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Abstract

In this paper my endeavor is to give you an idea about the upshot of a recessionary phase on the intermediation activity which is required for the survival of the informal fragment of the society. Informal part of the economy covers a large chunk of the total economic activities in any stylized developing economy. Therefore it is imperative to check possible consequences of recession on this subdivision because intermediation also requires unskilled work force which need to be pulled out from the productive spectrum. In doing so I would be using the hybrid of standard Heckscher - Ohlin and Specific Factor general equilibrium models of trade. I would also strive to focus on the wage-inequality paradigm.

Key words: *International Trade; Corruption; Informal sector; General Equilibrium.*

JEL classification: *F11; D73; O17; D5.*

1. INTRODUCTION

Recession and the consequent effects on different economies have grabbed the attention of the development economists across the globe in the recent past. Most of the economies on the both sides of the Atlantic are severely affected by the global financial crisis led recession with the exception of some developing economies such as India. Since the main channels through which recessionary impacts are trickled down from USA to other developed and developing countries are trade-based, mainly trade economists are more interested than others in tracing out the possible fall outs. In this paper my prime focus would be the developing economy where both formal and informal fragments exist in tandem. Sometimes informal activities cover the major chunk of total economic functions (e.g. 90% of Indian economy comes under informal segment if agriculture is taken into account). Formal goods are customarily considered as traded whereas the informal goods are non-traded per se. empirical supports for formal sectors' happenings could be easily availed from secondary data source but for the informal activities it is very difficult to provide with the statistical findings. Because, by definition informal activities are unregistered and extra-legal, if not illegal. A few papers have already been written to capture the post-recession reality of the developing nations that comprises of both formal and informal zones. Mandal (2009b), Chaudhuri (2009) and Marjit et al (2009) have nicely brought into the concept of informal sector in a standard theoretical model and explained some likely consequences. Mandal (2009b) has shown that informal workers actually benefit from the recession whereas the capitalist are the worst sufferers. In the output front informal segment, in fact, expands whereas formal unskilled segment must contract. On the other hand Chaudhuri (2009), using a Harris-Todaro kind of framework has explained how recession could put a mark on the informal workers. Again Marjit et al (2009) included a tradeable informal good in a

general equilibrium model to check the robustness of an increase in informal wage due to recession.

However, none of the existing papers attempted to capture another reality: informal sector is always beset with extortion or corruption as the survival of the so-called extra-legal activity crucial depends on the negotiation between informal producers and administrators. One may easily argue over the type of corruption, nature of negotiation required in this fragment but the undeniable fact is that corruption related extortion is omnipresent in the informal counter part of the society.¹ This sort of intermediation or manipulation is precisely done by a group of labor who are termed as intermediators or extortionists. In this model no skilled workers are used in manipulation linked works. Intermediators are paid out of the price of informal good(s). I shall try to invoke this phenomenon in a standard trade theoretic general equilibrium set up. Two earlier papers by Marjit and Mandal (2008), Mandal and Marjit (2010) and Mandal (2009a) have used the similar notion to consider such an issue of corruption.

The current papers uses the Heckscher-Ohlin nugget kind of framework developed in Gruen and Corden (1970), Jones and Marjit (1992, 2009) that resembles complementarity structure. This is essentially a hybrid of Heckscher-ohlin and Specific factor models of trade. This structure has more often than not been used to assess the development policies.

The paper is schematized as follows. Introduction is followed by the model in section 2. Section 3 delivers the basic result with explanations. Section 4 contains concluding remarks.

2. THE MODEL

The economy that we consider here is a small one characterized by the co-existence of formal and informal subdivisions. X and Y are traded and are being produced in the formal set

up following neo-classical production function. X uses skilled labor and Y uses unskilled workforce with the homogenous capital. Capital is perfectly mobile across sectors and goods. Note that unskilled workers wage is pre-determined by trade union in Y. There is another commodity, Z, the informal good. Z is being produced the unskilled workers and homogenous capital. Unskilled wage in the informal sector is expectedly less than unionized wage since who do not find jobs in the formal part fall back on the informal counter part. No one can afford to remain unemployed. This is precisely the reason why informal sector exists as it provides means of survival to some people. And perhaps the existence of informal sector also helps satisfying the full employment criterion for the developing countries.

