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Informal Wage, Informal Price and Extortion under Migration and Tariff Reform[*]

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Abstract

In this paper we propose a theoretical model where formal and informal sectors co-exist in tandem. Trade union segregates some labor from being formal. Capital is not allowed to freely move between formal and informal sectors. Using this sort of framework it has been shown that immigration of unskilled workers reduces the return to informal labor and makes the informal good relatively cheap. A tariff slash also impinges on similar kind of results. In both the cases informal capitalists gain. Moreover, what is more striking is that both migration and tariff reform are equally bad for the economy as a whole since these policies enhance the 'unproductive' element or labor in the society which is really costly as these laborers could have been used to produce some more consumable commodities.

1. Introduction

Irrespective of the type of countries, be it developing or developed, the existence of informal sector is an undeniable fact of real world. Informal sector mainly consists of non-agricultural sector or any sector which is not registered and not legal, per se. In fact more than 50% in South Asia, 30-50% in South East Asia, almost 50% in Africa, 55% in Latin America and Caribbean, 24% in Southern Europe, 10% in Western Europe, 18% in Canada and 8% in USA employment come under the informal purview ([1-3]). Here we define informal sector by the non-existence of trade union implying a perfectly competitive labor market for unskilled informal workers. Since informal sector is unlawful, it is beset with intermediation related extortion[1]. At this point extortion is defined by the set activities of a group of people who intermediate with local governmental authority for the survival of informal units. In return of this intermediation extortionists get a wage equivalent to the wage of informal workers. Hence informal production and extortion are complementary with each other in a sense.

Another important facet of factual world is migration. It could be immigration of unskilled workers or emigration of skilled workers. The reasons might be a search for better job opportunity (pull factor) or relatively poverty-stricken native land (push factor). The issue of international migration posits itself in causing major challenges to the socio-economic condition of a country. For example, India has a long history of receiving a constant inflow of migrants from Bangladesh. More than 56% of the migrants to India are from Bangladesh. Though the trend of Bangladeshi immigrants has decreased in recent times, the absolute number is still huge and warrants discussion. These migrants generally find work as cheap labor in the informal sector of the receiving country. Coupled with these issues trade protectionist policies are gradually taking the backseat. Continuing demolition of tariff has become the prime agendum of all economies across the globe. Therefore, in this paper we will try to look at the possible effects of all these policies in a trade theoretic framework described in the next section. We primarily focus on three things: informal wage, price of the informal good and extortion activity due to immigration and tariff reform. Several papers have been written in this line [8-14]. In a recent volume [15] emphasize has been given on different facets of informal sector and dealt with varied intricate issues. But none of the papers

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[1]Interested readers may look into [4,5,6,7] etc. for further understanding of extortion and informal activities.

in the existing literature has attempted to focus on the effects of migration on informal wage, informal price, extortion etc.

The next section describes the model and provides with the solution. Section 3 analyses the effects of migration and reform. Section 4 points to some possible extensions which is followed by concluding remarks in Section 5. However, relevant mathematical details are relegated to the Appendix.

2. The Basic Model and Solutions

Here we have a small open economy producing three goods: X, Y and Z. Out of these three goods X (exportable) and Y (importable) are traded but Z is a non-traded one. Hence P_x and P_y are determined in the international market whereas P_z is determined by the standard Cobb-Douglas demand function. X and Y use skilled labor (S) and unskilled labor (L) respectively as specific factors but they share a common capital (K). Note that Y is protected by a tariff and L is unionized there. Thus L gets $\overline{W}$ as wage in Y. Therefore X and Y constitute the formal segment of the economy. However, Y is not capable of absorbing all unskilled workers. Hence some "unlucky" workers have to search for an alternative option and they find it in the informal sector (Z) where wage rate is determined by the competitive pressure. Z uses T as a specific factor. As informal sector is distorted by the intermediation of local 'tolapickers' (L_n) a certain proportion (α) of the value of the good (P_z) is appropriated by L_n as the fee of extortion. Informal producers have to abide by this 'system' as informal units are illegal by rules. We can easily term this extortion activity as 'corruption' sector if we go by Bhagwati's [16] concept of directly unproductive profit seeking activities (DUP). Since L_n workers get the same wage as informal workers total expenditure on L_n ($= w.\ L_n$) has to be equal with the lost value of output ($= \alpha\ P_z.\ Z$). We further assume competitive market for all goods and factors. Production of goods follows constant returns to scale (CRS) and factors of production exhibit diminishing marginal productivity (DMP).

