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On Openness and Wage Inequality: What We Have Learned So Far?

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Abstract: The distributional consequences of trade reforms have attracted greater attention in recent decades due to the fact that most countries experienced an increase in inequality during the post-reforms period. This paper attempts to review some selected studies covering both theory and recent empirical research. There are some emerging evidence that trade reforms have improved wage distribution though the majority of studies concludes that the reforms have worsened wage inequality in many countries.

JEL Classification: J3, J6, F16, O15

Keywords: Trade Liberalization, Wages, Inequality, Developing Countries

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1 . Introduction

Since around the early 1980s, many developing countries have undergone in an unprecedented level of economic integration. By facilitating this process, developing countries undertook drastic economic reforms during the 1980s and early the 90s for a freer foreign trade and investment regime. In addition to this policy shift, the post-1980 period has also been characterized as an epoch of rising wage inequality in many developing countries. This particular way of coincidence of the above two events – greater openness and rising inequality - raised the doubts in many minds that the forces of openness may be responsible for the increasing inequality¹⁾. Although, right now, there is little consensus on the causes of rising inequality in developing countries, on the academic ground, considerable efforts have been made to explore, both theoretic-

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1) The incidence of rising inequality caught up many with surprise since at the time of trade reforms, the proponents of free trade argued that such reforms would lead to improve the income distribution in developing countries.

cally and empirically, the patterns of wage inequality, its causes, and the implications for the broader inequality dimensions. Consequently, this on-going academic investigation has already produced vast literature on this subject.

Objective of this paper is to review some selected studies on the relationship between openness and wage inequality. However, there are some excellent literature surveys on this topic, covering mostly the pre-2000 period (Anderson, 2005; Goldberg and Pavcnik, 2007; Robbins, 2002; Wood, 1994). Then, is there any importance for another literature survey at this moment? On one hand, it is constructive to conduct a literature survey at this moment, covering primarily the studies published during the first decade of this century, due to a number of reasons. These include (a) the availability of studies covering divergent country experiences; (b) the materialization of evidence validating the conventional wisdom (i. e. trade reforms reduces inequality); and (c) the significant contribution to theory and analytical tools in analyzing trade-inequality nexus in recent years. On the other hand, an overall understanding on the relationship between openness and income (wage) inequality is of the essence on few grounds. First, if openness increases inequality, poverty reduction effect of trade-induced growth gets weaker. Second, if openness has undesirable distributional consequences on some groups of people in the society, future trade and investment reforms should be formulated by mitigating such effects and reforms should be carried out in proper consultation with such groups. Finally, and more importantly, overall welfare effect of trade reforms on an individual or a household could be assessed only with the combination of their growth effect and distributional effect.

Before getting into the core parts of the paper, it is essential to clarify what we mean by openness and wage inequality. This paper defines openness by the ease and cost with which goods and services, factors (especially capital), and technology can flow into and out of a country. Thus, it is assumed that the intensity and volume of these flows increases due to greater openness. Change in openness is very often measured in terms of change in tariffs and non-tariff barriers and sometimes supplement with indicators such as foreign direct investment flows, trade to GDP ratio, and the black market premium of an exchange rate. This paper defines wage inequality as the gap between skilled- and unskilled-labour wages. When measuring wage inequality, the literature employs various measurements ranging from the ratio of non-production worker wage to the production worker wage to the ratio of the estimated coefficients of skilled- and to unskilled-workers in the wage equation.

In the reminder of this paper, section 2 reviews some selected theoretical models explaining the trade-wage nexus while section 3 appraises selected empirical studies. Section 4 makes some concluding remarks.

