Does Trade Increase Employment? A Developing Country Perspective

By

Sugata Marjit
City University of Hong Kong
and
Center for Studies in Social Sciences, India

Hamid Beladi
University of Texas at San Antonio

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Address for correspondence: Hamid Beladi, Department of Economics, College of Business, University of Texas at San Antonio, San Antonio, TX 78249, Phone:210-458-7038, Email: hamid.beladi@utsa.edu

Abstract

We introduce an urban informal sector in the standard Harris – Todaro model. Labor is mobile between the rural and the informal sectors and capital is mobile between the urban formal and informal sectors. In this structure we show that a tariff designed to *protect* the formal sector would *increase* total unemployment. Liberal trade policy in the form of a decline in tariff raises employment and informal wage under very reasonable conditions. Liberalization process may hurt both organized manufacturing and traditional agriculture and lead to a booming informal sector.

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I. Introduction

Whether trade helps or hurts employment has been a topic of never-ending debate among economists, policy makers and activists. Such debate gets even more intense for developing countries experimenting with trade related reforms, since rising unemployment tends to aggravate the problem of poverty and inequality. Typically, when tariffs come down people lose jobs in the import competing sector. As a consequence exportables and total employment can go up. But due to remarkable media coverage of "negative" impact of reforming policies, rising unemployment in the deregulated sectors can create a huge impact on public opinion whereas expanding sectors hardly make the news. While total unemployment will be determined by the relative size of contraction and expansion, models of trade policy and unemployment have to rely on "ifs and buts" i.e. on specific conditions that affect aggregate unemployment. In this paper we use a conventional Harris – Todaro (HT) structure with an informal sector and obtain the result under very reasonable assumptions, *that a tariff contracts employment and raises open unemployment.*

Variants of HT structure have been used to look at the impact of policies on open unemployment and welfare. Interested readers may look at Beladi and Marjit (1996), Marjit and Beladi (2003), and Fields (2005).[1] We relate our paper to a particular strand of HT literature that deals with the informal sector. Gupta (1997) introduced informal sectors in a HT model. But the urban informal wage in such models is less that the rural wage, as expected urban wage has to be equal to the rural wage and the urban formal wage is greater than the rural wage. Casual empiricism suggests that in the developing world there is a fair bit of mobility between the urban informal sector and the rural sector. In our framework workers get the same wage in both sectors. The urban informal sector draws labor from the rural sector and capital from the urban formal sector. Such mobility assigns a pivotal role to the informal sector. The way we set up the model allows workers the choice of either working in the informal sector or going back to the rural sector and of course the choice of "waiting" in the pool of unemployed. One may imagine the urban informal sector to be located in the periphery of the city, between the formal and the rural sector.

Empirically the significance of the urban informal sector has been understood in many papers. Agenor (1996) provides an elegant survey on the size of informal sectors in developing countries. By quoting numerous studies, informal labor force accounts for more than 70% of total labor force. Segmented labor markets and implications of development policies in such a set up have been analized in Agenor and Montiel (1996). Drawing on earlier papers by Carruth and Oswald (1981) and Agenor and Montiel (1996) and Kar and Marjit (2001) and Marjit (2003) looked at the possibility of a rising informal wage and employment when laid off workers from the formal sector crowd into the informal sector. But somehow employment effect of trade policy in a standard HT structure with an informal sector is largely absent in the literature. Moreover our paper provides an almost unambiguous result of *rising unemployment with protection.*

It is difficult to obtain data on informal sectors in any country. However, there is some scattered empirical evidence which shows that during the recent trend in globalization, developing countries are experiencing an increase in the size of the informal economy. Also Marjit and Maiti (2005) demonstrate with the figures available for the informal manufacturing sector in India before and after the initiation of the reform process, that the informal wage and employment have increased across various Indian states during the post reform period. In our framework a decline in tariffs reduces open unemployment through expansion of employment in the informal sector and an increase in the informal wage. The result is an outcome of having a labor intensive urban informal sector and is more simple and general than the earlier work of Beladi and Marjit (1996) which brings in an intermediate input in the HT structure to get the employment reducing effect of protection.

