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Abstract

In this paper we revisit the influential theory of monopolistic competition and optimum product variety as developed by Dixit and Stiglitz (1977) with applications in international trade by Krugman (1979,1980), by modeling fixed and variable costs of production in terms of underlying use of skilled and unskilled labor in a single good model. This is different from earlier work on multi sector variant of Krugman cum Heckscher-Ohlin-Samuelson model such as Helpman (1981) and others. In our structure factor endowment and factor intensities determine both number of varieties and output per variety in a closed economy mimicking the features of Heckscher-Ohlin-Samuelson model. Differences in factor endowments across countries determine the pattern of trade between varieties and output per variety, which is indeterminate in a standard single good Dixit-Stiglitz-Krugman model. Later we reflect on wage inequality and unemployment providing some interesting results.

JEL-Codes: D430, F100, J310, F240.

Keywords: monopolistic competition, trade, wage inequality, unemployment.

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1. Introduction and the Context

The purpose of this paper is to bring in factor endowment and factor intensities in an otherwise standard model of monopolistic competition, optimum product diversity and international trade by modelling fixed and variable costs of production in terms of underlying inputs used in the process of production. Such a structure fundamentally alters the way number of varieties and output per variety are usually determined in such a class of models. Both these variables, including pattern of trade now depend critically on factor endowments and factor intensities as in a standard two factor neo-classical model. We argue that this is a general model which characterizes the well-known workhorses of trade theory, the Dixit-Stiglitz-Krugman (DSK) model and Heckscher-Ohlin-Samuelson (HOS) framework as special cases. In other words once we bring in multiple factors of production , look inside the black boxes of how fixed and variable costs are determined through factor prices and factor intensities and introduce resource constraints, DSK model comes quite close to the HOS structure. The well- known indeterminacy result related to pattern of trade in DSK model now gives way to such trade being determined by relative difference in factor endowment. This contribution is primarily related to Dixit and Stiglitz (1977), grafting a two factor neo-classical model in the monopolistic competition framework and then extends it to modify Krugman (1980). We use a CES utility function, as used by Krugman (1980) to hammer home the basic result.

Monopolistic competition and optimum product diversity framework of Dixit and Stiglitz (DS) (1977) is recognized as one of the most influential papers in modern microeconomic theory. Krugman (1979, 1980) adaptation of such a structure has radically transformed the way the theory of international trade is analyzed in the profession. In fact highly popular Melitz (2003) structure, which has integrated the theoretical analysis with firm level data, considers variants of Dixit-Stiglitz-Krugman (DSK) framework as the basic building block. Interested readers may look at Helpman (2006) for an elegant introduction and overview of recent research along these lines. DSK approach , often hailed as the new trade theory, in the post Hecksher-Ohlin-Samuelson (HOS) era, brings in monopolistic completion, increasing returns to scale and trade in product varieties, explains trade between similar nations and provides a solid alternative to the way we think of trade theory based only on factor endowments. Feenstra (2015) is a great reference analyzing the evolution of theoretical ad empirical research in trade theory. For the fundamental theorems of the traditional HOS structure one may refer to the seminal work of Jones (1965). Factor endowments and factor intensities do not play much of a role in the basic DS or DSK approach, with single resource labor being used in the process of production and all the action is embedded in one firm one variety outcome due to increasing returns. Market size as a crucial element also comes out quite clearly with greater size determining greater number of varieties.

Helpman (1981), Falvey (1981) and later applications by Das (2002, 2005), Dutta, Kar and Marjit (2013), etc. made attempts to integrate HOS into a typical DSK structure by increasing number of sectors.[1],[2] However, ours is very different and more fundamental as we retain the classic DSK approach with *single sector* and many varieties of the same product and approach the problem by decomposing the cost structure in terms of underlying factor use and factor price. This is also different from Ethier (1982, 1982a) which brings in variety of intermediate inputs but each market following DSK properties. In our approach if we use a single factor it is the same as the original DSK.

