EXPENDITURE AND WAGE POLICIES IN A SEGMENTED LABOR MARKET: A THEORETICAL ANALYSIS

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Abstract:

Despite the crucial role attributed to labor markets in determining the supply response to adjustment policies, the implications of a segmented market remain largely unexplored. A common presumption is that adjustment policies would exert an unequitable effect because informal sector wages would decline proportionately more than in formal activities. In this paper, a formal model of segmented labor markets is used, where open unemployment is mostly a formal sector phenomenon derived from regulations setting a premium on wages. The Model assumes that the informal sector is completely unregulated and non-unionized. The paper shows that Expenditure-reducing policies unaccompanied by ad-hoc indexation schemes, do not necessarily lead to any unequitable effect in terms of the formal-informal wage gap. The paper also shows that increasing wage distortions are likely to cause an appreciation of the real exchange rate and higher open unemployment. Finally, the paper concludes that under a proportionately fixed wage distortion, expenditure-reducing policies may decrease rather than increase open unemployment.

1. Introduction

The segmented labor market (SLM) approach has often been used by both neoclassical and structuralist economists to study wage determination under non-clearing markets[1], and the relationship between employment and the relationship

between employment and income distribution in LDCs[2]. However, after enjoying widespread acceptance in the early 1970s, the SLM approach was seen as largely atheoretical an based on rather ambiguous empirical evidence (Cain, 1976; Watcher, 1974). Its recent reemergence has relied heavily upon new theoretical development in the areas of information theory and efficiency wages, as well as in the use of more sophisticated econometrics (Dickens and Lang, 1988)[3], but at the same time retaining strong microeconomic roots.

While the reemergence of the SLM has contributed to a better understanding of the process of wage determination at the level of the firm (for reviews, see Taubman and Watcher, 1986, and Katz 1986), little has been said with regard to macroeconomic adjustment. Despite the crucial role attributed to the labor market in determining the supply response to expenditure-reduction and expenditure-switching policies (for a review, see Edwards, 1988), the implications of a segmented market remain largely unexplored. While the association between segmentation and the existence of diverse wage setting mechanisms is well known (see, for instance, Dickens and Lang, 1985), the standard theory does not have any prediction regarding the effect of expenditure policies on the formal/informal wage gap. However, the presumption exists that –in presence of SLMs– macroeconomic adjustment policies would exert an inequitable impact because real informal sector wages would decline proportionately more than in the formal sector. Another common presumption is that a reduction in aggregate expenditure would lead to an increase in the open unemployment. These issues are intimately related to the poverty impact of adjustment policies in LDCs and on their sustainability.

A theoretical analysis on the effect of macropolicies upon the formal-informal wage differential and the open unemployment has important implications. A key aspect is the presumption that the labor market segmentation is associated to relatively more flexible wages in the informal sector, which in turn may affect the attainment of macroeconomic adjustment. The effectiveness and the political credibility of the macroeconomic policy may be harmed if the use of expenditure-reducing policies in the presence of a segmented labor market leads to inequitable results in terms of the formal-informal wage differential. On the other hand, it is also likely that segmentation is not by itself a source of wage rigidity, unless certain ad hoc mechanisms of wage indexation in the formal labor market are assumed. Similarly, the optimism regarding the negative effect of aggregate expenditure policies, on unemployment, depends on key assumptions regarding the nature of the wage rigidity and the market homogeneity not often made fully explicit.

This paper analyzes the effect of expenditure policies upon formal and informal sector wages and the open unemployment. The existence of government intervention and union activity in the labor market in central in defining the formal and the informal sectors in the model, while the skill distribution of the labor force is a crucial variable in analyzing the equity impact of macroeconomic policies. In this context, the existence of minimum wages what drives the presence of segmentation, but the global intervention in total labor costs in the final sector of the economy.

The purpose of this paper is investigating the overall effect of segmentation in the economy, without concentrating on the causes of the wage rigidity in the formal sector. Recent developments on labor market segmentation puts less emphasis on the role of government intervention, especially the minimum wage. For instance, an important stream in the literature has discussed the role of efficiency wage in creating rigidities that differentiate the formal and the informal sectors (Riveros and Bouton, 1991) and

create problems in attaining macroeconomic adjustment. Similarly, informational problems associated to the wage distribution and the bargaining process, introduce observable short run market segmentation (Stiglitz, 1987). This paper explores a model based on the existence of unions' market clout and/or the willingness of governments to adopt regulations setting a premium on wages in the formal sector above the market clearing wage. This premium depends on structural and institutional characteristics of the economy and, therefore can be assumed constant at least in the short-run, implying that the size of the wage distortion cannot arbitrarily change with respect to the notional market clearing wage. Since the size of the wage distortion in the formal sector is largely a policy instrument –because the difference between actual and national wages in the formal sector is a policy decision– it is important to consider the effect of changes in this distortion on certain key macroeconomic variables, particularly the real exchange rate. Therefore, the existence of labor market segmentation is confronted more with its consequence than with its origins.

An important stylized fact in many LDCs is that open unemployment is mostly concentrated among relatively skilled workers (see for instance, Chenery et al., 1986). That is, the typical unemployed is a skilled worker searching for a job in the formal sector of the economy and unwilling to become employed in the low-paid informal sector. The poor and the unskilled cannot afford open unemployment and are most likely working either in the formal sector (at a higher wage than in the informal sector) or in the informal sector. Thus, the model assumes that open unemployment is mostly a formal sector phenomenon, while underemployment in the form of low-paid jobs is mostly present in the informal sector. Another assumption is that the informal sector labor market is completely unregulated and non-unionized, and thus the prevailing wage rate is market clearing.

