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Trade liberalization, Skilled Intermediate input and Wage Distribution*

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Abstract

This paper proposes a simple theoretical model of a small open economy comprising of four sectors including formal and informal ones. One sector produces skilled intermediate input for the importable production. Though other two sectors use labour and capital (land), labour is segregated as skilled or unskilled. Following traditional specification we also assumed that the skilled labours are employed in the formal sector and unskilled labours are employed in the informal sector. One of the distinguishing features of the present paper is the use of skilled intermediate input in import competing sector. So, in a sense import competing sector uses both skilled and unskilled labour. In such backdrop we tried to study the impact of trade liberalization on absolute and relative wage(s). It has been found that irrespective of factor intensity ranking both types of workers lose owing to tariff cut whereas under reasonable condition wage disparity between skilled and unskilled workers is reduced. These results seem to be quite sensible though the structure is slightly different from the conventional set up.

JEL classification: D5; J31

Keywords: informality; skilled- unskilled labour; wage gap

1. Introduction

In the aftermath of World War II, there were significant structural changes particularly in the developing economies as they started to liberate themselves from decades of colonial despotism (Chaudhuri and Mukhopadhyay, 2009). These economies were then characterized by the existence of a developed urban market economy and a backward agriculture-oriented subsistence economy. It was expected that the growth of organized economic activities would foster national development. But, industrial development could not keep pace with the massive rural-urban migration and the surplus urban labour force was compelled to generate and survive in the informal sector. Thus, the presence of the formal and informal sector is seen in almost all the countries of the world right from their early history. The primary distinction between these two sectors rests on the laws of regulations of labour markets. Informal sector is one where there is absence of government protection and recognition and absence of trade union. The workers of informal sector are not covered under minimum wage legislation and social security system either. Conventionally they earn low income and wages. They do not even enjoy any fringe benefits from institutional sources. In general they are characterized by low educational level, poor financial capacity, possessing low skills, strenuous working conditions, and low bargaining capacity due to the lack of organizational skills. In rural areas, the bulk of the informal sector workers comprise of landless agricultural labourers, small and marginal farmers, sharecroppers, persons engaged in animal husbandry and fishing, forest workers, workers in agro-processing units, artisans such as weavers, blacksmiths, carpenters and goldsmiths etc. On the other hand, the urban informal sector comprises of manual labourers in construction, carpentry, trade and transport, small and tiny manufacturing enterprises, street vendors and hawkers, rag pickers etc.

The term organized or formal and unorganized or informal is used synonymously in National Accounts System. Generally, the organized or formal sector comprises of enterprises for which statistics is available regularly from budget documents or reports, annual reports in case of public sector and through the Annual Survey of Industries (ASI) in case of registered manufacturing for India. On the other hand, unorganized or informal sector refers to those enterprises whose activities are not regulated under any legal provisions and/or which do not maintain any regular audit accounts (Marjit and Kar, 2011). The informal sector accounts for about two thirds of the labour force in developing countries. Informal wages are market determined competitive wage where there is no control of government. On the other hand, wages in the formal sector are determined by negotiations between the trade unions and the employer. Thus it is very obvious that formal labour enjoy a higher wage than the informal labour. The wage differential between the two sectors is highly influenced by the migration of labour, skill of the workers, availability of jobs, liberalization policies adopted by the domestic country, level of corruption¹ and many other factors. The effects of international migration of skilled and unskilled labour on its wage inequity depend on both the relative capital intensities between the low-skilled and high-skilled sectors and the institutional nature of the markets for unskilled labour (Yabuuchi and Chaudhuri 2007). A reduction of tariff restriction on import of low-skill manufacturing product worsens the skilled-unskilled wage inequality but wage inequality improves owing to an inflow of foreign capital under reasonable factor intensity condition (Chaudhuri and Yabuuchi, 2007). There is a possibility of a decline in the relative wage of the unskilled labour following an improvement in the terms of trade (Marjit, Beladi and Chakrabarti, 2004). On the other hand, informal wages, informal employment as well as informal production increase across occupational types due to trade liberalization in import competing sector (Marjit and Kar, 2005, 2009). Corruption has its

¹ Corruption, as an institutional factor affects wage-inequality between the skilled and unskilled workers.

adverse effects not only on efficiency but also on the incentive to invest and thereby on the development process of an economy (Bardhan, 1997). A change in the degree of corruption affects the size of the corruptive (formal and informal) sector. Lower degree of corruption benefits capitalists. Effect of corruption on wage-inequality depends on the loose bored by the sectors due to increase in return to capital (Mandal and Marjit, 2010). On the other hand, it is argued that the size of the intermediation sector increases if unskilled labour using formal sector is capital intensive in comparison to its informal counterparts (Mandal, 2011).