The plan of the paper is as follows. Second section discusses the model and the equilibrium. The third section deals with the impact of a tariff when the informal is a traded sector. The fourth extends the result by treating the informal good as the non-traded good. The last section provides some concluding remarks.

II. The Basic Framework and Equilibrium

This is a three sector economy producing X (urban formal manufacturing good), Y (urban informal good), and Z (the agricultural good). X and Y use capital and labor, Z uses land and labor. Labor is freely mobile between Y and Z, in the sense that workers earn the same wage, W, informal in both these sectors. But X offers a wage $\overline{W}$, formal wage determined through negotiation with the unions. There is open unemployment i.e. the workers migrating from the rural to the urban area can either hang around unemployed waiting for a formal job which pays $\overline{W} > W$ or they can get W in the urban informal sector or in the rural sector. They are indifferent between the two. Capital moves freely between the urban formal and informal sectors earning the same return, r.

We assume that X is an import-competing good enjoying a tariff, t. On the other hand, Y, the informal manufacturing sector is assumed to produce a traded good in the benchmark model. Later we introduce the possibility that Y is a non-traded good. The agricultural good, Z is an export good. Competitive markets and constant returns to scale technology with diminishing marginal productivities of factors are assumed. Competitive price conditions imply:

$$\overline{W}a_{LX} + ra_{KX} = P_X(1+t) \tag{1}$$

$$Wa_{Ly} + ra_{KY} = P_Y \tag{2}$$

$$Wa_{LZ} + Ra_{TZ} = P_Z \tag{3}$$

a_{ij}'s are rural input-output coefficients, r is the return to capital and R is rental on land. Full employment of land and capital ensure that,

$$a_{TZ}Z = T \tag{4}$$

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

Where T and K are inelastic supplies of land and capital. Harris – Tadaro migration equilibrium condition is given by,

$$\frac{\overline{W}a_{LX}X}{L-(a_{LY}Y + a_{LZ}Z)} = W \tag{6}$$

Note that (6) can be rewritten as a modified "full-employment" condition for labor.

$$\frac{\overline{W}}{W}a_{LX}X + a_{LY}Y = L - a_{LZ}Z \tag{7}$$

With given prices and tariff rate , t, one can determine W, r, and R from (1) – (3). Factor prices in turn determine factor proportion. Now from (4) we can determine Z.

Then (5) and (7) determine X and Y. This completes the determination of equilibrium. We assume that Y is labor intensive and X is capital intensive, an assumption which hardly needs any justification. However, the factor intensity assumption implies,

$$\left[\frac{\overline{W}}{W} a_{LX} a_{KY} - a_{KX} a_{LY}\right] < 0$$

or,

$$\frac{a_{KX}}{a_{LX}} > \frac{\overline{W}}{W} \bullet \frac{a_{KY}}{a_{LY}} \tag{8}$$

Note that on, $\overline{W} > W$, capital intensity assumption is a bit stronger than the usual i.e.

$$\frac{a_{KX}}{a_{LX}} > \frac{a_{KY}}{a_{LY}} \tag{9}$$

Let us define (8) as the stronger version of intensity assumption and the weaker version is given by,

$$\left(\frac{\overline{W}}{W}\right) \bullet \left(\frac{a_{KY}}{a_{LY}}\right) > \frac{a_{KX}}{a_{LX}} > \frac{a_{KY}}{a_{LY}} \tag{10}$$

Under the weaker version, the informal sector becomes effectively the capital-intensive sector. (10) Accommodates a kind of factor intensity reversal if W goes down way below $\overline{W}$ i.e. wider is the formal wage gap, we may have a factor intensity reversal. Henceforth, we shall assume (8) holds and assume away any possible factor intensity reversal.

III. A Reduction in tariffs

Let us trace through the changes in equilibrium as t is reduced. A decline in t reduces r, increases W and reduces R. This follows directly from equations (1) – (3).

