Employment E®ects of Stabilization Policies

Pierre-Richard Ag§nor¤
Research Department, International Monetary Fund
World Bank Institute

Revised: March 1999

Abstract

This paper studies the e®ects of a stabilization program based on a reduction in the devaluation rate in a macroeconomic model with capital controls, minimum wages for unskilled labor, an informal sector, and public production of intermediate inputs. Perfect mobililty across sectors of the unskilled labor force prevents the emergence of unemployment for that category of labor, but skilled unemployment prevails in equilibrium. The analysis highlights the role of turnover costs and quit behavior in assessing the e®ects of this shock.

JEL Classi¯cation Numbers: F41, J31, J64

¤I am grateful to Joshua Aizenman, Peter Nunnenkamp, Miguel Savastano, and participants at a Macroeconomics workshop at Georgetown University and the Latin American Macroeconomics Network Seminar held in Bogot§, Colombia (Sept. 19-20, 1997) for very useful comments on a previous version. The views expressed in this paper are not to be interpreted as re°ecting those of the institutions with which I am a±liated.

1 Introduction

The importance of wage °exibility and intersectoral labor mobility in the transmission of macroeconomic policy shocks have long been recognized by economists and policymakers. Downward rigidity in real wages, for instance, usually prevents a nominal exchange rate adjustment from translating into a change in relative prices, thereby hampering the reallocation of resources towards production of tradable goods. Similarly, a low degree of labor mobility across sectors may raise unemployment, and thus increase the transitional costs | or even the sustainability | of macroeconomic and structural reform programs.

A variety of factors have led in recent years to renewed interest in the role of labor markets in the process of economic adjustment in developing countries.[1] First, growing recognition of the importance of the informal sector in generating employment in response to adverse short-run economic shocks in the formal economy has prompted several attempts at better understanding the interrelations between the formal and the informal sectors, most notably the factors explaining labor reallocation across sectors.[2] Second, various studies have shown that real wages in developing countries appear to be considerably more °exible than generally assumed; during the 1980s, they fell dramatically in many countries (Horton et al., 1994). Evidence of a high degree of wage °exibility has led many economists to question the adequacy of conventional views on the sources of unemployment. Third, attempts to stabilize during the 1980s led in many countries to ¯scal restructuring | which in many cases involved constraining the growth in (or reducing the level of) public sector employment and maintaining wage increases below in°ation. Because the public sector is a major employer in the formal sector in many

[1] See Agénor (1996) and the World Bank (1995) for comprehensive accounts of the recent literature in that area.

[2] See notably Agénor and Aizenman (1994) and Agénor and Santaella (1998). The ¯rst paper provides a rigorous analysis of e±ciency considerations within the framework of a model with segmented labor markets.

developing countries (it accounts, for instance, to 25 percent of employment in Tunisia and 40 percent in Jordan), changes in the government's employment and wage-setting policies tend to have signi¯cant e®ects on private sector wages and employment. Understanding how such e®ects are transmitted to the rest of the economy has become an issue of major importance. Finally, the increased incidence of poverty and wage dispersion during the 1980s has raised concerns about the social and distributional e®ects of adjustment programs in developing countries, and has led many researchers to focus on the role of labor market institutions and regulations.

This paper analyzes the e®ects of a stabilization program based on a reduction in the devaluation rate on the labor market, as well as on output, in°ation, and the real exchange rate,. The analysis is based on a framework that incorporates several features that are deemed important for developing countries: capital controls, a large informal sector, public sector production and employment, optimizing households, a heterogeneous labor force, binding minimum wages and turnover costs in the formal sector, and wage and price °exibility in the informal economy. Government services are used as intermediate inputs in the production of exportables.

Section II presents the analytical framework. Section III expresses the model in a compact dynamic form. Section IV examines the short- and longer-run e®ects of a reduction in the devaluation rate.[3] The analysis emphasizes the e®ects of these policy shocks on the composition of employment across sectors, relative wages, and unemployment. Section V summarizes the main results of the paper and discusses some possible extensions of the analysis.

[3] The integration of the monetary and real sectors makes the model particularly suitable for the analysis of the labor market implications of ¯nancial and exchange rate policies in the short run. An extended version of this paper (available upon request) analyzes the e®ects of public sector layo®s, and an increase in the price of government services.