In developing countries, a substantial proportion of employment and output generation are concentrated in the informal sector (Schneider et al., 2010). Informal employment in India has expanded in the post-reform period and there has been a shift of workers from the formal to the informal sector during the initial years of liberalization (Dev, 2000). The reports based on periodic employment and unemployment surveys (EUS) conducted by the National Sample Survey Organization during July 2011 to June 2012 suggests that the estimated employment in the informal component is about 75 per cent of total usual status employment (principal and subsidiary) in the rural areas and about 69 per cent in the urban areas. There is overwhelming presence of informal sector not only in India but also in other developing and under developed countries all over the world. It accounts for 50-80% employment in South Asia, 30-50% in South East Asia, 40-50% in Africa, 55% in Latin America and Caribbean, 24% in Southern Europe, 10% in Western Europe, 18% in Canada and 8% in USA (Mandal and Chaudhuri, 2011).

In this backdrop we develop a theoretical model *a la* Jones (1965) having both formal and informal sectors. The basic results we derive in this paper are: irrespective of factor intensity ranking both skilled and unskilled wage decrease consequent upon trade liberalization, whereas

relative wage disparity crucially hinges on factor intensity ranking. Therefore, the results indicate the role of factor intensity assumption in determining which kind of labor is going loose much.

The present paper is divided into a number of sections. Section II discusses the background literature. Section III comprises of the structure and equations of the model along with their solutions. Section IV discusses the findings and finally section V includes the conclusion. Some mathematical details are placed in the Appendix.

1. Background Literature

In developing economies, workers employed in the untaxed, unregulated sector tends to be younger², have less education, and earn less than their counterparts in the formal sector (Thomas,1992, Maloney 1999;). In many LDCs, the public or the government sector is a large employer of labour outside agriculture which has yielded to pressure to increase wages of their existing workforce, which reduces its potential for hiring new workers with its budget constraints (Mazumdar, 1983). The consequence is that the urban economy is characterized by widening wage differentials between the formal and residual sectors with a declining proportion of the urban labour force employed in the former. According to the traditional labour market segmentation theory (Fields 1975, Dickens and Lang 1985, Agenor and Montiel 1996), wages may differ between the formal and informal sectors workers of equal potential. In this case informal employment is portrayed as a strategy for escaping involuntary unemployment. Sometimes, workers or firms voluntarily select into the informal sector given their preferences and skills or, in order to avoid taxes or regulatory legislation (De Soto 1989, Maloney 1999,

² However, this may not be necessarily true. But, while in the process of job search younger people are likely to work in the informal sector

Cunningham and Maloney 2001). Under such circumstances, wages in the informal sector may not necessarily be lower than the formal sector wage. Instead, wages of informal sector workers may exceed those of formal sector workers with the same observable characteristics, especially for those who are self-employed (Maloney 1998, 1999,). There is substantial literature showing that the wage gap between the formal and informal or the skilled and unskilled workers is influenced by different trade policies adopted by the domestic countries, emigration of labour and factor mobility between the different sectors (Marjit and Kar 2005, 2008a, 2008b, 2009; Marjit 2003, Marjit and Acharyya 2006, Marjit and Maiti 2006, Mandal and Chaudhuri 2011 etc.). Further the wages of formal and informal sector are interdependent. In a small open economy the informal wage increases due to a rise in formal wage by reducing the return on capital (Carruth and Oswald, 1981 and Leamer 1998).³ But in case of a closed economy or an economy with some monopoly power in world trade, the result is just the reverse. Here, an increase in the formal wage depresses the informal wage (Carruth and Oswald, 1981). The experience of East Asia in 1960s and 1970s shows that greater openness to trade tends to narrow the wage gap between skilled and unskilled workers in developing countries. But the experience of Latin America in 1980s was completely the opposite (Wood, 1997).