The implications of these reasonable assumptions for the evaluation of the effects of expenditure-reducing macroeconomic policies are somehow startling:

(1) An inequitable impact of expenditure-reducing policies in terms of the formal-informal wage differential does not necessarily follow from the existence of segmentation. The sign of the effect of these policies on relative wages depends upon the size of certain relevant elasticities and the behavior of specific parameter linked to the extent of segmentation and the degree of wage rigidity associated with both exogenous and endogenous factors. Thus, the actual occurrence of inequitable effects deriving from adjustment policies is left as an empirical question.

(2) Under a proportionally fixed wage distortion relative to the market clearing wage in the formal sector –and assuming that skilled workers do not accept employment in the informal sector of the labor market– expenditure reducing policies may decrease rather than increase open unemployment.

(3) Increasing wage distortions in the formal sector are likely to cause an appreciation of the real exchange rate, and higher open unemployment.

An important implication of these results is that stabilization programs that emphasize aggregate expenditure-reduction may not be as negative as usually assumed in the context of segmented markets. Another implication of these results is that increasing labor market segmentation may lead to greater macroeconomic disequilibrium.

The remainder of the paper is organized as follows: in the second section, the basic assumptions of the model are explained. The third section formally analyzes the short run equilibrium conditions. The fourth section considers the effect of aggregate expenditure policies on informal sector wages, the real exchange rate and open unemployment. Similar analysis is included in section five with regard to policies affecting the gap between notional equilibrium and actual formal sector wages. Section six explores some long run features of the model, particularly in connection with the distributive impact of macroeconomic policies. Finally, section seven presents some central conclusions.

2. A General Description of the Model

In analizing the impact of devaluations and other macroeconomic policies[4], models in the tradition of the two-sector small-open-economy emphasize the role of relative prices between tradable and non-tradable commodities. Wage flexibility has been the only labor market feature considered important in determining the effectiveness of expenditure policies to correct external and internal imbalances (Corden, 1977). Although some extensions of the standard macro model have focused on the role of the labor market in the context of macro-economic policies (Dornbusch, 1982; Cardoso, 1986; Edwards, 1988) they have normally assumed homogeneous and well integrated labor markets. Hence, nominal devaluations accompanied by demand management policies lead to a reduction in the real wage in terms of tradable, and to a subsequent shift of labor from non-tradable to tradable production.

The model explored in this paper recognizes the existence of a formal sector in the labor market, which is comprised of large firms subject to regulations regarding employment and labor costs. This is a "protected" sector where wage setting is affected by market conditions but, in general, the actual wage rate does not necessarily clear the market. Union and government intervention leads to a wedge between actual and market clearing wages. However, for given structural conditions (degree of unionization and government intervention) the proportional size of this wedge remains constant. Wages in the formal sector are thus flexible. The model assumes that the informal sector –i.e., the one that, mainly due to enforcement problems, is not covered by institutional regulations– is a neoclassical price-clearing labor market. The formal sector produces both tradable and non-tradable goods using skilled and unskilled workers whereas the informal sector produces only non-tradable using exclusively unskilled workers[5]. Thus, the models accounts for two central features of the traditional SLM approach: the informal sector is characterized by low labor productivity (i. e., the average general human capital content is low), and it is mainly a producer of non-tradable concentrated in the services sector.

The model assumes the existence of two distinct sub-markets, namely the market for unskilled workers and the market for skilled workers[6], and that in the short-run the supply of skilled and unskilled workers is fixed. In the long-run there is an equilibrium situation involving the supply of skilled and unskilled labor in the economy that depends on wages, the unemployment rate and other exogenous variables. The presence of submarkets for skills in the model allows us to account for two elements usually absent in traditional SLM analyses: (i) certain regulations, like minimum wage (MWs) is binding only for unskilled labor in the formal sector; (ii) there are well defined

relationships of substitution and complementarily between skills and across segments, which operate through relative wages.

The wage rate of skilled workers is determined in the formal sector. Clearing market conditions determine a competitive "notional" wage that depends upon prices of tradables and non-tradables, the supply of skilled workers, and the MW. The actual wage for skilled workers is assumed to be the notional wage modified by a distortionary factor related to government and union intervention, implying that part of the skilled workers would remain openly unemployed[7]. Wages for unskilled workers vary by sector. In the informal sector the wage level correspond to the MW[8].

The segmentation in the wage model is not only associated to the presence of binding MWs, but also to regulations affecting the wedge between actual and notional wages for formal skilled labor. Even in absence of binding MWs, segmentation associated to more general labor market intervention would persist, particularly as regards skilled wages. This can also be attributed to the presence of an efficiency-wage in the formal sector, which is an endogenous form of wage rigidity. The source of the segmentation problem not withstanding, the paper will now discuss the implications for adjustment purposes.

