

Effects of Foreign Direct Investment and human capital formation on labour markets in India

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Abstract

Foreign Direct Investment (FDI) and human capital formation's interaction has strong implications for labour demand and supply factors in developing economies. Multi-national Enterprises invest in their employees through provision of training, direct technological diffusion and up-gradation, innovation and imitation. They also tend to affect the scale and composition of labour demand in economy. Indian economy has featured rising wage inequality and demographic dividend simultaneously since the last decade. In our first attempt to empirically assess the human capital formation effect of Foreign Direct Investment in Indian manufacturing firms, we use unbalanced panel data for 568 firms for the period 2001-2013. FDI is found out to be stirring up wage inequality. We find an evidence of negative relation between relative wages and interaction term of training and foreign direct investment suggestive of positive human capital formation effect of FDI only through this channel. Results are the same when we do it for sub-classifications of industries.

Keywords: Foreign direct investment, Human capital, Labour demand, Labour supply, Wages

JEL codes: F24, J31, J24, J31.

1 Introduction

Inquiry into the growth drivers of countries has always been a major issue of research. Over the period of time these drivers have changed. Trade, Foreign Direct Investment (FDI) and human capital have emerged as the new factors causing growth of economies. Free capital mobility among the countries led to advent of Multinational Enterprises (MNE's)¹, thus providing a substitute to domestic investment. This FDI has the potential to affect the host country's macroeconomic variables like income, investment and employment (Borensztein et.al.1998; Gregario, 2003; Fry, 1993). FDI directly ameliorates production through better technologies, financial capabilities, and provision of state of the art (Luiz and Mello, 1999). It affects level of domestic investment via crowding in and crowding out effect (Agosin and Mayer, 2000).The indirect effects of FDI include spill-over effects (Kokko, 1994).Similarly human capital also has significant long run impact on an economy's income and employment (Romer, 1986; Lucas, 1988; Barro, 1998, Pissarides,2000; Wilson and Briscoe,2004). Human capital formation takes place through on the job training, schooling, and other knowledge gained through experience and learning by labour force (Becker, 1974; Blundell, 1999). Investments in human capital affect wages (Constantine and Neumark, 1994; Liu, 2013). This stock of human capital determines the technological absorptive capacity of country (Nelson and Phelps, 1966; Benhabib and Spiegel, 1994). Human capital creates positive spillovers to economy (Acemoglu and Angrist, 2000; Ciccone and Peri, 2002). FDI also affects the labour market through changes in employment and wage structure of labour force (Baldwin, 1995), leads to human capital formation through upgrading the skills of human capital of host countries by provision of formal training, schooling and spill-over effects of layoffs and turn overs of labour force from international firm to domestic firms (Michie, 2001; Kapstien, 2001; Miyamoto, 2003; Ritchie, 2002). Thus these may be considered supply side effects of FDI on human capital formation process of the host country. On the supply side, FDI may affect the human capital formation in terms of skill up-gradation of labour force, thus contribute to supply of human capital. However in the process, FDI also demands specific kind of human capital thus also affects the wages of different catagories; highly skilled, mid skilled

¹We use the terms Foreign Direct Investment and Multinational Enterprises interchangeably henceforth.

and low skilled of human capital (Feenstra and Hanson, 1995; Figini and Gorg, 2006; Gorg and Stroble, 2002). Both of these effects are crucial as they have long term consequences on labour force of host economy. The significance of either effect is important in determining the overall effect of FDI in a country. Ours is the first attempt to assess this effect empirically in Indian manufacturing industries for the last decade. The structure of the paper is organised as followed: in section 2 we discuss trends of FDI, human capital formation and wage inequality in India. In section 3 we discuss the theoretical framework. Empirical strategy has been developed in section 4 where. Data has been discussed in section 5. In section 6 we discuss our variables formation. Section 7 presents the results of effect of FDI on human capital formation and relative wages. We also check for inter- industry and time differences of this effect in this section. Section 8 concludes the discussion.

2.1 Trends of FDI and Human Capital Formation, Wage inequality in India

India remains the third most attractive destination for FDI, after China and the United States of America, for 2013-15, according to a survey of global companies conducted by UNCTAD. Foreign Direct Investment in India has increased from \$ 1,04,411 in year 2000-2001 to \$ 6,96,011 in 2011-2012. The distribution of FDI inflow is concentrated to some sectors. Services, Construction, Communication, Drugs and Pharmaceuticals, Chemicals, Automobile Industry etc. are among the leading sectors which bag major share of FDI inflows. Similarly there is spatial clustering in spread of FDI as some economically advanced regions have accounted for the lion's share of FDI inflows. Top of them are states of Maharashtra, Delhi, Tamilnadu, Karnataka, Gujarat and Andhra Pradesh. Whereas states like Uttar Pradesh, Madhya Pradesh, Bihar, Orissa, Rajasthan and North- eastern region managed to receive no or only a meagre amount of FDI inflows. In literature there are several determinants responsible for this clustering like availability of quality labour force, size and growth of local markets, physical infrastructure, policy environment, business climate, and presence of agglomeration economies (Mukherji, 2011; Goldar, 2007 ; Moriss,2007 ; Nunnenkamp and Stracke, 2007).