So, liberalization policies adopted by the developing countries play a major role in the determination of wages of informal sector workers. A lot of researchers have focused on the issue of the impact of trade reform on the size and wages of informal sector using the general equilibrium framework. Marjit (2003), Marjit and Kar (2004, 2008a, 2008b), Marjit et al.(2007a, 2007b, 2009) show theoretically that informal wages may rise or fall depending on the assumptions about capital mobility between formal and informal sectors, improvement of skill-

³ Increase in the minimum wage reduces profits. Capital moves to informal sector boosting both the earnings and employment of informal workers.

based service and productivity rather than physical capital accumulation, the factor intensity of the sector that is being hurt by trade liberalization. These models show how changes in the exogenous policy variables affect the wages and employment conditions in the informal sectors. In most of the models it is shown that informal wage increases through contraction of formal sector due to liberalization. A reduction in tariff leads to the contraction of formal sector. The displaced workers from the formal sector crowd over the informal sector for subsistence. Along with the movement of labour force if unused capital also moves into the informal counterpart then the informal wage may boost up. Marjit (2003) argued that even if a part of the informal sector is vertically linked with the formal sector, the income of the unskilled workers employed in the informal sector may rise following a contraction of the formal sector and consequent expansion of the informal sector due to the liberalization policy. Marjit, Kar and Sarkar (2003) also provided evidence that there has been a substantial growth in the informal wage in most parts of India in the post reform period. An empirical study shows that the urban informal wage has increased substantially for workers hired under Non-Directory Manufacturing enterprises in India over the period of 1984-85 and 2000-01 (Marjit and Kar, 2004). With limited degree of capital mobility trade reform reduces the informal wage which is the conventional wisdom obtained under a partial equilibrium framework. However, with increased mobility of capital this result is reversed. Marjit and Kar (2007) postulated that degree of capital mobility between the two sectors determines the wage movement of the informal workers. If the displaced workers of the formal sector are accompanied by fresh investment in the informal sector then they may be the gainer. Capital mobility between the formal and informal sector is crucial when there is one formal and one informal sector but not when there is a pair of formal as well as informal sector. When there exist two informal sectors that are prototypes of the formal sectors, simple Stolper-

Samuelson argument shows why informal wage improves as a result of the adoption of liberalization policies (Marjit, Kar and Beladi 2007b). The same issue of capital mobility has also been dealt by Marjit and Maiti (2006). Trade liberalization in the import competing sector raises the informal wage across occupational types, and also the informal employment. It has also been shown that real informal wage increases with trade reform and it further leads to reduction of urban poverty (Kar and Marjit, 2009). The consequences of international factor movements on skilled-unskilled wage inequality crucially depend on the difference in the intersectoral factor intensities between the skilled labour and capital in presence of unemployment. There is a possibility in the deterioration in wage inequality following an inflow of foreign unskilled labour (Beladi, Chaudhuri and Yabuuchi, 2008). Moreover, wage inequality can move up or down with the presence of corruptive sector which uses both the skilled and unskilled labours. Impact on absolute wages depends on the factor intensity rankings within the productive as well as the corruptive sectors (Mandal and Marjit, 2010)⁴.

In Mexico the wage gap between the skilled and unskilled workers widened as a result of the adoption of liberalization policies in 1985. Examining the data on 2,354 Mexican manufacturing plants for 1984-90 and Mexican Industrial Census data for 1966-88, it was found that the reduction in tariff protection in 1985 disproportionately affected low-skilled industries (Hanson and Harrison, 1999). Goods from the low skilled sector may have experienced a fall in price because of increased competition from economies with reserves of cheap unskilled labour larger than Mexico's. The consequent increase in the relative price of skilled intensive goods explains the increase in wage inequality. Trade liberalization, however, has an ambiguous effect on the informal sector, since the evidence from Brazil shows no or little connection between trade

⁴ The paper does not consider informality but introduces corruption as an institutional issue in a general equilibrium framework.

policy and informality. But for Colombia liberal trade policies has led to the expansion of the informal sector (Goldberg and Pavcnik, 2003).