A decline in R makes people use land more intensively and with a given T that reduces Z [from (4)] and a_{LZ}. As the RHS in (7) increases with a decline in $a_{LZ}Z$, the LHS reduces with a decline in $(\overline{W}/W)$. Also (a_{KX}, a_{KY}) increases with an increase in $(\overline{W}/r)$ and (W/r). Hence, the labor constraint [(7)] becomes less binding and the capital constraint [(5)] becomes more binding, This leads to the well known Rybczynski type result increasing the labor-intensive Y (urban informal sector) and contracts the capital intensive X (urban formal manufacturing good).

Now from (7) we can write total employment, L_E, as

$$L_E \equiv a_{LX}X + a_{LY}Y + a_{LZ}Z = L - \frac{\overline{W}}{W}a_{LX} + a_{LX}X$$

$$= L - a_{LX}X\left[\frac{\overline{W}}{W} - 1\right] \tag{11}$$

By now we know that $a_{LX}X$ must have gone down and $(\overline{W}/W)$ also has gone down. L_E must increase. Therefore, we can write the following proposition.

Proposition I: *Under the stronger factor intensity ranking a decline in tariffs must increase total employment.*

The exact proof is given in the appendix. Note that a downsized urban formal sector, with an expanding urban informal sector and a rising informal wage must reduce open unemployment in the economy. A decline in tariffs not only contracts formal manufacturing, but also traditional agriculture. The existing set of informal and rural workers must gain as W is higher now. Displaced workers from the formal sector lose as they were getting $\overline{W}$. Some of those who were in the pool of "open unemployed" may give up hope and join the informal sector.

Typically a drop in t will reduce the expected wage rate in the urban formal sector and has a tendency to reduce open unemployment. But in the standard H T framework people migrating to agriculture depresses the wage rate in agriculture. Therefore, the effect on expected wage rates is ambiguous, so is for unemployment. However, in our framework W in fact goes up as displaced capital from the formal sector goes to the informal sector. This is a must when there is not much of a change in P_Y. Here a drop in t unambiguously reduces total unemployment or increases total employment. It is the rise in the informal wage which is a striking outcome because the conventional wisdom will be a drop in W as more people crowd into the informal segment. But as capital leaves the formal sector and as r goes down, capital-labor ratios in each sector go up, driving up W. Not only the displaced workers from the formal sector are absorbed in Y but higher W also attracts more agricultural workers to the informal sector raising overall employment. Also note that the average wage which is a weighted average of formal wage $\overline{W}$ and W is given by,

$$W_a = \overline{W} \bullet \frac{L_X}{\overline{L}} + \frac{W(L_Y + L_Z)}{\overline{L}}$$

$$= \overline{W} \bullet \frac{L_X}{L} + W \frac{\left[L - L_X\left(\frac{\overline{W}}{W} - 1\right) - L_X\right]}{L} \qquad \text{(from (4))}$$

$$= W + \frac{L_X}{L}\left[\overline{W} - W\left(\frac{\overline{W}}{W} - 1\right) - W\right]$$

$$= W + \frac{L_X}{L}\left[\overline{W} - \overline{W} + W - W\right]$$

$$= W$$

Clearly, the average wage is nothing but W itself. Hence, the average worker must gain from a tariff reform. Therefore, a rise in W must mean a rise in W_a and hence the welfare level of an average worker.

IV. The Non-Traded Informal Sector

If the urban informal good, Y is non-traded, we need a separate equation for determining the equilibrium P_Y by balancing demand and supply in this sector. Let us look at the sequence of outcomes following a decline in tariff in such a context.

In our earlier analysis Y definitely expands due to the assumption of factor intensity ranking between X and Y. Now an increase in Y reduces P_Y to clear the market for the informal good and a decline in P_Y tends to reduce W, offsetting the positive effect on employment.

However, a decline in t and a decline in P_Y have opposite effects on demand for Y. What we have shown in the appendix [(13A)] suggests that a high elasticity of substitution in demand (μ_2) will be a sufficient condition to reinstate our earlier result. In fact, it is well known that if $\mu_2 \to \infty, \hat{P}_Y \to 0$ i.e. in the limit it mimics the case with a traded informal sector. More generally, even if W goes down, strong elasticity of factor substitution in X, σ_X, will mean an increase in employment. But there is every possibility that the informal wage will go up.