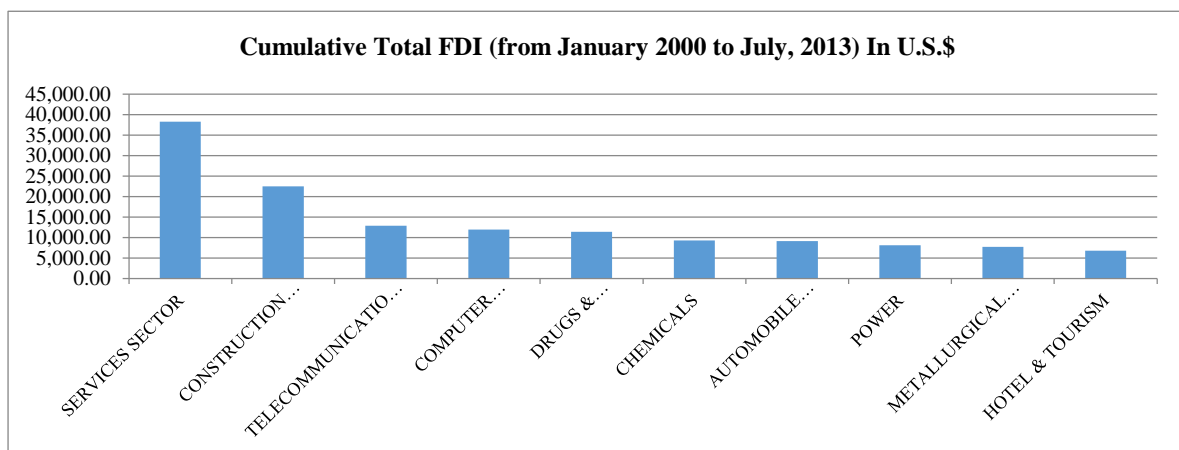
2.2 Human Capital Base in India

Gross enrolment ratio in tertiary education of India has increased with compound annual growth rate of 7.8% during 2001-2002 to 2007-2008 (Figure 3).² Similar trend is observed in spread of higher education clustered in southern states of Tamilnadu, Karnataka, Andhra Pradesh, Kerala but northern states like Bihar, Orissa, Uttar Pradesh, Madhya Pradesh being laggards. The composition of human capital is concentrated to some special courses with replacement of professional courses with general courses. (Figure 4). National Skill Development Corporation based on public-private partnership, of government of India has also been engaged in funding and incentivizing vocational training initiatives for skill development via training partners and sectoral skill councils. It has 187 training partners, 2228 training centers. It boasts of having trained 33, 66,647 people and 14, 73,647 people placed.

2.3 Wage inequality in India

Wage inequality both on average (Figure 5) and based on skills has also seen an upwards trend since last decade (Figure 6). Indian wage inequality has been vastly studied. (Ramaswamy, 2008; Chamarbagwala, 2007; Mehta and Hasan, 2011; Azam, 2009; Mishra and Kumar, 2005).

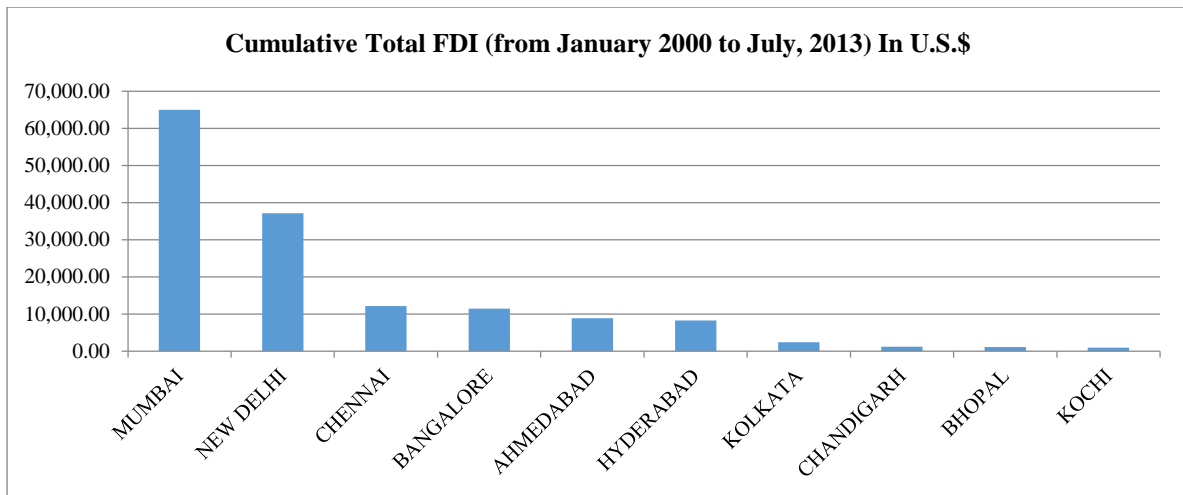
Figure 1: Sectoral clustering of FDI in India



Source: SIA newsletters, DIPP, India

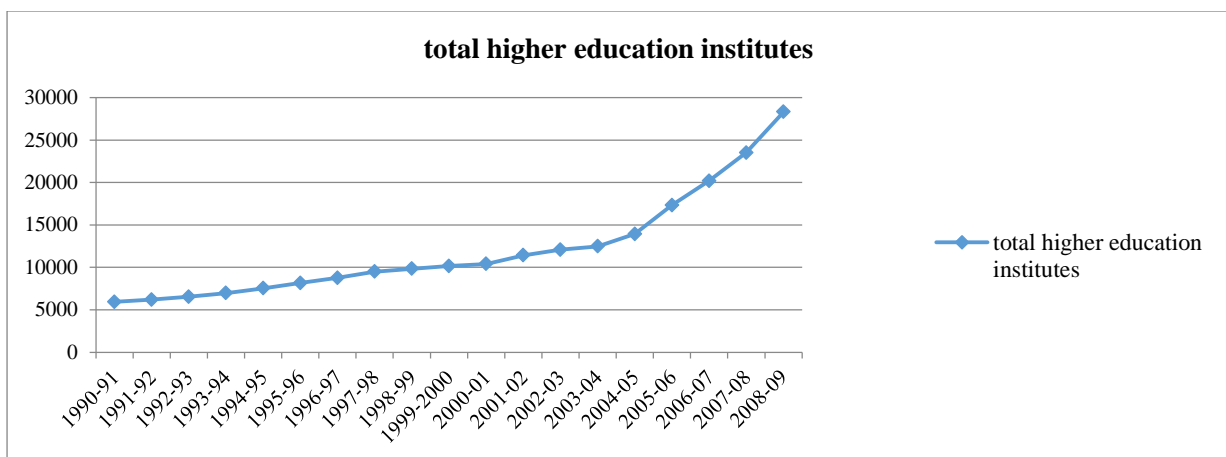
Figure 2: Spatial clustering of FDI in India

²Human Resource Development report, 2011.



