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Capital inflow, vanishing sector and wage distribution in an economy with corruption related intermediation

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Abstract

This paper formulates a specific factor model of trade with skilled and unskilled workers as the specific and capital as the mobile factors. Production of goods is subject to intermediation and corruption. We then allow for international capital mobility and show that corruption as an activity may be squeezed out if the cost of intermediation is held fixed at any exogenously fixed level.

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1. INTRODUCTION

The concern, mechanism and determinants of wage-inequality between skilled and unskilled workers all over the globe have been extensively discussed in Feenstra (2004), Feenstra and Hanson (1997, 2003), Marjit and Acharyya (2003), Zhu and Trefler (2005), Das (2005), Jones and Marjit (2003), Chao *et al* (2006) etc. Till the publication of Mandal and Marjit (2010), however, there was no paper in the literature which attempted to theoretically capture the interrelation between institutional factors like corruption or intermediation and wage inequality. Following this paper Andres and Dobson (2011), using a panel data methodology, has done an empirical study on Latin America to show that institutional corruption and wage inequality are in fact interrelated. Nevertheless there is real dearth of papers that have focus on another fascinating possibility that any of the existing sectors might vanish along with dispersing wage-inequality due to influx of foreign capital. Two pioneering papers in this line are Jones (1996) and Findlay and Jones (2000). Very recently Marjit and Kar (2011) described the phenomenon of two-sided wage inequality with the possibility of a sector to be vanished and Kikuchi, Marjit and Mandal (2012) analyses the same phenomenon in a model where separated time zones determine pattern of trade.

Following Jones (1971) here we develop a general equilibrium specific factor model of trade. We assume both the sectors to be distorted with corruption related transaction cost[1]. This is not an insensible assumption for a developing economy where bureaucratic red tapism, political control over business ventures, interest motivated administration related extortion are omnipresent[2]. We assume that the corruption related cost or the loss in the value of output assumes an ice-berg type form. To start with we further assume that cost of corruption is constant.[3]

Corruption in our framework diverts resources from productive to corruptive activities. This argument is drawn from a reasonable assumption that economic agents often have to comply with the undesired forces of regulation, intervention and rent-seeking. The lost value of

[1] One can also consider the transaction cost of corruption as a tax on the output or activity. So other way of representing this cost is "corruption-tax".

[2] This idea has similar interpretation like trading cost. Trading does not necessarily mean international trading cost. In order to make the produced goods available for consumption the same needs to be reached from producers to consumers. Retailing or distribution or trading needs some cost which one may focus on within the framework that we develop in the current paper. For related literature interested readers may look at Falvey (1976), Cassing (1978), Deardorff (2004), Anderson (2000), Anderson and Wincoop (2004), Davis (1998), Trefler (1995), Laussel and Riezman (2008), Bernard, Jensen and Schoot (2006), Limao and Venables (2001), Marjit and Mandal (2012) etc.

[3] Sometimes it is argued that domestic and foreign investors are not symmetrically affected by domestic corruption. Corruption may act as a serious barrier for attracting foreign capital as foreign investors are not fully aware of local customs, practices and the "efficient" mode of doing corruption related intermediation. In that case we can easily place a mark-up over the standard cost of intermediation. This will, however, not change the basic arguments significantly.

output in each sector due to institutional menace goes towards paying bill for those who essentially intermediates for the producers at a price.

In this set up we prove that consequent upon capital inflow at least one of these three sectors must vanish when the cost of corruption related intermediation is fixed at an exogenously given level.

The arrangement of the paper is as follows. Introduction is followed by the environment and the basic model in section 2. Section 3 discusses in brief the possibility that one of the sectors may vanish consequent upon capital influx. The last section concludes.

2. FORMATION OF THE BASIC MODEL AND SOLUTION

We assume a small open economy. All markets are perfectly competitive and constant returns to scale helps determining the input-output coefficients. For brevity we normalize all the prices to unity. Two traded goods X and Y are produced by skilled labor (S) and unskilled labor (L) as specific factors, respectively and by inter-sectorally mobile capital (K). Producers of X and Y need to conform to the institutional hazards that we have mentioned in the introduction. Z denotes the sector which engages labor and capital in the act of intermediation[4]. All factors are freely mobile among these three alternatives. Production of both X and Y are symmetrically affected by corruption related transaction costs denoted by α. α signifies the rate of cost of corruption. This is covered by a part of the value of per unit of outputs. Thus by definition corruption smoothening intermediation requires all factors of production.