2 The Analytical Framework

Consider a small open economy in which four categories of agents operate: ¯rms, households, the government, and the central bank. The exchange rate is depreciated at a predetermined rate by the central bank. The economy consists of two major segments: the formal economy and the informal sector. In the formal economy two goods are produced: an exportable good, whose output is entirely sold abroad, and a nontradable government service.[4] Firms in the informal economy produce a nontradable good, which is used only for ¯nal domestic consumption. The capital stock in each production sector is ¯xed within the time frame of the analysis. The labor force (which is also constant) is heterogeneous and consists of skilled and unskilled workers. Production of the nontradable good and government services requires only unskilled labor, whereas both labor categories are used as intermediate inputs to produce exportables.[5]

Employment and real wages (measured in terms of the consumption basket) in the public sector are exogenously determined. In the exportable sector, the real wage (measured in terms of the domestic price of exportables) earned by skilled workers is determined so as to minimize turnover costs (hiring, training, litigation, and ¯ring costs), while unskilled workers earn a minimum wage ¯xed by the government. For a given level of wages, ¯rms in the exportable sector determine the level of employment of both categories of labor so as to maximize pro¯ts. Unskilled workers can move freely and instantaneously between the formal and the informal sectors. The informal

[4] The absence of an import-competing sector can be rationalized by taking the view that the e±ciency losses induced by barriers to foreign trade | which are not explicitly modeled here | are so high that goods that were once importables have e®ectively become nontraded goods (Agénor and Aizenman, 1996).

[5] The assumption that the nontraded goods sector does not use skilled labor is a simplifying assumption that is broadly consistent with the evidence on employment structure in the informal sector and the public sector in many developing countries. Examining a more general case is certainly possible, but would complicate the analysis without adding much insight.

sector therefore absorbs all unskilled workers who are not hired in the formal sector. Wages in that sector adjust continuously to equilibrate supply and demand for labor. Prices are also °exible in the informal sector, and adjust to eliminate excess demand for nontradable goods.

No government-run unemployment bene¯t scheme exists in the economy. Unskilled workers' opportunity cost of e®ort (foregone leisure) is taken to be nil; those who are unable to ¯nd employment in the formal sector are thus always willing to move to the informal economy. By contrast, skilled workers who are not successful in applying for a job in the exportable sector always opt to remain unemployed, rather than take up employment in the informal sector. The reason is that the going wage in the informal economy, adjusted for the perceived net cost of working there | which depends on factors such as demotivation e®ects, ine±ciencies associated with on-the-job search activities, loss of skills or social prestige, and the extent of the \safety net" provided by relatives | is always lower than the skilled workers' reservation wage. Thus, \quasi-voluntary" unemployment of skilled workers | a key feature of the labor market in developing countries, as discussed later | emerges in equilibrium.[6]

Households supply labor inelastically and consume, in addition to the nontradable good produced in the informal sector, an imported good which is imperfectly substitutable for the home good. They hold three categories of assets: domestic money (which bears no interest), foreign bonds, and domestic government bonds. Money and government bonds are held only domestically. Capital controls (which take the form of a tax on holdings of foreign assets) impede the mobility of capital across borders.

The government consumes imported goods and nontradable goods produced in the informal sector, receives transfers from the central bank, pays interest on its domestic debt and levies (in addition to taxes on private foreign

[6]Because there is no unemployment bene¯t scheme in the present framework, unemployed workers in the long run are implicitly assumed to either turn to a subsistence activity (home production) or to rely on relatives to cater for their basic needs.

assets) lump-sum taxes on households.

2.1 Output in the formal economy

As stated above, two goods are produced in the formal economy: an exportable good and government services. The world price of exportables is exogenous and normalized to unity for simplicity. The domestic price of exportables is thus equal to the nominal exchange rate, E. Production in the exportable sector is a function of skilled and unskilled labor.

Let n_S and n_U employment levels of skilled and unskilled labor (measured in natural units). The representative producer's production function is given by[7]

$$Y_E = V(n_S; n_U); \tag{1}$$

where V is linear homogeneous in n_S and n_U with partial derivatives given by $V_{n_S}; V_{n_U} > 0; V_{n_S n_S}; V_{n_U n_U} < 0$, and $V_{n_S n_U} > 0$. Skilled and unskilled labor are thus taken to be Edgeworth complements in the production of value added.[8]

Let $!_S$ denote the wage paid to skilled workers employed in the exportable sector (measured in terms of the price of exportables), and $!_U < !_S$ the real minimum wage earned by unskilled workers (also measured in terms of the price of exportables). In addition to normal costs associated with the use of

[7] Except otherwise indicated, partial derivatives are denoted by corresponding subscripts, while the total derivative of a function of a single argument is denoted by a prime. A sign over a variable refers to the sign of the corresponding partial derivative, and $\dot{x} \equiv dx/dt$. Time subscripts are omitted for simplicity. A tilde over a variable is used to denote steady-state values. The initial steady-state value of the real exchange rate is normalized to unity.