Following Jones [17,18] we can describe the model by the following symbols and the set of equations, where, $P_j \Rightarrow$ price of the jth commodity ($j = X,\ Y,\ Z$); $W_S \Rightarrow$ skilled wage; $\overline{W} \Rightarrow$ unskilled formal wage; $W \Rightarrow$ unskilled informal wage; $r \Rightarrow$ rate of return to K; $R \Rightarrow$ rate of return to T; $a_{ij} \Rightarrow$ production requirement of the ith factor in one unit of jth commodity ($i = S,\ L,\ K,\ T$ and $j = X,\ Y,\ Z$); $S \Rightarrow$ total supply of skilled labor; $L \Rightarrow$ total supply of unskilled labor; $L_n \Rightarrow$ number of unskilled labor employed in extortion; K

$\Rightarrow$ total supply of capital, K; $T \Rightarrow$ total supply of capital, T.

The competitive price conditions are given by:

$$W_S a_{SX} + r a_{KX} = P_x \tag{1}$$

$$\overline{W} a_{LY} + r a_{KY} = P_y(1+t) \tag{2}$$

$$W a_{LZ} + R a_{TZ} = P_z(1-\alpha) \tag{3}^2$$

Note that $\overline{w} > w$ because of the trade union exercise in the formal unskilled segment. Full employment of all the factors guarantee the following equations,

$$a_{SX}.X = S \tag{4}$$

$$a_{KX}.X + a_{KY}.Y = K \tag{5}$$

$$a_{LY}.Y + a_{LZ}.Z = L - L_n \tag{6}$$

$$a_{TZ}.Z = T \tag{7}$$

Let us further assume that the demand for Z follows standard Cobb-Douglas preference where β fraction of consumers' income is spent on the informal good. This is denoted by

$$\beta\{P_x.X + (1+t)P_y.Y\} = (1-\beta)P_z.Z \tag{8}$$

The value-cost equality of extortion is

$$\alpha.P_z.Z = w.Ln \tag{9}$$

Here we have nine unknown variables (W_S, W, r, R, P_z, X, Y, Z and L_n) and nine equations. For given t and P_y, we solve r from (2). Given P_x, we solve W_S from (1). The technological co-efficients for X and Y are determined from the CRS assumption. X can be derived from (4) for any given S. Equation (5) solves the value of Y for given K and for the given value of X, calculated from (4). Again for any given and positive L_n, we get the value of Z from (6). Consequently P_z is solved from (8). W and R are determined from (3) and (7). Moreover, we can solve for equilibrium L_n from (9). So the system is solved. For a detailed technique one can check [19,20].

3. Effects of Migration and Reform

3.1. Immigration of Unskilled Workers

An immigration of unskilled workers indicates an increase in labor supply in Z. This is likely to influence the output of Z, W and L_n. However as P_x and P_y are given, there would be no change in W_S, r and $\overline{W}$. Through CRS assumption output of X and Y would not change. This implies a constant $\{P_x.X + (1+t)P_y.Y\}$ for given t. Hence demand for Z remains same and P_z crucially depends on supply of Z.

$^2 \alpha$ implies the degree of extortion and $0 \leqq \alpha \leqq 1$.

An increase in L immediately pushes W down and for given Z (and hence unchanged P_z) R must go up. Producers will try to economize on the usage of T. This ensures an increase in the supply of Z from Equation (7). For given α, P_z if Z goes up L_n must increase from (9) (also see **Figure 1**) again as Z rises and $\{P_x.X + (1+t)P_y.Y\}$ remains same P_z must fall because β is constant.

When W falls, WL_n rotates down. But as L increases some more L would also be employed as extortionists and productive L in the informal sector will increase as well. Thus $\alpha.P_z.Z$ would shift up. These two effects would result in an unambiguous increase in L_n.