We use following symbols to describe the set of equations of our model. Note that here $P_j \Rightarrow$ price of the jth commodity (j= *X, Y*); $w_s \Rightarrow$ skilled wage; $w \Rightarrow$ unskilled wage; $r \Rightarrow$ rate of return to *K;* $a_{ij} \Rightarrow$ input-output coefficient *(*$i \neq j$; i = *S,L,K* and j = *X,Y,Z*); $\alpha \Rightarrow$ per unit corruption smoothening intermediation cost or the rate of cost of corruption; $\bar{S} \Rightarrow$ total supply of skilled labor; $\bar{K} \Rightarrow$ total supply of capital; and $\bar{L} \Rightarrow$ total supply of unskilled labor; $S_z, L_z, K_z \Longrightarrow$ factors' employment in Z; $\wedge \Longrightarrow$ proportional change.

Competitive price conditions entail that,

$$w_s\, a_{sx} + r\, a_{kx} = (1 - \alpha) \quad (1)$$

$$w\, a_{ly} + r\, a_{ky} = (1 - \alpha) \quad (2)$$

Total value of the goods lost due to corruption related intermediation must be equal to the payments made for factors implying

$$w_s\, S_z + w\, L_z + r\, K_z = \alpha(X + Y) \quad (3)$$

α fraction of total output $(X + Y)$ is the total revenue earned in the Z sector. In equation (3) $S_z = a_{sz}.Z$, $L_z = a_{lz}.Z$ and $K_z = a_{kz}.Z$. The relations among S_z, L_z and K_z are linear and fixed

[4] One can easily refer to Bhagwati (1982) for a detailed explanation of unproductive factors/services.

such that $L_z = a\,S_z$ and $K_z = b\,S_z$ where a and b are constants[5]. Therefore equation (3) can be re-written as

$$w_s + aw + br = \alpha\frac{(X+Y)}{S_z} \qquad (3').$$

Now let us turn to the full employment conditions. Full employment condition ensures the following equalities:

$$a_{sx}.X + S_z = \bar{S} \qquad (4)$$

$$a_{ly}.Y + L_z = \bar{L} \qquad (5)$$

$$a_{kx}.X + a_{ky}.Y + K_z = \bar{K} \qquad (6)$$

Furthermore, equation (3) can be re-interpreted as

$$w_s\,a_{sz} + w\,a_{lz} + r\,a_{kz} = \alpha\frac{(X+Y)}{Z}$$

It has been mentioned before that the economy is plagued with corruption. Irrespective of the nature and source this needs to be tackled. Producers have to employ resources in order to contest with corruption generating forces as well. Corruption related intermediation is required for each unit of produce. This, in turn, implies that the demand for intermediation actually comes from producers who are ready to pay pecuniary benefits to those who are willing to serve as intermediaries. Producers essentially do not find any difference between "productive" and "unproductive" factors and, thus, pay identical returns. Therefore, it is worth mentioning that $(X+Y) = Z$. In brief this equality states that, on the one hand, total amount of goods X and Y produced are subject to intermediation without any specific bias. And on the other hand, total units of intermediation service required in the economy is denoted by Z. By definition these two amounts are equal as we presume that each unit of output in either sector, X or Y requires one unit of intermediation or corruption. Thus,

$$w_s\,a_{sz} + w\,a_{lz} + r\,a_{kz} = \alpha \qquad (7)$$

We shall use equation (7) for further exploration of the consequences of an inflow of capital in the next section. However, there will be no qualitative change as such if we proceed with (3). Equation (7) is a mere different representation of (3).

Therefore the structure of the model is complete. Here we have six unknown variables (w_s, r, w, X, Y, S_z) as we assume α to be given in the basic structure. We will, however, relax this assumption in Section 4. We determine w_s, r and w from equations (1), (2) and (7). Through the assumptions of constant returns to scale and diminishing marginal productivity we get the values of $a_{ij}s$. Thus we solve for X, Y and S_z from (4), (5) and (6). It is worth-repeating that $L_z = a\,S_z$ and $K_z = b\,S_z$.In addition once S_z is determined we have the equilibrium value of Z as $S_z = a_{sz}Z$. In fact solution of S_z is to be done in tandem with X and Y.

[5] Production technology for corruption related intermediation follows Leontief structure. Factors are used in fixed proportion.