[8] The assumption that an increase in the use of unskilled labor raises | as theory would suggest | the marginal productivity of skilled labor does not of course, preclude the possibility that skilled and unskilled labor may be net (Hicks-Allen) substitutes. For some recent evidence on the substituability between skilled and unskilled labor in the formal (manufacturing) sector in developing countries, see Cárdenas and Gutiérrez (1996), and Roberts and Skoufias (1997).

labor inputs in the production process, firms incur a total cost of $Á_S q^S n_S$ in hiring and training new skilled workers, where q^S is the quit rate, and $Á_S$ is the cost incurred in recruiting and training each worker. Similarly, training costs for unskilled workers are given by $Á_U q^U n_U$, where $Á_U < Á_S$. Following Stiglitz (1974), the quit rate for skilled workers is specified as depending negatively on the unemployment rate of that category of labor, u_S, as well as the ratio of $!_S$ to the reservation wage. By contrast, the quit rate for unskilled workers is specified as depending only on the ratio of the minimum wage $!_U$ to the reservation wage, because the assumption of perfect labor mobility across sectors rules out unemployment for that category of labor. Unskilled workers' reservation wage is equal to the going wage in the informal sector wage, $!_I$. By contrast, skilled workers' reservation wage, $-_S$, is taken to be exogenous, because such workers never consider working in the informal sector as an option. Thus, the quit rates can be written as

$$q^S = q^S(\frac{!^i_S}{-_S}; u^i_S); \quad q^U = q^U(\frac{!^i_U}{!_I}); \tag{2}$$

where $u_S = 1 ¡ n^d_S=n^s_S$; with n^s_S (n^d_S) denoting the supply (demand) of skilled labor. It is also assumed that $q^S_{!_S!_S}, q^U_{!_U!_U} < 0$.[9] If q^S become less responsive to wages at higher levels of unemployment, so that $q^S_{!_S}$ becomes less negative as the unemployment rate increases, it will also satisfy the condition $q^S_{!_S u_S} > 0$. Alternatively, if a higher unemployment rate results in a stronger effect of a given change in the wage ratio on the quit rate, $q^S_{!_S u_S} < 0$. The analysis below focuses on the latter case, which ensures that an increase in unemployment lowers the optimum wage.

Profits of the representative firm in the exportable sector are given by

$$Y_E ¡ (!_S + Á_S q^S)n_S ¡ (!_U + Á_U q^U)n_U:$$

Using (1) and (2), profit maximization with respect to $!_S$; n_S and n_U (with $!_U$ and $!_I$ given) yields

[9] These restrictions on the quit functions are necessary to ensure that the second-order conditions for profit maximization are satisfied.

$$-\acute{A}_S q^S_{!_S}\left(\frac{!_S}{-_S};u_S\right) = -_S; \tag{3}$$

$$V_{n_S}(\cdot) = !_S + \acute{A}_S q^S\left(\frac{!_S}{-_S};u_S\right); \tag{4}$$

$$V_{n_U}(\cdot) = !_U + \acute{A}_U q^U\left(\frac{!_U}{!_I}\right): \tag{5}$$

Equation (3) is the optimal wage setting condition. It can be rewritten as $\acute{A}_S q^S_{!_S}=-_S = -1$, which is the familiar condition indicating that minimizing production costs associated with the use of skilled labor is achieved when a rise in skilled workers' wage increases direct labor costs by as much as it reduces turnover costs. Given the assumptions stated above regarding the sign of $q^S_{!_S!_S}$ and $q^S_{!_Su_S}$, and given the de¯nition of u_S, equation (3) implies that the equilibrium skilled workers' wage can be written as

$$!_S = !_S(u^j_S) = !_S(\overset{+}{n^d_S}); \tag{6}$$

which shows that an increase in open unemployment (or a reduction in labor demand), by reducing the quit rate, lowers the optimal wage paid to skilled workers.[10]

From equations (4) and (5), and with the second-order condition for pro¯t maximization imposing $V_{n_Sn_S}V_{n_Un_U} - V^2_{n_Sn_U} > 0$, the demand functions for labor can be derived as

$$n^d_S = n^d_S(!^i_S;\, !^i_I;\, !^?_U); \quad n^d_U = n^d_U(!^i_S;\, !^i_I;\, !^?_U); \tag{7}$$

which, using (6), can be rearranged to give

$$n^d_S = n^d_S(!^i_I;\, !^?_U); \quad n^d_U = n^d_U(!^i_I;\, !^?_U): \tag{8}$$

[10]Evidence of a negative relationship | albeit at the aggregate level | between wage and unemployment levels in the urban sector in developing countries is discussed, for instance, by Hoddinot (1996).

Equations (8) indicate that an increase in the informal sector wage, by increasing the quit rate of unskilled workers (and thus turnover costs) in the exportable sector, lowers the demand for that category of labor. As a result of gross complementarity between labor categories, the demand for skilled labor falls also. By contrast, the effect of changes in the minimum wage on labor demand are in general ambiguous. On the one hand, an increase in the minimum wage raises labor costs directly and reduces demand for that category of labor. On the other, the induced reduction in turnover costs associated with the reduction in the quit rate of unskilled workers tends to increase the demand for that category of labor | as well as the demand for skilled labor. If unit turnover costs $Á_U$ or the sensitivity of the quit rate to wages $q^U_{!_U=!_I}$ are not too large, the direct effect will dominate and a rise in $!_U$ will reduce demand for both categories of labor.

