

Trade Reform and Informal Wages

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Abstract

When trade reform contracts protected formal sectors in developing countries and the formal workers move to the informal sector for employment, does that reduce informal wages? Using a 2×2 Heckscher–Ohlin–Samuelson (HOS) structure with formal–informal production organization for the same commodity, we show that a tariff cut in the import-competing sector increases both informal wage and employment under very reasonable assumptions. An increase in the price of the export commodity will also increase informal wages, although aggregate informal employment unambiguously falls even if the informal export sector is labor intensive. Furthermore, the formal–informal segmentation of each sector opens up an interesting, hitherto unexplored, possibility that the informal export sector may contract despite a price increase in this sector. Change in the overall size of the export sector is also ambiguous and conditional on the relative strengths of changes in these two segments.

1. Introduction

The purpose of this paper is to explore the impact of trade liberalization on informal wages in a modified 2×2 Heckscher–Ohlin–Samuelson (HOS) structure. The impact of trade reform on employment and wages in the informal sector is of serious policy concern in the developing world. In general, it is feared that external competition will force layoffs in the formal sector, increase informal employment and lower wages. Since the majority of the workforce in the developing world is absorbed within the informal sector, employment and wages in this segment of the economy is related to political unrest and resistance to reforms. This is well argued in Stallings and Peres (2000).

Before we delve further into the problem, it may be instructive to offer the definition of a so-called informal sector. According to ILO (1972, available in Webster & Fidler, 1996) the informal sector is defined as, “illicit or illegal activities by individuals operating outside the formal sphere for the purpose of evading taxation or regulatory burden”. Clearly, this is opposed to the general description of a formal sector, which takes the form of either government and semi-government units or private manufacturing and service units that are registered and hence bound by the legal requirements associated with setting up of the unit under company laws, labor laws, environmental laws, etc. For our purpose, the informal sector is defined as one where minimum wage laws are not adhered to.

A related concern to that raised in Stallings and Peres (2000) is the issue of trade and income inequality in developing countries, whereby a decline in the informal wage implies further impoverishment of a low-income labor force. Earlier, however, the

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impact of trade on income inequality in the developing world has been discussed by Attanasio et al. (2004), Hanson and Harrison (1999), Feenstra and Hanson (2001), Goldberg and Pavcnik (2003), Marjit and Acharyya (2003), and Marjit et al. (2003a), among others. Furthermore, institution of dual labor markets and associated issues of interest in the developing country labor markets have been raised in Agenor (1996), Agenor and Montiel (1996), Saint-Paul (1996), and Harrison and Leamer (1997). However, a careful review of the literature reveals that the issue of employment and wage consequence of a contracting formal sector needs to be closely examined when both labor and capital can move between the formal and informal segments. What we argue in this paper is that the simple general equilibrium models in the tradition of trade theory can help improve our understanding of formal–informal interactions in terms of labor, capital, wage, and employment.

In fact, two recent papers by Marjit (2003) and Marjit et al. (2003b) provide in-depth detail on the behavior that can be expected of the informal wage, when the economy is exposed to trade policy reforms. Of these, Marjit (2003) shows that even if a part of the informal sector is vertically linked with the formal sector and the formal sector contracts due to trade liberalization, informal wages can still increase. In the other paper, capital mobility plays a major role in a two-sector formal–informal framework. Capital immobility reduces informal wages when informal employment expands, whereas allowing for freer capital mobility leads to exactly the opposite outcome. Such issues and others have been surveyed in Marjit and Maiti (2006).