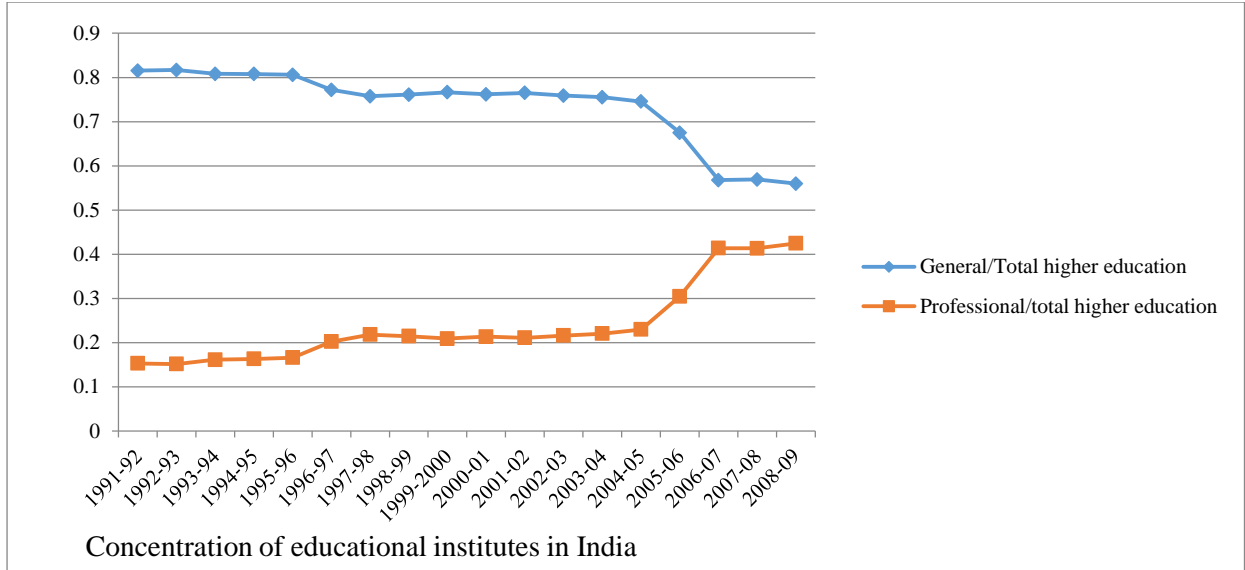
Source: SIA newsletters, DIPP, India

Figure 3: Human capital formation in India over the years



Source: All India Survey on Higher education, ministry of HRD, India.

Figure: 4 Clustering of human capital (higher education) in India



Source: All India Survey on Higher education, ministry of HRD, India

3 Theoretical Framework

We follow modification of Katz and Murphy (1992), Velde and Morrissey (2002) to analyse the effects of FDI on relative wages. It can be represented by two factor CES production function with low skilled labour (U) and high skilled labour (S) as two inputs.

$$f(U_t, S_t) = \{\lambda(\psi_{Ut}U_t)^\rho + (1 - \lambda)(\psi_{St}S_t)^\rho\}^{\frac{1}{\rho}} \quad \rho < 1 \quad (1)$$

$$\varphi_{Ut} \equiv \ln\psi_{Ut}; \quad \varphi_{Ut} = \gamma_{1U}t + \gamma_{2U}FS; \quad \varphi_{St} \equiv \ln\psi_{St}; \quad \varphi_{St} = \gamma_{1S}t + \gamma_{2S}FS \quad (2)$$

Where $\varphi_{Ut} \equiv \ln\psi_{Ut}$ and $\varphi_{St} \equiv \ln\psi_{St}$ are functions of labour efficiency units, parameter $\rho < 1$.

Labour efficiency index can be interpreted as accumulated human capital. The elasticity of substitution between U and S is $\sigma = 1/1 - \rho$. The possible changes in technology may come through factors like FDI, openness and interaction terms of foreign investment with firm level characteristics. These are some routes through which FDI can affect labour market. These demand shift factors are factors like foreign direct investment and international trade.³ Thus this labour

³ The effect of foreign direct investment on wage inequality is well researched in literature. (Ramaswamy,2008; Banga,2005 ;Mehta and Hasan,2011; Azam,2009 ; Mishra and Kumar,2005; Feenstra and Hanson,1995; Figini and Gorg, 2006; Gorg and Stroble,2002).

efficiency indices is a function of share of foreign promoters in equity shares FS , (T.Velde , 2000) interaction terms $FS_{it} * train_{it}, FS_{it} * royal_{it}, FS_{it} * RnD_{it}, FS_{it} * KL_{it}$ and host of firm level factors as training expenses, royalty expenses, research and development expenses , capital labour ratio, size etc.⁴ In order to assess the human capital formation process done by foreign firms, we test other interactions terms of FDI and training expenses of the firms and royalty.

Solving for first order condition and keeping marginal productivity equal to factor prices, we derive the formula for relative wages of skilled-unskilled labour.

$$\ln\left(\frac{w_{St}}{w_{Ut}}\right) = \ln\left(\frac{1-\lambda}{\lambda}\right) - \frac{1}{\sigma} \ln\left(\frac{S_t}{U_t}\right) + \frac{\sigma-1}{\sigma} \gamma_1 FS_t + \varepsilon_t \quad (3)$$

Where $\gamma_1 = \gamma_{1S} + \gamma_{1U}$ and $\gamma_2 = \gamma_{2S} + \gamma_{2U}$ thus wage inequality depends on a supply term (relative supply of high to low skilled labour and FDI (foreign shares). The sign of γ_1 directs the effect of FDI on wage inequality. A positive γ_1 tends to increase wage inequality.

