



## Can public subsidy on education necessarily improve wage inequality?<sup>☆</sup>



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### ARTICLE INFO

#### JEL Classification:

D58  
I24  
I28  
J31

#### Keywords:

Skill formation  
Education subsidy  
Skilled labour  
Unskilled labour  
Wage inequality  
Urban unemployment  
Composite policy  
General equilibrium

### ABSTRACT

The present paper develops a two-sector, specific factor general equilibrium framework for analyzing endogenous skill formation in a dynamic set-up and examining the consequence of a public subsidy policy on education on the skilled-unskilled wage inequality in a small open economy. It shows that given the technologies of production the policy produces a favorable impact on the wage inequality only in one of the two periods while producing an adverse consequence in the other. If the wage income inequality improves (deteriorates) in period 1 it worsens (ameliorates) in period 2 under the same sufficient conditions. The results are found to be more or less valid even in the presence of unemployment of unskilled labour. Finally, some composite policy recommendations have been suggested so that the relative wages always move in favor of the poorer section of the working population.

## 1. Introduction and motivation

Education leads to skill formation which is extremely crucial in all countries irrespective of whether developed or developing.<sup>1</sup> It promotes human capital formation, which is conducive to economic growth and prosperity of an economy as well as has an egalitarian aspect because it is expected to lower the difference in wages between the two groups of worker differentiated with respect to their skills. Nevertheless, skill formation is a dynamic aspect although its positive effect on the wage income inequality should be immediately derived. Skill acquisition, given the size of the workforce, lowers the endowment of unskilled labour in the short run and raises the supply of skilled labour in the future. In the current period, given other things, relative wages should move in favor of unskilled labour because the supply of this type of labour decreases although the endowment of skilled labour does not change. In the future unskilled workers going for skill acquisition in period 1 become skilled and therefore, the endowment of skilled labour goes up while that of unskilled labour does not

<sup>\*</sup> The paper has been substantially revised in the light of several interesting and constructive comments of an anonymous referee of this journal to whom we must remain grateful. The usual disclaimer, however, applies.

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<sup>1</sup> Different facets of skill formation have been discussed in works like Autor (2014), Becker (1964), Brown et al. (2001), Crouch et al. (1999), Heckman and Krueger (2003), and Vanhuyse (2007).

change. The wage inequality again should improve because of the increased supply of skilled labour. Then logically it follows that there should be a provision for public assistance for skill acquirement at least from the perspective of mitigating the wage income inequality in both present and future. In the post-reform regime, the need for this type of public assistance has become extremely critical in view of the empirical evidence of strong symmetrical wage movements against unskilled labour in different countries across the globe.<sup>2</sup>

The empirical studies of Robbins (1994, 1995, 1996), Harrison and Hanson (1999), Beyer et al. (1999), Currie and Harrison (1997), Revenga (1997) and some indirect studies by Khan (1998); and, Tendulkar et al. (1996) have pointed out that while the inequality has narrowed in the East Asian countries, the Latin American countries like Mexico, Chile, Costa Rica and Columbia and South Asian countries including India have experienced increasing skilled-unskilled wage gap during the liberalized regime.

Acemoglu (1998) argues that skilled-biased technological progress, a resultant of the trade liberalization, explains the rising wage inequality in the industrialized countries. However, the fact that the relative wages have moved against unskilled labour in the developing economies as well, in which unskilled labour is the abundant factor, is contrary to the predictions of the standard Heckscher-Ohlin trade model with Stolper-Samuelson theorem at its core. This calls for theoretical explanations. Feenstra (2004), Zhou and Trefler (2005), Marjit, Beladi and Chakrabarti (2004), Chaudhuri and Yabuuchi (2007), Beladi, Chaudhuri, and Yabuuchi (2008) etc. have explained the increasing wage inequality in the developing nations in terms of increased foreign direct investment (FDI) in high-skill sectors and some of the essential characteristics of these economies e.g. factor market imperfections, presence of non-traded goods, dualistic structures etc.

There has been a spurt in theoretical research on the wage inequality in recent times. Important contributions include those of Pan and Zhou (2013), Pi, Zhou and Yin (2013), Pi and Zhou (2012, 2013, 2014), Anwar and Sun (2015), Pi and Chen (2016) and Pi and Zhang (2016, 2017) etc. that pay attention to the role of governmental behaviors e.g., public inputs, pollution control, institutional arrangements including capital market distortion, and economic policies in affecting the relative wage inequality.