3. A Formal Analysis of the Short-Run Equilibrium

The formal sector is assumed to produce both tradable and non-tradable, using skilled and unskilled workers. Capital is assumed sector-specific. The formal sector is represented by the following normalized profit function.

$$G = G(w_s, \overline{w}, p) \qquad (1)$$

where G is profit in the formal sector normalized by the price of tradable (p_t), $w_s \equiv \frac{W_s}{\overline{w}}$ is the normalized wage rate of skilled workers, $\overline{w} \equiv \frac{\overline{W}}{P_t}$ is the normalized wage rate for unskilled labor in the formal sector, which is assumed to be equal to the MW; and $p \equiv \frac{P_n}{P_t}$ is the price of non-tradable normalized by the price of tradables. The well known properties of the profit function imply conditions 2 (i) and 2 (ii) and the assumption of gross complementary 2 (iii):

(i) $G_1 < 0;\ G_2 < 0;\ G_3 > 0$

(ii) G is convex. $(G_{ii} > 0)$

(iii) $G_{12} = G_{21} > 0$

$\qquad G_{13} = G_{31} < 0$ $\qquad\qquad (2)$

where $G_1 \equiv \dfrac{G}{w_s}$, $G_2 \equiv \dfrac{G}{\overline{w}}$ and $G_3 \equiv \dfrac{G}{w}$; the G_{ij}'s correspond to second derivatives.

The informal sector is assumed to produce only non-tradable using unskilled labor.

Its profit function can be represented as

$$H = H (p, w_u) \qquad (3)$$

where H is normalized by the price of tradable, and $w_u - W_u/p_t$ is the (informal) market determined wage rate for the unskilled labor expressed in units of tradables. There is truly a market clearing wage rate for unskilled labor because, given the large number of small firms and their dispersion, the MW is not enforced in the informal sector. Note that H is homogenous of degree one in prices given that the normalizing price (P) is not originally an argument of H(°). The following conditions characterize (3):

(i) $H_1 > 0$, $H_2 > 0$

(ii) $H_{11} > 0$, $H_{22} > 0$, and $H_{11} H_{22} - H_{12}^2 = 0 \qquad (4)$

(iii) $H_{12} < 0$ (normality of unskilled labor)

Using Hotelling's lemma, one can derive from the functions G(°) and H(°) the demand functions for skilled and unskilled labor (G_1 and G_2 plus H_2, respectively), as well as the supply function of non-tradable goods ($G_3 + H_1$). Equilibrium in the market for unskilled workers is represented by the following condition:

$$N^u = [G_2 (w_s, \bar{w}, p) + H_2 (p, w_u)] \qquad (5)$$

where N^u is the supply of unskilled workers which is assumed fixed in the short-run.

Due to government regulations and/or union activity, the actual wage rate (w) is higher than the market clearing wage rate in the skilled labor market. It is assumed that the actual wage rate and the market clearing wage are related by

$$w_s = \Theta\, w_s^* \qquad (6)$$

where $\Theta > 1$ is a distortionary factor associated to government intervention and w_s^* is the notional market clearing wage rate for skilled labor. For simplicity we assume that Θ is exogenous, but its likely dependence on price inflation when analyzing the short run dynamic of the model will be recalled. Using Hotelling's lemma on the function G(°) the following (notional) equilibrium in the skilled (formal) labor market is obtained:

$$N^s = -G_1 (w_s^*, \bar{w}, p) \qquad (7)$$

where N^s is the supply of skilled labor assumed fixed in the short-run. The level of open unemployment (U) is obtained from (6) and (7) as a residual.

$$U = N^s + G_1 (w_s^*, \bar{w}, p) \qquad (8)$$

where naturally the wage rate of skilled workers is evaluated at the actual wage w_s, rather than at w_s^*.

Equilibrium in the non-tradable market requires that

$$G_3 (w_s, \bar{w}, p) + H_1 (p, w_u) = D (p; E) \qquad (9)$$

where $G_3 (w_s, \bar{w}, p) - \dfrac{\partial G}{\partial p}(w_s, \bar{w}, p)$ is the supply of non-tradable by the formal sector; $D(°)$ is the demand for non-tradable, $H_1 (p, w_u) - \dfrac{\partial H(p, w_u)}{\partial p}$ is the supply of non-tradable by the informal sector; and E are total aggregate expenditures normalized by p_t. It is assumed that the demand for non-tradable is downward sloping ($D_1 < 0$) and increasing in E ($D_2 > 0$).

The model is partial equilibrium in the sense that the level of aggregate expenditures is assumed to depend on policy variables such as money supply, fiscal policy and nominal exchange rate and is, thus, not endogenized. A proper treatment would require explicit recognition that apart from policy variables, expenditures are also dependent on p, w_s and w_u. This considerably increases the complexity of the model and would make it more difficult to understand its implications for labor market equilibrium. In addition, even if the second order feedback effects from wages and prices to expenditures are taken into account, the direction of the effects arrived at in this paper is not likely to change. Furthermore, consistent with the short run nature of the model, it does not impose a condition regarding the external equilibrium, which would allow to endogenize real expenditures. That is, in the short-run the current account may not be in equilibrium.

From (7) a unique combination between w_s and p (for a given w) which is consistent with market equilibrium. Using the solution for w_s^* from (7) we can now write (6) as

$$w_s = \Theta\, w_s^* (p, \bar{w}) \qquad (10)$$

Thus, from (7) we get $\dfrac{dw_s^*}{dp} = -\dfrac{G_{13}}{G_{11}} > 0$ given that G13 < 0 and G11 > 0 and

$$\frac{dw_s^*}{d\bar{w}} = -\frac{G_{12}}{G_{11}} < 0$$

by the gross complementarity assumption. Using (10) the market equilibrium condition for the unskilled labor market (5) can be written as

$$N^u = -\{G_2 [\Theta\, w_s^* (p, \bar{w}), \bar{w}, p] + H_2 (p, w_u)\} \qquad (11)$$

There is a unique pair (w_u, p) consistent with equilibrium in the unskilled labor market, which is represented by a locus of equilibrium points UU (Figure 1). NN is the locus of pairs (w_u, p) consistent with equilibrium in the non-tradable market [eq. (9)].