2. The Model and its Solution

Let us consider a small open economy with two formal sectors (X and Z), an informal sector (Y) and a sector producing an intermediate commodity (K) with the help of skilled labour only to be used in the production of formal import competing good, X. Both the formal sectors produce traded commodities. X is an import competing commodity produced with the help of unskilled labour (L) and the intermediate commodity (K) and this sector is protected by an import tariff (t), which artificially raises the price of X. X may be considered as electronic goods manufacturer as mobile phones or camera. The intermediate commodity (K) may be a software development firm which develops gaming software used in mobile phones. Liberalization implies a decline in this tariff rate denoted by t . Z is an exportable commodity produced using skilled labour (S) and land (T) which may be considered as a firm manufacturing nuclear reactors or mechanical appliances. Commodity Y is a non-traded one produced in the informal setup using unskilled labour (L) and land (T). Wage in the formal sector is set fixed by prior negotiations with the labour unions. Formal wage (\bar{w}) is higher than the informal wage (w) because labour laws allow various benefits to formal workers but not to the informal workers. Again, wage of skilled labour (w_s) is higher than that of formal wage (\bar{w}). Thus $w_s > \bar{w} > w$.

All the factors of production are fully employed. Workers who do not find a job in the formal segment must move to the informal segment to survive and there is no open unemployment in the economy. Labour is heterogeneous and skilled workers receive a higher premium. The production functions are neo-classical types with constant returns to scale (CRS), diminishing

marginal productivity for factor inputs and operate in perfectly competitive market. To build the system of equations (following Jones (1965), (1971), we use the traditional notations like \bar{w} , w_s , w , R , t , P_k , X , Y , Z , $P_x, P_y, P_z, \bar{S}, \bar{L}, \bar{T}, \bar{K}, a_{ij}, \theta_{ij}$ ⁵. The general equilibrium structure of the model is given by the following equations comprising of the competitive price equations from (1) to (4) as factor endowments and full employment conditions for each input through equations (5) to (8).

$$P_k = W_s a_{sk} \dots\dots\dots (1)$$

$$P_x(1 + t) = \bar{W} a_{Lx} + P_k a_{kx} \dots\dots\dots (2)$$

$$P_y = w a_{Ly} + R a_{Ty} \dots\dots\dots (3)$$

$$P_z = W_s a_{sz} + R a_{Tz} \dots\dots\dots (4)$$

$$a_{kx} X = K \dots\dots\dots (5)$$

$$a_{Lx} X + a_{Ly} Y = \bar{L} \dots\dots\dots (6)$$

$$a_{Ty} Y + a_{Tz} Z = \bar{T} \dots\dots\dots (7)$$

$$a_{sk} K + a_{sz} Z = \bar{S} \dots\dots\dots (8)$$

The commodity prices are given from the rest of the world. We intend to check the effects of tariff cut on endogenously determined factor prices and the wage gap between the skilled and unskilled workers who are employed in formal and informal sector respectively.

The four price variables in the model P_k, W_s, w and R are determined from the four price equations with exogenously given commodity prices P_x, P_y and P_z in the following way. Given

⁵ \bar{w} =Wage of skilled labor, w_s = Wage of skilled labor, w = Informal wage, R = return to land, t = Exogenously imposed import tariff rate, P_k = Price of intermediate good, X = Output of formal importable, Y = Output of informal sector, Z = Output of non-traded formal sector, $P_x, P_y, P_z = Exogenous\ commodity\ prices, \bar{S}, \bar{L}, \bar{T}, \bar{K}$ = Total supply of skilled labor, unskilled labor, land and intermediate commodity respectively, a_{ij} = Input coefficients, θ_{ij} = Relative share of i th input in the total value of the j th commodity where $i=S,L,T,K$ and $j=K,X,Y,Z$, '^' represents percentage changes for particular variables.

the formal wage \bar{w} and the exogenous price of commodity X (P_x), the price of intermediate input (P_k) is obtained from equation (2) in terms of tariff rate t . Substituting this value of P_k in equation (1) we determine W_s . Again using the value of W_s in equation (4) we determine the return to land (R) as p_z is also determined in the rest of the world. Finally substituting the value of R and W_s in equation (3) we determine w .