Table.1 Description of variables

| <i>Variable</i> | <i>Description of Variables</i> | <i>Signs</i> |
|-----------------------------------------------------------|------------------------------------------------------------------------------------|--------------|
| $\{rlw\}_{it} = \left\{ \frac{w_{Sit}}{w_{Uit}} \right\}$ | relative price of labour, ratio of skilled to unskilled labour force in firms | |
| FS_{it} | equity share of foreign promoters in firms | (+) |
| OI_{it} | Total forex earnings+ Total forex spending/ Total Income , Openness Index of firms | (-) |
| K/L_{it} | Gross Fixed assets/ number of employees of firms | (+) |
| $train_{it}$ | training expenses by firms on their employees | (-) |
| $royal_{it}$ | royalty expenses by firms | (-) |
| RnD_{it} | Research and Development expenses by the firms | (-) |

⁴ Kathuria, 2001, also empirically test the interaction term of foreign share and research and development indices.

| Interaction terms | |
|-----------------------------------------------------------------------------------|-----|
| $FS_{it} * train_{it}$ = Interaction Term1, FS * Training expenses by firms. | (-) |
| $FS_{it} * K/L_{it}$ = Interaction term2, FS *Capital- Labour ratio of firms | (-) |
| $FS_{it} * roy_{it}$ = Interaction term 3, FS * Royalty expenses by firms | (-) |
| $FS_{it} * FS_{it}$ = Interaction term4, FS * Research and Development expenses | (-) |
| $size_{it}$ = sales of firms | (+) |
| $size_{it}^2 = size_{it} * size_{it}$ of firms | (-) |

4 Econometric Estimation

Our basic equation is of demand and supply kind. Empirical estimation of this equation requires use of simultaneous equation method due the existence of possible endogeneity in the system. Thus the dependent variable should be relative wages and main the independent variable, relative employment along with all the demand shift factors and controls. The equation would represent the changes in relative wages of skilled and unskilled labour force being explained by differences in skill and unskilled labour force equation and it should look like equation (4).

$$\begin{aligned}
 \ln\{rlw\}_{it} = & \alpha_i + \beta_1 \ln\{rlemp\}_{it} + \beta_2 FS_{it} + \beta_3 OI_{it} + \beta_4 train_{it} + \beta_5 RnD_{it} + \beta_6 royal_{it} + \\
 & \beta_7 K/L_{it} + \beta_8 FS_{it} * train_{it} + \beta_9 FS_{it} * K/L_{it} + \beta_{10} FS_{it} * roy_{it} + \beta_{11} FS_{it} * RnD_{it} + \beta_{12} size_{it} + \\
 & \beta_{13} size_{it}^2 + \varepsilon_{it}
 \end{aligned} \tag{4}$$

But it actually does not solve our purpose since our goal is to see the effect foreign direct investment on human capital formation, not to identify the supply and demand curves, we can safely drop relative

employment from equation (4). In other words it also implies that we are interested in the shifts in relative labour demand caused by foreign direct investment Figure 7(a) rather than identifying demand and supply curve. In latter case there is a condition of multiple equilibria Figure 7(b). To this end, our equation boils down to equation (5). We estimate our final equation⁵:

$$\{rlw\}_{it} = \alpha_i + \beta_1 FS_{it} + \beta_2 OI_{it} + \beta_3 train_{it} + \beta_4 RnD_{it} + \beta_5 royal_{it} + \beta_6 K/L_{it} + \beta_7 FS_{it} * train_{it} + \beta_8 FS_{it} * K/L_{it} + \beta_9 FS_{it} * roy_{it} + \beta_{10} FS_{it} * RnD_{it} + \beta_{11} size_{it} + \beta_{12} size^2_{it} + \varepsilon_{it} \quad (5)$$

So now we implicitly assume relative employment is given exogenously and we are estimating the shifts in demand side of labour market explained by other factors like FDI, openness firm specific factors and their interaction terms.

5 Data:

Paucity of skill based firm level employer-employee data in India poses a strong challenge in testing our hypothesis. This leaves us with the alternative to create relative indices with all possible data available. We use CMIE database to test our hypothesis. CMIE provides data on listed Indian firms based on their income statements and balance sheets. This is the only source of micro data on Indian firms which gives minute details of income, expenses, structure and other resources of the firms. This is the virtue of PROWESS data in comparison with ASI (Annual Survey of Industries) data which does not give plant level information of Indian industries on such distinct aspects. The empirical exercise has been conducted using Prowess database published by Centre for Monitoring Indian Economy for the period from 2001-2013 for NIC two digit non-financial public and private limited manufacturing firms trading on National Stock Exchange and Bombay Stock Exchange. The industries included are Food (88 firms), Metal and Metal products (101firms), Textile (91 firms), Chemicals (231 firms) and Consumer goods (49 firms). The result is an unbalanced sample of 568 firms as our final sample.

6 Variables Formation

⁵ This also makes us drop the log specification since we are not interested in estimating elasticity of substitution between skilled and unskilled labour.

Labour demand is proxied by the relative changes in wages. Thus, our dependent variable is relative price of labour. It is the ratio of skilled to unskilled labour in a firm. We derive this indicator by dividing wages and salaries paid by firms in prowess data base to the average wages of rural sector⁶ for men over the years at all India level provided by Labour Bureau. This creates our index of relative labour prices that we use for relative labour demand changes. The table below explains all the variables used in model.

Demand shift indicators

Foreign Direct Investment: Many studies have attempted to find out the impact of FDI on development process of countries. The results are very different for developed and developing countries. We try to assess the impact of FDI on relative wage ratio of skilled and unskilled labour. We measure it by share of foreign equity in annual equity shares of firms. (Aitken and Harrison, 1999; Almeida, 2002; Arnold and Javorcik, 2009) Some studies use binary measure of private and foreign ownership at the expense of information. But the relation between foreign ownership is better approximated as linear than binary. (Bircan, 2011)

Openness Index: Openness is the frequently used indicator in literature to explain effect of international exposure of firms on wage inequality. (Ramaswamy, 2008) Our openness indicator is constituted by the ratio of sum total forex earnings, total forex spending by the total income of the firms. Openness may lead to increase in demand for skilled labour force in case of skill intensive exports.

Human capital Indicators: We use four indicators of human capital which may directly or indirectly lead to skill up-gradation.

On the job training: On the job training provided increases the supply of skilled labour force and therefore should affect the level of wages in economy by increasing the productivity and bargaining power of labour. (Tan and Batra, 1996, Mincer 1991, Becker, 1974, Veum, 1995) Our measure of

⁶Rural sector includes activities like ploughing, sowing, weeding, transplanting, harvesting, winnowing, threshing, picking, herdsman, well digging, cane crushing, carpenter, blacksmith, cobbler, mason, tractor driver, sweeper and unskilled labourers. Labour Bureau.

training is annual expenses financed by firms on training their employees which upgrades the level of skills. It has been normalised by dividing it by sales of firms.