3. EXOGENOUS COST OF CORRUPTION AND VANISHING SECTOR

One striking situation that can emerge in this framework is the possibility where one of these three sectors may eventually vanish due to foreign capital inflow. The economic reasoning for "vanishing sector argument" is quite simple. When factors are freely mobile across sectors any factor will choose that occupation which promises relatively high return. If such mobility of factor(s) induces changes in factor return(s) and the unit price of a commodity becomes less than unit cost, the commodity becomes unviable in a competitive set up. On the other hand when cost becomes less than price, at least one specific factors' price must increase and pull the mobile factor(s) from other sectors. This will also lead to stopping production of another commodity in a specific-factor framework. In this context Jones (1996), Findlay and Jones (2000) have nicely indicated at various possibilities and implications of "vanishing sector argument" in different perspectives.

Consider the cost of corruption related intermediation as exogenously given and constant. Under this condition an inflow of foreign capital depresses *r*. In what follows both w_s and w would increase. This is apparent from equation (1) and (2). The rate of rise of w_s and w entirely hinges upon factors' share in X and Y, respectively. Now turn to equation (3). The Left Hand Side (LHS) indicating payment to the factors engaged in intermediation may increase, decrease or remain constant. However, the Right Hand Side (RHS) implying the value of lost output must increase as both w_s and w rise. Also note that Z will also increase since (X+Y) is identical with Z. Therefore, using (3') the RHS remains same as a_{sz} is constant. If LHS of (3') turns out to be greater than RHS, the cost of intermediation becomes greater than the value of intermediation in a sense. This leads to non-viability of Z. Only X and Y would exist and Z would vanish from the structure[6]. For any given value of α, consequent upon capital inflow

$$\widehat{w}_s = (-)\hat{r}\frac{\theta_{kx}}{\theta_{sx}} > 0 \text{ and } \widehat{w} = (-)\hat{r}\frac{\theta_{ky}}{\theta_{ly}} > 0.$$

Differentiating (7)

$$\widehat{w}_s\theta_{sz} + \widehat{w}\theta_{lz} + \hat{r}\theta_{kz} = 0$$

As w_s and w increase, cost of intermediation increases countered by a decline in r. If Z is "labor" intensive implying a low cost share of capital, the cost will exceed α and Z will vanish. This is trivially true if $\theta_{kz} = 0$. If α is not allowed to go up, workers are better off being employed in X and Y rather than in intermediation. This is ensured if the following condition is satisfied

$$\left(\frac{\theta_{kx}}{\theta_{sx}}\frac{\theta_{sz}}{\theta_{kz}} + \frac{\theta_{ky}}{\theta_{ly}}\frac{\theta_{lz}}{\theta_{kz}}\right) < 1$$

For reverse argument there will be no X and Y, only Z would theoretically exist. But this is not feasible by definition as Z is a byproduct of X and Y and (X+Y) =Z. Now we are left with the possibility where LHS of (3') is equal to the RHS. In that case either X or Y may vanish from the system. X would no longer be produced if $\theta_{kx} > \theta_{ky}$ or $\theta_{sx} < \theta_{ly}$. Production of *X* would be

[6] Interested readers may look at Marjit and Kar (2009, 2011) for similar kind of arguments from a different perspective.

non-viable when unit cost would be higher than unit price which is normalized to unity. We already know that r falls and w_s rises. When w_s rises by a greater extent then only the cost of production may outweigh price. In order to get this outcome the share of capital in *X* has to be sufficiently high or the share of labor has to be sufficiently low compared to that of in *Y*. For analogous reasoning *Y* would be vanished *if* $\theta_{kx} < \theta_{ky}$ and all unskilled workers have to go to the intermediation sector for survival. Thus what we see here is that the possibility of a sector vanishing essentially depends on the factor intensity assumption.[7] Thus we have

PROPOSITION : *(i) Capital inflow leads to the closure of one of the sectors;*
(ii) If θ_{kz} *is very small, Z must vanish and X and Y will survive;*
(iii) If $\theta_{kx} > \theta_{ky}$, $\frac{w_s}{\mathrm{w}}$ *will increase.*

Proof: See discussion above.

What the proposition tells us is that capital inflow though may increase the degree of inequality can curtail corruption related activities.

4. CONCLUDING REMARKS

Here we have developed a standard specific factor general equilibrium model of trade with corruption related intermediation. The cost associated with intermediation eats away output from both the sectors without any bias. In this set up it has been shown that if international capital is allowed to come in, one of the three sectors of the system has to vanish when rate of cost of corruption related intermediation is constant at an exogenously given level. We have also discussed the condition for which corruption as a separate activity will cease to exist consequent upon capital inflow.

[7] Even if we assume asymmetric costs of corruption for X and Y, the factor intensity assumption will decide which sector will survive as long as the costs of corruption are held fixed. We are thankful to the referee for pointing out this.

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