Differentiating equations (1) to (4) and using the zero profit condition and envelope theorem we get the following mathematical results. These results will help us later in exploring the effects of trade liberalization. Detailed calculations are given in the appendix.

$$\widehat{P}_k = \alpha \frac{\hat{t}}{\theta_{kx}} < 0 \text{ as } \hat{t} < 0 \text{ ----- (9) where } \alpha = \frac{t}{1+t} > 0$$

$$\widehat{W}_s = \alpha \frac{\hat{t}}{\theta_{kx}\theta_{sk}} < 0 \text{ as } \hat{t} < 0 \text{ ----- (10)}$$

$$\widehat{R} = (-)\alpha \frac{\hat{t}\theta_{sz}}{\theta_{kx}\theta_{sk}\theta_{TZ}} > 0 \text{ as } \hat{t} < 0 \text{ ----- (11)}$$

$$\widehat{w} = \alpha \frac{\hat{t}\theta_{sz}\theta_{TY}}{\theta_{kx}\theta_{sk}\theta_{TZ}\theta_{LY}} < 0 \text{ as } \hat{t} < 0 \text{ ----- (12)}$$

The wage gap ($\widehat{W}_s - \widehat{w}$) is given by

$$\widehat{W}_s - \widehat{w} = \alpha \hat{t} \frac{\theta_{TZ} - \theta_{TY}}{\theta_{kx}\theta_{sk}\theta_{TZ}\theta_{LY}} \text{ (13)}$$

3. Tariff cut and wages

Suppose the tariff rate decreases due to the introduction of economic reforms. From equation (9) to (12) we find that \widehat{P}_k , \widehat{W}_s , and \widehat{w} decreases as $\hat{t} < 0$. Thus the return to intermediate input, wage of skilled labour and unskilled labour decreases with reduction in tariff rate. Thus, both skilled and unskilled workers loose in absolute sense.

Proposition I: *A reduction in tariff rate decreases w and W_s irrespective of factor intensities.*

Explanation: From equation (10) and (12) it is found that $\widehat{W}_s < 0$ and $\widehat{w} < 0$ as $\hat{t} < 0$. This implies that wage rate decreases in both the sector with reduction in tariff rate. A reduction in tariff rate decreases the return to the intermediate input (K). From equation (1) W_s must decrease to maintain the equality as skilled labour is the only factor of production. A reduction in W_s reduces R in equation (4) and further it leads to reduction in w from equation (3).

In the present model X is a tariff protected import commodity. In general protection is given in order to safeguard the domestic industries from low-priced imports of foreign goods. Openness in trade or liberalization policy aims at removing all sorts of barriers in international trade. As trade opens up the tariff rate or the protection rate (t) decreases and the domestic industry is thrown open to face the challenges of international competition. X being a formal sector hires labour at a fixed wage, hence the whole impact of reduction in t is born by the intermediate input (K) whose unit price decreases instantly. On the other hand, a reduction in tariff rate reduces the demand for domestically produced good X since the tariff inclusive price has gone down and hence a reduction in demand for the intermediate input (K). Automatically, the return to the factor used in the production of K which is skilled labour decreases. This in turn affects the export sector of the economy which also uses skilled labour and land. Reduction in the wages of skilled labour is compensated by an increase in return to land and it further reduces the unskilled wage by affecting the informal sector.

Proposition II: *The relative wage gap between skilled and unskilled workers depends on factor intensities.*

Explanation: From equation (13) it may be found that $(\widehat{W}_s - \widehat{w}) < 0$ if $\theta_{Tz} > \theta_{Ty}$ since $0 < \theta_{Tz}, \theta_{Ty}, \theta_{LY} < 1$. Thus if the exportable sector uses T more intensively than the informal sector then wage inequality decreases due to reduction in tariff rate. As T is used more intensively in

sector Z, its return R must increase. Thus from equation (4) Ra_{TZ} increases. As P_Z is given W_s must decrease to compensate the increase in R. Sector Z uses T more intensively than sector Y, so its return W_s decreases by significant amount. On the other hand, from equation (3), it may be found that w must fall as R increases. But as sector Y uses T less intensively than sector Z, a_{TY} is low and thus Ra_{TY} rises by lower amount. But for sector Z, a_{TZ} is high and this reduces w by a lesser amount.