By simple mathematical manipulation and using the standard notation we can arrive at the following expressions (see Appendix for detailed calculation).

$$\hat{X} = \frac{\sigma_x \theta_{kx}}{\theta_{sx}} \left\{ \hat{P}_x - \hat{P}_y \frac{(1+t)}{\theta_{ty}} - \hat{t} \frac{t}{\theta_{ky}} \right\} = 0, \quad (10)$$
$$\text{as} \quad \hat{P}_x = \hat{P}_y = \hat{t} = 0$$

Note that throughout the paper ' Λ ' represents proportional change.

σ_i = elastcity of substitution in i^{th} commodity.
θ_{ij} = value share of ith factor in j^{th} commodity.
λ_{ij} = quantity share of ith factor in j^{th} commodity.

$$\hat{Y} = \frac{\lambda_{kx}}{\lambda_{ky}} \frac{\sigma_x \theta_{kx}}{\theta_{sx}} \left\{ \hat{P}_x - \hat{P}_y \frac{(1+t)}{\theta_{ty}} - \hat{t} \frac{t}{\theta_{ky}} \right\} = 0 \quad (11)$$

$$\hat{R} = \frac{1}{\lambda_{lz}\sigma_z(\theta_{lz}+\theta_{tz})}\{\hat{L} - \lambda_{ln}\hat{L}_n\} + \hat{P}_z \frac{(1-\alpha)}{(\theta_{lz}+\theta_{tz})} > 0 \quad (12)$$

For given P_z, $\hat{R} > 0$ as $\hat{L}$ can not be less than $\lambda_{ln}\hat{L}_n$. Note that even if entire increased L is absorbed in extortion, $\hat{L} > \lambda_{ln}\hat{L}_n$ as $0 < \lambda_{ln} < 1$.

$$\hat{W} = (-)\frac{\theta_{tz}}{\lambda_{lz}\sigma_z(\theta_{lz}+\theta_{tz})}\{\hat{L} - \lambda_{ln}\hat{L}_n\} + \hat{P}_z \frac{(1-\alpha)}{(\theta_{lz}+\theta_{tz})} < 0 \quad (13)$$
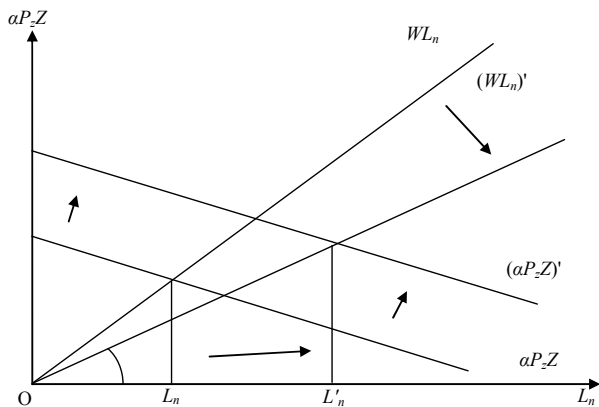

Figure 1. Change in the number of extortionists due to immigration.

$$\hat{Z} = \frac{\theta_{lz}}{\lambda_{lz}\theta_{tz}}\{\hat{L} - \lambda_{ln}\hat{L}_n\} > 0 \quad (14)$$

From (8)

$$\hat{P}_z = (-)\hat{Z} < 0 \quad (\text{as } \hat{X} = \hat{Y} = 0) \quad (15)$$

From (9) $\hat{\alpha} + \hat{P}_z + \hat{Z} = \hat{W} + \hat{L}_n$

Or, $\hat{W} = (-)\hat{L}_n$ as $\hat{\alpha} = 0$ and $(\hat{P}_z + \hat{Z}) = 0$ (16)

Or, $\hat{L}_n = (-)\hat{W} > 0$ as $\hat{W} < 0$ (17)

Thus the following proposition is immediate:

Proposition I: *An immigration of unskilled labor*
    a) *Depresses the informal wage,*
    b) *Expands the informal output,*
    c) *Decreases the price of the informal good, and*
    d) *Enhances the number of extortionists.*

