

Economic Reforms, Governance and the Informal Sector

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Abstract

An import competing firm allocates production between a high wage formal and a low wage informal segment. Illegal use of labour in the informal sector is characterized by a probability of punishment which depends on the size of informal employment. In such a structure, as tariff comes down, total employment contracts but the informal sector expands. Once we bring in working capital, lowering of interest rate, again an indicator of reformatory policies, tends to reduce the size of the informal segment. Our theoretical result matches with a recent empirical evidence on the response of the informal sector to trade liberalization.

Keywords: Economic liberalisation, production, informal sector.

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I. Introduction

Economic reform or liberal economic policies have been taking firm root in the entire developing world. Be it Latin America, Asia or Africa tariffs are being reduced, foreign investment is being encouraged and interventionist strategies are slowly taking a backseat. Naturally volumes are being contributed towards justifying or criticizing market-based reformist policies. A key feature of the developing world is that most of its work force is absorbed in the informal sectors, sectors which are usually not registered, non-tax paying and most likely to ignore labour laws or unionized wage negotiations. Agenor (1987) gives a detailed list of the relevant work on several developing countries which repeatedly assert the significance of informal labour market. Therefore, it is natural to ask how reforms are going to affect the informal segment of the labour market.

We think that two issues should be of prime importance in the current context. First, the reforms are likely to affect wage and employment in the informal sector. There have been some attempts to explore these issues. Kar and Marjit (2001) and Marjit (2003) have tried to analyse the impact of trade reforms on informal wage in terms of general equilibrium models. These models build on the assumption of a dual labour market with fixed as well as flexible wage contracts and labour mobility. In a way this is also related to Bulow and Summers (1986), Carruth and Oswald (1981), Saint-Paul (1996), Agenor and Montiel (1996) etc. Marjit, Kar and Sarkar (2003) substantiates earlier theoretical claims with evidence drawn from informal manufacturing in India. In these papers reform tends to expand size of the informal sector through a cut back in employment in the formal sector when formal and informal are producing *different* goods and a tariff protects the formal sector. Apparently, if one focuses on a typical import

competing sector, which has both formal and informal segments, the impact of a reform is less clear. For example, a negative output effect of a tariff cut should be felt by both segments and one does not know a priori how the composition will change. In a recent paper Goldberg and Pavcnik (2003) provides a detailed empirical evidence on Brazil and Colombia to highlight the impact of trade reform on the size of the informal sector. While Colombia clearly demonstrates an expansion in the informal segment, Brazil demonstrates very little change. With this backdrop in place, our purpose is to understand the relationship between the size of informal production and reformatory policies by treating the case of an import-competing sector.

Another important departure from the exiting literature is in raising the issue of governance. Use of informal workers is illegal in our set up since this involves violation of labour laws. We argue that if the producer is monitored and apprehended for operating an ‘informal’ segment, he faces a penalty. However, he can get away by paying a bribe to the apprehending agent[#]. It is reasonable to argue that the opportunity costs of such actions are monotonic in benefits from protection. We develop an explicit Nash-bargaining structure to determine the equilibrium bribe. This outcome is internalized by the firm while deciding the allocation of production or employment between the formal and informal sector.

Although our focus is on trade related reform, i.e., a decline in the tariff rate, we also consider the case where return to capital or cost of capital is reduced. This is also a worldwide phenomenon and real interest rate has drastically come down in the developing world. For example, in India, one redeeming factor of reform is a substantial

[#] Economics of corruption and governance is a fairly vibrant area of research. One interesting result in the literature suggests that even a substantial amount of penalty may not deter crime [Marjit & Shi (1998)].

or partly phenomenal increase in foreign exchange reserve and a sharp decline in the interest rate all around. In tables – I & II, we provide the history of a downward trend in tariff and interest rates in Brazil, Columbia as well, supplementing the information available in Goldberg and Pavcnik (2003).

With these in hand we proceed towards the formal analysis. Section II sketches the basic model and the impact of a decline in tariff. The third discusses the consequences of a declining interest rate. The last one concludes.