One has to realize that a high σ_X, reduces $(a_{LX}X)$ significantly and workers with depressed wages do not hang around in the hope of a job and turn back to Y, increasing employment.

Proposition II: If Y *is the urban non-traded sector, a decline in tariffs will increase total employment provided that* σ_X *and* μ_2 *are strong enough.*

For proof of this proposition, see the derivation of (13A) in the appendix.

V. Related Discussion

It is well known in the HT framework that employment and aggregate labor income may move in opposite directions following a policy change. Aggregate labor income in our model is given by.

$$\overline{W}a_{LX}X + Wa_{LY}Y + Wa_{LZ}Z = WL \tag{12}$$

Whatever happens to employment, aggregate labor income increases with an increase in W, the informal/rural wage. What we have shown here is that a decline in t can simultaneously increase employment and raise W, provided the condition (13A) holds. If P_Y does not move much, W must increase. If P_Y does change a lot, W can still go up [see (10A) in the appendix]. The weaker factor-intensity ranking condition,

$$\frac{\overline{W}}{W} \bullet \frac{a_{KY}}{a_{LY}} > \frac{a_{KX}}{a_{LX}}$$

leads to a capital intensive informal sector, as a substantial wage gap $\left(\frac{\overline{W}}{W}\right)$ makes worker's share of average cost in X quite high relative to the informal sector. Therefore, a drop in t may actually increase X and reduce Y. Yet L_E may very well increase since a rise in W will always have a positive effect on total employment. As there is a general consensus that the informal sector is labor intensive compared to formal sectors, we prefer to retain the stronger factor intensity assumption as preserved usual factor intensity ranking.

Another point to note in this context is that a rise in the effective price of Z, may be through an increase in prospects for exports or through an increase in productivity is going to increase unemployment. A rise in P_Z does not change W. But an increase in Z reduces total labor available for the production of X and Y. Since X is capital – intensive, due to the Rybczynski effect, X goes up and L_E goes down. Informal sector contracts but X expands , more people wish to hang around for the job in the formal sector, increasing the extent of open unemployment.

One issue that seems to be left open is the pattern of trade. As t goes down both X and Z contract. This means that import-competing output and export production both decline. A natural query is how to sustain balance of trade. Of course as P_x (1+t) and P_Y drop relative to that of Z, exportable surplus can very well increase. If not, income effect will make sure that consumption adjusts to balance of trade constraint. But a simple extension of the basic model will be much more realistic.

Consider a situation where we also have a sector which uses skilled labor and capital and produces an exportable. A drop in t, by reducing r will increase skilled wage and skilled output of the exportable. This can be added without altering any of our basic results. Skilled labor, just as capital, can be assumed to be a scarce input and fully employed. One additional interesting result that one may obtain in the extended model has to do with the worsening of unskilled/skilled wage gap following a drop in t if capital's share in average cost is greater in the skilled sector than the unskilled sector.

VI. Concluding Remarks

We address one of the most controversial issues in trade policy of the developing nations. Does trade increase employment?

We argue that a decline in tariff helps create jobs in the informal sector and increase informal wage at the same time even when workers are laid off from the formal sector. This may accompany a decline in rural employment. But overall employment must increase.

The pivotal role of an urban informal sector is justified by the fact that if we did not have the informal sector in our model we could not have obtained a totally different result. A drop in t will reduce urban employment and reduce W, the rural wage rate. Although there will be offsetting effects on open unemployment, rural workers would have been definitely worse off and unemployment could easily go up. It is the informal sector which draws in capital, preserves and raises employment and also allows the informal wage to increase. Even if people leave rural areas, open unemployment is not allowed to grow.

Footnotes

1 For related studies on H-T Model see Khan (1982a, 1982b), Gupta (1993, 1997), Batra and Lahiri (1987, 1988), Chao and Yu (1992, 1995) and Yabuuchi (1998,1993) among others.

