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## Input trade reform and wage inequality



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## ABSTRACT

This paper, using a general equilibrium model of production and trade for a developing country with non-traded goods, dual unskilled labour markets and internationally fragmented skill-intensive production, illuminates how liberalised input trade affects the unskilled wages prevailing in the informal sectors and employment conditions in those sectors. Numerical analysis further highlights importance of the elasticities of factor substitution in production of different sectors to determine the movement in informal wage and therefore the movement in skilled–unskilled wage gap. These results are consistent with the empirical evidence on developing countries (like India) that suggests liberalisation–inequality relationship cannot be explained by focusing on tradable goods alone.

## 1. Introduction

One popular yet contentious issue of research in the context of developing countries is to find out implications of trade liberalisation on the skill–unskilled wage inequality, since one cannot rule out the ambiguity on the resultant implication on the unskilled wage given the complex production structure of a developing dual economy like India. As pointed out by [Sharma and Morrissey \(2006\)](#), in order to be competitive in the world market, the exportable producers in developing countries often seek efficient and relatively high skilled labour. The poor, unskilled labour may only experience changes in their real earnings in an indirect way, through backward linkages in production and consequent demand. A large body of trade theory literature takes recourse to the famous Stolper–Samuelson theorem that considers international trade as the main driving force behind the behavior of wages ([Leamer, 1992](#); [Wood, 1994](#); [Beladi & Batra, 2004](#); and so on). However, developing countries are characterised by peculiarities such as exporting both skill-intensive manufacturing and unskilled labour intensive agricultural products, coexistence of organised and informal labour markets and the production and selling of finished non-traded goods.

A relatively sparse strand of theoretical literature focused on the implications of technical progress on the inter-sectoral wage differential in the presence of non-traded goods ([Beladi & Batra, 2004](#); [Oladi & Beladi, 2008](#); to name among the few). This paper contributes to this class of literature by identifying the avenues through which trade-induced productivity surges in the skill-intensive sector can affect the poor unskilled workers in a developing economy with the presence of dual unskilled labour markets and finished non-tradables, in terms of wage–employment conditions. The relationships suggested by the theoretical model have subsequently been quantified using numerical analysis.

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In order to take up the issue of ‘trade-induced productivity surge’ this paper utilises the fact that in developing countries like India, liberalisation has facilitated greater access of capital-intensive imported inputs (Goldberg, Khandelwal, Pavcnik, & Topalova, 2009; 2010). To utilise the foreign technology embedded within those inputs in the most effective way, demand for additional skills has been generated. This leads to increased demand for skilled workforce driving their wages up. Hasan (2002); Kijima (2006); Dehejia and Panagariya (2012); have provided evidences on such trade-induced productivity growth in India's skill-intensive services sector. Such typical trade pattern, does definitely have an implication on the income distribution aspect, which is well established in recent relevant empirical literature (Bensidoun, Jean, & Sztulman, 2011; Caselli, 2012; and so on).

The general equilibrium framework used in this paper follows the available empirical evidence that unskilled workers of a developing country like India cannot sustain to be unemployed (without any wages) and the retrenched unskilled workers from the organised formal sectors get absorbed in the unorganised informal sectors at market-determined lower wages (Mukherjee, 2016). Hence, this paper considers full employment of unskilled workers in this general equilibrium set-up. Later the baseline model has also been extended with involuntary unemployment of the skilled workforce.

Oladi and Beladi (2008) provided evidences on the fact that unskilled workers are mostly employed in the non-traded good sector with no institutionally fixed minimum wage in the United States. India is not an exception. In fact, majority (about 70 per cent) of the informal workers are employed in the unorganised smaller enterprises (not covered under the Annual Survey of Industries (ASI) and employ less than six workers) of urban or semi-urban areas, at lower competitive wages to produce and sale domestically (National Sample Survey Report No. 557, 2011–12). Therefore, in the developing economy under consideration, the informal sector with unorganised labour market produces the finished non-tradable. In this sector with unorganised labour market, unskilled labour receives market-determined (flexible) nominal wage ( $W$ ). Typically, such non-tradable include items like products produced in small domestic industries, services provided by petty traders or street-side vendors and so on. Therefore, similar to Oladi and Beladi (2008), changes in the demand for non-tradable are due to the changes in both production and price of the non-traded good.