2 . Trade-Wage Nexus: Theory

A Simple Model

Following Anderson (2005), this section outlines a simple framework useful in understanding various channels through which greater openness affects wage inequality²⁾. Assume that effective labour service of a given worker is composed of *raw labour* (L) and *human capital* (H), and each worker, regardless of his occupation, owns some combination of both of these production factors. Accordingly, wage of any worker i is determined as follows.

$$W_i \equiv r_{li}L_{si} + r_{hi}H_{si} \quad (1)$$

In eq. (1), total wage earnings (W) of worker i is determined jointly by return to L (r_l) and H (r_h), the total endowment of L and H in the economy, and the shares of his or her endowment of L (s_{li}) and of H (s_{hi}). Given this relationship, it can be shown that wage inequality is jointly determined by the *distribution of endowments* and the *distribution of total wage bill* between L and H in an economy as given in eq. (2).

$$\Psi_p \equiv \varphi_l s_{pl} + \varphi_h s_{ph} \quad (2)$$

Where Ψ_p is the share of total wage bill of the economy received by the poorest 20% of the workers, φ_h is the share of total wage bill received H, and s_{ph} is the share of H owned by the poorest 20%³⁾. Similarly, φ_l and s_{pl} are, respectively, the share of total wage bill received by L and the share of L owned by the poorest 20% workers. If we assume L is distributed more equally, particularly true in developing country context, than H, according to eq. (2), an increase in the share of total wage bill of H relative to L leads to greater wage inequality. The ratio of any two factor shares in total wage bill (φ_h/φ_l) can be expressed in terms of their relative return (r_h/r_l) and relative endowment as give in eq. (3).

$$\frac{\varphi_h}{\varphi_l} = \frac{r_h}{r_l} \cdot \frac{H}{L} \quad (3)$$

Now we can write relative demand for and supply of a given factor as a function of its relative return. Assuming a constant elasticity of substitution (CES) production function, we can express the relative demand schedule as

$$\frac{H}{L} = \eta \left(\frac{r_h}{r_l} \right)^{-\sigma} \quad (4)$$

2) Anderson (2005) employs a model in understanding various channels through which openness affects income inequality. The model this paper present, however, confines only to the relationship between openness and wage inequality.

3) The share of the total wage of H = $\varphi_h = (r_h * H) / W$. The share of total wage income belong to the poorest 20% is commonly used in the literature as one indicator of wage (income) inequality. The decomposition method applied in eq. (2) is possible for any given inequality measure.

where η is a term representing the exogenous level of demand for H relative to L, and σ is the elasticity of substitution between H and L. Similarly, the relative supply function can be written as follows

$$\frac{H}{L} = \nu \left(\frac{\gamma_h}{\gamma_l} \right)^\rho \quad (5)$$

where ν is a term denoting the exogenous level of relative supply, and ρ is the elasticity of relative supply. Given these assumptions, an increase in demand for H relative to L increases the relative return of H, thereby increasing the relative share of H in the total wage bill. Change in relative return affects wage inequality via its effect on income shares of respective factors in total wage bill and on the distribution of endowments. Nevertheless, this paper primarily focuses on the changes in demand for skilled-labour and its effect on relative return (skilled-unskilled wage ratio) or relative share of H in total wage bill. This is the main channel through which openness affects inequality and on which most theoretical models and empirical studies have based⁴⁾⁵⁾. In the rest of this section, we discuss some selected models based on changes in relative demand for different labour services.

2.1 Stolper-Samuelson Theorem

Conventionally, the Stolper-Samuelson theorem of the Heckscher-Ohlin-Samuelson (HOS) model is employed in explaining the relationship between trade liberalization and income distribution (Stolper and Samuelson, 1941). According to this model, under an *open* trade regime, comparative advantage of a country is determined by its relative factor endowments. Given certain assumptions, countries export goods produced using their abundant factors intensively, and import goods produced using their scarce factors intensively⁶⁾. Assuming that developed and developing countries are relatively abundant in skilled- and unskilled-labour respectively, in the absence of barriers to trade, developing countries export labour-intensive products and their counterparts export capital-intensive goods while relative prices of goods (and of factors) being equal between the two groups of countries. The *autarky* trade regime, nevertheless, creates differences in the relative prices of goods between the two groups. The Stolper-Samuelson theorem argues, following trade liberalization, the relative prices of unskilled-labor intensive goods increases in developing countries; with a consequent increase in unskilled-labor wages, while increases in the relative prices of skilled-intensive goods will lead to a corresponding increase in skilled wages in the developed country. Thus, greater openness will reduce wage

4) As eq. (1) through (4) shows there are other channels through which openness affects inequality, but this paper does not attempt to cover them.