Since $\dfrac{dw_u}{dp}\Big|_N = \dfrac{(G_{13}+H_{11})_t - D_1}{H_{12}} > 0$, the slope of NN is positive (Fig. 1). For a given level of w_s^*, the slope of the schedule UU is positive, but less steep than the slope of NN in order to get stable equilibrium[9]. Also, for a given w_s, the slope of UU is

$$\frac{dw_u}{dp}\Big|_u = \frac{H_{21}+G_{23}}{H_{22}} > 0.$$

Since w_s is not a constant, the equilibrium solution is arrived at by simultaneously solving equations (9) and (11) using (10).

In a model with a segmented labor market, the supply response to alternative policies is more sluggish due to difficulties in moving labor across sectors and the

likely existence of institutional wage rigidities[10]. In the coming sections the comparative static of the model in terms of aggregate expenditures and labor market policies will be explored.

FIGURE 1
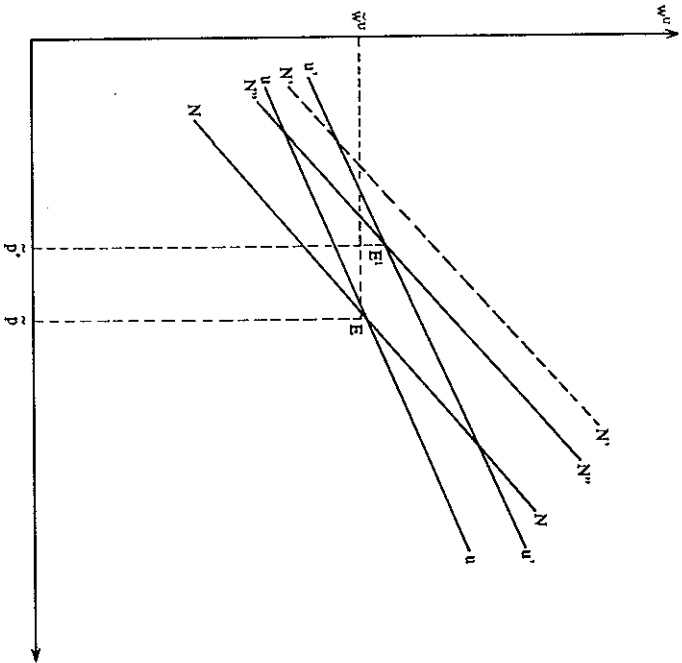
4. Expenditure Policies with SLMs

The first issue possible to be examined is the effect of a change aggregate expenditure upon the equilibrium pair, (w_u, p). Taking total differentials in (9) and (11) using (20), we obtain:

$$\begin{bmatrix} H_{22} & H_{21}+G_{23}-\Theta G_{21}\dfrac{G_{13}}{G_{11}} \\[2mm] H_{22} & H_{11}+G_{33}-\Theta\dfrac{G_{13}^2}{G_{11}}-D_1 \end{bmatrix}\begin{bmatrix} \partial w_u/\partial E \\[2mm] \partial_p/\partial E \end{bmatrix} = \begin{bmatrix} 0 \\[2mm] D_2 \end{bmatrix} \qquad (12)$$

(i) $\dfrac{\partial w_u}{\partial E} = -\dfrac{D_2\left[H_{21}+G_{23}-\Theta G_{21}\dfrac{G_{13}}{G_{11}}\right]}{|Z|}$

(ii) $\dfrac{\partial p}{\partial E} = \dfrac{D_2 H_{22}}{|Z|} > 0$ (13)

where | Z | is the determinant of the 2 x 2 matrix in the left hand side of (12). Thus a decrease in aggregate expenditures necessarily leads to a fall in the relative price of non-tradables but has an ambiguous effect on the wage rate for the unskilled[11].

Suppose the initial equilibrium in Figure 1 is given by ($\tilde{p}$, $\tilde{w}_u$), a decline in expenditures will shift NN to the left (to N'N') thus causing a reduction in the equilibrium pair ($\tilde{p}$, $\tilde{w}_u$). In a second round effect, the decline in w_s resulting from the drop in w_u will shift NN back towards its original position (to N'N'), while UU will also shift to the left (to U'U'). As a result, p will decline (to $\tilde{p}$), but the sign of the change in w_u is not known a priori[12]. Hence, the sign of expression (13) (i) is crucial in analyzing the impact of contractionary expenditure policies. Convexity of G and H, $D_2 > 0$ and existence of a stable solution imply that the sign of | Z | is positive. The effect of reducing expenditures on the wage rate of the unskilled is in general ambiguous given that the sign of the numerator in (13)(i) is generally unknown. Since D_2 is positive, reducing aggregate expenditures will lead to lower real wages for the unskilled if

$H_{21} + G_{23} - \Theta G_{21}\dfrac{G_{13}}{G_{11}} < 0$. Using Hotelling's lemma it can be shown that this is the case

if and only if

$$\Theta\left\{\left[\frac{E^p(y^n, w_s)}{E^p(y^n, w)}\right]\left[\frac{E^i(L_s, w)}{E^p(L_s, w)}\right] - \alpha\beta\left[\frac{E^i(y^n, w_u)}{E^p(y^n, w)}\right]\right\} < 1 \qquad (14)$$

where $E^p(y^n, w_s)$ is the elasticity of production of non-tradable goods in the formal sector with respect to the wage rate of skilled workers, and $E^i(y^n, w_u)$ is the elasticity of supply of non-tradable goods with respect to the wage of unskilled workers in the informal sector. Other elasticities are expressed in a similar way and L_s refers to the demand for skilled labor. The coefficient α is the ratio of production of non-tradable in the informal sector over non-tradable produced in the formal sector; and $\beta - \dfrac{\bar{w}}{w_s} > 1$ is a measure of the distortion induced by the minimum wage.

