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Skilled–unskilled wage inequality and unemployment: A general equilibrium analysis ☆

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ABSTRACT

The paper develops a static three sector competitive general equilibrium model of a small open economy in which skilled labor is mobile between a traded good sector and the non-traded good sector and unskilled labor is specific to another traded good sector. Capital is perfectly mobile among all these three sectors. We introduce involuntary unemployment equilibrium in both the labor markets and explain unemployment using efficiency wage hypothesis. We examine the effects of change in different factor endowments and prices of traded goods on the unemployment rates and on the skilled–unskilled relative wage. Also, we introduce Gini-Coefficient of wage income distribution as a measure of wage income inequality; and show that a comparative static effect may force the skilled–unskilled relative wage and the Gini-Coefficient of wage income distribution to move in opposite directions in the presence of unemployment.

1. Introduction

Explanation of growing income inequality is one of the important recent research areas in Development Economics. The conventional belief is that globalization leads to an improvement in welfare both from the aggregative and distributive perspectives. However, with regard to its distributive effect, many empirical works point out that skilled–unskilled wage income inequality has grown up in various developed[1] and developing[2] countries. Different studies offer different explanations for this phenomenon; and trade liberalization and technological progress are the main two controversial reasons of this phenomenon.[3] Many empirical studies also point out other causes like international outsourcing,[4] increase in the price of skill intensive good,[5] entry of unskilled labor surplus low income countries in the international market[6] etc.

According to the conventional theory, developed and less developed countries, who generally play opposite roles on international factor movements and face opposite type of changes in the relative price structure of traded goods due to trade liberalization, should face opposite movements in the degree of skilled–unskilled wage inequality. However, empirical data show that both these groups of countries have experienced an increase in the degree of

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[1] According to Bound and Johnson (1992), Leamer (2000), Marjit and Acharyya (2003) etc. growing income inequality is experienced in the US between the 1960s and 1970s and according to Lawrence (1994), Katz et al. (1992) etc. in European countries between 1978 and 1988.

[2] According to Wood (1997), Dev (2000), Borjas and Ramey (1993), Banga (2005), Beyer et al. (1999) etc. wage inequality has increased in many Latin American and South Asian countries in the mid 1980s.

[3] According to Wood (1998), Beyer et al. (1999), Green et al. (2001), Behrman et al. (2000), Isgut (2001) etc. trade liberalization is to blame for this growing wage inequality. However, Wood (1997, 1998), Dev (2000) and Gorg and Strobl (2002) are of the view that technological progress worsens wage inequality through an increase in the relative demand for skilled labor. Esquivel and Lopez (2003) shows that technological change aggravates but trade liberalization lowers wage inequality in Mexico.

[4] See Feenstra and Hanson (1997) in this context.

[5] See Harrison and Hanson (1999), Hanson and Harisson (1999) and Beyer et al. (1999) in this context.

[6] See Wood (1997) in this context.

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wage inequality.[7] There exists a theoretical literature dealing with the issue of this growing wage inequality and trade liberalization; and it is based on the framework of static competitive general equilibrium models[8] with two different types of labor — skilled and unskilled. We can divide the existing theoretical literature into two groups. One group of models assumes full employment of both type of labor and this group includes works of Gupta and Dutta (2010a,b), Yabuuchi and Chadhuri (2009, 2007), Chaudhuri and Yabuuchi (2007, 2008), Marjit and Acharyya (2003, 2006), Marjit and Kar (2005), Marjit et al. (2004) and Kar and Beladi (2004) etc. However, only Chaudhuri and Yabuuchi (2008) and Marjit and Acharyya (2003) introduce non-traded goods in their models; and assume it to be produced by unskilled labor. Hence, these models cannot analyze the role played by the mobility of skilled labor between the traded good sector and the non-traded good sector on the skilled–unskilled wage inequality. Another small group of models consider Harris and Todaro (1970) type unemployment of unskilled labor; and this group includes works of Marjit and Acharyya (2003), Beladi et al. (2008) and Chaudhuri (2008, 2004). However, these models assume full employment of skilled labor. Chaudhuri and Banerjee (2010) explain unemployment of skilled labor with the help of efficiency wage hypothesis[9] and unemployment of unskilled labor using Harris and Todaro (1970) migration mechanism. However, they do not consider non-traded good. The ratio of the wage rate of the skilled worker to that of the unskilled worker is taken as the measure of wage inequality in all these models. However, none of them considers Gini-Coefficient as a measure of wage inequality.

The present model is also a static competitive general equilibrium model of a small open economy with skilled labor and unskilled labor being two primary factors of production. However, it is an improvement over the existing literature because it, on one hand, considers mobility of skilled labor between a traded good sector and a non-traded good sector and, on the other hand, introduces efficiency wage hypothesis to explain unemployment in each of the two labor markets. According to the efficiency wage hypothesis, efficiency of a laborer varies positively with its wage rate and the unemployment rate in the labor market. The non-traded good is assumed to be a non-inferior final good whose demand varies positively with the disposable income of consumers; and thus increases in factor prices and/or factor endowments produce positive effects on the demand for the non-traded good and consequently on its equilibrium price. The skilled–unskilled wage ratio and unemployment rates in two labor markets are affected by this change in this equilibrium price. Gini-Coefficient of wage income distribution is also considered as a measure of wage income inequality as an alternative to the skilled–unskilled wage ratio.