Appendix

Effect of a change in tariff (t):

Using (4) and (7) we derive (1A)

$$\frac{\overline{W}}{W} a_{LX} X + a_{LY} Y = L - \frac{a_{LZ}}{a_{TZ}} \bullet T \tag{1A}$$

$$a_{KX} X + a_{KY} Y = K \tag{2A}$$

Differentiating and using '^' to denote proportional change we get,

$$\lambda_{LX} \hat{X} + \lambda_{LY} \hat{Y} = \delta_L \hat{W} \tag{3A}$$

$$\lambda_{KX} \hat{X} + \lambda_{KY} \hat{Y} = -\delta_K \hat{W} \tag{4A}$$

$$(\delta_L, \delta_K) > 0$$

Derivation here follow Beladi and Marjit (1996). Now from competitive price conditions we get,

$$\hat{r} = \frac{\hat{\tau}}{\theta_{KX}} (\tau \equiv 1 + t)$$

$$\hat{W} = \frac{\hat{P}_Y - \frac{\theta_{KY}}{\theta_{KX}} \bullet \hat{\tau}}{\theta_{LY}} \tag{5A}$$

$$\hat{W} > 0 \text{ as } \hat{\tau} < 0$$

There fore we have,

$$\hat{X} = \frac{\begin{vmatrix} \delta_L \hat{W} & \lambda_{LY} \\ -\delta_K \hat{W} & \lambda_{KY} \end{vmatrix}}{|\lambda|} = \frac{(\delta_L \lambda_{KY} + \delta_K \lambda_{LY}) \hat{W}}{|\lambda|}$$

Where,

$$|\lambda| \equiv \left[\frac{\hat{W}}{W} a_{LX} a_{KY} - a_{KX} a_{LY}\right] < 0$$

(by stronger factor intensity assumption), hence

$$\hat{Y} = \frac{\begin{vmatrix} \lambda_{LX} & \delta_L \hat{W} \\ \lambda_{KX} & -\delta_K \hat{W} \end{vmatrix}}{|\lambda|} = \frac{-\hat{W}}{|\lambda|}\left[\lambda_{LX}\delta_K + \lambda_{KX}\delta_L\right] \equiv \hat{W} \bullet A, A > 0$$

So that,

$$\hat{Y} = \left[\frac{\hat{P}_Y - \dfrac{\theta_{KY}}{\theta_{KX}}\hat{\tau}}{\theta_{LY}}\right] \bullet A = \frac{\hat{P}_Y}{\theta_{LY}} A + \frac{\theta_{KY}}{\theta_{KX}\theta_{LY}}\left(-\hat{\tau}\right) \bullet A$$

Note that when Y is a traded good and P_Y is given, $\hat{X} < 0, \hat{Y} > 0$. If Y is a non-traded good, demanded for Y and supply of Y must match locally. Let us postulate a demand function for Y.

$$\hat{Y}_D = \mu_1 \hat{\tau} - \mu_2 \hat{P}_Y \tag{7A}$$

A change in τ has both income and substitution effects on demand for Y. While the substitution effect is negative i.e. a drop in τ reduces Y_D, the income effect can go either way. μ_1 captures both. μ_2 is own price effect and in general equilibrium any changes in P_y will have income effect as well. We will assume their substitution effect dominates and μ_1, μ_2 are positive

Equating (6A) and (7A) we get the equilibrating change in P_Y as,

$$\frac{\hat{P}_Y}{\theta_{LY}} \bullet A + \frac{\theta_{KY}}{\theta_{KX}\theta_{LY}}\left(-\hat{\tau}\right) A = \mu_1 \hat{\tau} - \mu_2 \hat{P}_Y \tag{8A}$$

or,

$$\hat{P}_Y = \left\{ \frac{\hat{\tau}\left[\mu_1 + \dfrac{\theta_{KY} A}{\theta_{KX}\theta_{LY}}\right]}{\mu_2 + \dfrac{A}{\theta_{LY}}} \right\} < 0 \tag{9A}$$