Substituting the solution for n^d_S in equation (6) yields

$$!_S = !_S(!^i_I; !^?_U); \tag{9}$$

which leads to the following proposition:

Proposition 1 The optimal wage for skilled workers, $!_S$, is independent of the informal sector wage if a) there are no turnover costs on unskilled labor ($Á_U = 0$); b) the quit rate for unskilled labor does not depend on relative wages ($q^U_{!_U=!_I} = 0$); or c) the quit rate for skilled workers is independent of the level of unemployment ($q^S_{u_S} = 0$). In the latter case, $!_S$ is also independent of the minimum wage.

Intuitively, a rise in the informal sector wage, by increasing the quit rate for unskilled labor in the exportable sector, lowers the demand for that category of labor and reduces (as a result of gross complementarity of production factors) the demand for skilled labor. The unemployment rate for that category of labor rises as a result, leading to a reduction in the optimal wage for skilled workers. If the unit turnover cost associated with unskilled labor is

zero ($\acute{A}_U = 0$), or equivalently if the quit rate for that category of labor does not depend on relative wages (so that $q^S_{!_U=!_I} = 0$), then $@!_S=@!_I = 0$. The optimal wage for skilled workers will depend in that case only on the minimum wage.[11] In addition, if the quit rate for skilled workers is independent of the level of unemployment ($q^S_{u_S} = 0$), then $@!_S=@!_I = @!_S=@!_U = 0$.

Figure 1 shows the determination of the optimal wage. Curve WSC is the wage-setting condition (6) and has a positive slope. n^d_S is the labor demand curve given in (7), which has a negative slope. The equilibrium wage is obtained at E. An increase in the informal sector wage shifts the n^d_S curve to the left, with no effect on the WSC curve. The net result is a reduction in $!_S$ (as given at point E^0).

In what follows, it will be assumed that $q^S_{u_S}$ is strictly positive. Nevertheless, as can be expected, whether $\acute{A}_U$ or $q_{!_U=!_I}$ are small or large plays an important role in the dynamics of policy shocks.

Substituting these results in equation (1) yields output of the representative producer as

$$Y^s_E = Y^s_E(!^i_S; !^i_U): \tag{10}$$

2.2 Output and price formation in the informal sector

Production in the informal sector Y_I depends only on labor and is characterized by decreasing marginal returns:

$$Y_I = y_I(n_I); \quad y^0_I > 0; \; y^{00}_I < 0 \tag{11}$$

where n_I denotes the quantity of labor employed in the informal economy.

[11] A relationship such as (9) can also be derived from other models of wage determination | as, for instance, in an efficiency wage model where effort is related positively to the wage ratio and inversely to the unemployment rate. In such a setting, reducing the premium over the informal sector wage would have an adverse effect on the firm's profitability by reducing the level of effort produced by those remaining on the job. Yet another approach to deriving an equation similar to (9) would be, as in Agénor (1996), to assume that a trade union operates in the export sector.

The representative producer maximize pro¯ts given by $z^{i\,1}Y_I \;\; ¡ \;!_I n_I$, where $!_I$ denotes the real wage in the informal sector measured in terms of the price of exported goods, and $z = E=P_I$, the relative price of exportables in terms of informal sector goods, which will be referred to as the real exchange rate. Pro¯t maximization yields the familiar equality between marginal revenue and marginal cost, $!_I = y_I^{0}=z$, from which labor demand can be derived as

$$n_I^d = y_I^{0\,i\,1}(!_I z) = n_I^d(!_I z); \quad n_I^{d0} < 0 \tag{12}$$

where $!_I z$ measures the product wage in the informal sector. Substituting equation (12) in (11) yields the representative producer's supply function for goods produced in the informal sector:

$$Y_I^s = Y_I^s(!_I z): \quad Y_I^{0} < 0 \tag{13}$$

Using equations (??) and (13), net factor income y is

$$Py = EY_E^s + P_I Y_I^s; \tag{14}$$

where P is the price of the consumption basket (derived below).

2.3 Household

The representative household in this economy is assumed to consist of all workers, skilled and unskilled. The consumption decision of the representative household is assumed to follow a two-step process. The household ¯rst determines the optimal level of total consumption, and then allocates that amount between consumption of the home good and the imperfectly substitutable imported good.

The representative household's discounted lifetime utility is given by

$$\int_0^{1} \left(\frac{c^{1\,i\,´}}{1\,i\,´} + \ln m \right) e^{i\,½t} dt; \quad ´ > 0; \; ´ \neq 1 \tag{15}$$

where ½ denotes the rate of time preference (assumed constant), c total consumption, and m real money balances.