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[1] Interested readers may also check Antras (2003), Bernard et al (2007, 2011), Dhingra and Morrow (2019), Etro (2017), Furusawa (2008), Yeaple (2005), Grossman and Rossi-Hansberg (2006) for some interesting dimensions on HOS, firm heterogeneity etc.

[2] One may further check two important papers: Chakraborty (2003) and Dhingra and Morrow (2019). Chakraborty examines why factor endowment becomes crucial in determining the pattern of trade in intermediate input across various stages of production. Whereas Dhingra and Morrow looks at the interconnectedness between productivity difference and allocative inefficiency in an imperfect market with product diversity.

Novel feature of our work is reflected in the determination of pattern of trade, number of varieties and output per variety in general equilibrium with two factors skilled and unskilled labor. The two sector analogue of DSK structure in our set up is comprised of as if one sector that produces varieties and another that produces aggregate output of those varieties and two types of labor have to be fully employed in these " sectors". Relative factor endowments then determine the relative size of these sectors. Thus on top of the fundamental proposition of DSK type models, whereby trade provides the opportunity to consume larger basket of varieties, factor endowments determine pattern of trade as to who is going to produce greater number of varieties or greater output per variety. The integrated world equilibrium is the mega DSK set up with regional variations in the distribution of varieties and output per variety. Factor content of trade [Feenstra (2015), Leamer (2000), Trefler (1993), Davis (1995, 1998a)] suggests that , for example, if the fixed cost component is skill intensive, then the export from the skilled labor abundant country will contain more varieties and less output per variety. Gains from trade in this model is completely determined by DSK logic as it is only number of varieties consumed that counts. But asymmetry emerges in number of varieties and output per variety across nations. Our approach in a way suggests a way of how to reinterpret a standard HOS structure if we take two sectors, one producing number of varieties and the other aggregate output from all varieties with two factors of production. DSK adds the gains from trade element and demonstrates a way to use the number of varieties as relevant entity in model building.

With a single factor of production this model boils down to the standard DSK model. The idea of extending DSK to incorporate HOS flavor so far has been by increasing the number of sectors and/or some of them having CRS structures. Ours is input use driven model where we are only introducing one other factor into the standard product variety model and that immediately brings in the significant impact of factor endowments and factor intensities on the core outcomes of the mother framework.

The next section develops the modified Krugman (1979, 1980) model of increasing returns and trade with both skilled and unskilled labor. Then we find the basic results of our paper in regard to relative factor abundance, trade pattern and factor prices. In the subsequent Section we extend the basic model to explore if factor trade and unemployment of unskilled labor has some interesting repercussions. The last section provides concluding remarks.

2. The Basic Model

Our model set up closely follows Dixit and Stigltiz (1977) monopolistically competitive market structure. Hence consumers' preference is characterized by love-for-variety and hence the utility function of the representative consumer is given by

$$U = \left(\sum_{i=1}^{N} x_i^{\varepsilon}\right)^{\frac{1}{\varepsilon}} \qquad \text{where,} \quad 0 < \varepsilon < 1 \qquad (1)$$

Here, i indicates different varieties of N number, x_i stands for quantity of consumption of i[th] variety, and ε is a measure of substitutability among different varieties. Notice that all varieties enter into the utility function symmetrically. Maximizing this utility function for different varieties of the good subject to budget constraint one can easily show that the elasticity of substitution between any two varieties may be defined by ρ

$$\rho = \frac{1}{1-\varepsilon} \qquad \text{where,} \; \rho > 1 \qquad (2)$$

Also remember that ρ stands for the elasticity of demand[3]. Now let us turn to the production of x_i . Unlike, typical Krugman model we consider two factors of production viz. skilled labor (S) and unskilled labor (L). Both S and L constitute fixed and variable cost elements of the standard total cost function as follows. [4]

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[3] For more clarification and mathematical arguments in favor of such similarity consult Dixit and Stiglitz (1977).