Condition (14) depends upon the relevant elasticities, the extent of the segmentation problem (α and β) and the degree of intervention in formal sector wages (Θ).

(a) Given that the supply of non-tradables from the informal sector does not depend on w_s the larger the share of the informal sector in producing non-tradables (α), the smaller will be the second round effect causes by the decline of w_s on the supply of non-tradables. Non-tradable output will expand less, thus requiring a lesser (upward) adjustment in w_s and p.

(b) Similarly, the greater the minimum wage distortion (β), the lower the proportion of unskilled labor working in the formal sector. Hence, the second round effect

of the decline in w_u will cause a relatively smaller displacement of unskilled workers from the formal to the informal sector. This causes w_u to decline by less a given p.

(c) The greater Θ, the greater will be the actual wage w_s and $-w_u$ given the existence of gross complementarity between skilled and unskilled labor in the formal sector— the larger will be the decline in w_u for a given p.

In order to examine the equity effects of expenditure policies on income distribution, consider.

$$\frac{\partial w^s}{\partial E} = -\frac{G_{13}}{G_{11}}\frac{D_2 H_{22}}{|Z|} \qquad (20)$$

which is obtained from (11) and (13ii). Thus, expenditure-reducing policies will negatively affect skilled wages. Based on (13) and (20), the relative change in wages can be written as

$$\frac{\partial w^u/\partial E}{\partial w^s/\partial E} = \frac{\left[H_{21}+G_{23}-\Theta G_{21}\frac{G_{13}}{G_{11}}\right]G_{11}}{\Theta G_{13}H_{22}} \qquad (21)$$

which is obtained from (13i) and (20). After some manipulations (21) can be written as:

$$\frac{E(w^u,E)}{E(w^s,E)} = \frac{\left[H_{21}+G_{23}-\Theta \frac{G_{13}G_{21}}{G_{11}}\right]E^p\left[L_u, w^s\right]}{\Theta G_{13}\, E^p(L_s^f, w^s)\,\gamma} \qquad (22)$$

where E (Y, X) is the elasticity of Y with respect to X and $g = L_u^I/L_s^f$ is the ratio of informal sector employment to formal sector employment of skilled labor.

If expenditure-reduction policies exert inequitable effects in terms of informal sector wages, (21) will be negative. In considering this condition in (20) we obtain the following inequality:

$$\left[\frac{E^I(L_u, w_u)}{E^I(L_s, w_s)}\right]\left[\Omega+\frac{E^I(L_u, w_u)}{E^I(L_s, w_s)}\,\gamma\right]-\lambda\left[\frac{E^I(y_u, w_u)}{E^I(y_s, w_s)}\right]<1 \qquad (23)$$

where $\Omega = \dfrac{L_u^I}{L_s^I}$; $\lambda = \dfrac{w_u}{w_s} = \Theta\dfrac{w_s}{w_u}$

An important conclusion follows. The sign of (23) depends upon the relative size of the relevant elasticities and parameters, and it can only be determined under more specific assumptions. Hence, a definite conclusion with regard to the equity impact of expenditure policies in the presence of a SLM cannot be reached under the basic

postulates of the model. Whether there is or not an increase in the formal/informal wage differential with expenditure-reducing policies, it will basically depend upon the size of the relevant elasticities, the extent of the segmentation problem, the technology of production in the formal sector (Ω) and the degree of intervention (indexation) of formal sector wages (α and Θ).

To determine the effect of a decline (increase) in aggregate expenditures on unemployment, rewrite (8) as

$$U = N^s + G_1(\Theta w_s^*(p, \bar{w}), \bar{w}, p) \qquad (24)$$

and differentiate it with respect to E using (10) to obtain

$$\frac{dU}{dE} = (1-\Theta)G_{13}\frac{\partial p}{\partial E} > 0 \qquad (25)$$

Since $\Theta > 1$, $G_{13} < 0$ and $\frac{\partial p}{\partial E} > 0$, unemployment falls in response to a reduction in aggregate expenditures! While the decline in aggregate expenditures always leads to a decrease in the demand for skilled labor, given a fixed proportional distortionary factor greater than one, the absolute value of the existing gap between market clearing wages and the actual wage rate will fall. In the presence of a fixed labor supply, the unemployment of skilled workers will thus decline. This result is very surprising and thus it is necessary to probe the assumptions made to verify its robustness. If the magnitude of the distortion Θ is increasing with the level of expenditures (it would be meaningless to assume that the wage distortion would decrease with aggregate demand) then it is intuitively clear that the sign of (25) would be reinforced. In this case the value of the gap between actual wages and market clearing wages would decrease even more when aggregate expenditures fall and, hence, unemployment will decrease more. If the wage distortion is additive, i.e., a fixed markup over the market clearing wage ($w_s = w^* + \Theta$), then it is easy to verify that unemployment will be independent of the level of aggregate expenditures. This is still an unexpected result. Indeed, to obtain the "expected" result it is necessary to assume that w_s is rigid and thus independent of a market clearing notional wage, or equivalently, that the size of the labor market distortion decreases (increases) by a sufficient margin when aggregate expenditures increases (decreases). This is a very implausible assumption even under very limited rationality on the part of the unions.