Corruption related intermediation in our framework switches labor from productive to corruptive activities. Thus corruption is viewed as directly unproductive profit seeking activity as some people engaged in corruption essentially avail of the arbitrage opportunities, acting as middlemen and intermediaries. Such diversion of human talent can be quite costly for the society as effective labor endowment shrinks. α is the fraction of value of per unit Z that could be spent on extortionists for doing intermediation allied assignment. This is done only by unskilled workers. This sector is represented by C. Thus unskilled workers have three options: to work in Y or in Z or in C. All the markets are competitive. Competitive market for extortion ensures that lost value of output would be exactly equal to the payment made to the unskilled workers who actually do the intermediations.

The system of equations would be as follows. Note that we would be intimately following the structure of Marjit and Mandal (2008) and be using the standard symbols that are frequently used in stylized general equilibrium trade models.

Non-existence of supernormal profits entails that the competitive price equations be:

$$w_s a_{sx} + r a_{kx} = P_x \quad (1)$$

$$\bar{w} a_{ly} + r a_{ky} = P_y \quad (2)$$

$$w a_{lz} + r a_{kz} = P_z(1-\alpha) \quad (3)$$

Note that $\bar{w} > w$ because of the trade union exercise in the formal unskilled segment.

$$w.Lc = \alpha.Pz.Z \quad (4)$$

Factors' full employment conditions are defined as:

$$a_{sx}.X = \bar{S} \quad (5)$$

$$a_{ly}.Y + a_{lz}.Z = \bar{L} - Lc \quad (6)$$

$$a_{kx}.X + a_{ky}.Y + a_{kz}.Z = \bar{K} \quad (7)$$

The structure we just built is merely a recursive one. X uses a specific factor in form of skilled labor (S). Y and Z share the unskilled labor as the mobile factor (L). Whereas capital (K) is perfectly mobile across all X, Y and Z. It is important to keep in mind throughout that α , the degree of corruption or extortion is exogenous in the model.

We have some typical essential phenomena in our model. Only the formal goods' prices are determined from the international market and the formal unskilled workers get fixed wage rate. Formal unskilled wage is, essentially, the prime driving force of this paper. On the other hand as the informal good is non-traded no international economic shock like recession can percolate into the informal segment of the economy through price effect. Whatever happens to this segment that that would be through the changes in relative factor returns. Therefore, once the recessionary phase starts, by virtue of the structure of the model, capital gets the first jostle as unskilled wage is pre-fixed in the formal segment. Capitalists internalizing the distress would

help increasing the skilled workers' wage if the price of skilled goods does not alter. However, as the informal good's price remains unchanged, the informal workers must gain as the return to the mobile factor has already gone down. However, in output front there might be some interesting outcomes. After being disappointed in the formal unskilled segment capital immediately flows out and subsequently the output contracts. Whereas in the skilled segment, producers try to substitute skilled labor by relatively less costly capital. Thus the output effect here depends on the relative changes in factor return. Nevertheless, in the informal sector, as wage goes up, there could be some changes in L_c . The eventual output effects on Y and Z will substantially depend on the factor intensity comparison between Y and Z. In this paper our prime focus would be on L_c or $w.L_c$, the size of the intermediation activity.

Here equation (1) represents the specific factor structure while equations (2) and (3) resemble the Heckscher-Ohlin subsystem. This is how the hybrid nature of our model come into play. P_x and P_y are determined in the world market. r is solved for from equation (2) as wage is pre-fixed at \bar{w} . w_s can be easily calculated from (1) because r is already calculated. Thus non-unionized informal wage, w is determined from (3) for any given α and P_z . By means of CRS and DMP assumptions all a_{ij} s are determined. Now let us start from any positive L_c such that $(\bar{L} - L_c) > 0$. Hence X is derived from (5) and Y and Z are simultaneously determined from (6) and (7) for given factor endowments.

Moreover, we can also solve for the equilibrium value of L_c or the size of the extortion sector in our model. Once w is determined the LHS of equation (4) would be an increasing function of L_c with slope w . As L_c goes up, availability of productive unskilled labor shrinks. Thus what would happen to the RHS of (4) and output of Z that crucially depends on the factor intensity assumption of Z compared to Y. If Z happens to be the labor-intensive one, output of Z

must fall. Rationality suggests the assumption of a labor-intensive Z. Therefore the RHS of (4) must be declining in L_c for given w and P_z . Hence the value of equilibrium L_c is worked out for given degree of extortion, w and P_z . Determination of equilibrium L_c is shown in diagram-1.