Research and Development (RnD): It is an endogenous tool of innovation in new growth theory. Firms invest for accumulation of knowledge capital (Grossman and Helpman, 1990; 1994; Redding, 1996). This accumulation of knowledge capital increases the productivity, wages and thus sharpens the skills of labour force. We use annual investment by the firms in research and development activities normalised by sales of firms.

Royalties: Imitation is another indirect form of human capital formation coming through adoption of technologies. Along with RnD activities firms also invest in purchasing already patented technologies. It increases the skill level indirectly by imitation of technologies. The indicator of royalty payment is expenses by firms on royalty payments normalised by sales of the firms.

Capital-labour ratio: This is also an indirect indicator for human capital formation which works through technological changes. Multi-national enterprises encourage technological up-gradation for domestic firms. We create our capital- labour ratio by dividing gross fixed assets by number of employees in the firm. Capital-skill complementarity increases the demand for skilled labour and therefore increases wage inequality between skilled and unskilled.

Interaction terms: In order to separate the role of foreign firms on human capital formation from domestic, we use four interaction terms. These terms show the effect of foreign firms on human capital formation.

FDItrain: This indicator looks at the direct effect of foreign firms on human capital formation and skill up gradation of employees by imparting them training. It is product of annual foreign share and training expenses by the firms. It affects the wages directly by increasing productivity and bargaining power of labour force.

FDIRnD: It shows the innovation practices made by the foreign firms in India. These foreign innovation practices lead to skill up gradation. It is a product of foreign share and research and development expenses by firms. (Kathuria, 2001; 2008)

FDIroyalties: Foreign firms also spend on purchasing technologies to imitate them. This variable reflects the indirect effect of imitation of technology on wages of labour. Foreign share and royalty payment make up this variable.

FDIkl: Another indicator of technological change brought about by the foreign firms is a product of foreign share and capital-labour ratio of the firms. It shows the direct effect of foreign technology on wage inequality.

Size: We take the size of firms in all the specifications in order to control for the firm specific characteristics. It is the total annual sales of the firms. Larger firms give higher packages to their employees.

Size²: This term is included to account for the non-linearities in firm specific indicators. It is a square term of size of firms. It represents that as the size of the firm increases the size of packages they offer to their employees declines.

7 Relative wages, FDI and human capital formation results

Our panel includes missing values on some of the variables which actually leads to reduce the sample size. Another problem caused by systematic missing data is that it may produce the selection bias. But in case of missing data completely at random also termed as Missing Completely At Random (MCAR), any value of an observation neither depends on its own value nor on values of other variables in the set (Schafer, 1997; Cameron and Trivedi, 2005). It does not produce biases though it may have less precision. Since these missing values are randomly missing, they do not affect our results of estimation and we also take robust standard errors to minimise the possibility of less precision.⁷ First

⁷ Other studies using PROWESS database also faced this problem due to unbalance panel, but it does not affect their results. (Kathuria, 2001; Kumar and Siddharthan, 1994; Chowdhuri et.al., 2013; Parameswaran, 2009; Sahu, 2009)

we test our baseline equation by regressing relative wages on foreign share and openness index. We start with estimating our baseline equation where we look at the effect of foreign shares and openness indicator of the firm while also controlling for firm level variables. Then we go on to include the human capital indicators one by one to see the effect of them on relative wages. One way of finding out the human capital formation effect of foreign shares is to incorporate the interaction term of foreign share and expenses done by firms on human capital formation.

Table (2) shows the results for the baseline equation in through Ordinary Least Squares method and Fixed Effects method. Column (1) finds out the positive and significant impact of openness of the firms on relative wages. Whereas this impact vanishes, when we switch to fixed effects estimation. Foreign share does not show any significant effect on relative wages.

Table (3) shows the human capital formation effect of foreign share on relative wages. The reasoning is, a positive relation between relative wages and interaction term of foreign share and human capital implies supply of skills by foreign firms, is lesser than the demand for skills which is denoted by relative wages of skilled to unskilled labourers. The result is disequilibrium in skills market and increased wage inequality. The first column shows the results for training expenses on relative wages. The coefficient of training is positive and significant which actually reflects that as the employees become skilled they will also become eligible to enter into a higher income band due to increased bargaining power. Interestingly the coefficient of the interaction term is negative and significant which may imply that these foreign firms are actually leading to human capital formation through provision of training to their employees. Since the supply side of skills is negatively related to demand for skills it is helping to reduce wage inequality. This result holds true for all the other different specifications (Table 3 column 1-4) where we also take into account research and development expenses, royalty expenses and capital- labour ratio of the firms. Column 2 shows the results for effects of research and development expenses and its interaction term with foreign share on relative wage inequality. Research and development expenses by foreign firms are not found to affect relative wages. Same is the case with royalty expenses and its interaction term with foreign share. They both also have an insignificant relationship with relative wages. (Column 4) Another indicator of

technological change, capital labour ratio is taken to see the effect of technological change on relative wages along with the interaction term (Column 3). Interaction term of technological change and foreign shares also represents the possible spill over effects of foreign technology on relative wages. The coefficient of this term is also insignificantly related to relative wages. Thus we find that foreign share and human capital's interaction, through the mechanism of training, is negatively related with relative wages and foreign firms are actually contributing to pull down the wage inequality between skilled to unskilled labour in manufacturing sector in last decade.

7.1 Inter-Industry relative wages, FDI and human capital formation

Table 4 show human capital formation effects of foreign firms on relative wages in five industries; Low technology industries food, textile, consumer goods and high technology industries, chemicals, and metal, separately. (Kumar and Siddharthan, 1994) The results are summarised below:

1. Training is still positively related with relative wages. We find the same results in Consumer goods and Metal industry for foreign firm's training and relative wages.
2. The effect of technology on relative wages is negative on wage inequality in Textile industry. It may suggest the possible unskilled biased technological change in both of these industries.
3. In line with our previous results, interaction term of foreign share and training is negative and significant in Food, Consumer Goods and Metal industry.
4. The effect of royalty and foreign shares interaction is positive on wage inequality in Textiles industry.
5. Foreign share is positively related to wage inequality in Metal and Consumer goods industry.

So basically the results are same as that of our whole manufacturing panel. Thus the only channel of human capital formation by foreign firms is through training expenses by firms.