5) The effect of openness on human capital formation or adjustments has received some renewed interest in the literature in recent years (Greenaway *et al*, 2007).

6) Consider a simple model with two country groups, developed and developing, two factors, skilled- and unskilled-labor, and two goods, skilled- and unskilled-labor-intensive products.

inequality in developing countries and the opposite effect happens in the developed countries⁷⁾. Going by our simple model discussed previously, unskilled-labour is, in relative terms, evenly distributed in developing countries and it is the skilled-labour that is evenly distributed in developed countries. Thus an increase in demand for unskilled-labour raises the relative share of unskilled-labour wages in the total wage bill in developing countries whereas it is the relative share of skilled-labour in the wage bill that increases in developed countries. As a result, greater openness leads to decrease in wage inequality in developing countries and to increase in developed countries. The two most important facts about the Stolper-Samuelson theorem are that; (i) it is a long-run model and (ii) relative price changes affect only economy-wide returns, and not sector-specific returns, through reallocation of resources across industries⁸⁾. As we discuss in section 3, there is little evidence supporting this theorem.

2.2 *Feenstra-Hanson Model of Outsourcing*

In reconciling growing wage inequality both in developed and developing countries, Feenstra and Hanson (1996) constructed a model based on FDI-driven outsourcing activities or intermediate goods trade that increases demand for skilled-labour in both groups of countries. Feenstra and Hanson (2003) emphasizes that trade in intermediate goods not only affects labour demand in import-competing industries but also affects labour demand in the industries using the inputs. The essence of the model is that even if the tasks outsourced by developed countries are unskilled-labour-intensive from developed countries' perspective, from the viewpoint of developing countries, those are actually skilled-labour-intensive tasks. Hence, with the expansion of outsourcing activities, demand for skilled-labour increases in both groups of countries resulting increase in wage inequality. Feenstra and Hanson Model assumed that the unit cost of production varies among intermediate goods along the continuum of skill-intensity in the two regions. Compared to developed countries, the unit cost of production rapidly increases in developing countries when the skill-intensity of intermediate goods goes up since skilled-unskilled wage ratio is higher in the former than the later. Further it is assumed that price of capital is higher in developing countries than the developed countries. If a part of capital stock moves from developed countries to developing countries, production cost declines in the latter while it

7) This clear-cut conclusion is derived using a simple model of 2x2x2 (two-factors, two-countries, and two-goods). The prediction of the Stolper-Samuelson theorem becomes less clear when the dimensions of the model increases.

8) Motivated by the bulk of empirical evidence against the SS theorem, Davis (1996) provided a theoretical framework with which the Stolper-Samuelson theorem could be modified to reconcile with empirical evidence on trade-wage relationship. He argued that the reference set against which one measures the relative factor abundance should not be the global economy, instead, factor abundance matters only relative to a smaller set of countries with similar endowment proportions. In this case, some countries that are unskilled-labour-abundant in global sense may actually be skilled-labour abundant. Author argues that trade liberalization in those countries may lead to increase wages of skilled-workers.

increases in the former. As a result, production of some intermediate goods move from developed countries to developing countries. The relative demand for skilled-labour increases in developing countries since the skill-intensity of newly shifted intermediate goods is higher than the ones they produced previously. On the other hand, the relative demand for skilled-labour increases in developed countries since the outsourced activities are the least skill-intensity activities that they engaged previously⁹⁾.