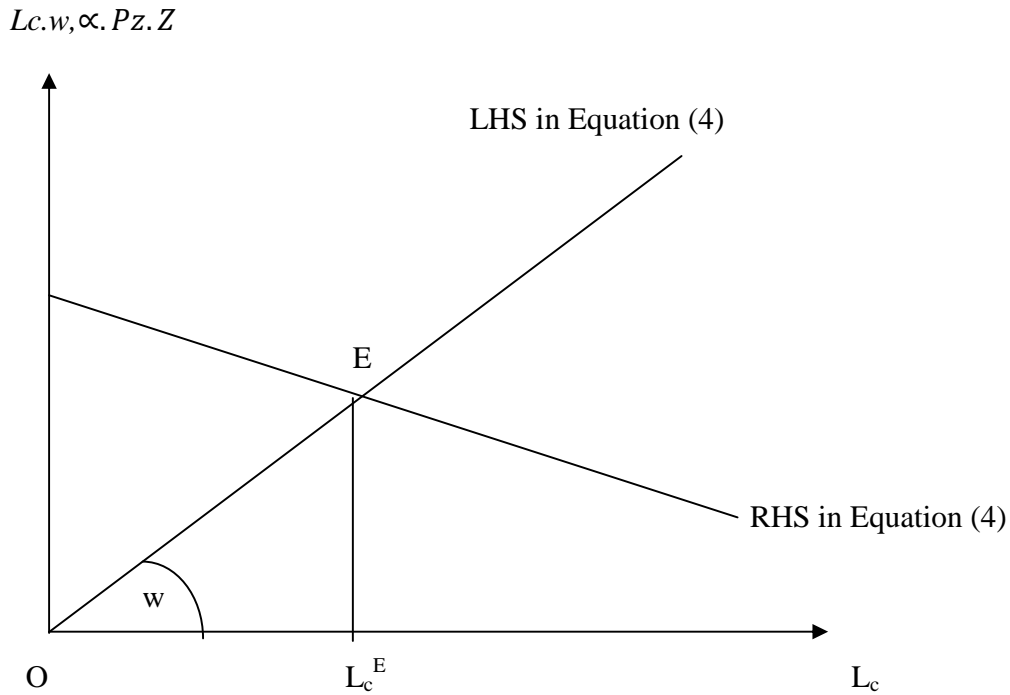


Figure -1

Determination of equilibrium L_c for given w , P_z and α

In this model, in conjunction with the price effect caused by recession people, the real possibility of endowment effect is explored. We are not talking about that kind of Rybczynski effect which originates from a change in factor return (making the constraint less or more binding). In our model we have, in fact, two types of Rybczynski effects. One originates from change in the factors' return, the conventional way to look at the complementarity structure. The other one comes from the direct change in the unskilled labor endowment for productive

purpose. Once the return to unskilled workers, w changes the output of Y and will change, depending upon the intensity of factor used. With the change in Z production the number of intermediators is likely to change. This will then and there initiate another round of Rybczynski effect. Therefore the second category of Rybczynski effect essentially enters through the change in the size of the intermediation sector that requires only unskilled labor which has another alternative employment options in the production of Y and Z .

3. BASIC RESULTS AND THE EXPLANATIONS

In this paper my prime focus would be to check the potential effects on the size of the extortion sector and on the wage inequality conundrum consequents upon recessionary shocks. For this purpose let us start from some facts that are explored in UNCTAD secretariat calculations (2009). The report emphasizes that there is 37% decline in the price of all commodities' group excluding crude petroleum in between 2008 and January 2009. The crude petroleum price in isolation has been decreased by 67% in the same period. In case of service trade it has been observed that service export growth had started declining in the third quarter of 2008 with a sudden fall in the last quarter of 2008. Therefore, it is, by and large, accepted that prices of traded goods have been reduced in the phase of economic recession.

The comparative static properties of this model can be established by considering the effects of changes in the parameters like goods' prices. In this model the resultant effect of a decrease in the prices of the formal goods would be first felt in Y . As wage is pre-fixed, the first shove would on the capital and thus r would fall. Now, what is going to happen to the W s that depends on the relative strengths of a fall in r and P_x . Nevertheless, w would inevitably increase in the informal sector as α and P_z are assumed to be constants for the time being. The change in w will invoke some adjustment process in the size of the extortion sector and subsequent changes

in the commodity output. This would again lead to another round of adjustment in equation (4).

Let us try to show the mathematical nitty-gritty through which this model works.