3.2. Tariff Reform

A reduction in tariff in the protected sector (Y) changes the return of K as formal wage is already fixed at $\overline{W}$. The return to capital r will fall in both X and Y. But as P_x is given W_S must go up leading to an increase in X and a fall in Y as these two goods share the same mobile capital, K. The moment Y falls some unskilled labor would be released from Y and would rush to Z to raise the output of Z. In this process the informal wage rate must fall as the supply of unskilled workers go up in the informal sector. If we assume an unchanged $\{P_x.X + (1+t)P_y.Y\}$, P_z should decline as Z has already increased. A similar diagram like **Figure 1** helps explaining the effect on L_n which must increase.

Mathematically the effects of a tariff cut can be summarized as follows:

$$\hat{X} = (-)\frac{\sigma_x \theta_{kx}}{\theta_{sx}}\left\{\hat{t}\frac{t}{\theta_{ky}}\right\} > 0, \text{ as } \hat{P}_x = \hat{P}_y = 0 \text{ and } \hat{t} < 0 \quad (18)$$

$$\hat{Y} = \frac{\lambda_{kx}}{\lambda_{ky}}\frac{\sigma_x \theta_{kx}}{\theta_{sx}}\left\{\hat{t}\frac{t}{\theta_{ky}}\right\} < 0, \text{ as } \hat{P}_x = \hat{P}_y = 0 \text{ and } \hat{t} < 0 \quad (19)$$

$$\hat{r} = \hat{t}\frac{t}{\theta_{ky}} < 0 \quad (20)$$

$$\hat{W}_S = \frac{\theta_{kx}}{\theta_{ky}}\hat{t}\frac{t}{\theta_{sx}} \quad (21)$$

$$\hat{R} = \frac{1}{\lambda_{lz}\sigma_z(\theta_{lz}+\theta_{tz})}\left\{-\lambda_{ln}\hat{L}_n - \frac{\lambda_{ly}.\lambda_{kx}}{\theta_{ky}.\lambda_{ky}}\frac{\theta_{kx}}{\theta_{sx}}t\hat{t}\right\} > 0 \quad (22)$$

R will increase for a given Ln and we prove later that $\hat{L}_n > 0$, in that case $\hat{R}$ is not unambiguously positive.

We need to put some more restrictions.

$$\hat{W} = (-)\frac{\theta_{tz}}{\lambda_{lz}\sigma_z\theta_{lz}(\theta_{lz}+\theta_{tz})}\left\{-\frac{\lambda_{ly}.\lambda_{kx.}}{\theta_{ky}.\lambda_{ky}}\frac{\theta_{kx}}{\theta_{sx}}t.\hat{t}\right\} < 0 \quad (23)$$

$$\hat{Z} = \theta_{tz}.\sigma_x(\hat{R}-\hat{W}) > 0 \quad (24)$$

If there is no change in $\{P_x.X+(1+t)P_y.Y\}, \alpha.P_z.Z$ would also remain unaltered. Hence from (9)

$$\hat{L}_n = (-)\hat{W} > 0 \text{ as } \hat{W} < 0 \quad (25)$$

And from

$$\hat{P}_z = (-)\hat{Z} < 0 \quad (26)$$

However, if $\{P_x.X+(1+t)P_y.Y\}$ does not remain unaltered

$$\hat{P}_z + \hat{Z} = \frac{\theta_{kx}}{\theta_{sx}}t.\hat{t}(\mu_y\frac{\lambda_{kx}}{\lambda_{ky}}-\mu_x) \quad (27)$$

Where $\mu_x = \frac{\beta.P_x.X}{P_z.Z}$ and $\mu_y = \frac{\beta.P_y.Y}{P_z.Z}$

If $\mu_x = \mu_y$ and $\lambda_{kx} > \lambda_{ky}$ (likely to hold true). P_z must fall as Z has already increased. But for $\lambda_{kx} < \lambda_{ky}$ the impact on P_z is uncertain.