[4] Existence of fixed cost restrains any two firms from producing similar varieties.

$$C(x) = (w_S\alpha_1 + w\beta_1) + x\,(w_S\alpha_2 + w\beta_2) \quad (3)$$

w_S is the return to S and w is the return to L.

α_i and β_i are the shares of S and L in fixed cost and variable cost respectively. $0 < \alpha_1, \alpha_2, \beta_1, \beta_2 < 1$ and $\alpha_1 + \alpha_2 = 1 = \beta_1 + \beta_2$.

Hence, the average and marginal cost of production are shown as

$$\left.\begin{array}{l} AC = \frac{w_S\alpha_1 + w\beta_1}{x} + (w_S\alpha_2 + w\beta_2) \\ MC = (w_S\alpha_2 + w\beta_2) \end{array}\right\} \quad (4)$$

Therefore, the market equilibrium price is given by

$$P = (w_S\alpha_2 + w\beta_2)\ \frac{\rho}{\rho - 1} = \frac{1}{\varepsilon}$$

$$= (w_S\alpha_2 + w\beta_2)\,\mu \quad (5)$$

Where, $\mu = \frac{\rho}{\rho - 1} = \frac{1}{\varepsilon}$

However, absence of entry barriers in such models ensures that in the long run profit must be driven down to zero indicating that the price should be equal to the average cost of production.

Hence,

$$\frac{w_S\alpha_1 + w\beta_1}{x} + (w_S\alpha_2 + w\beta_2) = P \quad (6)$$

On the other hand, the output of a representative firm can easily be calculated from the zero profit condition as follows:

$$0 = \pi_i = P.x_i - \{(w_S\alpha_1 + w\beta_1) + (w_S\alpha_2 + w\beta_2)x_i\}$$

$$\Rightarrow x_i = \frac{w_S\alpha_1 + w\beta_1}{P - (w_S\alpha_2 + w\beta_2)} = \frac{w_S\alpha_1 + w\beta_1}{(w_S\alpha_2 + w\beta_2)\mu - (w_S\alpha_2 + w\beta_2)} \quad \text{(from (5))}$$

$$= \frac{w_S\alpha_1 + w\beta_1}{(w_S\alpha_2 + w\beta_2)(\mu - 1)} \quad (7)$$

Now it's time to move to the factor market clearing conditions as these type of models do not have room for unemployment. Both S and L are fully employed following these conditions:

$$\alpha_1.N + \alpha_2.N.x = S \tag{8}$$

$$\beta_1.N + \beta_2.N.x = L \tag{9}$$

Where N is the number of varieties and x is the quantity of any variety as these quantities are identical for all varieties. So, total output of a variety is $x.N = X$ (say). Thus (8) and (9) are modified as:

$$\alpha_1.N + \alpha_2.X = S \tag{8'}$$

$$\beta_1.N + \beta_2.X = L \tag{9'}$$

Solving for N and X we get,

$$N = \frac{S\beta_2 - L\alpha_2}{\alpha_1\beta_2 - \alpha_2\beta_1} \tag{10}$$

And

$$X = \frac{L\alpha_1 - S\beta_1}{\alpha_1\beta_2 - \alpha_2\beta_1} \tag{11}$$

In what follows we solve for x as $x = \frac{X}{N}$

$$x = \frac{L\alpha_1 - S\beta_1}{S\beta_2 - L\alpha_2} \tag{12}$$

Comparing (12) with (7)

$$x = \frac{L\alpha_1 - S\beta_1}{S\beta_2 - L\alpha_2} = \frac{\left(\frac{w_S}{w}\right)\alpha_1 + \beta_1}{\left(\frac{w_S}{w}\right)\alpha_2 + \beta_2} . \frac{1}{\mu - 1} \tag{13}$$