Totally differentiating the price equations we have

$$\widehat{w}_s \theta_{sx} + \widehat{r} \theta_{kx} = \widehat{P}_x \quad (8)$$

$$\widehat{w} \theta_{ly} + \widehat{r} \theta_{ky} = \widehat{P}_y \quad (9)$$

$$\widehat{w} \theta_{lz} + \widehat{r} \theta_{kz} = \widehat{P}_z (1 - \alpha) - \alpha \cdot \widehat{\alpha} \quad (10)$$

$\widehat{w} = 0$, because \bar{w} is always pre-determined.

Setting $\widehat{w} = 0$ in equation (9) we can solve for \widehat{r} and then substituting it in (8) we get the value for \widehat{w}_s . Hence

$$\widehat{r} = \frac{\widehat{P}_y}{\theta_{ky}} \quad (11)$$

$$\widehat{w}_s = \left(\widehat{P}_x - \frac{\widehat{P}_y}{\theta_{ky}} \theta_{kx} \right) \frac{1}{\theta_{sx}} \quad (12)$$

Again using (11) in (10) we can have the value of \widehat{w} ,

$$\widehat{w} = \left\{ \widehat{P}_z (1 - \alpha) - \alpha \cdot \widehat{\alpha} - \widehat{P}_y \frac{\theta_{kz}}{\theta_{ky}} \right\} \frac{1}{\theta_{lz}} \quad (13)$$

The intuitive explanations for the value of changes are very simple to follow.² When P_x and P_y fall, P_z remains constant³ and α remains constant throughout,

$$\widehat{r} < 0;$$

$$\widehat{w} > 0^4;$$

$$\widehat{w}_s \geq 0 \text{ iff } \left| \frac{\theta_{kx}}{\theta_{ky}} \right| \geq \left| \frac{\widehat{P}_x}{\widehat{P}_y} \right|$$

θ_{kx} is likely to be greater than θ_{ky} as skilled good normally requires more capital. Therefore, if P_x falls less (more) than P_y , W_s will increase (decrease).

Differentiating equation (4) one gets,

$$\widehat{L}_c = \widehat{\alpha} + \widehat{P}_z + \widehat{Z} - \widehat{w} \quad (14)$$

Implication of (14) is quite simple to understand. When α and P_z are constants an increase in Z induce more people to be employed as intermediators while a simultaneous increase in w would affect L_c in opposite way since people's natural tendency would be to work as productive factors not as an intermediators. Therefore, a positive \widehat{w} would lead to a fall in L_c .

With any change in the goods' price there must be some sort of revision in the factor returns, these must impact the final output. As the endowments of factors are constants producer would go for substituting the factors in use depending on the elasticity of substitution, internal reallocation of factors etc. The effects on output could be systematically determined as follows.

Let us assume that the factors' endowment are given and constants. Totally differentiating the full employment condition (5) – (7) and using the concept of elasticity of substitution one can have,

$$\widehat{X} = \widehat{S} - \widehat{\alpha}_{sx} \quad (15)$$

$$\widehat{Y}\lambda_{ly} + \widehat{Z}\lambda_{lz} = \lambda_{lz}\sigma_z\theta_{kz}(\widehat{w} - \widehat{r}) - \lambda_{ly}\sigma_y\theta_{ky}\widehat{r} - \widehat{L}_c\lambda_{lc} \quad (16)$$

$$\widehat{Y}\lambda_{ky} + \widehat{Z}\lambda_{kz} = -\lambda_{kz}\sigma_z\theta_{lz}(\widehat{w} - \widehat{r}) + \lambda_{ky}\sigma_y\theta_{ly}\widehat{r} - \lambda_{kx}\sigma_x(\widehat{w}_s - \widehat{r}) \quad (17)$$

Setting $\widehat{\alpha} = \widehat{P}_z = 0$, equation (14) can be modified as

$$\widehat{L}_c - \widehat{Z} = -\widehat{w} \quad (18)$$

$$\text{Where, } \sigma_x = \frac{\widehat{a}_{kx} - \widehat{a}_{sx}}{\widehat{w}_s - \widehat{r}}, \quad \sigma_y = \frac{\widehat{a}_{ky} - \widehat{a}_{ly}}{\widehat{w} - \widehat{r}}, \quad \sigma_z = \frac{\widehat{a}_{kz} - \widehat{a}_{lz}}{\widehat{w} - \widehat{r}}$$

Solving for \widehat{X} we get

$$\widehat{X} = \sigma_x(\widehat{w}_s - \widehat{r})\theta_{kx} \quad (19)$$

However, the solutions for \widehat{Y} and \widehat{Z} are not very straightforward. Because the same unskilled labor is used not only in Y and Z but also in the sector C which takes care of the administrative negotiation activities. Thus, we need to go for simultaneous determination of \widehat{Y} , \widehat{Z} and \widehat{L}_c .

