming and fishing while it increased in the urban areas. Skill premium declined for both rural and urban workers involved in activities such as craft, plant and machine operators and assemblers. Occupations related to tailoring, dress making and sewing experienced a rise in the skill premium in the case of urban workers but it declined in the case of rural workers.

In the construction sector we find opposing trends in skill premium for the rural and urban workers, it increased for the rural workers and declined in urban areas. By occupation categories the broad trend that emerges in regard to skill premium is interesting in the sense that in the urban segment the skill premium declined in most of the manufacturing and in some of the service activities while it increased sharply in the case of administrative and executive workers. In the rural segment occupations related to agriculture experienced decline in the skill premium while there seems to be mixed trends in other occupations.

From the abovementioned facts we possibly identify some broad trends those may be underlined: a) The share of skilled workers within sectors increased consistently over the three reference periods in the case of agriculture and allied activities, mining and quarrying, electricity, gas and water; construction and trade. The share declined in the second period in case of manufacturing, hotels and restaurants, transport, storage and communication and other services; b) During the initial period of reforms returns to skill increased in most of the sectors for the male workers both in rural and urban areas. For the female workers in the rural segment skill premium mostly declined while in the urban segment it increased in the majority of the sectors; c) In the later part of reforms skill premium for male workers increased in most of the sectors both in the rural and urban segments. Returns to skill for the female workers in rural areas declined in most of the sectors although in the urban segment we find a mixed trend that is it declined for four and increased for six of the ten industry categories; d) In the urban segment occupations

related to manufacturing and in some services and in the rural segment those related to agriculture experienced a decline in the skill premium.

Skill premium for specific occupations or related to specific sectors may change because of two reasons: either because of changes in technology that drives up the demand for skills or it may be because of a change in the sectoral distribution of skilled/unskilled workers that changes the relative supply of skills across sectors for reasons other than technological change. We discuss this issue in the following section.

EXPLAINING CHANGES IN SKILL PREMIUM

Assuming technologies to be intrinsically skill complementary is ahistoric and based on impressionistic notions. In the early nineteenth century technological developments were mostly skill replacing because of the increased supply of the unskilled workers in the English cities. On the contrary new technologies in the twentieth century have become more skill using because of the fact of the steady rise in the relative supply of skilled workforce. Thus advancement of technology responds to the relative supply price of skills. Acemoglu (2002) introduces a simple framework to explain changes in skill premia by linking the relative supply of skills to demand generated by the technology possibilities frontier of the economy. The simple argument is presuming a downward sloping relative demand for skill such that an increase in the relative supply of skills causes fall in the skill premium. Changes in relative price of skills in response to changes in technology however depend on the elasticity of substitution between skilled and unskilled workers. Since most estimates show an elasticity of substitution greater than one the general conclusions of this demand-supply model are as follows: a) If the relative demand for skills remains same a rise in the relative supply of skills reduces the skill premium; b) If the advancement in skill complementary technology is slow a rise in the relative supply of skills would cause a fall in the skill premium in the short run.

Using this simple framework we try to explain the trends shown in the previous section. In the initial period of reforms the proportion of skilled workers increased in all sectors but during the period 1999/2000 to 2004/05 the share of skilled workers in the workforce declined in manufacturing, hotel and restaurants, transport storage and communication

and other services. Surprisingly the share of skilled workers increased in agriculture quite sharply. Change in the share of skilled workforce might be because of a change in the structural composition of the workforce caused by exogenous factors or a demand driven response to a fast advancement of skill-complementary technology.

Advancement in skill-complementary technology is usually manifested by a rising capital-labour ratio together with proportions of skilled workers increasing at a similar pace in respective sectors (Goldin and Katz, 1996). In Table 4 we compute the percentage change in Net Fixed Capital Stock (NFCS)/ labour over the two reference periods and also the percentage point change in the share of skilled workers.