7.2 Robustness Check

We also look for other possible channels by taking into account two or more indicators of human capital formation together. The results remain unaffected. (Table 5) The only significant coefficient is

of foreign share and training interaction. All other indicators of human capital are insignificant. In Table 6 test for any differences in the results for two different time periods. The first part shows the results for 2001 to 2006. The results are in the same as here also we find a negative coefficient of foreign share and training with a both a positive training and foreign share. This is the only channel which is found to be significantly affecting relative wages and leading to possible human capital formation for this period in manufacturing sector. In the second panel for 2007-2013, also we find another indirect channel of royalty expenses which is negatively related to wage inequality.

8 Conclusion

We attempted to assess the effects of foreign direct investment on human capital formation in Indian manufacturing sector for the period 2001-2013. Our results indicate that the favourable human capital formation effects of foreign direct investment. Training provided by foreign firms to their employees is the main channel of his human capital formation done by foreign direct investment.

| Variables | OLS | Fixed Effects |
|----------------|------------------------------------------------|------------------------------------------------|
| Foreign shares | 4.27E-04 (2.53E-04) | 1.58E-03 (9.82E-04) |
| Openness | -4.12E-04 ^{***} (9.77E-05) | -9.18E-05 (2.06E-04) |
| Size | 3.45E-04 ^{***} (4.09E-05) | -4.05E-04 (1.50E-04) |
| Sizesquare | -1.26E-08 ^{***} (3.00E-09) | -3.16E-10 ^{***} (4.26E-08) |
| constant | 0.03 (0.009) | 0.04 (0.02) |
| Observations | 2437 | 2437 |
| F | 33.82 | 2.79 |

Table2.
Effect of
FDI and
openness
on
relative
wages

Table3. Effect of FDI and human capital indicators on relative wages

| | (1) | (2) | (3) | (4) |
|----------------|--------------------------------------|---------------------------------------------|-------------------------|-------------------------|
| Foreign shares | 4.83E-04 (2.67E-04) | -1.72E-05 (2.20E-04) | -7.74E-04 (6.12E-04) | -5.57E-05 (3.05E-04) |
| Openness | -3.63E-04 (1.78E-04) | -3.40E-04 [*] (1.55E-04) | -5.53E-04 (2.96E-04) | 6.54E-04 (4.75E-04) |
| training | 3.60 ^{**} (1.36) | - | - | - |
| fditrain | -0.05 ^{**} (0.01) | - | - | - |
| RnD | - | 0.08 (0.22) | - | - |
| fdirnd | - | 4.77E-03 (8.45E-03) | - | - |
| kl | | | -0.14 (0.12) | - |
| fdikl | | | 0.01 (0.02) | - |
| roy | | | - | 0.16 (0.88) |
| fdiroy | | | - | 8.56E-03 |

| | | | | |
|--------------------|---------------------------------|---------------------------------|---------------------------------|-------------------------|
| | | | | (0.01) |
| Size | 3.44E-04** (1.02E-04) | 2.89E-04** (8.48E-05) | 3.65E-04** (1.38E-04) | 3.07E-04 (1.70E-04) |
| Size square | -1.32E-08* (6.59E-09) | -8.99E-09 (5.30E-09) | -1.35E-08 (8.42E-09) | -1.43E-08 (1.13E-08) |
| Observations | 2308 | 1233 | 953 | 529 |
| Time Fixed Effects | Yes | Yes | Yes | Yes |

Note: All the results are based on random effects panel data estimation. All the results control for firm specific factors like size, size square, power and fuel consumption and expenses on raw materials. All the nominal values have been deflated by industry wise whole sale price index with the base year 2004-2005. Time fixed effects are also included. All the reported errors are robust standard errors.

Table4. Industry wise differences in effects of foreign share on relative wages

| Industries | Foreign shares | Openness | training | fditrain | RnD | fdirmd | Kl | fdikl | Roy | fdiroy | Observations |
|---------------------------------------------------------------|------------------|------------------|----------------|----------------|--------|------------|----------------|------------|---------------|---------------|--------------|
| Low Technology industries (Kumar and Siddharthan,1994) | | | | | | | | | | | |
| Food | 7.56E-05 | 1.15E-04 | 2.02* | -0.01 | - | - | - | - | - | - | 231 |
| (1) | (1.96E-04) | (2.22E-04) | (0.93) | (0.01) | | | | | | | |
| (2) | 3.13E-04 | 2.37E-04 | 3.57*** | -0.03** | -0.09 | 0.01 | - | - | - | - | 155 |
| | (2.66E-04) | (2.71E-04) | (0.76) | (9.65E-03) | (0.05) | (0.01) | | | | | |
| (3) | 2.10E-04 | 1.95E-03 | 3.39** | 0.02 | - | - | -0.21 | 0.01 | - | - | 115 |
| | (2.70E-04) | (8.32E-04) | (1.23) | (0.01) | | | (0.16) | (0.01) | | | |
| (4) | 1.99E-03 | -5.91E-04 | 6.48 | -0.14 | - | - | - | - | 2.40 | -0.05 | 52 |
| | (1.08E-03) | (2.88E-04) | (7.18) | (0.17) | | | | | (2.70) | (0.07) | |
| Textiles | -3.23E-05 | 3.18E-04 | 0.04 | -8.58E-03 | - | - | - | - | - | - | 333 |
| (5) | (6.41E-05) | (1.37E-04) | (0.22) | (7.20E-03) | | | | | | | |
| (6) | -8.88E-05 | 6.81E-05 | 0.16 | -1.24E-04 | 0.40 | 1.27E-04 | - | - | - | - | 119 |
| | (1.40E-04) | (4.02E-04) | (1.22) | (0.01) | (1.68) | (0.02) | | | | | |
| (7) | 3.72E-04 | 4.90E-04 | 0.73 | -0.03 | - | - | -0.50** | 4.84E-03 | - | - | 99 |
| | (3.46E-04) | (2.52E-04) | (1.08) | (0.02) | | | (0.16) | (2.87E-03) | | | |
| (8) | 1.14E-03 | 5.24E-04 | -2.12 | 0.02 | - | - | - | - | 3.56** | 0.06** | 54 |
| | (4.46E-04) | (1.06E-03) | (1.03) | (0.03) | | | | | (1.03) | (0.01) | |
| Consumer Goods | 5.04E-05 | -1.09E-04 | 1.30 | -6.27E-03 | - | - | - | - | - | - | 105 |
| (9) | (1.04E-04) | (7.92E-05) | (0.91) | (0.01) | | | | | | | 8 |
| (10) | 7.97E-05 | -9.25E-05 | 1.92 | -4.70E-03 | -0.07 | -1.22E-03 | - | - | - | - | 684 |
| | (1.35E-04) | (9.77E-05) | (1.66) | (0.01) | (0.13) | (2.26E-03) | | | | | |
| (11) | 5.95E-05 | -1.21E-04 | 0.03 | 7.48E-03 | - | - | 0.01 | -4.40E-04 | - | - | 465 |
| | (1.96E-04) | (6.10E-05) | (1.03) | (0.02) | | | (6.59E-03) | (1.21E-03) | | | |
| (12) | 6.74E-04* | 1.76E-03* | 2.91 | -0.03* | - | - | - | - | 0.64 | -4.08E-03 | 276 |
| | (3.32E-04) | (5.34E-04) | (2.02) | (0.02) | | | | | (0.43) | (7.62E-03) | |
| High Tech Industries | | | | | | | | | | | |
| Chemicals | -1.83E-05 | -1.05E-04 | 0.43* | 1.96E-03 | - | - | - | - | - | - | 104 |
| (13) | (8.40E-05) | (5.25E-05) | (0.16) | (1.81E-03) | | | | | | | 0 |
| (14) | -1.01E-04 | -1.03E-04 | 0.05 | 4.27E-03 | 0.04 | 2.18E-03 | - | - | - | - | 695 |