This leads to the follwoing proposition:

Prposition II: *Due to trade reform informal workers are worsened but informal output gets a boost. However the number of extortionists must go up.*

4. Some Possible Extensions

4.1. Capital Mobility

If capital is allowed to move among X, Y and Z an immigration of L would not depress W (for given P_z) like the basic model. Because, r would not change (from Equation (2)) and it would be same for all the sectors. Hence out put of Z will increase and that of Y would fall if $\lambda_{lz} > \lambda_{ly}$ following Rybczynski argument. However, when $\lambda_{lz} < \lambda_{ly}$, Z would, in fact, contract. Depending upon the output effect on Z, P_z will change. Note that if $\lambda_{lz} > \lambda_{ly}$, $\{P_x.X+(1+t)P_y.Y\}$ would fall as Y falls. Thus P_z must decrease as Z has already risen. And again $\alpha.P_z.Z$ should fall as $\{P_x.X+(1+t)P_y.Y\}$ has fallen. We already know that W has not changed, therefore the effect on L_n is certain and it would fall.

4.2. Skilled Emigration

If skilled workers emigrate, there will be a tendency for W_S to rise. But since the system determines r from (2) and it is unchanged, W_S can not change because of

small country assumption. Therefore production of X would fall due to shortage of specific skilled labor. Subsequently, some capital would be released from X to augment production of Y. Again in order to produce more Y some more unskilled workers need to be relinquished from Z. This will induce an increase in W and hence a fall in R for given P. As R falls, a_{TZ} should increase and subsequently Z will fall.

If we assume $\{P_x.X+(1+t)P_y.Y\}$ as constant eventually P_z would go up. Thus from equation (9) L_n has to fall as $\alpha.P_z.Z$ remains same through the constancy of $\{P_x.X+(1+t)P_y.Y\}$. Thus an outmigration of skilled workers is good for the society as a whole as L_n falls and is also good for informal workers in particular as W goes up.

4.3. Foreign Capital Inflow

If foreign capital comes in the formal sector there will be changes in the outputs but r, $\overline{W}$ and W_S would remain unchanged because of the structure of the model. Both X and Y would increase. X would expand more than Y if distributive share of capital is higher in X than that of in Y. In order to produce more X, skilled labor need to be substituted by increased capital as supply of skilled labor is fixed at S. However, as far as an increase in Y is concerned, along with increased capital the necessity of an increased employment of unskilled workers is also there. These workers should come from informal sector and hence W will rise. At given P_z, R has to fall. This will induce a reduction Z. From (8) the Left Hand Side (LHS) has gone up and Z falls, therefore, subsequently P_z must increase. It should be noted that the effect on L_n is uncertain.

5. Conclusions

Here we have built a trade theoretic model where both formal and informal sectors are embedded. Informal sector is segregated from the formal world by the non-existence of trade union. Since informal units are illegal, they are distorted by extortion. In this framework we have shown that both the immigration of unskilled workers and a tariff cut lead to similar kind of results. Under these two situations informal workers lose, informal output expands but informal capitalists gain. But what is more worrying is that under both these cases number of extortionists in the economy inflates. If we allow for capital mobility between formal and informal sectors, this would not matter much for the informal workers under immigration of unskilled workers and reform. Nevertheless, an outmigration of skilled workers would raise the informal wage and reduce the number of

extortionists. Informal wage would also go up if we allow foreign capital to come in.

We can easily invoke some other possibilities in this set up. One is when the demand for informal good comes only from formal unskilled sector. Under immigration of unskilled workers, the wage rate of informal labor must fall and there would also be a decline in the informal commodity price. This assumption is quite sensible in that skilled workers constitute the richer section of the society and they do not usually consume informal goods. The interesting point is that it does not matter whether the richer segment of the society demands the informal good, the effect of immigration of unskilled workers on informal wage, price and extortion are identical. Another interesting possibility is the introduction of new imported substitutes of Z which, essentially, move away the demand for Z. This may happen in the post reform period (if we assume the existence of prohibitive tariff in the pre-reform phase). In this situation, consequent upon reform, the price of the informal good would fall by a relatively large amount. The size of the extortion sector would increase in this case also. Nevertheless, the extent of increase would be relatively less.