Table: 4: Percentage Change in Net Fixed Capital Stock/ Labour and Percentage Point Change in the Share of Skilled Workers by Industry

	% Change in NFCS/Labour		% Point Change in the Share of Skilled Workers	
	1993/94 to 1999/00	1999/00 to 2004/05	1993/94 to 1999/00	1999/00 to 2004/05
A&A	11.61	18.19	0.31	1.61
M&Q	50.15	0.85	0.04	0.16
MANU	59.11	16.12	0.22	-0.25
EGW	76.30	19.64	0.17	0.03
CONST	20.93	58.85	0.34	0.24
THR	-8.03	22.16	0.18	0.01
TSC	7.05	36.75	0.51	-0.09
OS	64.64	75.41	0.03	-0.10
Total	33.11	27.38	0.11	0.03

Source: Computations are done using National Accounts Statistics, 2007 and back series, Employment and Unemployment Situation in India, NSSO several years and Table 1.

We find that in many of the sectors the changes in NFCS/labour moved in a different direction from that of the changes in the share of skilled workers. Moreover, in the case of mining and quarrying, manufacturing and electricity gas water there is a deceleration in the growth of NFCS/labour in the second period compared to the first while in construction, trade hotel and restaurants, transport storage and communications and other services the capital-labour ratio increased faster in the second period. Furthermore, in the case of manufacturing, the sector in which we expect the most an upward spiral of both capital-labour ratio and the share of skilled workers, the latter declined in the second period. Similar disconnect between the growth of capital-labour ratio and the share of

skilled workers is also found in the case of transport, storage and communication and other services. What is evident from the facts is even though the capital-labour ratio has increased in many sectors but that did not lead to a rise in the share of skilled workers at a similar pace as expected rather it declined in manufacturing and many of the service activities in the second period. This possibly implies that the change in the share of skilled workers, in any case, was not driven by advancement in skill-complementary technology.

This possibly draws our attention to the structural shift in employment that occurred during the last decade as shown in Table 5.

Table 5: Distribution of Employment According to Census Data and NSS Results

Industry	Distribution of Total main Workers by Industry According to Census Data			Industry	Distribution of Employment(UPSS) by Industry According to NSS Data			
	1981	1991	2001		1983	1993/94	1999/2000	2004/05
A&A	68.82	67.20	56.67	A&A	68.29	63.89	60.28	58.17
M&Q	0.64	0.61	0.61	M&Q	0.61	0.72	0.57	0.55
MANUT	11.07	9.44	13.41	MANUT	10.76	10.65	10.99	11.81
EGW	0.45	0.43	0.49	EGW	0.28	0.37	0.26	0.25
CONST	1.85	1.95	3.70	CONST	2.25	3.24	4.40	5.57
THR	5.48	7.08	9.39	THR	6.38	7.60	10.26	10.32
TSC	2.74	2.82	4.01	TSC	2.52	2.88	3.68	3.87
FIRB	0.79	1.07	1.96	OS	8.91	10.65	9.56	9.47
CSPS	8.16	9.40	9.76					
Total	100.00	100.00	100.00	Total	100.00	100.00	100.00	100.00

Notes: CSPS= Community, Social & Personal Services, OS= FIRB+CSPS and others same as Table1.

Source: Census data for various years; Mathew (2006) and NSS 61st.Round 'Employment and Unemployment Situation in India-Part I'Report No. 515

There had been a significant shift in employment away from agriculture and allied sectors. Labour shifted from agriculture were mostly absorbed in the unorganized segment of manufacturing and services and that possibly explains the rise of skill proportions in agriculture and fall in manufacturing, hotel and restaurants, transport storage and communication and other services. However, this may be a partial explanation only, because the shift alone cannot explain the sharp rise in the share of skilled workers in agriculture and allied sectors.