The present paper is a valuable addition to the previous results in the sense that we rule out (1) vertical linkage and (2) the issue of capital mobility, although the unifying link between the present study and the others is that they discuss similar problems, i.e. the effect of contraction in the previously protected formal sector on the changes in the informal competitive wage. In addition, the description of the sectors as formal or unionized and informal or non-unionized remains the same.¹ To focus on the wage and employment in the informal labor market, we take a very conventional route of defining the formal sector as unionized whereby trade unions make sure that wages are decided through negotiations. In the informal sector there is no such activity and wage is competitively determined. A similar characterization is available in Carruth and Oswald (1981) and Agenor and Montiel (1996). What we offer here, however, is a traditional HOS 2×2 framework with each good being produced both in the formal and the informal sector, and yet we obtain a result which suggests that the informal sector, crowded by an influx of retrenched workers from the formal segment, can still exhibit a rise in wages. It allows one to use full employment models in a wage-differential framework. With this backdrop our study formulates a model, a close analogue of the standard HOS structure, and proves that a decline in tariff rate should increase informal wages in a developing economy.

2. The Model and its Equilibrium

Let us consider a two-sector small open economy producing X , an import-competing good, and Y , an export good with neo-classical technology. Each sector has a formal and informal segment. The formal segment has contracted workers with a fixed wage, higher than that available in the informal segment.² However, the formal wage is always higher than the informal wage because labor laws allow various benefits to the formal workers but not to the informal workers. Second, the micro-theoretic foundation of dual wage system, established in Goldberg and Pavcnik (2003), can be applied here as well.

If workers cannot find a job in the formal sector, they go to the informal sector and all of them find jobs at a wage determined through the market. Hence, there is no open unemployment in the model. Two observations are in order. The other important assumption in this paper is that capital can move freely within the informal segment and equalize the returns. But there is no mobility of capital between the formal and the informal segments. Within the formal segment also capital is sector-specific. The first assumption is far more crucial than the second. We shall take up the second when we discuss the actual working of the model. Violation of the second assumption should not jeopardize our results.

There is more than just casual empiricism on inelastic interest differentials between the formal and the informal sectors, which suggests that the flow of capital is not smooth. In fact, the assumption behind such general immobility of capital between the formal and the informal sectors draws heavily from the nature of the informal sector in poor countries, which is defined above. Admittedly, such interest differentials could cause sufficient incentives for formal capital to relocate in the low-wage informal segment, but typically, bank loans and other formal sources of credit cannot easily jump such legal barriers, which include the fact that most informal units are unregistered and therefore have no legal standing/identity. Possibilities of punitive actions/closures/evictions on these units render formal investments extremely risky. Additionally, of course, there could be other standard criteria like moral hazard and other forms of costs that restrict easy flow of capital from formal to informal sectors.³ Moreover, there is a theoretical motivation behind this assumption. In Marjit (2003) and Marjit et al. (2003b) it was shown that the mobility of capital between the formal and informal segments works towards an improvement in informal wages when more workers are pushed into the informal segment as trade reform leads to the downsizing of the formal zone. In this paper we deliberately close the avenue for such mechanism to operate and yet still obtain an improvement in informal wages, thanks to the standard Stolper–Samuelson property. Nevertheless, we shall discuss some mobility issues in section 4.

Given these assumptions and that of a competitive small economy, we set up the following equations. The following symbols, quite common in a standard general equilibrium framework, are used to describe the model.

The competitive price conditions are:

$$a_{LX}\bar{w} + a_{KX}r_X = P_X(1+t) \quad (1)$$

$$\tilde{a}_{LX}w + \tilde{a}_{KX}R = P_X(1+t) \quad (2)$$

$$a_{LY}\bar{w} + a_{KY}r_Y = P_Y \quad (3)$$

$$\tilde{a}_{LY}w + \tilde{a}_{KY}R = P_Y. \quad (4)$$

Full-employment conditions:

$$a_{LX}X + a_{LY}Y + \tilde{a}_{LX}\tilde{X} + \tilde{a}_{LY}\tilde{Y} = L \quad (5)$$