6. References

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Appendix

Differentiating Equation (2) one gets,

$$\hat{r}\theta_{ky} = \hat{P}_y(1+t) + t\hat{t} \tag{A.1}$$

Differentiating (1) and substituting (A.1) into that,

$$\hat{W}_S\theta_{sx} = \hat{P}_x - \hat{P}_y(1+t)\frac{\theta_{kx}}{\theta_{ky}} + t\hat{t}\frac{\theta_{kx}}{\theta_{ky}} \tag{A.2}$$

Differentiating equation (3)

$$\hat{W}\theta_{lz} + \hat{R}\theta_{tz} = \hat{P}_z(1-\alpha) - \alpha\hat{\alpha} \tag{A.3}$$

Given that the factor endowments remain constant, from the full employment conditions we get,

$$\hat{X} = (-)\hat{a}_{SX} \tag{A.4}$$

$$\hat{X}\lambda_{kx} + \hat{Y}\lambda_{ky} = 0 \tag{A.5}$$

$$\hat{Y}\lambda_{ly} + \hat{Z}\lambda_{lz} = (-)\hat{L}_n\lambda_{ln} \tag{A.6}$$

$$\hat{Z} = (-)\hat{a}_{TZ} \tag{A.7}$$

Using the concept of elasticity of substitution in X and the zero profit condition we have

$$\hat{a}_{SX} = \sigma_X(\hat{r} - \hat{W}_S)\theta_{kx} \tag{A.8}$$

where, $\sigma_x = \dfrac{\hat{a}_{SX} - \hat{a}_{KX}}{\hat{r} - \hat{W}_S}$

Using the above equation one can easily calcultae that

$$\hat{X} = \frac{\sigma_x\theta_{kx}}{\theta_{sx}}\left\{\hat{P}_x - \hat{P}_y\frac{(1+t)}{\theta_{ty}} - \hat{t}\frac{t}{\theta_{ky}}\right\} \tag{A.9}$$

$$\hat{Y} = \frac{\lambda_{kx}}{\lambda_{ky}}\frac{\sigma_x\theta_{kx}}{\theta_{sx}}\left\{\hat{P}_x - \hat{P}_y\frac{(1+t)}{\theta_{ty}} - \hat{t}\frac{t}{\theta_{ky}}\right\} \tag{A.10}$$

$$\begin{aligned}\hat{W} = &\frac{1}{(\theta_{lz} + \theta_{tz})}\Bigg[\hat{P}_z(1-\alpha) - \alpha\hat{\alpha} - \frac{\theta_{tz}}{\lambda_{lz}\theta_{lz}\sigma_z}\\ &\times\left\{\hat{L} - \lambda_{ln}\hat{L}_n - \frac{\lambda_{kx}}{\theta_{ky}}\frac{\lambda_{kx}}{\lambda_{ky}}\frac{\lambda_{ly}}{\theta_{ky}}\frac{\theta_{kx}}{\theta_{sx}}t\hat{t}\right\}\Bigg]\end{aligned} \tag{A.11}$$

Substituting (A.10) in (A.6) and then using (A.3) we have,

$$\hat{Z} = \frac{\theta_{lz}}{\lambda_{lz}\theta_{tz}}\left\{\hat{L} - \lambda_{ln}\hat{L}_n - \frac{\lambda_{kx}}{\lambda_{ky}}\frac{\lambda_{ly}}{\theta_{ky}}\frac{\theta_{kx}}{\theta_{sx}}t\hat{t}\right\} \tag{A.12}$$

From equation (8)

$$\hat{P}_z = \frac{\theta_{kx}}{\theta_{sx}}t.\hat{t}\left(\mu_y\frac{\lambda_{kx}}{\lambda_{ky}} - \mu_x\right) - \hat{Z} \tag{A.13}$$

where $\mu_x = \dfrac{\beta.Px.X}{Pz.Z}$ and $\mu_y = \dfrac{\beta.Py.Y}{Pz.Z}$

And again from (9)

$$\hat{L}_n = \hat{\alpha} + \hat{P}_z + \hat{Z} - \hat{W} \tag{A.14}$$

We can use the above equations to find out the specific effects of migration and tariff cut on informal wage, informal price and extortion.