As discussed in the previous section skill premium declined in manufacturing, mining and quarrying, electricity, gas, water, construction and services during the period 1993/94 to 1999/2000. This can be explained possibly by the fact of the rise in the skill proportions in these sectors without having any change in the relative demand for skills. The decline is even higher in the case of female workers possibly because of the

segmented nature of the labour market that often discriminates female skilled workers vi-a vis their male counterparts. In the second period the skill premium increased in sectors where the proportion of skilled workers declined and that is obviously because of the relative decline in supply compared to more or less unchanged relative demand.

Figure 1: Growth of Skill Proportions by Industry
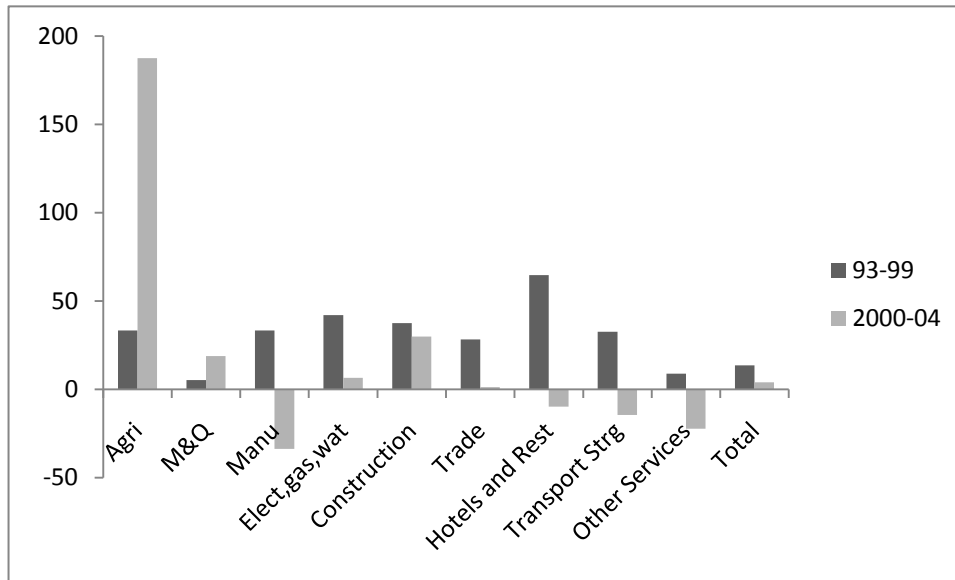
The movement of skill premia with respect to changes in relative supply is further captured if we compare the growth of skill proportions and skill premium in various sectors. The growth in the share of skilled workers comparing two periods increased only in the case of agriculture and mining and quarrying and declined in all other sectors. We find a clear inverse relation between the growth of skill proportions and that of skill premium. However in the urban segment we find a sharp decline in the growth of skill premium in both registered and unregistered manufacturing despite the fact that the growth in the share of skilled workers declined in manufacturing in the second reference period. This may possibly because of the slow growth in manufacturing during the recent period. In the case of female skilled workers the changes in the growth of skill premium with respect to changes in the growth of skill proportions had been much sharper because of the gendered nature of the labour market (not shown in the paper). These trends in any case confirms the fact that the rise and fall in the returns to skill is primarily because of a

relative shift in employment across sectors and has little relation to changes in skill requirements.