II. The Model

We start our model in a simplified way where initially there is no capital requirement.

Labour is the only input of production.

L_1 : labour requirement in the formal sector,

L_2 : labour requirement in the informal sector,

w_1 : wage rate in the formal sector,

w_2 : wage rate in the informal sector,

t : rate of tariff.

The formal-informal distinction is captured through the assumption that $w_1 > w_2$. Such wage determination is beyond the control of the particular firm. There is no difference in productivity of labour between segments. Therefore, it is quite likely that the entire production should shift to the informal sector. However, this can not be done because ‘informal’ production is ‘illegal’ since it violates labour laws and calls for positive actions from the state. We explicitly model such a process as follows.

For the producer, the probability of getting caught while producing in the informal sector will depend upon the size of the informal sector. In our model, the probability of getting caught is shown by $[1 - p(L_2)]$ with $p', p'' < 0$. If the producer gets caught he has to pay either bribe or the punishment cost. He will have to pay bribe to the monitoring officer who has a salary, denoted in our model by 's', independent of his monitoring capabilities.

Let us analyse the collusive form of game between the bribing producer and the corrupt monitoring officer. Assume that, $\Pi(t)$ be the level of profit by the tariff protected producer, which is a function of the tariff rate 't'; 'b' is the amount of bribe and F is the punishment cost. We assume that the punishment cost is quite severe which drives the profit level of the producer down to $\Pi(0)$, the reservation pay-off if the producer has to fall back on an alternative occupation. We try to determine the optimal level of bribing through the 'Nash Bargaining' approach. The net profit of the dishonest producer with tariff protection, would be $[\Pi(t) - b]$. But if he does not pay bribe, his net profit falls to $[\Pi(0) - F]$. On the other hand, if the monitoring officer takes bribe his total income would be $(s + b)$, otherwise it will remain at 's'. Thus, one way to treat this is to maximize the following simple expression with respect to b.

$$\text{Max}_{\{b\}} [\{(\Pi(t) - b) - (\Pi(0) - F)\} [s + b - s]] \dots\dots\dots (1).$$

From the first order condition, we get, $b = [\{ \Pi(t) - \Pi(0) + F \} / 2]$, which we denote as $b(t)$ with $b'(t) > 0$. The second order condition is also satisfied.

We now form the objective function for the producer. The production function is: $q = f(L_1 + L_2)$, with $f' > 0$ and $f'' < 0$. Assuming that the domestic price of the commodity is normalised to one, the objective function can be written as:

$\Omega = p(L_2)[(1+t)f(L_1 + L_2) - (w_1L_1 + w_2L_2)] + [1 - p(L_2)][(1+t)f(L_1 + L_2) - (w_1L_1 + w_2L_2) - b(t)]$
 Rewriting the above equation, we get,

$$\Omega = (1+t)f(L_1 + L_2) - (w_1L_1 + w_2L_2) - [1 - p(L_2)]b(t) \dots\dots\dots (2).$$

The producer will try to rationally allocate the total production into two different sectors to maximise his total profit. Thus, we differentiate equation (1) with respect to L_1 and L_2 .

First order conditions give,

$$(1+t) \frac{\partial f}{\partial L_1} = w_1 \dots\dots\dots (2) \text{ and } (1+t) \frac{\partial f}{\partial L_2} = w_2 - p'(L_2)b(t) \dots\dots\dots (3).$$

It is easy to check that (see appendix I for details)

$$\left(\frac{dL_1}{dt}\right) = -\frac{f'}{f''(1+t)} + \frac{p'b'}{p'' \cdot b(t)} > 0 \dots\dots\dots (4)$$

$$\left(\frac{dL_2}{dt}\right) = \frac{p' \cdot b'}{-p'' \cdot b(t)} < 0 \dots\dots\dots (5).$$

The signs of (4) & (5) depend upon the facts that $p', p'' < 0$, $f' > 0$, $f'' < 0$ and $b' > 0$.