Thus it may be concluded that both W_s and w fall with the introduction of trade reform. By assumption $W_s > w$ and according to the given model W_s fall by a greater amount than w , thus the wage gap between the skilled and unskilled labour decreases.

4. Conclusion

This paper has investigated the relationship between trade policy reform and the wage gap between the skilled and unskilled workers employed in the formal and informal sector of a small open economy. The study finds that the wage gap between the skilled and unskilled workers depends on the factor intensities of the formal exportable and informal sector. In the present model the common factor of production between these two sectors is land with its return denoted as R. If the exportable formal sector uses land more intensively than the non traded informal sector then the wage inequality between the skilled and unskilled workers will be reduced and vice versa.

APPENDIX

A reduction in the tariff rate and the consequent equations of change are given below.

Differentiating equation (2) and solving for \widehat{P}_k we obtain,

$$\begin{aligned} \frac{dP_x(1+t)}{P_x(1+t)} + \frac{dt}{t} \frac{tP_x}{P_x(1+t)} \\ = \frac{d\bar{w}}{\bar{w}} \frac{a_{Lx}\bar{w}}{P_x(1+t)} + \frac{da_{Lx}}{a_{Lx}} \frac{a_{Lx}\bar{w}}{P_x(1+t)} + \frac{dP_k}{dP_k} \frac{a_{kx}P_k}{P_x(1+t)} + \frac{da_{kx}}{a_{kx}} \frac{P_x a_{kx}}{P_x(1+t)} \end{aligned}$$

Since \bar{w} and P_x do not change, and using the envelope condition

$[\frac{da_{Lx}}{a_{Lx}} \frac{a_{Lx}\bar{w}}{P_x(1+t)} + \frac{da_{kx}}{a_{kx}} \frac{P_x a_{kx}}{P_x(1+t)} = 0]$ the above expression yields:

$$\theta_{kx} \widehat{P}_k = \alpha \hat{t}, \text{ where, } \alpha = \frac{t}{(1+t)} \text{ and } \theta_{kx} = \frac{a_{kx}P_x}{P_x(1+t)}, \text{ the income share of capital in sector X.}$$

$$\text{Thus, } \widehat{P}_k = \alpha \frac{\hat{t}}{\theta_{kx}} < 0, \text{ as, } \hat{t} < 0 \quad (9)$$

Now differentiating equation (1) and substituting the expression for \widehat{P}_k we get,

$$\widehat{W}_s = \frac{1}{\theta_{kx}\theta_{sk}} \alpha \hat{t} < 0, \text{ as, } \hat{t} < 0 \quad (10)$$

Again, using equation (4) and substituting the above information, we obtain

$$\widehat{R} = (-) \frac{\alpha \hat{t}}{\theta_{TZ} \theta_{kx} \theta_{sk}} > 0, \text{ as } \hat{t} < 0 \quad (11)$$

Differentiating equation (3) and substituting the above result yields:

$$\widehat{w} = \alpha \hat{t} \frac{\theta_{sz} \theta_{Ty}}{\theta_{TZ} \theta_{Ly} \theta_{kx} \theta_{sk}} < 0, \text{ as } \hat{t} < 0 \quad (12)$$

Equation (10) and (12) shows that both the wages of skilled and unskilled labour decreases.

The wage gap ($\widehat{w}_s - \widehat{w}$) is calculated by substituting the values of \widehat{w}_s and \widehat{w} from equation (10) and (12) respectively.

The wage gap is given by

$$\widehat{w}_s - \widehat{w} = \alpha \hat{t} \frac{\theta_{TZ} - \theta_{Ty}}{\theta_{kx} \theta_{sk} \theta_{TZ} \theta_{Ly}}$$

Now θ_{TZ} , θ_{Ty} , and $\theta_{Ly} > 0$ Hence, $\theta_{TZ} \theta_{Ly} > 0$

The absolute value of wage gap depends on θ_{TZ} and θ_{Ty} .

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