Therefore,

$$\hat{W} = \hat{\tau}\, \frac{\mu_1\theta_{KX}\theta_{LY} + \theta_{KY} A}{(\mu_2\theta_{LY} + A)\theta_{KX}\theta_{LY}} - \frac{\hat{\tau}\theta_{KY}}{\theta_{KX}\theta_{LY}}$$

$$= \frac{-\hat{\tau}}{\theta_{KX}\theta_{LY}}\left[\theta_{KY} - \frac{\mu_1\theta_{KX}\theta_{LY} + \theta_{KY} A}{\mu_2\theta_{LY} + A}\right]$$

$$= \frac{-\hat{\tau}}{\theta_{KX}\theta_{LY}}\left[\frac{\theta_{LY}\left[\theta_{KY}\mu_2 - \theta_{KX}\mu_1\right]}{\mu_2\theta_{LY} + A}\right] \tag{10A}$$

Therefore, $\hat{W} > 0$ if

$$\mu_2 > \frac{\theta_{KX}}{\theta_{KY}} \bullet \mu_1$$

We now look at the effect of a decline in t on the total unemployment L_E .

$$L_E = a_{LX} X + a_{LY} Y + a_{LZ} Z = \overline{L} - a_{LX} X\left(\frac{\overline{W}}{W} - 1\right) \tag{11A}$$

$$\hat{L}_E > 0 \text{ iff } \left[a_{LX} X + \left(\frac{\overline{W}}{W} - 1\right)\right] < 0$$

$$\hat{L}_E > 0 \text{ iff } \quad \left\{ \left[-\theta_{KX}\sigma_X(-\hat{r}) + \hat{W} \bullet B \right] - \hat{W} \frac{\frac{\overline{W}}{W}}{\left[\frac{\overline{W}}{W} - 1 \right]} \right\} < 0$$

$$\text{where B} = \left[\frac{\delta_L \lambda_{KY} + \delta_K \lambda_{LY}}{|\lambda|} \right] < 0$$

Hence,

$$L_E > 0 \text{ iff } \quad \sigma_X \bullet \hat{\tau} + \hat{W} \left[B - \frac{\frac{\overline{W}}{W}}{\frac{\overline{W}}{W} - 1} \right] < 0 \qquad \text{(12A)}$$

It is now readily available from (12A) that since $\hat{\tau} < 0$ and $B < 0$, $\hat{L}_E > 0$ if $\hat{W} > 0$.

We already noted that for for $\hat{P}_Y = 0$, $\hat{W} > 0$ as $\hat{\tau} < 0$ [from(5A)]. Therefore, L_E must go up when τ goes down – the main proposition of the paper. The general expression for (12A) is given by (after substitution for $\hat{W}$).

$$\sigma_X \hat{\tau} - \hat{\tau} \left[\frac{\theta_{KY}\mu_2 - \theta_{KX}\mu_1}{\theta_{KX}(\mu_2\theta_{LY} + A)} \right] \left[B - \frac{\frac{\overline{W}}{W}}{\frac{\overline{W}}{W} - 1} \right] = \hat{\tau} \left[\sigma_X - \frac{\theta_{KY}\mu_2 - \theta_{KX}\mu_1}{\theta_{KX}(\mu_2\theta_{LY} + A)} \left(B - \frac{\frac{\overline{W}}{W}}{\frac{\overline{W}}{W} - 1} \right) \right]$$

Therefore as $\hat{\tau} < 0$, $\hat{L}_E > 0$ iff,

$$\sigma_X > \frac{\theta_{KY}\mu_2 - \theta_{KX}\mu_1}{\theta_{KX}(\mu_2\theta_{LY} + A)} \left(B - \frac{\frac{\overline{W}}{W}}{\frac{\overline{W}}{W} - 1} \right)$$

Since the bracketed term is RHS (13A) is negative, a sufficient condition for an increase in employment following a decline in t is given by,

$$\frac{\theta_{KY}\mu_2 - \theta_{KX}\mu_1}{\theta_{KX}\left(\mu_2\theta_{LY} + A\right)} > 0$$

Which is also the condition for an increase in W.

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