2.3 *Tang and Wood Model of Co-operation Costs*

In a series of papers, Wood and his associates (Anderson, Tang and Wood, 2006, Tang and Wood, 2000, and Wood, 2002) discuss the effects of falling co-operation costs, due to the globalization process, on wage inequality within developed and developing countries, and between the two groups of countries. The model assumes that with the fall of co-operation costs, some production shifts from developed countries to developing ones since highly skilled-workers in developed countries can now co-operate with workers in developing countries at a lower cost than previous¹⁰⁾. The shift of production, as in Feenstra and Hanson mode, leads to increase in wage inequality due to those production activities are skill-intensive from the viewpoint of developing countries¹¹⁾. Although model is largely focused on explaining rising wage inequality in developed countries especially between top earners and the rest, Wood (2002) showed this model could explain various patterns of wage inequality experienced in developing countries once its basic insights are combined with that of the HOS and Feenstra and Hanson model. In his synthesis of these three models (Wood, 2002), author argue that various anomalies with respect to wage inequality experienced in different countries are largely due to their initial conditions relating to relative supply of skilled-workers and skill-intensity of trade sector relative to non-trade sector. As a result of differences in initial conditions, with the falling of transport and co-operation costs, some countries may experience either only falling or rising wage inequality while some other experiencing either one for some period followed by the reverse situation later.

9) Kurokawa (2010) argue that the effect of intermediate goods trade on skilled-labour demand depends on the range of varieties of intermediate goods. He argues that the use of intermediate goods is skilled-labour complementary and an increase in the variety of intermediate goods result greater demand for skilled-labour.

10) In their model, these highly skilled-workers are called K-workers, and K-workers include managers, entrepreneurs, designers, engineers, and other top business professionals. Their contribution to production come more from improving quality of goods or services than the quantity. Their knowledge comes partly from education and training, however, most of their creativity, experiences, and connections are acquired from their genes, families and carriers. Most importantly, the acquisition and maintenance of know-how requires frequent contact among K-workers, face-to-face and other way rounds, as a result of which they are clustered in developed countries.

11) The rise of wage inequality in developing countries is not formally explained in the original model since it is assume that all workers in developing countries are unskilled. However, in subsequent papers authors argue that it is possible to generate various patterns of wage inequality in developing countries, assuming skill-intensity differ between trade and non-trade sectors, classifying low and medium-skilled-workers, or assuming two-type of exporting products differing in their quality contents.

2.4 Trade-induced Technological Change

One of the other leading theoretical pieces of explaining the rise in skill-premium is the Skill-Biased Technological Change (SBTC) hypothesis. In a series of papers, Acemogolu (1998, 1999, 2002, 2003) developed the theory of skill premium. Accordingly, new technological innovations are complementary with the skilled labour. As a result, relative demand for skilled-labour is increased with the technological development. Interestingly he noted that higher relative-supply of skilled labour promotes skill-biased technological developments in an economy. This model in its basic form is more applicable in explaining the rising skill-premium (relative-wages) in developed countries, since technological development is rather limited in developing countries. However, Acemogolu (2003) noted that trade liberalization could work as a vehicle that facilitate a greater diffusion of technological developments took place in the North to South. This idea related to developing countries is closely associated with the one proposed by Ekholm and Midelfart (2005). They proposed a model where trade induces the technological advancement. Since trade liberalization expose firms to a relatively a larger market and profitability of different technologies changes in favour of skill-intensive. As a result, firms tend to invest in skill-intensive technologies resulting a greater demand for skill-labour. Some related theoretical arguments were put forward by Behrman, Birdsall, and Szekely (2000), Cragg and Epelbaum (1996), and Robbins (1994, 1995) where they argue that trade liberalization could facilitate the diffusion of technological development into developing countries through foreign direct investment flows and/or empowering developing countries for importing technology-imbedded new machinery and equipments (capital deepening). In addition to the effects of capital deepening on relative wages, Robbins (1994, 1995) argue that trade liberalization would put pressure on firms to enhance skill level of worker due to intense international competition. He introduced Skill-Enhancing-Trade (SET) hypothesis in explaining the rising relative wages in developing countries. In addition to skill-enhancing, he points out that a greater level of exports would enable developing countries to imports capital goods embedded with technology.