Combining equations (4) and (5), we get,

$$\frac{dL_1}{dt} + \frac{dL_2}{dt} = \frac{-f'}{f''(1+t)} > 0 \dots\dots\dots (6).$$

Equation (6) suggests that if the tariff protection falls, then the total production and hence, total labour requirements, $(L_1 + L_2)$ will fall. This is general convention. But what is more striking is that, following equations (4) and (5), though $(L_1 + L_2)$ is falling, L_2 , i.e., the labour requirement in the informal sector will rise and L_1 , the labour requirement in the formal sector will fall.

Figure (1) clearly expresses the above phenomena. Here, on the horizontal axis, we measure the total labour recruitments as well as the labour requirements in each of the sectors. On the vertical axis, we measure the formal and informal wage rates, i.e., the

marginal costs (MC) of production. Since, the wage rate in the formal sector is high and fixed, the wage line is parallel to the horizontal axis and starts at $w = w_1$. On the other hand, the informal wage rate starts from a lower level and has a positive slope as the wage rate in this sector increases with recruitment of more informal labour as $p' < 0$. The demand for labour is shown by the downward slopping Value of Marginal Product for labour (VMP_L) curve. Total labour, that will be hired by the producer, both in the formal and informal sectors, has been shown by the intersection point of the formal wage line and the VMP_L curve. Next we examine how a producer allocates his total labour requirements into two sectors. From figure (1), it can be clearly understood that, the demand for informal labour will be up to the point where the rising informal wage (or the informal MC) line meets the formal wage (or the formal MC) line. The rest will be hired from the formal sector.

We proceed further to examine graphically, the effects of a fall in the tariff protection on L_1 and L_2 . We know that lowering the tariff duty will cause a fall in the local price of that commodity and hence the VMP_L will fall. It has been shown by a leftward shift of the VMP_L curve in figure (1). Given the unchanged formal wage rate, it will cause a fall in overall labour requirements and hence the total production of that commodity will fall. But the MC of the informal sector has been given by $w_2 - p'(L_2)b(t)$. Since 't' is falling, the second part of the informal MC will also fall, as $b' > 0$, and the new informal MC curve will be flatter. A flatter informal MC curve will intersect the formal MC line at the right side of the initial intersection point. This rightward shift of the meeting points of the two MCs vividly demonstrates that due to a fall in the tariff protection, the labour requirement and hence production in the informal sector will rise

and the labour requirement and subsequent production in the formal sector will fall more than the rise in labour requirement in the informal sector.

Proposition 1: If the tariff protection (t) falls, then the total labour requirement in the production ($L_1 + L_2$) falls but labour requirement in the informal sector (L_2) will rise at the cost of formal labour (L_1).

The intuition is that as t goes down, equilibrium amount of bribe also goes down. Therefore, effective marginal cost facing the informal segment also goes down. Hence, there is a change in composition of production in favour of the informal sector.

III. The effects of change in the market rate of interest on the informal sector

In this section we look at yet another consequence of reform, i.e., lowering of interest rates. We introduce a notion of ‘working capital’ in the basic model. The firm under consideration needs to pay workers at the beginning of the period and then repays the principal and interest at the end of the production period. To prove our point we need not distinguish between formal and informal interest rates. So we keep them the same at r. The objective function for the producer would be:

$$\Psi = (1+t)f(L_1 + L_2) - \{w_1(1+r)L_1 + w_2(1+r)L_2\} - [1 - p(L_2)]b(t) \dots\dots\dots (7).$$

Maximising (10) with respect to L_1 and L_2 , we get,

$$(1+t) \frac{\partial f}{\partial L_1} = w_1(1+r) \dots\dots\dots (8) \text{ and } (1+t) \frac{\partial f}{\partial L_2} = w_2(1+r) - p'(L_2)b(t) \dots\dots\dots (9).$$

The above equations (8 & 9) represent the FOCs, SOC's are also satisfied.

It is obvious that as r goes down, total employment of labour will expand. But we now show that L_1 will expand and L_2 will go down. It is instructive to look at figure 2.

Since $w_1 > w_2$, a drop in r will mean $AA' > BB'$. Thus MC in the formal sector declines more than the MC in the informal sector. $L_1 + L_2$ expands, but L_1 goes down to L'_1 as the point of intersection between two MCs shifts from C to C' . For formal proof see appendix II.