The paper is streamlined as follows: section 2 illustrates the basic model with full employment and the numerical analysis based on the basic model. In section 3, the model has also been extended to incorporate involuntary unemployment of skilled labour. Finally, section 4 concludes.

## 2. The full-employment framework

Let us consider a small, open dual economy comprising of four sectors: sector  $A$ , vertically integrated sector  $U$  (and sector  $I$ ), sector  $S$  and sector  $N$ .

Sector  $A$  is the rural agricultural sector (with informal or unorganised labour market for the unskilled labourers) producing a tradable agricultural good using unskilled labour ( $L$ ) and land-capital ( $T$ ). The input ‘land-capital’ broadly includes land and other durable assets. See Mukherjee (2012; 2014) and the references therein in this context.

Sector  $U$  is an unskilled labour-intensive formal manufacturing sector (with organised labour market for unskilled workers) in the urban area, producing with unskilled labour, capital ( $K$ ) and an internationally non-traded intermediate input (examples of such non-traded intermediate input include electricity, water supply, local transportation, goods with very high transportation costs such as gravel and so on. See Mukherjee, 2016 in this context), which is, in turn, produced in one segment of the formal sector  $U$  (sub-sector  $I$ ) using unorganised unskilled workers and capital.

The skill-intensive services sector ( $S$ ) uses skilled labour ( $L_S$ ), capital and a hi-technology-intensive imported intermediate input produced abroad ( $M$ ). Examples of such imported inputs include computer data storage units, automatic data processing machines and so on. Consistent with empirical evidence (see for example Alvarez & Lopez, 2005; Lopez, 2015; and so on), I assume that only the relatively skill-intensive firms use imported intermediate inputs and consequently pay for foreign technology licences or foreign technical assistance. Furthermore, there is an *ad valorem* tariff ( $t$ ) imposed on the import of  $M$ .

Sector  $N$  produces finished non-tradable (internationally) goods using only unskilled labour ( $L$ ). We are making a simplifying assumption that a non-traded final good is produced in the urban area using only unskilled labour.

Unskilled labourers in the unorganised labour market of the rural agricultural sector and in the urban non-traded good producing sector get competitive (market-determined) money wages at the rate  $W$ , while their counterparts working in the organised labour markets of sectors  $I$  and  $U$  receive contractual money wages at the rate  $W^*$ , determined owing to prior unionised negotiation,<sup>1</sup> with  $W < W^*$ .

The skilled workers receive wages at the rate  $W_S$ . The rental to land-capital is denoted as  $R$  and the interest rate on capital is denoted as  $r$ . The price the non-traded intermediate input  $I$ ,  $P_I$ , is determined domestically by demand-supply mechanism.  $a_{ji}$  denotes the amount of the  $j^{\text{th}}$  input used in per-unit production of the  $i^{\text{th}}$  good.  $P_i^*$  denotes the internationally given price of the  $i^{\text{th}}$  commodity owing to the small, open economy assumption ( $i = A, U, S$ ).

All markets, except the organised labour market for the unskilled workers working in sectors  $I$  and  $U$ , are perfectly competitive. All production follows the constant returns to scale (CRS) technology. There are diminishing returns to the variable factors in each sector, except for the production of non-tradable.

The price-unit cost equality conditions (the so-called ‘zero-profit conditions’) for the competitive producers are mentioned below

<sup>1</sup> We assume the organised sector wages are institutionally given and we do not explicitly model the wage-bargaining here. For a discussion on how unionised wages are determined through collective bargaining, see Chaudhuri and Mukhopadhyay (2010); Mukherjee (2014) and so on.

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