(Substituting From (7) $x = \frac{w_S\alpha_1 + w\beta_1}{(w_S\alpha_2 + w\beta_2)(\mu - 1)}$ as $x_i = x$)

Manipulating equation (13) we arrive at[5]

$$\frac{w_S}{w} = \frac{L\,[\alpha_1\beta_2\,(\mu-1) + \alpha_2\,\beta_1] - S\beta_1\,\beta_2\,\mu}{S\,[\alpha_1\beta_2 + \alpha_2\,\beta_1(\mu-1)] - L\,\alpha_1\,\alpha_2\,\mu}$$

$$Or,\ \frac{w_S}{w} = \frac{[\alpha_1\beta_2\,(\mu-1) + \alpha_2\,\beta_1] - \left(\frac{S}{L}\right)\beta_1\,\beta_2\,\mu}{\left(\frac{S}{L}\right)[\alpha_1\beta_2 + \alpha_2\,\beta_1(\mu-1)] - \alpha_1\,\alpha_2\,\mu} = B\ (say) \qquad (14)$$

A careful investigation of equation (14) asserts that for any given S and L, B becomes a constant as all other factors are exogenously given and known to us. This implies that w_S and w are positively related. Whereas equilibrium price in equation (5) provides an inverse relationship between w_S and w for given μ, α_2, β_2. Also notice that X is considered as numeraire good.[6]

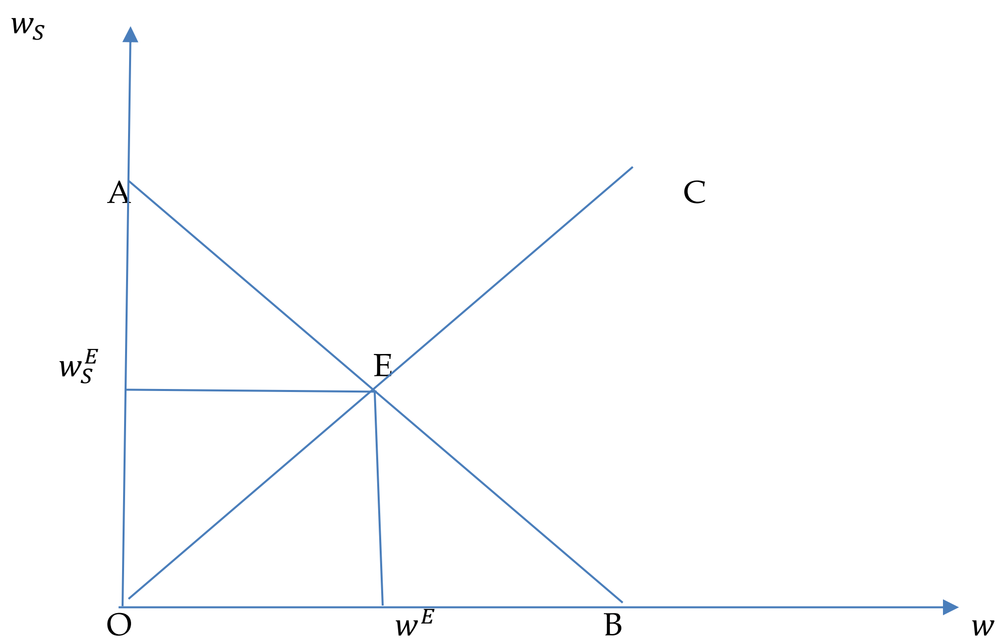

Figure: 1- Determination of wages

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[5] Alternatively, we can have $w_S\alpha_2(\mu-1)x + w\beta_2(\mu-1)x = w_S\alpha_1 + w\beta_1 \Rightarrow w_S \{\alpha_2(\mu-1)x - \alpha_1\} = w\{\beta_1 - \beta_2(\mu-1)x\} \Rightarrow \frac{w_S}{w} = \frac{\beta_2(\mu-1)x-\beta_1}{\alpha_1-\alpha_2(\mu-1)x}$.