We derive some interesting results from this model. First, Gini-Coefficient of wage income distribution appears to be a monotonically increasing function of the skilled–unskilled relative wage in the absence of unemployment. However, this is not so in the presence of unemployment. Secondly, different comparative static effects may force the skilled–unskilled relative wage and the Gini-Coefficient of wage income distribution to move in opposite directions in the presence of unemployment. So our present work justifies why the skilled–unskilled relative wage may yield misleading results about the change in the degree of wage income inequality in the presence of unemployment even though all full employment models in the existing literature rightly assume this relative wage as the only measure of wage income inequality.

This paper is organized as follows. Section 2 describes the model; and Section 3 analyzes effects of changes in factor endowments on unemployment rate, skilled–unskilled relative wage and Gini-Coefficient of wage-income distribution. In Section 4, we analyze similar effects of exogenous changes in prices of traded goods. Concluding remarks are made in Section 5.

2. The model

We consider a small open economy with three sectors and three factors — unskilled labor, skilled labor and capital. Sectors 1 and 2 produce products using skilled labor and capital as inputs; and sector 3 uses unskilled labor and capital as inputs. Production functions in each of these three sectors satisfies all standard neo-classical properties including CRS. Sectors 1 and 3 produce two traded goods but sector 2 produces a non-traded good which is normal to consumers. All factor endowments are exogenously given. Capital is mobile among all these three sectors; and skilled labor is mobile between sectors 1 and 2. However, unskilled labor is specific to sector U. Each of these two types of labor is measured in efficiency unit; and both wage rates are perfectly flexible. However, there exist unemployment in both these two labor markets; and these are explained by the efficiency wage hypothesis[10] which states that the efficiency of either type of laborer is a positive function of its wage rate and unemployment rate.[11] A higher wage rate motivates the worker to work hard; and a higher unemployment rate raises the disutility in the presence of a threat of firing and thus makes him more disciplined. Rental rate on capital is perfectly flexible and this flexibility ensures full utilization of capital stock. All markets are competitive. The representative firm in each of these three sectors maximizes profit; and the representative consumer maximizes utility subject to the budget constraint.

We use following notations.

a_{Ki}	Capital output ratio in ith sector for $i=1, 2, 3$.
a_{Si}	Skilled labor output ratio in ith sector for $i=1, 2$.
a_{N3}	Unskilled labor-output ratio in sector 3.
P_i	Effective producer's price of the product produced by ith sector for $i=1, 2, 3$.
h	Efficiency of the skilled worker.
f	Efficiency of the unskilled worker.
W_S	Wage rate of skilled worker.
$\frac{W_S}{h}$	Wage rate per efficiency unit of skilled labor.
W_U	Wage rate of unskilled worker.
$\frac{W_U}{f}$	Wage rate per efficiency unit of unskilled labor.
r	Common rate of return on capital employed in all three sectors.
D_2	Demand function for commodity 2.
Y	Total factor income.
X_i	Level of output of the product produced by ith sector for $i=1, 2, 3$.
S	Exogenously given endowment of skilled workers.
N	Exogenously given endowment of unskilled workers.
K	Exogenously given capital endowment.
v_S	Unemployment rate of skilled workers.
v_U	Unemployment rate of unskilled workers.
θ_{ji}	Distributive share of jth input in ith sector for $j=S, K, N$ and $i=1, 2, 3$.

[7] See footnotes 1 and 2, where it is mentioned that wage inequality has increased not only in the US and European countries but also in Latin America and South Asian Countries.

[8] A few works, for example, Acemoglu (1998, 1999, 2002a,b), Kiley (1999), Sener (2001), Ranjan (2001), Fang et al. (2008), Wang et al. (2009) etc. analyze how technological change affects skilled–unskilled wage inequality in dynamic models. However, Anwar and Rice (2009), Anwar (2006, 2009) etc. shows how trade liberalization affects wage inequality using static product variety models of imperfect competition.

[9] The literature on efficiency wage hypothesis include works of Solow (1979), Agell and Lundborg (1992, 1995), Feher (1991) and Akerlof and Yellen (1990) etc.

[10] See works of Shapiro and Stiglitz (1984), Pisauro (1991), Agell and Lundborg (1992, 1995), Gupta (2000), Gupta and Gupta (2001) and Chaudhuri and Banerjee (2010) etc.

[11] Our efficiency function is a special case of the more general efficiency function considered in the fair wage hypothesis developed by Agell and Lundborg (1992, 1995) where rental rate on capital also appears as an argument. Chaudhuri and Banerjee (2010) use this more general efficiency function.