Real ¯nancial wealth of the representative household, a, is de¯ned as

$$a = m + b + b^{\alpha}; \tag{16}$$

where b denotes real holdings of government bonds, and b^{α} real holdings of foreign bonds, both measured in terms of the price of the consumption basket, P. Speci¯cally, $b^{\alpha} = EB^{\alpha}=P$, where B^{α} represents holdings of foreign bonds measured in foreign-currency terms. The °ow budget constraint is given by

$$\dot{a} = y - c - \zeta + ib + (i^{\alpha} - \P + ")b^{\alpha} - ¼a; \tag{17}$$

where ¿ denotes the real value of lump-sum taxes, i the domestic nominal interest rate, i^{α} the exogenous, risk-free interest rate on foreign bonds, and $¼ = \dot{P}=P$ the domestic in°ation rate. The term $-¼a$ accounts for capital losses on total wealth resulting from in°ation, whereas the term $"b^{\alpha}$ represents the capital gain on the stock of foreign bonds resulting from exchange rate depreciation. The term $\P b^{\alpha}$, where $0 < \P < 1$, represents taxes on foreign bonds. The tax rate ¶ is endogenous and de¯ned as

$$\P = \P(b^{\alpha}; ¢); \quad \P_{b^{\alpha}} > 0: \tag{18}$$

Equation (18) shows that the tax rate on foreign bonds is positively related to actual holdings of foreign assets.[12]

In the ¯rst stage of the consumption decision process, households treat ¼, ", y, i, i^{α} and ¿ as given, and maximize (15) subject to (16), (17) and (18) by choosing a sequence $\{c,m,b, b^{\alpha}\}_{t=0}^{1}$. Let $r = i - ¼$ denote the domestic real rate of interest and $¾ = 1=´$ the intertemporal elasticity of substitution. The optimality conditions are

[12] ¶ may also depend on other factors (such as the household's demographic characteristics), which are left unspeci¯ed here.

$$c^{\prime}=m = i; \quad) \quad m = m(\overset{+}{c}; \overset{-}{i}); \tag{19}$$

$$i = i^{\alpha} ¡ ¶ + " ¡ b^{\alpha}¶_{b^{\alpha}}; \tag{20}$$

$$\underset{\cdot}{c}=c = ¾(r ¡ ½); \tag{21}$$

together with the transversality condition $\lim_{t ! 1}(e^{i ½t}a) = 0$.

Conditions (19) and (21) are familiar. (19) equates the marginal rate of substitution between consumption and real money balances to the opportunity cost of holding money. It relates the demand for money positively to the level of transactions | as measured by total consumption expenditure | and negatively to the domestic nominal interest rate. (21) relates the rate of change in consumption to the di®erence between the domestic real interest rate and the discount rate.

The novelty here is equation (20), which is the interest rate parity condition that holds under capital controls and the assumption that the representative household internalizes the e®ect of its portfolio decisions on the tax rate that he (or she) faces. It shows that in equilibrium the household must equate the rate of return on domestic bonds to the domestic-currency value of the rate of return on foreign bonds, which consists of the sum of the interest rate on foreign bonds i^{α} and the devaluation rate ", minus the tax rate ¶ and the increase in tax liabilities induced by a marginal increase in foreign assets | given by the product of the level of assets b^{α}, and the marginal increase in the tax rate, $¶_{b^{\alpha}}$.

Using the linear approximation $¶ \ ' \ ¶_{b^{\alpha}}b^{\alpha}$ to the tax function, equation (20) can be solved for the optimal level of foreign bonds:

$$b^{\alpha} = (i^{\alpha} + " ¡ i)=°; \tag{22}$$

where $\phi \equiv 2\psi_{b^*} > 0$. Equation (22) indicates that real holdings of foreign bonds depend on the difference between the domestic interest rate and the gross rate of return on foreign assets | given by the sum of the foreign interest rate and the devaluation rate. When $\psi_{b^*} \to 0$ (that is, the tax rate is independent of b^*), $\phi \to 0$ and equation (22) yields the uncovered interest parity condition $i = i^* + \varepsilon$. Thus, capital controls lead to imperfect capital mobility across borders.[13]

In the second stage of the consumption decision process, the representative household's allocation rule is[14]

$$c_I = \alpha z^{1-\eta} c; \quad c_M^S = (1-\alpha) z^{-\eta} c; \tag{23}$$

where $0 < \alpha < 1$. c_I denotes individual purchases of the informal sector good and c_M expenditure on the imported good. The consumer price index, P, can thus be defined as:

$$P = P_I^{\alpha} E^{1-\alpha} = E z^{-\eta}; \tag{24}$$

so that

$$\pi = \varepsilon - \eta \underline{z}/z. \tag{25}$$

The equilibrium condition of the market for informal sector goods can thus be written as

$$Y_I^S = \alpha z^{1-\eta} c + g_I; \tag{26}$$

[13] There is considerable empirical evidence supporting the assumption of imperfect capital mobility for a wide range of developing countries; see Agénor and Montiel (1996, Chapter 5). Turnovsky (1985) offered a specification that leads to an asset demand function analytically similar to (22). See also Agénor (1997) for a derivation based on individual default risk.