Equation (16), (17) and (18) can alternatively be represented in the following matrix form.

$$\begin{pmatrix} \lambda_{ky} & \lambda_{kz} & 0 \\ \lambda_{ly} & \lambda_{lz} & \lambda_{lc} \\ 0 & -1 & 1 \end{pmatrix} \begin{pmatrix} \widehat{Y} \\ \widehat{Z} \\ \widehat{L}_c \end{pmatrix} = \begin{pmatrix} -\lambda_{kz}\sigma_z\theta_{lz}(\widehat{w} - \widehat{r}) + \lambda_{ky}\sigma_y\theta_{ly}\widehat{r} - \lambda_{kx}\sigma_x(\widehat{w}_s - \widehat{r}) \\ \lambda_{lz}\sigma_z\theta_{kz}(\widehat{w} - \widehat{r}) - \lambda_{ly}\sigma_y\theta_{ky}\widehat{r} \\ -\widehat{w} \end{pmatrix}$$

Using the Cramer's rule we can simultaneously solve for \widehat{Y} , \widehat{Z} and \widehat{L}_c .

$$\widehat{Y} = \frac{1}{|A|} [\lambda_{ky}\sigma_y\theta_{ky}\widehat{r} - \lambda_{kx}\sigma_x(\widehat{w}_s - \widehat{r}) - \lambda_{kz}\sigma_z\theta_{lz}(\widehat{w} - \widehat{r})\{\lambda_{lz} + \lambda_{lc}\} - \lambda_{kz} \{ \lambda_{lz}\sigma_z\theta_{kz}(\widehat{w} - \widehat{r}) - \lambda_{ly}\sigma_y\theta_{ky}\widehat{r} + \lambda_{lc}\widehat{w} \}] \quad (20)$$

$$\widehat{Z} = \frac{1}{|A|} [\lambda_{ky}\lambda_{lc}\widehat{w} - \lambda_{ly}\lambda_{ky}\sigma_y\widehat{r}(\theta_{ky} + \theta_{ly}) + \lambda_{ky}\lambda_{lz}\sigma_z\theta_{kz}(\widehat{w} - \widehat{r}) + \lambda_{ly}\lambda_{kz}\sigma_z\theta_{lz}(\widehat{w} - \widehat{r}) + \lambda_{ly}\lambda_{kx}\sigma_x(\widehat{w}_s - \widehat{r})] \quad (21)$$

$$\widehat{L}_c = \frac{1}{|A|} [-\lambda_{ly}\lambda_{ky}\sigma_y\widehat{r}(\theta_{ky} + \theta_{ly}) - \widehat{w}(\lambda_{ky}\lambda_{lz} - \lambda_{ly}\lambda_{kz}) + \lambda_{ky}\lambda_{lz}\sigma_z\theta_{kz}(\widehat{w} - \widehat{r}) + \lambda_{ly}\lambda_{kz}\sigma_z\theta_{lz}(\widehat{w} - \widehat{r}) + \lambda_{ly}\lambda_{kx}\sigma_x(\widehat{w}_s - \widehat{r})] \quad (22)$$

$$\text{Here, } |A| = \begin{vmatrix} \lambda_{ky} & \lambda_{kz} & 0 \\ \lambda_{ly} & \lambda_{lz} & \lambda_{lc} \\ 0 & -1 & 1 \end{vmatrix}$$

$$= \lambda_{ky}(\lambda_{lc} + \lambda_{lz}) - \lambda_{kz}\lambda_{ly} = \lambda_{ky} - \lambda_{ly}(1 - \lambda_{kx}) \quad (23)$$

Note that $(1 - \lambda_{kx}) = (\lambda_{ky} + \lambda_{kz})$. And if Y is relatively capital intensive, $\lambda_{ky} > \lambda_{kz}$ or, $\lambda_{lz} > \lambda_{ly}$. Therefore it is most likely that $|A| > 0$.

Thus, if capitalists are the worst sufferers among all factors, i.e. $(\widehat{w}_s - \hat{r}) > 0$, $\hat{Y} < 0$; $\hat{Z} > 0$.