Proposition 2: If market interest rate (r) falls given unchanged tariff protection (t), total labour recruitment (L_1+L_2) will rise along with an increase in the formal employment (L_1) and a fall in informal employment (L_2).

What we have shown so far that a drop in t will increase L_2 and a drop in r will reduce L_2 . Therefore, if one is looking at two kinds of reforms, one should expect offsetting effects on the size of the informal segment.

Let us now retrace the evidence impeccably demonstrated in the well-known work of Goldberg & Pavcnik (2003). They argue that Colombia has demonstrated a greater degree of informalisation relative to Brazil over the period of economic liberalization. We supplement their evidence on ‘tariff’ with some data on real interest rates of two countries. We could not find proper evidence for the lending rates, so we take the real deposit rates as a proxy. It is evident from table II that real deposit rates have come down drastically in Brazil over the same period as considered by Goldberg & Pavcnik (2003); whereas real deposit rate has been almost stagnant in Colombia. However, the rate of decline in tariffs is quite similar between two countries (table I).

Our model predicts that since real interest rates came down heavily in Brazil, the impact of a drop in t on L_2 has been possibly offset to a large extent. Thus one should not observe much change in L_2 in Brazil. But in Colombia the impact of a decline in r is more or less absent. Therefore, a drop in t has the predictable effect of increasing the size of the informal segment.

IV. Conclusion

We have used a fairly simple model to argue convincingly that decline in tariff and interest rates, the two cornerstones of reformatory policies, have offsetting effects on the size of informal production within an import-competing sector. We try to match our theoretical conjecture by supplementing the existing evidence we have on Brazil and Colombia. It is interesting that our findings seem to be consistent with the empirical evidence.

All said and done we are aware of the “ifs and buts” in our arguments. We did not get data of interest rate on informal lending and we have not done a comprehensive econometric testing of the model in hand. But our approach is innovative to the extent it brings in the issue of governance in the analysis of formal-informal interaction and it based on generally acceptable assumptions. Our bonus is that our theoretical findings are not far off from the evidence available so far.

Several extensions of the present work can be planned.

First, one could look at few other policies and discuss the governance issue further by bringing in the role of labour unions explicitly. This will endogenise the process of wage formation.

Second, other country evidences could be collected to strengthen the empirical basis of the work.

Third, fiscal issues, in case formal-informal division has revenue implications, could be discussed as well.