5. The Effect of Labor Markets Policies

The effect of changes in the parameter Θ is analyzed because of its central importance with regard to the equity of expenditure policies. In fact, it is a usual policy to increase workers' protection in periods of economic hardship, which leads to the creation of wage indexation mechanisms. In a SLM this introduces wage rigidities in formal sector wages. As said before, the parameter Θ is associated to both government and union intervention in wages in the formal labor market. If in fact changes in Θ are used in periods of adjustment, it would originate inequity in the form of both a larger ratio w/w̄ and a larger ratio w/w*.

Naturally, indexation of $\bar{w}$ —by far a more unusual type of intervention— will also increase the wage differential between formal and formal sector wage rigidities.

Using expression (9), (10), and (11)

$$\begin{bmatrix} G_{33} + H_{11} - \dfrac{\Theta G_{13}^2}{G_{11}} - D_1 & H_{12} \\[2mm] G_{23} + H_{21} - \dfrac{\Theta G_{12} G_{13}}{G_{11}} & H_{22} \end{bmatrix} \begin{bmatrix} \dfrac{\partial p}{\partial \Theta} \\[2mm] \dfrac{\partial w_u}{\partial \Theta} \end{bmatrix} = \begin{bmatrix} -G_3 w^* \\[2mm] -G_{21} w^* \end{bmatrix} \qquad (26)$$

given $|R| > 0$, $\dfrac{\partial p}{\partial \Theta} > 0$ if $H_{12}G_{21} - H_{22}G_{31} > 0$. This condition can be written in terms of elasticities.

$$\frac{\partial p}{\partial \Theta} = \frac{w^* [H_{12} G_{21} - H_{22} G_{31}]}{|R|} \qquad (27)$$

$$\gamma_u^F E^I(L_u, W_u) E^F(Y_n, w_s) > \gamma_u^I E^I(L_u, w_s) E^I(Y_n, w_s) \qquad (28)$$

where γ_u^F is labor productivity of unskilled labor in sector i; $E(X,Y)$ is the elasticity of X with respect to Y, L is employment in sector i, Y_n is non-tradable output. Given that γ_u^I is likely to be very small, condition (28) will normally be satisfied and, thus, an increase in labor market distortions is likely to cause an appreciation of the real exchange rate (p).

10. The effect of Θ on unemployment can be derived by differentiating of (24), using

$$\frac{\partial U}{\partial \Theta} = \begin{bmatrix} G_{11} w^*_s + (1 - \Theta) G_{13} \dfrac{\partial p}{\partial \Theta} w^*_s \end{bmatrix} > 0 \qquad (29)$$

That is, unemployment always increase when the structural labor market distortion rises.

In order to know the effect of labor market policies on the wage of unskilled workers, consider

$$\frac{\partial w_u}{\partial \Theta} = \frac{\begin{bmatrix} G_{33} + H_{11} - \dfrac{\Theta G_{13}^2}{G_{11}} - D_p & -G_3 w^* \\[2mm] G_{23} + H_{21} - \dfrac{\Theta G_{12} G_{13}}{G_{11}} & -G_{31} w^* \end{bmatrix}}{|R|} \qquad (30)$$

Thus, the sign of (30) depends on

$$G_{31}\left(G_{23} + H_{21} - \frac{\Theta G_{12} G_{13}}{G_{11}} \right) - G_{21} \left[G_{33} + H_{11} - \frac{\Theta G_{13}^2}{G_{11}} - D_p \right] \qquad (31)$$

It can be demonstrated that a sufficient condition for (30) to be negative is:

$$E^F(Y_n, p) + E^I(Y_n, p)\, \alpha \geq -\delta \left[E^F(Y_n, w_s) + E^I(Y_n, w_u)\, \alpha\, \beta \right]$$

where $\delta = \dfrac{E^F(Y_n, w_s)}{E^F(L_u, w_s)} \cdot \dfrac{1}{S_u^p}$; $S_u^p = \dfrac{w_u L_u^p}{py_n^p} < 1$

Thus, not surprisingly, the effects of increasing distortions in the skilled labor market are ambiguous depending on various parameters in the system.

6. Long-Run Equilibrium

In long-run equilibrium it is assumed that the present value of the gap between the expected wage rate for skilled workers and the wage rate for unskilled workers must equal the cost of acquiring skills.

$$\int_o^h \left[w_s \left(\frac{U}{N^s} \right) - w_u \right] e^{-rt}\, dt = c \qquad (32)$$

where h is the expected working life for an average worker, r is the discount rate, c is the costs of acquiring skills and U/N^s is the probability of being unemployed for a skilled worker. In the long-run when w_s, U, N^s and w_u are constant we have:

$$w_s \left(\frac{U}{N^s} \right) - w_u = z \qquad (33)$$

where

$$z_u = \left[\frac{r}{1 - e^{-rh}} \right] c$$

Using (7) and (20) in (23) we obtain

$$w_s [1 + \lambda(w_s, w_u, \theta)] - w_u = \gamma \qquad (34)$$

where,

$$\lambda \equiv \frac{G_1(w_s, w_u)}{G_1\left(\frac{w_s}{\theta}, w_u \right)}$$