$$a_{KX}X = K_X \quad (6)$$

$$a_{KY}X = K_Y \quad (7)$$

$$\tilde{a}_{LX}\tilde{X} + \tilde{a}_{KY}\tilde{Y} = \tilde{K}, \quad (8)$$

where P_i is the price of the i th good, $i = X, Y$; \bar{w} is the formal wage and w the informal wage; r_i ($i = X, Y$) is return to capital specific to the formal segment, while R is return to capital specific to the informal segment; a_{ij} (\tilde{a}_{ij}) are the input–output coefficients in the formal (informal) segment; L is the inelastic supply of labor; and \tilde{K} is the stock of informal capital, whereas K_i ($i = X, Y$) is the stock of formal capital. Goods X and Y are produced in the formal sector, while \tilde{X} and \tilde{Y} are produced in the informal segment of the economy. If $r_X = r_Y$, i.e., we assume mobility of capital within the formal segment, it is likely that either (1) or (3) will not bind. To avoid the case of complete specialization we assume $r_X \neq r_Y$. But there are more subtle and profound institutional reasons behind this assumption.

3. The Analysis

Decline in “ t ”

Let us now consider the case of a fall in the tariff rate, t . A decline in t marks the initiative of trade reform. This will reduce r_X , reduce a_{LX} , and in turn, raises a_{KX} . It is obvious from (6) that all of this causes X to go down. Note that there will be no effect on Y as P_Y is held fixed. Therefore, from (5) it is straightforward to conclude that aggregate informal employment, i.e. $(\tilde{a}_{LX}\tilde{X} + \tilde{a}_{LY}\tilde{Y})$, must increase. In the meantime, formal workers lose jobs and move into the informal segment. Based on this outcome, we have the following proposition.

PROPOSITION 1: *Even if there is a rise in the aggregate informal employment, informal wage w will rise if and only if, \tilde{X} is capital-intensive relative to \tilde{Y} .*

This is a distinct implication of the Stolper–Samuelson theorem once we consider equations (2) and (4). As t goes down, R must go down and w must go up, given P_Y , if and only if \tilde{Y} is labor intensive. This assumption goes well with our intuition. If the import-competing good in a developing country is capital intensive, and if there is no reversal of intensity rankings between the formal and informal segments within a particular sector, it is natural to presume that the informal segment of the export sector is labor intensive compared to the informal segment of the import-competing sector.

The Rybczynski analog of this result would imply higher \tilde{Y} and lower \tilde{X} . Both X and \tilde{X} go down and Y does not change. Therefore, $\left[\frac{Y + \tilde{Y}}{X + \tilde{X}} \right]$ must go up. This is the standard aggregate output effect of a relative price change. As long as relative price of the capital-intensive good falls, wages improve. What is striking is that such a process releases labor from the formal to the informal segment, creating excess supply of labor in the informal sector. But the excess supply does not depress the wage because increasing output of the labor-intensive good absorbs the excess number of workers. Factor price adjustment is independent of endowment changes as long as the endowment ratio in this segment lies in the cone of diversification, a well-known property of the HOS system. Therefore, informal wages go up even if more people find jobs in the informal sector.

Note that a decline in t may induce wage renegotiations. Suppose, \bar{w} is also reduced following a tariff cut. This will contain the decline in the rate of interest on

capital, although it is obvious that, $\hat{r}_X < 0$ for $\hat{w} \leq \hat{t}$. Hence, our results will remain unchanged.⁴

Increase in “ P_Y ”

Next, consider an increase in the price of the export good, such that, $\hat{P}_Y > 0$. For the formal segment of sector Y , this would imply an increase in r_Y and subsequently an increase in Y and a_{LY} . Employment in the formal segment of Y must increase on account of this, and in the process relocates labor away from the informal segment to the formal segment of Y . On the other hand, under the assumption that \tilde{Y} is labor-intensive compared to \tilde{X} , a rise in P_Y increases w and lowers R by the Stolper–Samuelson effect. An interesting possibility, however, exists with regard to output effects in sectors \tilde{Y} and \tilde{X} . Contrary to conventional wisdom, an increase in the price of the export good Y may in fact lead to a contraction in the informal segment of this sector. Although the formal segment of Y unambiguously expands, the overall size of sector Y may still contract due to possible adverse impact on its informal segment.