| | | | | | | | | | | | |
|-----------|--------------------------------|-------------------------|------------------|-------------------------|-----------------|---------------------|--------------------|-------------------------|----------------|------------------------|------|
| | (7.30E-05) | (4.96E-05) | (0.41) | (7.89E-03) | (0.05) | (2.90E03) | | | | | |
| (15) | 1.78E-04 (2.95E-04) | -1.17E-04 (5.89E-05) | 0.72 (1.76) | 7.12E-04 (0.02) | - | - | 0.01 (5.72E-03) | -3.73E-04 (1.12E-03) | - | - | 481 |
| (16) | 1.69E-04 (1.97E-04) | 5.34E-04 (2.13E-04) | -0.01 (-0.01) | 1.86 (1.27) | - | - | - | - | 0.29 (0.01) | 1.66E-03 (4.97E-03) | 225 |
| Metal(17) | 6.93E-04 (7.05E-04) | -3.18E-04 (1.75E-04) | 5.04 (2.78) | -0.09 (0.07) | - | - | - | - | - | - | 1040 |
| (18) | -1.12E-04 (3.81E-04) | -1.86E-04 (8.75E-05) | 5.22 (2.64) | -0.03 (0.04) | -0.26 (0.20) | -4.47E-04 (0.01) | - | - | - | - | 544 |
| (19) | -4.18E-04 (1.81E-03) | -5.57E-04 (2.83E-04) | 11.48 (4.14) | -0.25 (0.27) | - | - | -0.14 (0.13) | 0.02 (.02) | - | - | 364 |
| (20) | 2.02E-03* (8.75E-04) | 2.68E-04 (3.13E-04) | 16.51 (4.17) | -0.43* (0.17) | - | - | - | - | 0.97 (1.32) | -0.01 (0.01) | 181 |

Note: All the results are based on random effects panel data estimation. All the results control for firm specific factors like size, size square, power and fuel consumption and expenses on raw materials. All the nominal values have been deflated by industry wise whole sale price index with the base year 2004-2005. Time fixed effects are also included. All the reported errors are robust standard errors.

Table5 : Effect of FDI and human capital formation interaction on wage inequality

| | (1) | (2) | (3) | (4) |
|----------------|--------------------------|-------------------------|--------------------------------|---------------------------|
| Foreign shares | 2.17E-04 (2.38E-04) | -4.88E-04 (7.33E-04) | 8.37E-04 (3.19E-04) | -3.15E-04 (7.52E-04) |
| Openness | -2.92E-04 (1.54E-04) | -5.24E-04 (3.04E-04) | 5.04E-04 (2.69E-04) | 7.18E-04 (4.25E-04) |
| training | 4.12** (1.42) | 6.37** (2.70) | 8.93** (4.07) | 12.36*** (3.01) |
| fditrain | -0.05** (0.01) | -0.07* (0.03) | -0.15** (0.06) | -0.16** (0.05) |
| RnD | -0.19 (0.27) | - | - | -0.48 (1.41) |
| fdirnd | 8.30E-03 (9.00E-03) | - | - | -0.001 (0.02) |
| kl | - | -0.14 (0.12) | - | -1.95 (0.89) |
| fdikl | - | 0.02 (0.02) | - | 0.02 (0.01) |
| roy | - | - | 0.14 (0.58) | -1.10 (1.73) |
| fdiroy | - | - | 1.74E-03 (0.01) | 0.02 (0.02) |
| Size | 2.64E-04 (7.91E-05) | 3.37E-04 (1.33E-04) | 2.11E-04* (9.01E-05) | 3.66E-04 (1.31E-04) |

| | | | | |
|--------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Size square | -7.62E-09 (5.12E-09) | -1.15E-08 (8.10E-09) | -6.91E-09 (5.78E-09) | -1.74E-08 (8.88E-09) |
| Observations | 1226 | 928 | 515 | 241 |
| Time Fixed Effects | Yes | Yes | Yes | Yes |