Under the assumption that

$$G_{11}(w_s, w_u) = G_{11}(\tfrac{w_s}{\theta})(\tfrac{w_s}{\theta}, w_u)$$ we obtain that

$$\frac{\partial \lambda}{\partial w_s} = \frac{G_{11}[G_1(\tfrac{w_s}{\theta}, w_u) - G_1(w_s, w_u)\tfrac{1}{\theta}]}{G_1(\tfrac{w_s}{\theta}, w_u)^2} < 0,$$ (35)

since

$$\frac{1}{\theta} G_1(w_s, w_u) > G_1(\tfrac{w_s}{\theta}, w_u)$$

given that G is convex and decreasing in w_s. Also,

$$\frac{\partial \lambda}{\partial w_u} = \frac{G_{12}[G_1(\tfrac{w_s}{\theta}, w_u) - G_1(w_s, w_u)\tfrac{1}{\theta}]}{G_1(\tfrac{w_s}{\theta}, w_u)^2} < 0$$ (36)

under the gross complementary assumption. Finally,

$$\frac{\partial \lambda}{\partial \theta} = \frac{G_{11}}{G_1} \frac{w_s}{\theta^2} < 0$$ (37)

given that $G_1 < 0$. Needless to say the expression λ should be strictly positive and less than 1.

Thus, the long-run equilibrium condition (34) indicates that for a given value of γ and θ there is a unique relationship between wages for skilled and unskilled workers. Moreover, it can be shown that under relatively weak conditions this relationship is positive. Differentiating (33) with respect to w_s and w_u,

$$\frac{\partial w_s}{\partial w_u}\Big|_{LR} = -\frac{w_u \lambda_2 - 1}{(1+\lambda) + w_s \lambda_1}$$ (38)

where

$$\lambda_1 = \frac{\partial \lambda}{\partial w_s} \text{ and } \lambda_2 = \frac{\partial \lambda}{\partial w_u}$$

The sign of (38) depends on the sign of the denominator, which can be written as $1 + \lambda(1 + \epsilon) - \epsilon \lambda^2/\theta$, where ε is the own wage elasticity of demand for skilled labor. A sufficient condition for (38) to be positive is that the demand for skilled labor be less than unit elastic.

In order to obtain the long-run equilibrium levels for the two wage rates equation (34) needs to be complemented with a long-run condition for the aggregate labor market. The level of unemployment would be zero if θ = 1, i. e., if there were no distortions in the skilled labor market. From (7) it is clear that the supply of skilled

workers should be equal to its demand when evaluated at the notional market clearing wage rate, i. e., $N^s = -G_1(\tfrac{w_s}{\theta}, w_u)$.

Therefore, the level of long-run unemployment can be written as

$$U = -G_1(\tfrac{w_s}{\theta}, w_u) + G_1(w_s, w_u)$$ (39)

and, hence, since the total labor available should be equal to the level of employed skilled workers plus the level of employed unskilled workers plus the level of unemployment, i.e.,

$$\bar{N} = -[G_1(\tfrac{w_s}{\theta}, w_u) + G_2(w_s, w_u) + H_2(p, w_u, \bar{w}, p)]$$ (40)

Note in (40) that since $G_1(\tfrac{w_s}{\theta}, w_u)$ is evaluated at the notional or nondistorted wage rate it includes both employed and unemployed skilled workers. The long-run market clearing condition for the non-tradable goods market is

$$H_1(p, w_u) = D[p; \pi(p, N^u, N^s_e)]$$ (41)

where N^s_e are the employed skilled workers. Condition (40) is identical to the short-run market equilibrium condition (9) except that on the demand side total expenditures have been replaced by real income π which, in turn, is a function of relative prices, and the level of employment of skilled and unskilled workers. Using $N^s_e = - G_1(w_s, w_u)$ in (38) and equation (11) to represent N^u, the demand for non-tradable can be represented in reduced form as

$$D = \tilde{D}(p, w_u, w_s)$$ (42)

and assume that $D_1 < 0$, $D_2 > 0$ and $D_3 < 0$. The fact that D_3 is negative reflects the income decreasing effect of distortions associated with a higher wage rate for skilled workers.

Thus from (41) it can be solved for the price of non-tradable as

$$p = p(w_s, w_u)$$

where $p_1 < 0$ and $p_2 > 0$. The slope of the schedule (41) considering (42) is then

$$\frac{\partial w_s}{\partial w_u}\Big|_N = -\frac{G_{12} + G_{22} + H_{21} p_2 + H_{22}}{G_{11} + G_{21} + H_{21} p_1}$$ (43)

The denominator in (43) is always positive while the numerator has an ambiguous sign due to the third term. We assume that the other terms dominate and, hence, schedule (32) has a negative slope.

Figure 2 shows schedules (34) and (40) in the w_u, w_s space. The upward sloping schedule LL represents equation (34) while the downward schedule NN represents the equilibrium condition (40). The intersection of the two schedules yields the long-run equilibrium values for the wage rates of skilled and unskilled workers, $\bar{w}_s$ and $\bar{w}_u$ respectively.