Figure 2: Growth of Skill Premium for Rural Male Skilled Workers by Industry
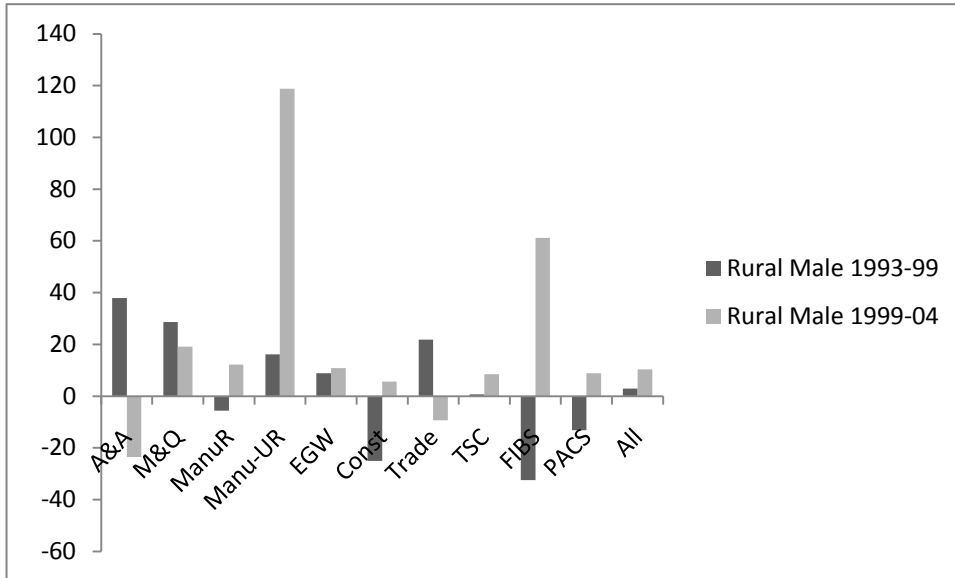
This observation is further strengthened if we recall the changes in skill premium by occupation categories. Production and some of the service workers in the urban segment suffered in terms of returns to skill while in the rural segment skill premium for agricultural activities declined in the later part of reforms.

Figure 3: Growth of Skill Premium for Urban Male Skilled Workers by Industry
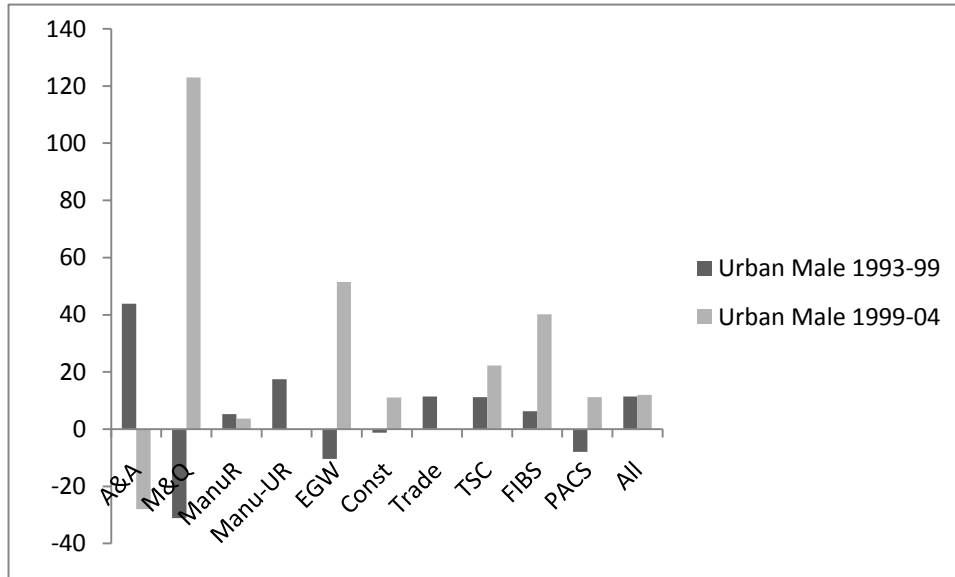
Source: Same as in Figure 2.

At a more disaggregate level using occupational survey data Banerjee (2005) has shown that occupation wise real wage increased for some and declined for the most and the increase/decrease did not strictly follow the 'skill scale'.

Normally there would be a rise in the skill proportions in course of time but there are no clear signs of endogenous response to this increase in relative supply that might be strong enough to outweigh the falling trends in returns caused by increased supply.