Intuitively, two cross-effects work within this sector in creating such a perverse possibility. On the one hand, expansion in the formal segment of Y draws labor away from its informal segment and may lead to a contraction in output. On the other hand, the price effect in sector Y directly favors an expansion of output in both segments of this sector. The formal segment of sector X , however, remains unaffected since there has been no change in the price of commodity X . Therefore $(a_{LX}X + a_{LY}Y)$ must increase while aggregate informal employment $(\tilde{a}_{LX}\tilde{X} + \tilde{a}_{LY}\tilde{Y})$ must fall. The following proposition is immediate.

PROPOSITION 2. *A rise in the price of Y unambiguously lowers aggregate informal employment and raises informal wage and may contract aggregate output of sector Y , if \tilde{X} is relatively capital intensive compared to \tilde{Y} .*

PROOF. A detailed mathematical proof is provided in the appendix. □

4. Capital Mobility in the Formal Segment

As stated earlier, both equations (1) and (3) should not hold simultaneously with $r_x = r_y$. Suppose they do not and without any tariff (i.e. $t = 0$), $r_Y > r_X$. Therefore, t must be adjusted for the formal import-competing sector to survive. This creates another problem because now there are three full employment conditions to solve for four output levels. We assume that the government decides on the allocation of K_X and K_Y in these sectors through a maze of licenses and quantitative restrictions. This solves the problem of determination of equilibrium.

Suppose now t falls, *ceteris paribus*. This will completely wipe out the X sector. All formal capital will flow into Y . So X goes down and Y goes up. It is obvious that w will increase anyway since (2) and (4) are not disturbed. The Rybczynski effect is not so unambiguous now. If $a_{LY}Y$ increases substantially, \tilde{X} may go up and \tilde{Y} may go down. But there will be standard forces working against this result.

This is essentially a “jump”. If a substantial amount of locked-in capital from sector X goes to sector Y , output in Y will increase substantially. Note that r in Y does not change. But such r cannot be sustained in sector X . Therefore, a_{LY} will not change. If the rise in Y is substantial, then informal workers will be pulled back into the formal segment. But as w rises and R falls, $(\tilde{a}_{LX}, \tilde{a}_{LY})$ will also go down reducing the requirement of labor in the informal pool. Thus, two effects will dictate the impact

on employment in the formal and informal sectors. This will also dictate the impact on (\tilde{X}, \tilde{Y}) . It is possible that while Y expands, \tilde{Y} goes down. In fact, it is more likely that the bigger is the rise in Y , the greater is the negative effect on \tilde{Y} , since now the labor constraint becomes more binding.

5. Concluding Remarks

We have formulated a modified 2×2 HOS structure with formal and informal segments. We have discussed the Stolper–Samuelson and Rybczynski type outcomes in this framework. One significant result is that even if trade reform downsizes the formal or the regulated segment, and drives labor into the informal segment, existing informal workers should gain under reasonable assumptions. Larger aggregate informal employment also implies higher informal wages.

Interestingly, a cut in import tariff and a rise in export price do not have the same implications for aggregate informal employment. While a reduction in t definitely increases informal employment, a rise in P_Y increases formal sector employment. However, the wage implication is very similar. The reasons behind the result are quite different from the ones discussed in Marjit (2003) and Marjit et al. (2003b), which argue that capital mobility between the formal sectors and the informal sectors is crucial. In this paper we restrict capital to move between the formal and informal sectors. Yet, the informal wage improves along with informal employment because of the standard Stolper–Samuelson argument. Capital mobility between the formal and the informal sector becomes an important issue when we consider one formal and one informal sector, but not a pair of informal sectors as we have considered in the present paper. In fact, the existence of two informal sectors that are prototypes of the formal sectors, allows us to use the Stolper–Samuelson argument. In this case, even if capital does not move between the formal segment and the pair of informal sectors, it does not affect our conjectured results. Finally, this paper basically expands a set of recent papers which argue that trade reform can be quite helpful to the existing set of informal workers.