[6] If the consumable final good is considered as numeraire, equation (5) becomes $(w_S\alpha_2 + w\beta_2) = \frac{1}{\mu}$.

These two equations and arguments are diagrammatically represented in Figure 1. From the intersection of AB (represents Equation (5)) and OC (represents equation (14)) we solve for equilibrium wage rates for S and L as w_S^E and w^E, respectively.[7]

Hence, x, N, X, w_S and w all are solved[8]. Therefore, from the foregone analysis it becomes apparent that we can also solve for skilled and unskilled wage, and wage disparity even in monopolistically competitive Krugman type model of trade.

2.1. Endowment, Trade, and Factor Mobility

So far, we have discussed a closed economy structure. Now, we open this structure for trade and introduce foreign economy represented by asterisk. S and L define supply of skilled and unskilled labor in Home economy while the same for Foreign economy are given by S^* and L^*, respectively, such that

$$\left(\frac{S}{L}\right) > \left(\frac{S}{L}\right)^* \quad (15)$$

In spirit of conventional Hecksher – Ohlin – Samuelson (HOS) factor proportions theory equation (15) talks about why Home economy is S abundant and Foreign economy is L abundant. In such backdrop we may consider two cases: (I): $(\frac{\alpha_1}{\beta_1}) > (\frac{\alpha_2}{\beta_2})$, and (II): $(\frac{\alpha_1}{\beta_1}) < (\frac{\alpha_2}{\beta_2})$.

If $(\frac{\alpha_1}{\beta_1}) > (\frac{\alpha_2}{\beta_2})$, the fixed cost component of the cost function turns out to be more skilled labor intensive. Such factor intensity of cost function also guarantees that $(\alpha_1\beta_2 - \alpha_2\beta_1) > 0$ which is a basic prerequisite for both N and X to be positive. It needs one more condition to be satisfied: $\frac{\alpha_1}{\beta_1} > \frac{S}{L} > \frac{\alpha_2}{\beta_2}$. Further, it is also apparent that due to

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[7] It can be easily checked that higher $\left(\frac{S}{L}\right)$ would rotate the upward rising OC-line to the right reducing skilled wage and increasing the unskilled wage.

[8] Note that our model does not determine P. We assume X as the numeraire good and hence everything is measured in units of X.

$\left(\frac{S}{L}\right) > \left(\frac{S}{L}\right)^*$, $N > N^*$ and X < X*. This can be checked from equation (10) and (11). Again, since we know $X = N.x$ and $X < X^*$, when $N > N^*$ we must have the following inequality: $x < x^*$.

Again, if $(\frac{\alpha_1}{\beta_1}) < (\frac{\alpha_2}{\beta_2})$, $(\alpha_1\beta_2 - \alpha_2\beta_1) < 0$. This indicates that both X and N would be negative if we do not impose any further condition. In this case for both N and X to be positive we must have following conditions satisfied[9] : $\frac{\alpha_2}{\beta_2} > \frac{S}{L}$ and $\frac{\alpha_1}{\beta_1} < \frac{S}{L}$ or $\frac{\alpha_1}{\beta_1} < \frac{S}{L} < \frac{\alpha_2}{\beta_2}$.

One interesting implication of our analysis is that in addition to the standard technique of determining the volume of trade in conventional Krugman type imperfectly competitive trade model, our model also says something about the pattern of trade even in Krugman structure.

Therefore, we have the following propositions.

Proposition 1: *If fixed costs are $S(L)$ intensive and home country is $S(L)$ abundant, then N will be greater (lower) than N^* and x will be lower (greater) than x^*.*

Proof: See discussion above.

Proposition 2: *Wage inequality between S and L would be less in S abundant country – $\left(\frac{w_s}{w}\right) < \left(\frac{w_s}{w}\right)^*$ if $\left(\frac{S}{L}\right) > \left(\frac{S}{L}\right)^*$*

Proof: Follows from Figure-1.