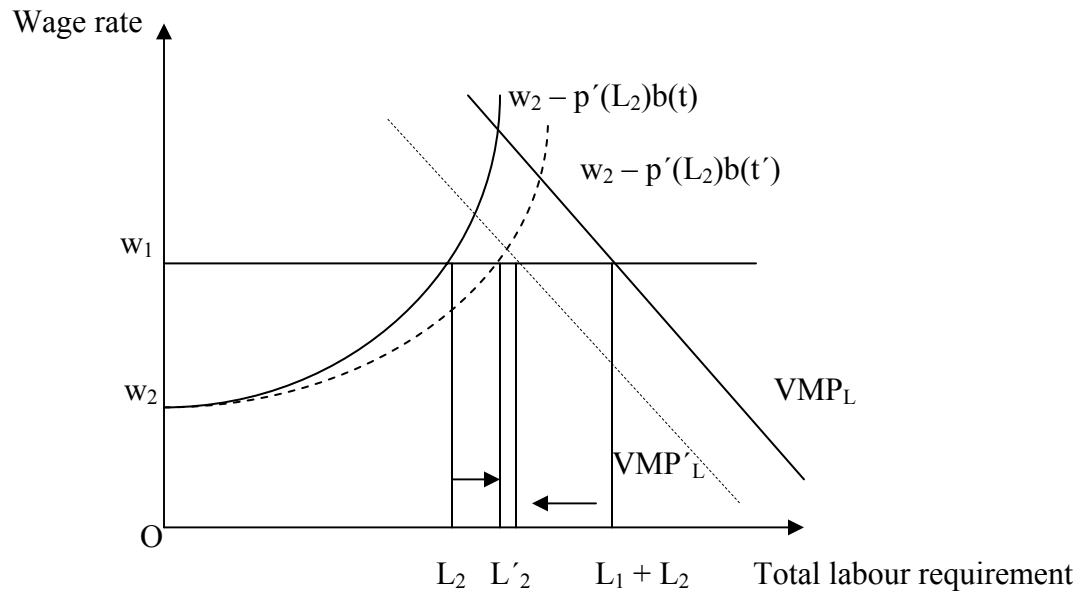


Figure (1): Effect of a fall in tariff protection ($t > t'$) on different labour sectors.

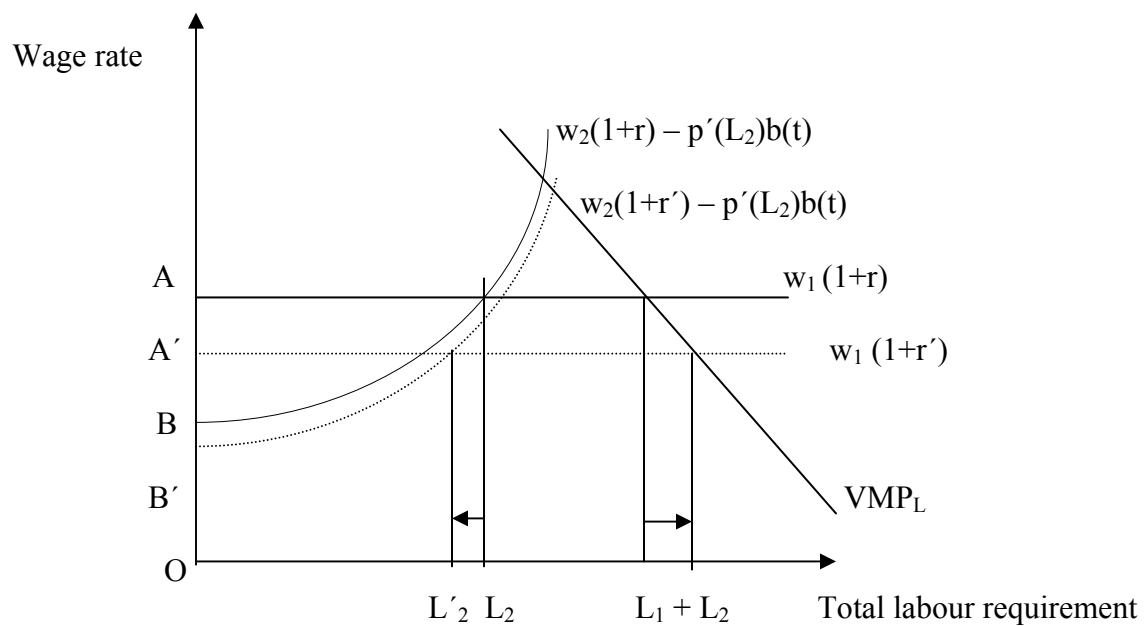


Figure (2): Effect of a fall in interest rate ($r > r'$) on different labour sectors

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Appendix - I

Proof of equations (4) and (5):

Differentiating further the two FOCs (equations 2 & 3), we obtain,

$$(1+t)f'' \frac{dL_1}{dt} + (1+t)f'' \frac{dL_2}{dt} = -f' \dots\dots\dots (A1) \text{ and}$$

$$(1+t)f'' \frac{dL_1}{dt} + [(1+t)f'' + p'' \cdot b(t)] \frac{dL_2}{dt} = -f' - p'b' \dots\dots\dots (A2).$$

Rearranging equations (A1) & (A2) in a vector-matrix form, we get,

$$\begin{bmatrix} (1+t)f'' & (1+t)f'' \\ (1+t)f'' & (1+t)f'' + p'' \cdot b(t) \end{bmatrix} \begin{bmatrix} \frac{dL_1}{dt} \\ \frac{dL_2}{dt} \end{bmatrix} = \begin{bmatrix} -f' \\ -f' - p'b' \end{bmatrix} \dots\dots\dots (A3),$$

where the determinant, $\Delta = (1+t)f'' \cdot p'' \cdot b(t) > 0$.