BEYOND THE DEMAND-SUPPLY FRAMEWORK

Future prospects of an upward spiral for both demand and supply of skills persuade the notion of post-industrial society. Analysing the US labour market through 1970s, Bell (1973) argued that with the rise in population density market demand generates new technologies that increase the demand for skilled workers. The increase in the dominance of professional and technical workers in the labour force with the steady progression of expanding skills and changing job content defines the post-industrial society. This argument primarily considers technology as exogenous and changes in that determine the shift in the skill structure of the workforce.

Similar conjectures in a different route are conceived in models assuming endogenous growth of technology. As the technology adjusts to the rising supply of skills the demand

curve might shift to the right resulting in a rise in the skill premium in the long run. Acemoglu (2002) has shown that if the elasticity of substitution is high enough returns to skill could be an increasing function of the relative supply of skills. This is because an increase in the relative supply of skills would encourage so much skill based technological change that we might have an upward sloping relative demand curve. The relative supply of skilled workers would induce skill complementary technology because of two effects: a) goods using the scarce factor will command a higher price and hence there will be more innovations directed to the scarce factor; b) the market size effect encourages innovations for the more abundant factor that is technologies those could be used by the larger sections of the workforce. Hence a virtuous circle of rising relative supply of skills together with rising skill premium could be the long run trajectory driving the economy close to a post-industrial society.

We discuss the predictability of such demand-supply model in a scenario very similar to that of India characterized by the following stylized facts: a) the proportion of skilled workers although increasing the absolute share itself is quite less than the share of unskilled workers; b) there is large involuntary unemployment both in educated and less educated workforce; c) there is little scope for domestic producers to choose technologies that match with the domestic factor endowments.

Change in skill requirements in standard models is linked to technology changes driven by profit and changing relative prices of inputs. Producers encourage advancement of skill-complementary technologies when there happens to be a rise in the relative supply of the skilled workforce. This reasoning advocates that in response to changes in the relative price of inputs the profit maximisers redefine equilibrium which simultaneously leads to efficient allocation of resources. By inefficient choice of technology we mean that there exists some other method of production that per unit of output uses less of at least some unit and not more of any. But efficiency so defined is not a necessary condition for cost minimization to the producer since if a technology allows the capitalist producer to lower the cost of some input then the producer might be able to raise profit even if the production technology is inefficient. Marglin (1974) argued that in many cases factory production began in the English Industrial Revolution because it was more

profitable for the factory owners, but not because it was any more efficient than home production. It was more profitable since as a means of organizing and controlling work effort it enabled more inputs of work to be extracted from workers.

The problem of determining equilibrium input choice is based on a budget constraint defined in a two-good space and isoquants in the two-input space. In the case of labour, the labour power, the worker, the good purchased by the employer cannot be taken as identical to the labour extracted from the worker that enters into the produced good as input (Bowles, 1985). This brings in the issue of labour process and organization of production that cannot be explained by the Walrasian notions of equilibrium determined by demand and supply. What follows from the above, that advancement of technology is not only determined by the relative supply of skilled and unskilled workers, firms incentive to move towards higher levels of technology is also conditioned by the possibilities of extracting higher levels of labour from the employed worker. If the scope of extraction can be increased by various methods such as flexibilisation, outsourcing, deunionisation, lax in minimum wage laws and so on profits can be increased even without adopting higher technologies. This possibility however increases with the threat of involuntary unemployment which acts as a disciplining instrument in the hands of capitalists. Hence, responses of firms to changing relative prices of skills might be very different in the case of India from what conceived in demand-supply models.

Second, existence of involuntary unemployment dampens the price effect that is even if the share of skilled workers increases the relative rise in the wages of unskilled workers might be small because of large labour surplus. As regards market effect it would also not be strong enough in the sense that even if the share of skilled workers has increased the absolute size of the share being small would not significantly increase the number of users of skill-complementary technology. Hence in balance there would be an advancement in skill-complementary technology but not likely to be so high to outstrip the growth of skilled workforce.