[14] As is well known, the allocation rule is optimal if the sub-utility function in both goods is homogeneous of degree one, and the budget constraint is given by $P_I c_I + E c_M = P c$. The constancy of expenditure shares results from the assumption that the sub-utility function is Cobb-Douglas.

where g_I denotes public consumption of nontradable goods.

Using equations (14) and (24) yields

$$y = z^{\pm}(Y_E^s + z^{i\,1}Y_I^s); \tag{27}$$

where $!_G$ denotes the constant real wage (measured in terms of the consumption basket) earned by government workers.

2.4 Wage formation and labor market equilibrium

The process of wage formation varies across segments of the labor market. As indicated above, both the minimum wage paid to unskilled workers in the exportable sector and the wage earned by public sector employees are assumed ¯xed by the government.[15] The skilled workers' wage is determined by ¯rms so as to reduce turnover costs (as explained above). Firms in that sector also determine the level of employment of both categories of labor.

Consider now the informal sector labor market. The demand for labor is derived from pro¯t maximization and is given by equation (12). Both categories of workers ¯rst queue up for employment in the formal sector.[16] But whereas unskilled workers who are unable to ¯nd a job in that sector move immediately to the informal economy, unsuccessful job seekers among the skilled labor force opt to remain unemployed.[17] With n^s denoting the

[15] Assuming that the minimum wage is fully indexed to the price of export goods rather than the overall price level allows us to abstract from supply-side e®ects induced by the impact of changes in the price of exports (relative to the price of the consumption basket) on the cost of unskilled labor.

[16] This assumption requires that both the skilled workers' wage and the minimum wage be higher than the informal sector wage. It should be noted, however, that in practice the second condition may not hold for the \upper-tier" segment of the informal economy. See, for instance, Yamada's (1996) discussion of the Peruvian case.

[17] Evidence supporting this assumption can be found in a variety of studies. Hirata and Humphrey's (1991) study of industrial workers in Brazil indicates that skilled workers are more likely than other categories to remain in open unemployment, rather than working in the informal sector. The evidence for India reviewed by Banerjee and Bucci (1995) also suggests that the more educated workers are more likely to engage in unemployed search. Additional evidence | for countries such as Chile, Morocco, and Thailand | is discussed by

total supply of labor, the supploy of unskilled workers is $n^s_U = n^s - n^s_S$. The equilibrium condition of the labor market in the informal economy is thus given by

$$n^s_U - n^d_U = n^d_I(\omega_I, z); \tag{28}$$

which, using equations (8) and (9), can be solved to yield:

$$\omega_I = \cdot(\bar{z}, \omega^?_U); \tag{29}$$

and $|\cdot_z| = \theta_I$ if $\acute{A}_U$ or $q^s_{\omega_U=\omega_I} = 0$.[18] Equation (29) indicates that a depreciation of the real exchange rate has a negative effect on the market-clearing wage in the informal sector. The effect of z on informal sector wages is both direct and indirect. On the one hand, a reduction, say, in the relative price of informal sector goods (a rise in z) requires a direct, offsetting reduction in ω_I to keep labor demand constant and maintain equilibrium in the informal sector labor market. On the other, because the demand for unskilled workers in the formal sector rises as a result (as long as $\acute{A}_U$ and $q^S_{\omega_U=\omega_I} > 0$), labor supply in the informal sector falls | offsetting to some extent the initial downward effect on wages in that sector. An increase in the minimum wage, as noted earlier, has an ambiguous effect on the demand for unskilled workers in the exportable sector | and thus on wages in the informal sector. If unit turnover costs $\acute{A}_U$ or the sensitivity of the quit rate of unskilled workers $q_{\omega_U=\omega_I}$ are sufficiently small, the direct (negative) effect of a higher minimum on labor demand in the formal economy will dominate; the resulting increase in

---

Agénor (1996), Horton et al. (1994), and the World Bank (1995). As indicated earlier, a combination of factors may account for this. In general, they imply thay the informal sector wage adjusted for the disutility of effort | that is, the opportunity cost of leisure | is lower than the expected return from remaining unemployed.

[18] Specifically, $\cdot_z = -n^{d0}_I\theta_I/[n^{d0}_I + (\partial n^d_U/\partial\omega_I)]$. Note that the direct, adverse effect of an increase in ω_I on informal sector employment (through a reduction in the demand for labor) is compounded by the indirect negative effect on the demand for unskilled labor in the formal sector (resulting from an increase in the quit rate and turnover costs), which raises labor supply in the informal economy.

labor supply in the informal economy will lead to an unambiguously negative e®ect on the market-clearing wage.

From (29) it can be shown that, with $\acute{A}_U$ and $q^S_{!_U=!_I} > 0$, $d(z!_I)=dz = \dot{+}_I + \cdot_z > 0$. This result, which plays an important role in what follows, can be summarized in the following proposition:

Proposition 2 A depreciation (appreciation) of the real exchange rate raises (lowers) the product wage in the informal sector.