Appendix

Using equations (2) and (4), and following Jones (1965) we get

$$\hat{w} = -\frac{\tilde{\theta}_{KX}}{\Delta_1} \hat{P}_Y > 0, \text{ where } \Delta_1 = (\tilde{\theta}_{LX}\tilde{\theta}_{KY} - \tilde{\theta}_{LY}\tilde{\theta}_{KX}) < 0, \quad \hat{P}_Y > 0$$

and $\hat{R} = \frac{\tilde{\theta}_{LX}}{\Delta_1} \hat{P}_Y < 0,$

such that,

$$(\hat{w} - \hat{R}) = \frac{\tilde{\theta}_{LX} - \tilde{\theta}_{KX}}{\Delta_1} \hat{P}_Y = \alpha \hat{P}_Y.$$

From equation (3), it directly follows that $\hat{r}_Y = \frac{\hat{P}_Y}{\theta_{KY}} > 0.$

Now using the equation for labor constraint, (5), we get,

$$\begin{aligned} \tilde{\lambda}_{LX} \hat{X} + \tilde{\lambda}_{LY} \hat{Y} &= \lambda_{LX} \sigma_X (\hat{w} - \hat{r}_X) + \lambda_{LX} \sigma_Y (\hat{w} - \hat{r}_Y) + \tilde{\lambda}_{LX} \tilde{\sigma}_X \tilde{\theta}_{KX} (\hat{w} - \hat{R}) + \tilde{\lambda}_{LY} \tilde{\sigma}_Y \tilde{\theta}_{KY} (\hat{w} - \hat{R}) \\ &= -\frac{\lambda_{LY}}{\theta_{KY}} \sigma_Y \hat{P}_Y + [\tilde{\lambda}_{LX} \tilde{\sigma}_X \tilde{\theta}_{KX} + \tilde{\lambda}_{LY} \tilde{\sigma}_Y \tilde{\theta}_{KY}] \alpha \hat{P}_Y = -\phi \hat{P}_Y + \alpha \beta \hat{P}_Y \\ &= (\alpha \beta - \phi) \hat{P}_Y. \end{aligned}$$

Finally, from equation (8),

$$\tilde{\lambda}_{KX}\hat{X} + \tilde{\lambda}_{KY}\hat{Y} = -[\tilde{\lambda}_{KX}\tilde{\sigma}_X\tilde{\theta}_{LX} - \tilde{\lambda}_{KY}\tilde{\sigma}_Y\tilde{\theta}_{LY}](\hat{w} - \hat{R})$$

or, $\tilde{\lambda}_{KX}\hat{X} + \tilde{\lambda}_{KY}\hat{Y} = -\phi\alpha\hat{P}_Y$

Using Cramer's rule to solve for \hat{X} and \hat{Y} ,

$$\hat{Y} = -\frac{[\tilde{\lambda}_{LX}\phi\alpha + \tilde{\lambda}_{KX}(\alpha\beta - \phi)]}{\Delta_2}\hat{P}_Y, \quad \text{where } \Delta_2 = (\tilde{\lambda}_{LX}\tilde{\lambda}_{KY} - \tilde{\lambda}_{LX}\tilde{\lambda}_{KX}) < 0. \quad \square$$

Thus, given $\hat{P}_Y > 0$ and $\Delta_2 < 0$, $\hat{Y} > 0$, iff, $[\tilde{\lambda}_{LX}\phi\alpha + \tilde{\lambda}_{KX}(\alpha\beta - \phi)] > 0$.

Simplifying, $\hat{Y} > 0$, iff, $\left(\frac{\phi - \alpha\beta}{\alpha\phi}\right)\left(\frac{\tilde{\lambda}_{KX}}{\tilde{\lambda}_{LX}}\right) < 1$.