Third, differential price for skills assumes a priori skill requirement for various kinds of jobs and that defines the relative demand which, it is generally held, increases over time. More complex a production process becomes the more will be the demand for

sophisticated skills. But there is always an underlying process of standardization in the production process that gradually reduces the specificity of skills. This is true even in the case of highly skilled workforce such as information workers. The process of standardization gets accelerated with greater integration of market in a globalised economy (Prasad, 1998). Global integration of market and consumption makes consumers unable to directly assess products imported from across the world. In the face of this uncertainty consumers look for signals that will help them discriminate among products, such as standardized practices on the part of producers. Attendant pressures to standardize products redefine skills in terms of the market and tend to reduce individual employee's monopoly of knowledge over the production process. This entails homogeneity of work medium and convergence of skills. Despite distinction among various information workers the overall convergence of skills across different occupations results from constituting work as a problem of coding, and a sort of symbolic sedimentation. Hence, even in computer related jobs this brings into force satuaration of skills caused by a relative closure of interpretive space in a programmed field of work (Aneesh, 2001). This process in a way reduces the differential amount of socially necessary training time required to attain various skills. Hence in some sense the value of skills tend to decline and so also the relative price attached to it. Thus there is a simultaneous process of de-skilling and reskilling within the capitalist labour process and that reduces the relative demand for some skills while increases for others.

In developing countries such as India having large labour reserves the relative supply of skills in various sectors would be driven by the relative absorption capacity of different sectors[1]. And hence the skill composition of the workforce across sectors might not be driven by their relative skill requirements and it is quite unlikely that the relative demand schedule would shift in so high a pace to reasonably utilize the skilled labour available. Rather absorption happens to be higher in sectors that require lesser skills pushing down the skill premium further in that case. Only in a full-employment scenario we may expect a definitive response in terms of technology to changing relative supply of inputs, otherwise advancement of skill complementary technology would be much slower and

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[1] See Steiger and Wardell (1992) for a detailed discussion.

the long-run trend in the rise of skill-premium could not be realized as predicted in demand-supply models. Furthermore, because most developing countries adapt to technologies available in the international shelf those c reated in the context of an altogether different combination of factor resources, the relative demand for skilled labour changes as a response to changes in technologies. In that case it is likely that industries operating close to the technology frontier often face a relative shortage of supply of required skills pushing up the skill premium for workers in such segments. But by the same process larger proportions of skilled workers would increasingly become relatively redundant or at least would be working with lesser proportions of skills being utilized. Wage differentials recorded in broad categories as defined in this paper could not capture the dynamics of such changes since averaging smoothes out the sharp differences that emerge within the skilled segment of the workforce.

CONCLUSION

There is a growing perception in the context of rising skill premium that wage inequalities are results of a shortage in supply compared to rising demand for skills driven by technology and trade. This may be true for some industries in India but in the aggregate rise and fall in the returns to skill for various sectors primarily depended on the fact of a relative shift in the workforce that hardly has any relation to changing skill requirements. Unlike that in the case of a full employment scenario this paper shows that initiatives in introducing skill-complementary technologies did not respond adequately to changes in relative prices of skill and hence there seems to be a drag in demand that fails to sustain the trends in skill premium. In countries having large labour reserves the relative supply of skills primarily depends on the absorption capacity of different sectors. In the long run there would be a rise in the supply of skilled workers, nevertheless, that would not necessarily generate a large enough price and market effect because of the existence of large involuntary unemployment. In other words, the rise of skill-complementary technology as an endogenous response to supply of skills might not outpace the rising supply of skilled workers in developing countries such as India since firms are left with options other than technology advancements in order to reduce per unit cost of inputs. Hence, conceiving a virtuous circle of up-scaling of skills for the aggregate

workforce with rising share of skilled workers together with a rise in skill premium that further accelerates supply is a distant possibility for countries such as India.

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