2.5 Government, the central bank, and the money market

There are no commercial banks in the economy. the role of the central bank is to devalue the nominal exchange rate at a constant rate " and to operate the costless conversion, at any moment in time, of domestic (foreign) currency into foreign (domestic) currency. Because there is no domestic credit, the real money stock is de¯ned as

$$m = z^{\pm}R^{¤}; \tag{30}$$

where $R^{¤}$ is the central bank's stock of net foreign assets, measured in foreign currency terms. The central bank receives interest on its holdings of foreign assets. Its real pro¯ts ¢ are therefore given by

$$¢ = (i^{¤} + ")z^{\pm}R^{¤}; \tag{31}$$

where $"z^{\pm}R^{¤}$ measures the real value of the revaluation gain on reserves.

The government's revenue sources consist of income from the sale of services, taxes on private holdings of foreign assets, lump-sum taxes on households, and transfers from the central bank. It consumes both home and imported goods, pays salaries to public sector workers, and services its domestic debt. The °ow budget constraint of the government can be written as, using (24):

$$\mu m + \dot{b} = z^{\pm}(g_l + g_M/z) + rb - \P b^{\alpha} - \dot{c} - (i^{\alpha} + " - \mu)z^{\pm}R^{\alpha}; \qquad (32)$$

where g_M measures government spending on imports. Equation (32) indicates that government spending on goods and salaries, plus net interest payments on domestic debt, minus lump-sum taxes, proceeds from the taxation of private foreign assets, and real interest income on foreign reserves, must be ¯nanced by the in°ation tax or issuance of bonds.

Finally, using equation (19), the equilibrium condition of the money market can be solved for the domestic interest rate:

$$i = i(\overset{+}{c}; \overset{-}{m}): \qquad (33)$$

Equation (33) indicates that an increase in private spending requires a rise in the nominal interest rate to maintain money market equilibrium, whereas an increase in the real money stock necessitates a fall in interest rates.

3 Dynamic Structure

In order to examine the dynamic properties of the model described in the previous section, it is convenient to rewrite it in a more compact form. Suppose that the government foregoes the issuance of bonds to ¯nance its de¯cit and instead varies lump-sum transfers to balance the budget. As shown in Appendix I, the dynamics of the model can be formulated in terms of consumption and the representative household's wealth measured in foreign-currency terms | or equivalently here, the sum of the foreign-currency value of holdings of foreign assets held by the private sector and the central bank. Saddlepath stability of the model is also established in Appendix I.

The steady-state equilibrium of the model is depicted in Figure 2. The NN curve in the North-West quadrant depicts combinations of consumption and the real exchange rate that are consistent with equilibrium in the market for informal sector goods (equation (A4) in Appendix I), whereas the

LL curve in the South-West quadrant depicts combinations of the informal sector wage and the real exchange rate that are consistent with equilibrium in the informal labor market (equation 29). In the North-East quadrant, the locus [$\dot{F} = 0$] depicts the combinations of c and F for which holdings of foreign assets remain constant, whereas the locus [$\dot{c} = 0$] depicts the combinations of c and F for which private consumption does not change over time. Saddlepath stability requires that the [$\dot{c} = 0$] curve be steeper than the [$\dot{F} = 0$] curve. The saddlepath SS has a positive slope and de¯nes the only convergent path to the steady-state equilibrium, which is obtained at point E.

A more detailed graphical illustration of labor market equilibrium is presented in Figure 3. Panel A depicts the demand functions for labor in the formal sector. The demand curve for skilled labor n_S^d is downward-sloping, because it is negatively related to $!_S$, the wage earned by skilled workers. The demand for unskilled labor n_U^d shown in the same panel is also downward-sloping (because skilled and unskilled workers are gross complements). By substracting n_U^d from the total supply of unskilled workers n_U^s, panel B gives the supply of labor (and thus actual employment) in the informal economy. Given the downward-sloping labor demand curve in the informal sector n_I^d, the market-clearing wage | for a given level of the real exchange rate | is determined at point C. The negative relationship between the skilled workers' wage and the informal sector wage (for $Á_U$ and $q_{!_U=!_I} > 0$) is displayed as curve WW in panel D (equation (9)). As shown in panel A, unemployment of skilled workers prevails in equilibrium (because unsuccessful job seekers prefer not to work in the informal economy) and is given by the distance between the total supply of skilled labor, n_S^s, and the equilibrium point on the demand curve, n_S^d.