2.5 Product Quality and Exporting

In addition to the above explanations, in recent years, explanation based on the compositional changes, within the industries during the post-liberalization, has been highlighted as one of the factors for the higher relative demand for skill-labour and resulting rise in relative wages. Recent research on heterogeneity in firms and workers within a given industry has emphasized that there is a greater level of labour reallocation within the industry even if labour reallocation is absent across sectors during the post-liberalization period, as predicted by the Stolper-Samuelson hypothesis (Haltiwanger, Kugler, and Pages, 2004; Melitz, 2003; Tybout, 2003, Verhoogen, 2008). These studies have highlighted some interesting within-industry developments in

the post-liberalization period. Most interestingly, labour reallocation is taking place within the industry where more efficient and relatively larger firms offer higher wages in attracting workers with higher ability. The reasons for offering attractive higher wages are for quality improvements – *productivity and or product quality* -, since the quality improvements within a firm largely depend on the proportion of the skill-work force to unskilled in the firm. These trends are very much visible in exporting sectors since exporting sector faces severe competition in the international market. The higher and differential demand for skill-labour lead to rise in relative wages and wage dispersion within the industry grow since different workers are paid according to their ability. As a result of different wage strata for seemingly identical workers with observed characteristics, within-industry wage inequality rises resulting overall wage inequality. Interestingly, as Helpman et al (2008), within-industry wage differential is higher among skilled-workers compared to less-skilled-workers. Although this explanation is not sufficient for accounting country-wide overall rise in relative wages, it provides a useful theoretical foundation for explaining the rise in relative wages in some sectors such as exporting sector. By extending the basic concepts of Verhoogen (2008) and other researchers, Brambilla, *et al* (2010) constructed a simple model linking export destination with wage inequality. In the model, they argue that the skill-intensity of exporting varies among exporting destinations. Accordingly, exporting activities aiming developed country markets are more skill-intensive than the developing country market. Hence, relative demand for skills increases when country enter to exporting activities as well as when it export more to developed countries. Thus export direction affect wage inequality by raising the relative demand for skilled-workers.

3 . Trade-Wage Nexus: Empirics

3.1 *Evidence of early studies*

As previously mentioned, there is vast volume of studies examining the effects of trade on wage inequality both in developed and developing countries. Since partly it is a tough task of going through this literature, we heavily depend on previous literature surveys to draw conclusion on what we had learned during the last century from empirical studies investigating trade-wage nexus. More importantly, recent studies on the subject are merited in terms of both methodological developments and the use of detailed data, which require careful assessments.

Wood (1994) reviewed a number of studies that examined the effects of trade policy on distributional outcomes both in developed and developing countries. In addition to reviewing, author also gave his own estimation for some countries¹²⁾. Nearly all studies conducted in Latin American countries during the 1980s and early 90s found that there was a positive relationship between the trade policy and inequality, however, country case studies in East Asia found a

negative relationship suggesting trade policy had led to greater equality. However, he highlighted that results may be, in addition driven by the labour-intensive manufactures, due to increase in relative supply of labour. Further, he showed that the results are highly sensitive to outliers and possible measurement errors.

Robbins (2003) surveys studies on distributional effects of trade reforms and also provides a critical review on Wood (1994). Author highlights that due to a number of reasons results summarized by Wood (1994) are highly fragile and do not provide sufficient insights into the distributional consequences of trade policy reforms. Specifically, he argued that the statistical evidence is very weak and that the decline in inequality is more or less attributed to other factors such as compositional change and wage “compression effect” rather than to trade policy reforms. Further, it is pointed out that those studies do not provide a clear experiment between trade policy reform and its distributional consequences. He noted that “the data [*in those studies provide*] rather an association between a wide array of trade-promotion and industrial policies, rising manufactured exports and changes in distribution” [p. 12]. In his survey, overwhelming evidence was found suggesting that both income and wage inequality has increased in developing countries during their post-liberalization period. Interestingly, empirical studies have used advance methodologies for analyses and most of them employ famous Katz-Murphy (1992) demand-supply framework and compare the distributional change prior and after the trade reforms. According to him this framework is capable of explaining the sources of relative-wage change. Nevertheless, author argued that use of broader distributional measures such as Gini coefficient when analyzing the distributional effects of trade reforms is misleading since such broad measures could be changed not only due to trade reforms but also other factors. Further, the need for the controlling for the relative labour-supply changes when analyzing relative-wage changes is emphasized since Rybczinski theorem is crushingly rejected. Author also summarized the arguments put forward by some of the reviewed studies for the failure of the Stolper-Samuelson theorem in explaining relative-wage patterns in developing world and alternatives to it emerged in the literature in the recent years.