Also, from equation (7),

$$\hat{Y} = -\hat{a}_{KY} = -\sigma_Y\theta_{LY}(\hat{w} - \hat{r}_Y) = \sigma_Y\frac{\theta_{LY}}{\theta_{KY}}\hat{P}_Y > 0$$

Therefore, change in the size of sector Y is given by Y_A (aggregated over formal and informal sector outputs):

$$\hat{Y}_A = s_Y\hat{Y} + (1 - s_Y)\hat{Y},$$

where s_Y = Share of formal sector in aggeragte output of Y .

Thus, $\hat{Y}_A = s_Y\hat{Y} + (1 - s_Y)\hat{Y} = s_Y\sigma_Y\frac{\theta_{LY}}{\theta_{KY}}\hat{P}_Y - (1 - s_Y)\frac{[\tilde{\lambda}_{LX}\phi\alpha + \tilde{\lambda}_{KX}(\alpha\beta - \phi)]}{\Delta_2}\hat{P}_Y$

such that, $\hat{Y}_A > 0$, iff, $s_Y\left\{\sigma_Y\frac{\theta_{LY}}{\theta_{KY}} + \frac{[\tilde{\lambda}_{LX}\phi\alpha + \tilde{\lambda}_{KX}(\alpha\beta - \phi)]}{\Delta_2}\right\} > \frac{[\tilde{\lambda}_{LX}\phi\alpha + \tilde{\lambda}_{KX}(\alpha\beta - \phi)]}{\Delta_2}$.

Simplifying, $\hat{Y}_A \cong 0$, iff, $\left\{\frac{\theta_{LY}}{\theta_{KY}} \cong \frac{[\tilde{\lambda}_{LX}\phi\alpha + \tilde{\lambda}_{KX}(\alpha\beta - \phi)]}{\Delta_2}\right\}\left(\frac{1}{s_Y\sigma_Y} - 1\right)$. □

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Notes

1. It is almost intrinsic to the description of formal and informal sectors in developing countries that "formal" sector workers use collective bargaining as a wage-setting mechanism and include employees mainly from the government and registered private manufacturing and service firms. Historically speaking, in any country, the collective bargaining starts with participation of industrial workers—a tradition that has spread to later evolving service sectors and has typically ignored the agricultural sector. In many developing and transition countries, however, this participation rate is not more than 30% of the total workforce (see Kar and Marjit, 2001, for further details). The remaining large section of workers do not get the benefit of union membership, neither in terms of pay nor job protection and are not even covered by national minimum wage acts (which exist but are rarely adhered to in the poor countries, due to weak governance, strategic non-intervention, etc.) and are generally referred to as the informal workers. Thus, another description of a formal sector will be where minimum wage regulation is strictly enforced, whereas in the informal sector such law is not properly enforced and wages can go into free fall.
2. In this example, one can allow for re-negotiation of the fixed wage. We have checked that there will not be any qualitative change in the results already obtained. For example, a re-negotiation in the fixed formal wage will redistribute the effects between labor and capital depending on the intensity assumption and will not alter the direction of the previous outcome, where formal wage does not change (see Marjit et al., 2003).
3. Thus, whatever little capital flow exists takes the form of outsourcing of formal production/services to the informal segment (vertical linkage, see Marjit, 2003) and that which can be closely monitored by the formal counterpart. While these are issues that require further research, they are beyond the scope of this paper.
4. In a fixed wage model choosing one of the prices as a *numéraire* generates theoretical problems, since nominal movements have real effects. Consider uniform rise in P_X and P_Y . In a full-employment model it should leave all real variables unaffected. Here, this will not be the case. Both X and Y will expand, \bar{X} will also expand but \bar{Y} will contract. R and w will increase by the same proportion, but not r_X , r_Y . Hence it is important that we explicitly work out the effects of a change in P_Y .