It is to be noted that none of above-referenced theoretical pieces has examined the outcome of the public subsidy on education targeted towards encouraging the process of skill formation on the skilled–unskilled wage inequality.

In this connection, it is important to mention that Beyer et al. (1999), while studying the consequence of trade liberalization on wages in Chile, have found that an increase in the proportion of labour force with higher education exerted downward pressure to reduce the skilled-unskilled wage inequality. Therefore, as per their findings education had some equalizing effects on the wage gap in that country which fortifies the necessity of explicitly analyzing the consequence a public incentive scheme to skill acquisition.

There is no gainsaying that Kar and Beladi (2004) have studied the welfare implications of skill formation and international migration of both skilled and unskilled labour using a four-sector general equilibrium framework. They have also paid some attention to the wage inequality in their work. On the other hand, Yabuuchi and Chaudhuri (2009) using a three-sector general equilibrium model including an education sector have examined the consequences of an infrastructure development scheme to the education sector and FDI flows on the wage inequality in a developing economy in the presence of a capital adjustment cost faced by the education sector. Nevertheless, in both of these works, skill formation is assumed to take place instantaneously. However, because skill formation is a dynamic process, it should be analyzed using at least a two-period model.

The present study is devoted to fill in the above vacuum in the theoretical literature using two two-sector, specific factor general equilibrium models with endogenous skill formation and provision for a public subsidy designed at encouraging acquisition of expertise on the part of the unskilled workers. It is important to note that this analysis is designed not to provide an alternative theory of human capital formation with an incentive scheme because many of such theories e.g. Jonas and Lommerud (1997), Stark and Wang (2002) and Viaene and Zilcha (2013) etc. are already available in the rich literature on this aspect.<sup>3</sup>

The only objective of the present analysis is to study the impact of an education subsidy on the skilled-unskilled wage inequality in a dynamic setting that is still unavailable in the wage inequality literature. Initially, we introduce endogenous skill formation in the  $2 \times 3$  specific factor, full-employment (à la Jones 1971) model. Then the model has been extended to a 2-sector, specific-factor Harris-Todaro (HT, henceforth) type model with urban unemployment of unskilled labour. We have investigated whether the subsidy policy is effective in addressing the problem of rising relative wage inequality in both of the periods under the two above-mentioned scenarios.

Ours is a two-period model where the number of people going for skill acquisition, and hence the supply of unskilled labour in period 1 are endogenously determined from the intertemporal utility maximizing behavior of the unskilled working families. The size of the workforce including both skilled and unskilled workers remains the same over time. The question of skill acquisition on the part of skilled workers does not arise. The education subsidy to the unskilled school-goers is paid in period 1, and the cost of the subsidy is financed by lump-sum taxes on skilled and rental incomes. Each unskilled working family in its maximization exercise takes the wage rates as datum. Although the equilibrium values of both the wages in period 2 could be different from those in period 1, the representative unskilled family cannot foresee them while taking a decision on the magnitude of skill formation in period 1.

From the analysis, we have found that the subsidy aggravates the wage income inequality in period 1 (the current period) if the high-skill sector is capital-intensive and that it does not necessarily improve the inequality even in period 2.<sup>4</sup> Although in the full-employment case the result depends solely on distributive shares of the intersectorally mobile factor, capital, in the HT case the results crucially depend not only on distributive shares but also on the institutional characteristics e.g. the degree of imperfection prevailing in the

<sup>2</sup> In this paper, the two words, education and skill formation, have been interchangeably used. This means that we presume education automatically leads to higher skills, greater earning opportunities and higher wages. No distinction has been made between general education and vocational training.

<sup>3</sup> As related studies, Stark et al. (1998), Chau and Stark (1999), and Fan and Stark (2007) have studied skill formation and international migration by paying attention to skill acquisition incentives created by the prospect of migration.

<sup>4</sup> That the difference in distributive shares of capital between high-skill and low-skill sectors play a crucial role in determining the final outcome on the relative wage inequality resulting from any exogenous shock has been pointed out in many theoretical works like Marjit and Kar (2005), Chaudhuri and Yabuuchi (2007), Beladi et al. (2008) and Chaudhuri (2008). However, Chaudhuri (2008) has found a special case where these distributive shares do not matter.

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