Table .6 Time Break (2001-2006) and (2007-2013)

| | 2001-2006 | | | | 2007-2013 | | | |
|--------------------|---------------------------------|-------------------------|--------------------------|--------------------------------|---------------------------------|-------------------------|-------------------------|---------------------------------|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Foreign shares | 5.18E-04 (4.50E-04) | 7.24E-04 (4.96E-04) | 1.97E-04 (1.32E-03) | 1.23E-03* (5.54E-04) | -5.01E-05 (7.91E-05) | -1.44E-04 (1.34E-04) | 2.50E-04 (2.12E-04) | 6.33E-04** (2.36E-04) |
| Openness | -8.42E-04* (4.04E-04) | -5.85E-04 (3.95E-04) | -2.04E-03 (1.47E-03) | 4.06E-04 (3.21E-04) | -6.67E-05 (6.15E-05) | -6.83E-05 (6.10E-05) | -1.31E-04 (2.20E-05) | 9.46E-04 (3.88E-04) |
| training | 7.94* (3.28) | 9.10 (4.41) | 7.70* (7.31) | 7.92* (0.03) | 0.54 (0.41) | 0.74 (0.65) | 1.15 (1.02) | 0.78 (1.09) |
| fditrain | -0.09** (0.04) | -0.10 (0.05) | -0.21** (0.09) | -0.28 (0.15) | -2.85E-04* (3.57E-03) | -4.46E-03 (6.94E-03) | -0.01 (0.01) | -0.01 (0.01) |
| RnD | - | 0.25 (0.52) | - | - | - | -0.02 (0.05) | - | - |
| fdirnd | - | -0.01 (0.01) | - | - | - | 3.96E-03 (3.40E-03) | - | - |
| kl | - | - | -0.14 (0.57) | - | - | - | 0.02 (0.04) | - |
| fdikl | - | - | 0.01 (0.03) | - | - | - | -4.96E-04 (9.41E-04) | - |
| roy | - | - | - | 0.73 (0.97) | - | - | - | 0.87** (0.34) |
| fdiroy | - | - | - | -9.12E-03 (0.01) | - | - | - | -0.01** (6.50E-03) |
| Observations | 943 | 499 | 414 | 207 | 1365 | 727 | 514 | 308 |
| Time Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

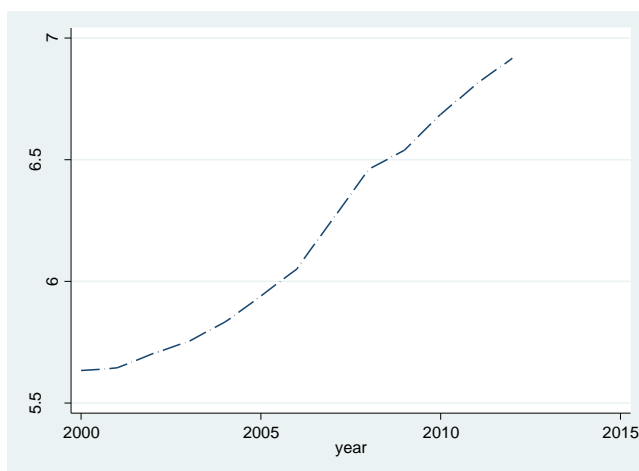
Note: All the results are based on random effects panel data estimation. All the results control for firm specific factors like size, size square, power and fuel consumption and expenses on raw materials. All the nominal values have been deflated by industry wise whole sale price index with the base year 2004-2005. Time fixed effects are also included. All the reported errors are robust standard errors.

Appendix

Table 7 Summary Statistics

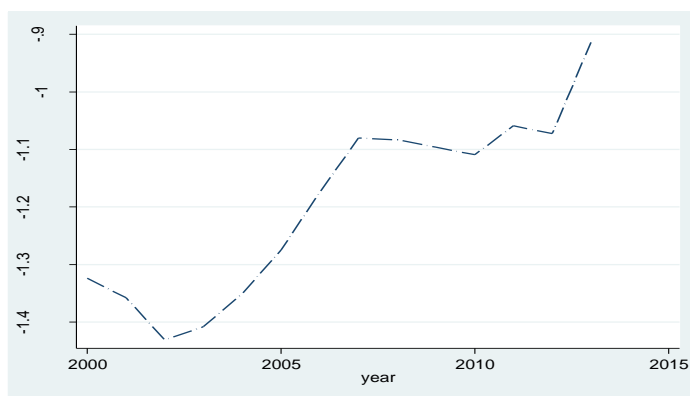
| | Mean | Standard Deviation | Min | Max |
|---------------------|-------|--------------------|---------|-------|
| Rlw | 0.05 | 0.31 | 0 | 9.01 |
| foreignshare | 23.62 | 24.83 | 0 | 97.45 |
| Openness | 1.13 | 2.12 | -8.22 | 7.69 |
| Training | 0.009 | 0.09 | 0 | 4.74 |
| RnD | 0.01 | 0.04 | 0 | 0.83 |
| royalty | 0.01 | 0.02 | 0 | 0.41 |
| kl | 0.05 | 0.23 | .000083 | 6.43 |
| size | 2.76 | 1.87 | -6.71 | 9.59 |

Figure.5 Log of relative wages 2000-2013



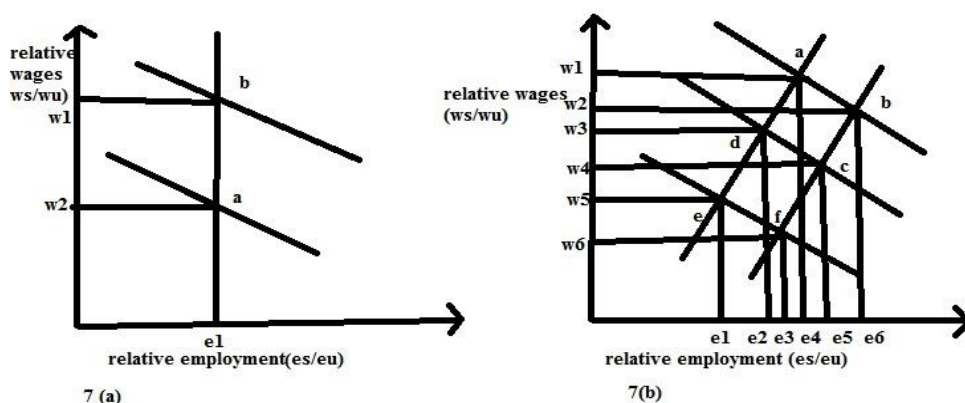
Source: calculated by author.

Figure.6 Log of average wages 2000-2013



Source: calculated by author.

Figure 7. Identification problem of demand and supply curve.



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