As trade opens up, the standard Krugman model type result will be the outcome. Each nation will enjoy greater number of varieties and hence mutual gains from trade. As with a CES utility function, number of varieties in each country do not change. Wages

[9] This condition and the previous one appear to be quite similar with the idea of cone of diversification and positive outputs in HOS model of trade.

remain the same as determined from Fig-1. But something else happens which is not generally observed in a typical monopolistically competitive trade model.

Now there is a specific pattern of trade depending on $\frac{S}{L}$. The country with higher $\frac{S}{L}$ produces more varieties and less output for each variety. This is exactly opposite in the other country. They produce less N and more output per variety. Both countries will continue to do so.[10] Thus, quantity of output per variety will differ across the union set of varieties between countries. But that will not impact the price as elasticity is constant. Thus, the higher $\frac{S}{L}$ economy will be observed to export more varieties relative to the L abundant economy $\left(\frac{N}{N^*} > 1\right)$ and its average consumption of output per variety will increase relative to autarky. Exactly opposite will happen for the other country. Its average consumption of output per variety will decline relative to what it was in autarky.

Factor flows will surely induce some shift in variety and quantity aspects [see equations (10), (11) and (12)]. The S abundant country should experience an exodus of S as w_S is lower in the domestic market, while the partner country has lower unskilled wage. If we allow for free factor flows, endowment and wages will be identical in trading countries. This will be the case of two exactly identical countries and the trade outcome will be exactly identical to textbook Krugman model. In Fig- 1 OC-line will rotate to the left for the home country and to the right for the foreign country leading to, as anticipated, equality of factor prices. Hence, trade in goods does not affect the wage gap, but factor

[10] It is also very fascinating to note that in autarky if one country has more of both factors but $\left(\frac{S}{L}\right)$ is identical in both countries. But one country has greater demand or market size, without differences in factor prices. Therefore, P is also same in these two countries. This indicates higher N in the country having higher S and L although x is same because of identical fixed cost across countries. Hence, the interesting point is that larger market size has no price effect or output per variety effect. The only effect would be on N, number of variety. This result is very similar to CES Krugman model even though we have two factors of production unlike conventional Krugman set up.

flows would increase wage gap in the home country and reduce it in the foreign, not really a surprising outcome.

Before we move to extending the basic model incorporating unemployment of unskilled workers let us very briefly look at the trade balance condition and its implications for pattern of trade. Say Home income is denoted by Y, and Foreign income is denoted by Y^*.

$Y = N.x$ and $Y^* = N^*.x^*$ as final commodity is considered as the numeraire one. Hence total world income is $Y + Y^* = N.x + N^*.x^*$. Let us further assume that α is the proportion of world income spent on Home and $(1 - \alpha)$ proportion is spent on Foreign. Therefore,

$$N.x = \alpha \, (N.x + N^*.x^*) \quad (16)$$

$$N^*.x^* = (1 - \alpha) \, (N.x + N^*.x^*) \quad (17)$$

From (16) and (17)

$$\frac{N.x}{N^*.x^*} = \frac{\alpha}{(1-\alpha)} \quad (18)$$

Equation (18) clearly suggests the balance of trade condition. Given the shares of expenditure, greater the number of varieties the home country produces relative to the foreign country, higher has to be the output per variety produced by the foreign country. So, proportion of import (export) of varieties by the foreign (home) country has to be exactly equal to the proportion of export (import) of output per variety by the foreign (home) country. Two exactly identical countries similar in all respects will mean both sides will be unity in (18). There balanced trade condition will not reveal the underlying trade since it is indeterminate as in the conventional Krugman type models. But once we bring in differences in factor endowments in this model we can see the underlying trade pattern also.