Goldberg and Pavcnik (2007) survey the distributional effects of globalization, somewhat broader theme than the previous two surveys, but ended-up with the distributional effect of trade reforms since the other aspects of globalization have no clear definitions and/or their effects are difficult to isolate. Their survey confines to the studies of few selected countries, the most them are Latin American countries. It is reported that the majority of studies had found that trade reforms in particular resulted greater increase in relative-wages. They strongly argued the unsoundness of comparing distributional consequences pre- and post-liberalization period, since

12) The majority of the reviewed studies had investigated the effect of trade policy on distribution measured using the broad indicators such as Gini coefficient.

pre- and post-liberalization do not correspond to autarky and free trade respectively. Further, they point out the difficulty of isolating the effects of trade reforms on distribution since other policies also changes simultaneously. Specifically, they argued that endogeneity of trade reforms due to political economy involved make it difficult to identify causes and consequences. According to them, although general equilibrium approach is most suitable in analyzing the trade-wage relation, restrictive nature of the approach in terms of certain population parameters estimation make it less applicable into developing country context. Instead, though with some drawbacks, they were in favour of applying differential exposure approach. According to this approach, effects of trade openness or reforms are analyzed.

3.2 Evidence of Recent Studies

In recent years, several studies examined the effects of trade reforms on industry-specific wage premium rather than economy wide skill premium (Hanson and Harrison, 1999; kumar and Mishra, 2008; Attanasio, *et al.*, 2004; Pavcnik, *et al.*, 2004; Ferreira, *et al.*, 2007; Goh and Javorcik, 2005; Chambarbagwala, 2006; Dutta, 2007). Interestingly, evidence shows a mixed picture. Attanasio, *et al.*, (2004), in the case of Mexico, found that there is a positive relationship between industry-specific wage premium and tariffs. They argue that unskilled-workers were hurt twice: (i) due to economy-wide increase in relative wages, and (ii) due to the presence of a positive relationship between tariffs and industry-specific wage premium. In Colombia, industries that employed a larger share of unskilled labour were the ones that experienced a greater tariff reduction, resulting negative effects on unskilled-workers in those industries. Similarly, Hanson and Harrison (1999) found that Mexican trade liberalization has disproportionately affected low-skilled workers. They argue that the increase in relative prices of skilled-intensive goods could explain the increase in wage inequality in Mexico.

Among others, findings on India are interesting in the sense that two almost comparable studies provide opposing evidence on the effect of Indian trade liberalization on wage inequality. Dutta (2007) studied the effect of industry trade protection on industry-wage premium and concluded that there is a positive relationship between the level of trade protection and industry-wage premium for the period of 1983-2000. He argued that industries with high initial levels of protection were also those with the largest tariff reduction during the study period. Those are also the industries that had the highest share of unskilled workers. Hence, the positive tariff-wage effect implies that the trade reforms were likely to increased wage inequality as the relative wages of the workers in these manufacturing industries fell. In contrast, Kumar and Mishra (2008) found that Indian trade reforms in the early 1990 have benefited unskilled-workers since there is a strong negative relationship between tariff level and industry-wage premium. Dutta (2007) gave several explanations for the differing empirical findings in Indian context, most of