But the value of L_c is ambiguous.

$\widehat{L}_c \geq 0$ iff

$$\begin{aligned} & \left| \lambda_{ky}\lambda_{lz}\sigma_z\theta_{kz}(\widehat{w} - \hat{r}) + \lambda_{ly}\lambda_{kz}\sigma_z\theta_{lz}(\widehat{w} - \hat{r}) + \lambda_{ly}\lambda_{kx}\sigma_x(\widehat{w}_s - \hat{r}) - \lambda_{ly}\lambda_{ky}\sigma_y\hat{r}(\theta_{ky} + \theta_{ly}) \right| \geq \\ & \left| \widehat{w}(\lambda_{ky}\lambda_{lz} - \lambda_{ly}\lambda_{kz}) \right| \end{aligned} \quad (24)$$

A careful investigation of equation (24) reveals that an increase in informal wage, \widehat{w} is actually dampening the positive effect on L_c , nothing else. This also evident from equation (14). The change in Y and Z are also very crucial as both these goods share the same kind labor with the intermediation sector. All the effects are simultaneously captured in equation (22). However, it is most likely that L_c should increase consequent upon recession. Higher production of Z must call for more intermediators to sort out the problem of negotiation. And if L_c increases the size of the intermediation sector ($= w.L_c$) would increase unambiguously as $\widehat{w} > 0$ otherwise we need to weigh the positive effect caused by \widehat{w} with the negative effects in equation (4).

Thus the following proposition is immediate:

Proposition 1: *Consequent upon recession the size of the intermediation sector must expand if Y is relatively labor-intensive and the following condition is satisfied. The precise condition is*

$$\left| \lambda_{ky} \lambda_{lz} \sigma_z \theta_{kz} (\widehat{w} - \hat{r}) + \lambda_{ly} \lambda_{kz} \sigma_z \theta_{lz} (\widehat{w} - \hat{r}) + \lambda_{ly} \lambda_{kx} \sigma_x (\widehat{w}_s - \hat{r}) - \lambda_{ly} \lambda_{ky} \sigma_y \hat{r} (\theta_{ky} + \theta_{ly}) \right| \geq \left| \widehat{w} (\lambda_{ky} \lambda_{lz} - \lambda_{ly} \lambda_{kz}) \right|$$

Another interesting result that we can derive from our analysis is the implication for the existing wage inequality as $(W_s - W) > 0$ to start with. If P_x does not change wage inequality must reduce as W must increase. Even when P_x falls wage inequality may fall if W_s falls. This will happen when $\left| \frac{\theta_{kx}}{\theta_{ky}} \right| < \left| \frac{\hat{P}_x}{\hat{P}_y} \right|$. However, if $\left| \frac{\theta_{kx}}{\theta_{ky}} \right| > \left| \frac{\hat{P}_x}{\hat{P}_y} \right|$, the outcome in relative wage distribution front is really unclear. In this circumstances the wage-inequality problem will worsen (or ameliorate) if $\left| \left(\hat{P}_x - \frac{\hat{P}_y}{\theta_{ky}} \theta_{kx} \right) \frac{1}{\theta_{sx}} \right| \geq \left| \left\{ \hat{P}_z (1 - \alpha) - \alpha \cdot \hat{\alpha} - \hat{P}_y \frac{\theta_{kz}}{\theta_{ky}} \right\} \frac{1}{\theta_{lz}} \right|$.

4. CONCLUDING REMARKS

In this paper I have constructed a general equilibrium trade model using the hybrid structure of Heckscher-Ohlin and Specific Factor model with a corrupt informal sector to substantiate what could happen to the size of the intermediation sector due to an economic recession. It has been shown that the size is likely to increase. This paper also has an inference regarding the wage-inequality problem. If skilled good's price does not decrease much compared to the unskilled formal good, wage-inequality must fall.

Footnote

1. For a detailed analysis of the causes of the existence of the informal sector interested readers may look at Marjit and Kar (2009), Marjit (2009). Marjit and Kar (2009) clearly elaborates the interconnectedness of the informal sector with other sectors of the economy and some policy implications.
2. One can refer to Mandal (2009b) for a detailed explanation.
3. When the informal good is considered to be a substitute for the formal unskilled good price of the informal good should rise in the recessionary situation. Traditionally formal good's price is greater than that of informal good. People's demand for relatively cheaper good will increase that would pull up P_z .
4. If P_z rises and w will increase further.

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