FIGURE 2
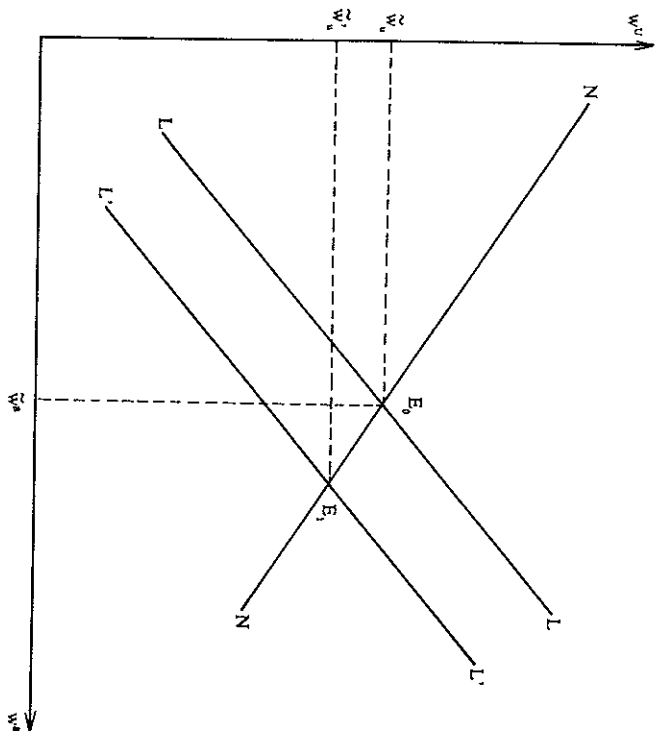
With the help of Figure 2 it is possible to show that an increase in the distortion θ will necessarily lead to a deterioration of the wage rate of unskilled workers. An increase in the distortion θ does not affect the schedule NN but shifts the schedule LL to the right. This increases the equilibrium wage rate of the skilled workers but decreasing the wage rate for the unskilled workers from $\tilde{w}^s_u$ to $\tilde{w}^u_u$. That is, in the long-run there exist a clear trade-off between wages for skilled and unskilled workers and any gains of the latter group necessarily imply losses for the unskilled, usually the poorest sector of the labor force.

7. Conclusions

The SLM approach has continued focusing on microeconomic issues despite the importance of questions with regard to the labor market response to macroeconomic policies used to restore external and internal equilibria. Standard macroeconomic analysis disregard the existence of labor market segmentation in LDCs, despite that segmentation may hinder structural adjustment. In fact, there is a belief that the existence of segmented labor markets implies that expenditure-reducing policies increase the wage differentials in favour of the formal sector during the adjustment and greatly increase open unemployment. As a result, the path of structural adjustment

would be sluggish and the existence of inequitable effects and increased unemployment would contribute to impairing the credibility of the program.

This paper has shown that expenditure policies in the presence of a segmented labor market do not necessarily lead to inequitable effects and that, under the plausible assumption that labor market distortions in the formal sector do not increase when aggregate expenditures are reduced, the rate of unemployment does not increase. Another important result obtained is that an increase in the structural wage distortionary gap between actual and market clearing wages is likely to lead to an appreciation of the real exchange rate and to an increase in the rate of unemployment. The labor market is characterized by a set of wage differentials due to segmentation, which in turn result from government intervention and union activity. However, there is not any clearly defined dynamics in these wage differentials when macro-adjustment policies are implemented.

Notes:

1   Dioinger and Piore (1971). For a general review of the SLM approach and its applications, see Taubman and Watcher (1986). Also, see Cain (1976) and Watcher (1979). An analysis in connection with LDCs is found in Berry and Sabot (1978) and Ishikawa (1981).

2   In connection with the radical approach, see Reich, *et. al.* (1973). A discussion for the case of LDCs is found in Mezzera (1981).

3   See, also, Solow and McDonald (1985), and Heckman and Hotz (1986). For a review of efficiency wages models, see Katz (1986), Stiglitz (1987) and Dickens and Katz (1987).

4   Origins of this model are found in the analysis of the Australian inflation by Meade (1951), and of Swedish inflation by Edgren, *et. al.* (1969). Aukurst (1977) and Lindbeck (1979) developed the so called Scandinavian version. A general presentation of the two sector model is found in Prachowny (1984).

5   Even if the informal sector produces some tradable goods, they would actually be traded only through formal sector channels. The model attempts to account for the most general characteristic of informal activities in LDCs which are basically related to the supply of services.

6   The concept of "skill" refers basically to general human capital, i. e., the one more clearly linked to intersectoral labor mobility.

7   As pointed out later, the model does not preclude the existence of formal indexation mechanisms for wage adjustment.

8   In many LDCs the MW may not be binding for formal sector employees. However, all that matters is the existence of a differential between effective wages of unskilled workers in the formal and the informal sectors, which may also result from existing non-wage costs of labor in the formal sector.

9   A given level of ws is assumed only for clarity of the graphic presentation. As a second round effect of certain macroeconomic policies, the level of w^u_s will also change as a result of changes in both p and w^u_s, thus introducing a dynamic feedback among submarkets.

10 For instance consider the function relating the production of tradable goods (Q_r) and prices: $Q_T = Q$ (p, w, w_s). As a result of a change in expenditure, we get

$$\frac{\partial Q^T}{\partial E} = \left[\frac{\partial Q^T}{\partial p} + \frac{\partial Q^T}{\partial w^s} \frac{\partial w^s}{\partial p} \right] \frac{\partial p}{\partial E}.$$

11 It is possible to show that with a simpler structure of the labor market –namely that the formal sector produces only tradable goods with both skilled and unskilled labor and that the informal sector produces nontradables with only unskilled labor –the signs of (13) are unambiguous.

Then, for a similar effect of the change in expenditure change on the (inverse of) the real exchange rate, the response in terms of the production of tradables will be lower with a segmented labor market than with a homogenous labor market. In fact, the terms in parenthesis relates to the need of moving unskilled workers across segments, in the presence of likely rigid wages in the formal sector.

12 If β is large enough, so that the formal sector will not use unskilled workers, then the effect is unambiguous, since the UU curve will not shift downwards.

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