them being the period of coverage and the measurements used. To analyze the effect of trade liberalization on wage inequality Chambarbagwala (2006) employed the Katz-Murphy demand-supply framework, while Kijima (2005) employed the methodology developed by Juhn, Murphy, and Pierce (1993). However, they both arrived at similar conclusion that is wage inequality in India has increased during the post-liberalization period. Further, they argued that the main cause of rising wage inequality is due to the rise in relative wage. Both authors argued that although relative labour supply has also increased, the magnitude of relative demand increased has been very much stronger. However, none of them attempted to examine the role that trade liberalization played in relative supply increase. In other words, they only examine the static effect of trade on wage inequality. However, in contrast to Kijima, Chambarbagwala linked the increase in relative labour demand to economic liberalization, where he showed that expansion of manufactures and services due to tariff reforms were responsible for the greater expansion of relative labour demand in the post-liberalization period. Further, he speculates that in addition to tariff reforms, factors such as trade-induced technological change, outsourcing, and other domestic factors may have contributed to rise in relative labour demand. However, Kijima explained the rise in relative labour demand through the skill-biased technological change and made no attempt to examine the role played by trade liberalization in this regard. In contrast to both these studies Topalova (2005) examined to what extent both poverty and inequality trends have changed across Indian states using the differential industrial composition and exposure to tariff reforms across the states. She emphasized that her study does not directly test the effects of trade liberalization on poverty and inequality in India, rather it attempt to examine how poverty and inequality experiences differ in states which also differ in terms of exposure to trade reforms. She pointed out this type of study is warranted since labour migration is very much limited across Indian states. She found that states that have greatly exposed to trade liberalization have experienced less reduction in poverty compared to the average poverty reduction across all the Indian states. In contrast, inequality has increased in all the Indian states after the trade liberalization and a greater increase is reported in states where labour regulation is relatively flexible. In contrast, poverty reduction is relatively less in states with tight labour regulation.

Compared to the Chambarbagwala and Kijima, Topalova study is outstanding since it clearly link trade liberalization to change income inequality. However, in addition to the differences of trade exposure across Indian states, Indian states may differ one another on other reforms such as financial liberalization. Since effectiveness of the trade policy is a combination of other reforms, differences in poverty and inequality across Indian states may attribute to other factors as well. However, it is widely accepted that isolating the distributional effects of trade reforms is very much difficult in the real world since trade policy reform is a one element of broader

policy reforms introduced simultaneously into a country. The differential approach, one that employed by Topalova (2005), may be goods when analyzing the effect of trade reforms in geographically bigger country such as India, but its applicability to a smaller country such as Sri Lanka may be limited since neither trade policy differs so greatly nor there is barrier to labour migration across regions. However, it would be possible to examine the effect of trade reforms on industry-wage premium since industries differ in terms of the level of tariff reduction experienced during the trade reforms. Although Topalova (2005) made no attempt to examine the effect of trade reforms on human capital, in a subsequent study, reviewed under section 5, Topalova *et al* (2008) examine the effect of Indian trade reforms on investment in education and child labour.

Attanasio, Goldberg, and Pavnik (2004) examined the relationship between trade reforms and wage inequality in Colombia. Using household survey data, they investigated the impact of trade reforms in the 1980s and 90s on returns to education, industry-wage premium and size of the informal sector. They employed a variant of Mincer equation to examine the effect of trade reforms on return to education and industry-wage premium. They related their findings with tariff reforms across industries to examine whether there is a association between each one of them and the trade reforms. They found that returns to skill have increased across the sectors over the time. Hence, as expected in the Heckscher-ohlin Model, there has been no labour reallocation due to trade reforms; hence, the increase in the skill-premium is explained by the skill-biased technological change. Additionally, industry-wage premium also increased in relatively skilled-intensive industries during the post-reform period. Hence, unskilled labour has been negatively affected by both of these forces, resulting rising wage inequality in Colombia.

Their approach is partial equilibrium in nature. Increase in skill-premium as well as industry-wage premium were captured by the changes in estimated coefficients of respective parameters over the years for different household surveys. This approach is rather limited in the sense that the particular coefficient is a one such value from a distribution of coefficient. Instead of relying on this method, it possible to take into account the contribution of changing prices of covariates into the distribution by using Machado and Mata (2005) methodology.

In comparison to the studies we just reviewed above, Verhoogen (2008) links the trade reforms and resulting wage inequality through “quality upgrading”. In a theoretical model of plants heterogeneity and product differentiation, author argue that trade reforms could encourage firms to engage in quality up-grading – either increase in productivity or launching innovation, to face the new competitive environment created by the policy change. He took the exchange rate devaluation in 1994 as the trade reforms and analysis its effect on wage inequality using a panel dataset representing Mexican manufacturing sector. He showed that workers in more productive firms are well-paid compared to their counterparts in relatively low productive firms.

According to him more productive firms are the ones that engage in exporting activities and to sustain in internationally competitive markets these firms have to engage in continuous quality up-grading process. This process requires more productive workers and to attract more productive workers into firms they have to pay relatively higher wages than the average wage rate. More or less his explanation readily applicable to the within-industry or within-occupation wage inequality rather than overall wage inequality.