For example, if US produces 20 varieties and Germany 10 and each country spends ½ of their income on products of each country, then the amount of output per variety in Germany has to be double of that of US. Remember that higher output in Germany is consistent with higher fixed costs as skilled labor is more expensive there and cost share of skilled labor is higher in fixed costs. Also, the variable cost component in equilibrium must be the same in each country for price to be the same and wages of both types of labor are determined via (5) and (14).

3. Extending the Basic Model with Unskilled Unemployment

In this Section we introduce unemployment of L which is a regular phenomenon in almost all countries regardless of their degrees of development. The easiest way to conceptualize this idea is to think of a minimum wage for L. Suppose in the home country now there is a minimum wage which is greater than the initial equilibrium wage as derived in the earlier section. Higher wage for L immediately leads to $MC > P$ or with real wages MC > 1. So, skilled wage has to drop if production has to take place. In fact, minimum wage for L pins down the wage for S. Though average variable cost does not change as skilled wage drops to accommodate a rise in the wage for L, fixed cost should fall as we have assumed that fixed cost component is skill intensive. This implies output per variety must fall for $P = AC$ to hold. Now (7) and (8′) are good enough to determine N and x given S. N will increase and x will fall leading to lower demand for unskilled labor compared to L. Hence, there is open unemployment.

Proposition 3: *With a minimum wage number of varieties increases (decreases) and output per variety falls (increases) if fixed cost component is S (L) intensive.*

Proof: Follows from (5), (7) and (8′).

We can briefly represent our points mathematically as follows. In presence of unemployment equation (9′) can be redefined as

$$\beta_1 . N + \beta_2 . X = L_e = L - L_U \qquad (19)$$

Here L_U represents unemployment of unskilled workers whereas L_e indicates total absorption of unskilled workers in production. Again, equation (14) takes the following form

$$\frac{w_S}{\bar{w}} == \frac{[\alpha_1\beta_2\,(\mu-1) + \alpha_2\,\beta_1] - \left(\frac{S}{L_e}\right)\beta_1\,\beta_2\,\mu}{\left(\frac{S}{L_e}\right)[\alpha_1\beta_2 + \alpha_2\,\beta_1(\mu-1)] - \alpha_1\,\alpha_2\,\mu} = \frac{[\alpha_1\beta_2\,(\mu-1) + \alpha_2\,\beta_1] - \left(\frac{S}{L-L_U}\right)\beta_1\,\beta_2\,\mu}{\left(\frac{S}{L-L_U}\right)[\alpha_1\beta_2 + \alpha_2\,\beta_1(\mu-1)] - \alpha_1\,\alpha_2\,\mu} \quad (20)$$

From (20) we see that the warranted relationship between L_U and w_S, for any given $\bar{w}$, is negative. This is shown by DE-line in Figure-2.

And, finally equation (5) gives rise to

$$1/\mu = (w_S\alpha_2 + \bar{w}\beta_2) \Rightarrow w_S = \frac{1}{\alpha_2}\left(\frac{1}{\mu} - \bar{w}\beta_2\right) \quad (21)$$