From (A3), we can solve for $(\frac{dL_1}{dt})$ and $(\frac{dL_2}{dt})$.

$$\begin{aligned} \frac{dL_1}{dt} &= \frac{\begin{vmatrix} -f' & (1+t)f'' \\ -f' - p'b' & (1+t)f'' + p'' \cdot b(t) \end{vmatrix}}{\Delta} \\ &= \frac{-f'p''b(t) + p'b'(1+t)f''}{(1+t)f'' \cdot p'' \cdot b(t)} \\ &= -\frac{f'}{f''(1+t)} + \frac{p'b'}{p'' \cdot b(t)} > 0 \dots\dots\dots (A4) \text{ (Equation 4 in the paper).} \end{aligned}$$

$$\frac{dL_2}{dt} = \frac{\begin{vmatrix} (1+t)f'' & -f' \\ (1+t)f'' & -f' - p'b' \end{vmatrix}}{\Delta}$$

$$= \frac{-(1+t)f'' \cdot p' \cdot b'}{(1+t)f'' \cdot p'' \cdot b(t)}$$

$$= \frac{p' \cdot b'}{-p'' \cdot b(t)} < 0 \dots\dots\dots (A5) \text{ (Equation 5 in the paper).}$$

Appendix – II

From equation (8) and (9),

$$w_1(1+r) = w_2(1+r) - p'(L_2)b(t)$$

$$\text{or, } w_1 = w_2 - \frac{p'(L_2)b(t)}{(1+r)}.$$

$$\text{It implies that } -p'' \frac{dL_2}{dr} \frac{b(t)}{(1+r)} + \frac{p'}{(1+r)^2} b(t) = 0.$$

$$\text{Since, } p' < 0, p'' < 0, \frac{dL_2}{dr} > 0,$$

therefore, as r goes down L_2 will also go down.

**Table I: Comparison of Mean Tariff Rates for the Manufacturing Sectors in
Brazil and Columbia**

Brazil for the period 1987 – 1998:

Year	Brazil
1987	58.8
1988	50.1
1989	39.1
1990	34.1
1991	25.2
1992	19.1
1993	14.4
1994	12.9
1995	10.9
1996	12.5
1997	12.8
1998	15.4

Colombia for the period 1984 – 1998:

Year	Colombia
1984	49.8
1985	36.6
1988	33.5
1990	29.1
1992	12.9
1994	12.9
1996	13
1998	13.1

Source: Goldberg and Pavcnik (2003).

Table II: Comparison of Real and Nominal deposit Rates (as an alternative for the market interest rate) in Brazil and Columbia for the period 1986 – 1998:

Year	Real (Brazil)	Real (Colombia)	Nominal (Brazil)	Nominal (Colombia)
1986	107.20	31.17	109.48	31.4
1987	395.04	30.52	401.33	30.8
1988	845.12	33.24	859.43	33.5
1989	5815.50	33.41	5844.98	33.7
1990	9390.27	36.10	9394.29	36.4
1991	903.59	36.93	913.47	37.2
1992	1533.18	26.47	1560.18	26.7
1993	3273.00	25.56	3293.5	25.8
1994	5174.58	29.19	5175.24	29.4
1995	51.99	32.10	52.15	32.3
1996	26.38	31.01	26.45	31.2
1997	24.32	23.90	24.35	24.1
1998	27.95	32.49	28	32.6

Note: As the nominal lending rates were not available for both Brazil and Colombia, we take the nominal deposit rates and then calculate the real rates by subtracting the inflation rate from the original series. Inflation rate for Colombia has been calculated from the Consumer Price Index (CPI). Inflation rate for Brazil has also been calculated from the CPI, except for the years 1990 and 1991 where the Wholesale Price Index (WPI) is used since CPI was not available.

Source: International Financial Statistics (IFS) Yearbook 2002, published by the International Monetary Fund (IMF).