In recent years, at least few studies found evidence that trade reforms have improved income (wage) distribution (Kumar and Mishra, 2008; Goh and Javorcik, 2005; Ferreira *et al*, 2007). As previously discussed, Kumar and Mishra (2008) found that trade reforms in 1990s in India have disproportionately contributed to unskilled-workers thereby lowering wage inequality. Similarly, Goh and Javorcik (2005) in the case of Poland found that there is a negative relationship between tariff-level and industry-wage premium. They found that wages of workers in labour-intensive industries, the ones that experienced a larger tariff reduction under the reform programme, has increase disproportionately compared with their identical counterparts in the other industries. As a result, wage inequality declined subsequent to the policy reforms. As author argue, an increase in market competition and the availability of raw materials following trade reforms push firms to increase productivity and profitability. This trade-induced productivity growth in turn increased the real wages of unskilled workers disproportionately. Ferreira *et al*, (2007) found that trade reforms in Brazil have contributed to decline in wage (income) inequality during the 1988-95. Their methodology is novel in the sense that they covered all sectors, trade and non-trade, and investigated the movement of workers from traded sector to non-trade sector when adjusting the labour markets for trade reforms. In contrast to most studies of industry wage-premium, this paper found that the positive effects of trade reforms are not due to industry wage-premium, rather they appear to have been channeled through substantial employment flows across sectors and formality category. Similarly it is found that changes in the economy-wide skill premium are also important.

The above reported evidence is mainly from country-case studies. However, findings of cross-country studies also show somewhat similar evidence (Avalos and Savvides, 2006; Behrman *et al*, 2007; Wood, 1994). Using Household surveys for 18 Latin American countries, Behrman, *et al* (2007) examined whether economic reforms affect wage differentials¹³⁾. One of the interesting findings of this study is that though there is a positive correlation between each policy reform indicator and wage differentials, this association gradually fades away over the time. In contrast,

13) Economic reforms include policy reforms such as trade, financial, tax, and privatization. Hence, this study examined the movements of wage differentials in a broader policy reform environment. Though this approach is comprehensive, it demands better data on wage and policy reforms that in most cases lack in many developing countries.

Avalos and Savvides (2006), using the manufacturing industry data published by the UNIDO, examined whether some of the hypotheses established by country-case studies are held for a cross-section of countries comprising Latin American and East Asian economies. In line with the findings of country-case studies, they found that trade openness, technological transfer, FDI, and relative labour supply are the main determinants of wage inequality.

Although Avalos and Savvides (2006) and Behrman *et al*, 2007 made a significant contribution in exploring the determinants of wage inequality at cross-country level, there are some limitations in their studies. First, when exploring the determinants of wage inequality, none of the study made an attempt to examine them from the dimension of the level of income of sampling countries. A vast available literature on this area argues that the determinants of wage inequality may differ across countries, even within the developing world, on the basis of the level of income (Behar, 2007; Goldberg and Pavcnik, 2007, Robbins, 2003)¹⁴).

4 . Conclusion

The distributional consequences of trade reforms have attracted greater attention in recent decades since most countries experienced an increase in inequality after the economic reforms. As a result, there is vast literature on trade-inequality nexus. This paper attempted to review some selected papers covering both theory and empirics. There are some emerging evidence that trade reforms have improved wage distribution though the majority of studies concludes that the reforms have contributed for the rise of wage inequality in many countries. As Ferreira, *et al*, (2007) did, it is important to examine economy-wide effects of trade reforms rather than just confining to the manufacturing sector because such analysis is able to uncover the effects of workers transition across sectors in response to trade reforms. In some cases, as in Brazil, moving workers from traded sectors to non-traded sectors improve the distribution outcomes.

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14) This is due to the fact that the level of economic development of a country may be an important determinant of the relative labour supply, level of trade openness, technological capacity and institutional structure for technological advancement, level of the advancement of the manufacturing sector, labour institutions, timing of economic reforms, and nature of FDI inflows.

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