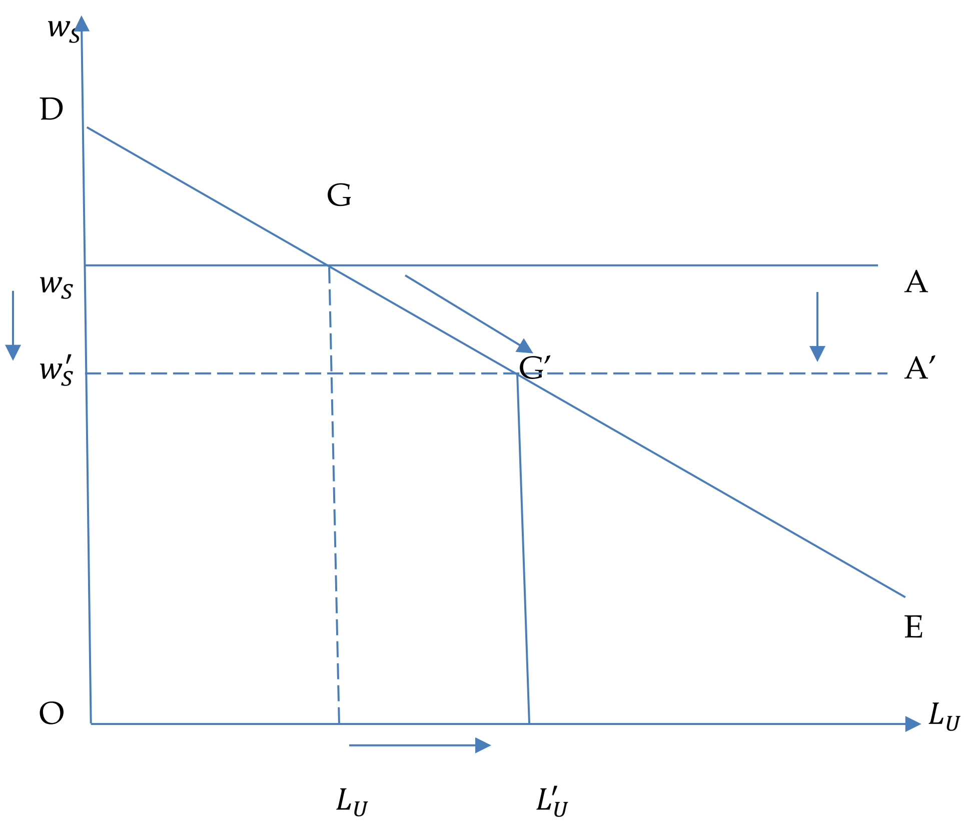

Figure: 2 – Effect on unskilled unemployment

Equation (21) shows why for given $\overline{w}$ and already determined value of μ, w_S is constant. Diagrammatically it is shown by a straight line, $w_S A$, parallel to the horizontal axis with a positive intercept equal to the value of w_S. And this is true for all levels of L_U. A higher $\overline{w}$ causes lowering the value of w_S. Initial equilibrium takes place at G producing w_S and L_U as equilibrium combination of skilled wage and unskilled unemployment. When $\overline{w}$ rises, $w_S A$ shifts down to $w'_S A'$ leading to decline in skilled wage and an increase in unskilled unemployment. New values are w'_S and L'_U, respectively corresponding to the new equilibrium at G'.

Interestingly, our results have some interesting similarities with the real-world phenomenon observed in some parts of the world. Consider USA and Europe or EU. It is a conventional theoretical construct to consider trade between relatively fully employed US economy with flexible wage and unemployment ridden Europe for example as in Davis (1998), Merkel (2006). We assume to start with US and EU were exactly identical two regions, but now there is a minimum wage in EU. As discussed above EU now will have greater number of varieties and less output per variety compared to US. Nothing will change in USA and consumers everywhere would consume greater number of varieties after trade. Note the difference with the single factor economy. Since fixed cost now is lower with a lower skilled wage in EU varieties will rise.

4. Conclusion

This paper builds up a monopolistically competitive model of trade in presence of increasing returns to scale in production. Unlike conventional imperfectly competitive trade model we consider two types of labor- skilled and unskilled. We find that skilled labor rich country would focus more on variety whereas unskilled labor abundant country's main target is to produce more quantity of any variety. Further, our model exhibits that wage inequality between skilled and unskilled labor would be relatively low in skilled labor abundant country. This result becomes further substantiated in the extended model where we incorporate unemployment of unskilled labor. In this line we also derive one interesting outcome – unskilled unemployment ridden economy produces more variety of consumable goods. Besides, a rise in the fixed wage of unskilled labor increases total unemployment in the economy and will have second round of effects on variety and on per variety quantity. Therefore, in the end, formation of skilled labor may be perceived as an important channel to ameliorate the much infuriating problem of wage disparity, and to produce higher number of varieties to satisfy the love-for-variety preference of the consumers.

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