The steady-state solution of the model is obtained by setting $\dot{c} = \dot{F} = 0$. From equation (25), the steady-state in°ation rate is thus equal to the devaluation rate ($¼ = "$). From (21), the real interest rate is equal to the

rate of time preference:

$$\dot{T} - \varepsilon = \rho \tag{34}$$

Substituting this result in (22) yields

$$\dot{b}^* = (i^* - \rho)/\phi; \tag{35}$$

which shows that the steady-state stock of foreign bonds held by the representative domestic household is positive as long as it has a lower preference for the present (or is more patient) than foreign households ($\rho < i^*$). From (34), steady-state real money balances $\bar{m}$ are given by

$$\bar{m} = m(c, \rho + \varepsilon). \tag{36}$$

4 Reduction in the Devaluation Rate

We now turn to an analysis of the impact and steady-state effects of a stabilization program based on a permanent reduction in the devaluation rate.[19] We emphasize the effects of this shock on wages, the sectoral composition of employment, and unemployment.[20]

Consider then a permanent, unanticipated reduction in the devaluation rate ε with no discrete change in the level of the exchange rate. The long-run effect of a reduction in ε is a proportional reduction in the domestic nominal interest rate. It thus has no effect on private demand for foreign assets, as

[19] The model developed above is suitable for the analysis of a large array of policy and exogenous shocks; an extended version of this paper considers public sector layoffs and an increase in the price of government services.The model could be used also to analyze a reduction in the minimum wage, or external disturbances such as an increase in world interest rates. See Agénor and Aizenman (1999) for a related analysis of the effects of minimum wage changes in the presence of segmented labor markets, and Agénor (1997) for an analysis of external shocks.

[20] In the discussion of policy shocks below, it is implicitly assumed that a) downward movements in the skilled workers' wage are not large enough to result in a situation in which it is lower than the minimun wage and the informal sector wage; b) upward movements in the informal sector wage are not large enough to reverse the inequality $\omega_U > \omega_I$. These assumptions rule out \regime switching."

indicated by equation (35). However, because it lowers the opportunity cost of money, it leads to an increase in domestic money demand (see (36)). The increase in the real money stock requires a rise in the central bank's foreign exchange reserves, that is (because b^{α} does not change), an increase in the economy's total holdings of foreign assets. To maintain external balance (at the initial level of the real exchange rate) private consumption must increase. The real exchange rate therefore appreciates, thereby raising real wages for workers in the informal economy and lowering the product wage there. Employment in the informal sector increases, whereas skilled workers' wage and demand for both categories of labor in the formal economy fall. Open unemployment therefore increases.

On impact, the reduction in the devaluation rate lowers the rate of return on foreign assets and leads to an instantaneous reallocation of portfolios away from foreign bonds and toward domestic money holdings. This portfolio shift | which leaves the economy's stock of foreign assets constant | tends to reduce the domestic interest rate to maintain equilibrium in the money market (see equation (33)). Graphically, as shown in Figure 4, a reduction in the devaluation rate leads to a rightward shift in the [$\underline{c} = 0$] curve. Private consumption jumps downward, from point E to point A. The fall in private expenditure requires a depreciation of the real exchange rate to maintain equilibrium between supply and demand for informal sector goods.[21] Real wages in the informal sector therefore fall on impact. Nevertheless, as implied by Proposition 2, the product wage faced by producers in the informal economy rises. As a result, output and employment fall in that sector. The reduction in informal sector real wages raises demand for both categories of workers in the exportable sector, as well as skilled workers' wages. Output of exportable goods increases, skilled unemployment falls, and the distribution of employment of the unskilled labor force shifts toward the formal economy.

[21] The reduction in consumption, together with the increase in real money balances, leads to a fall in the nominal interest rate.

The transitional effects of the shock on real wages and the real exchange rate operate in a direction opposite to the impact effects, and are qualitatively similar to those associated with a cut in government spending on imported goods.[22]

5 Concluding Remarks

The role of labor markets in economic adjustment in developing countries has been the subject of renewed interest in recent years. The purpose of this paper has been to present a macroeconomic framework that captures some of the most salient features of these markets, to analyze their role in the transmission process of macroeconomic shocks, and to assess the impact of various policy shocks on the performance of the labor market. The model developed here captures, in particular, imperfect capital mobility (a key feature of many developing economies), the use of public production of intermediate inputs, and the existence of a large informal sector. The labor market was assumed to be segmented as a result of minimum wage legislation. The model also assumes the existence of "luxury" unemployment, which suggests that those openly unemployed are more frequently the more educated (Horton et al., 1994). Unskilled workers cannot remain unemployed for long due to the lack of unemployment benefits, and tend to move to sectors with "flexible entry" frequently the informal sector. The model was used to study the macroeconomic effects of a reduction in the nominal rate of devaluation. This type of Policy has often figured in stabilization programs, but its impact on wages and employment have seldom been analyzed in a complete macroeconomic model with the type of labor market structure found in developing countries.

Beyond the specific results derived here, two broad lessons can be drawn from the analysis. First, the role of the labor market in the transmission

[22] See Agénor (1997) for a more detailed discussion of the monetary and financial effects of a reduction in the devaluation rate in a similar setting.

process of macroeconomic policy shocks on wages and employment is considerably more complex than is often portrayed. Whether output in the formal economy increases or not following an increase in public sector prices, for instance, cannot be ascertained a priori, and depends on such factors as workers' preferences, the relative importance of turnover costs, elasticity of skilled workers' wages to informal sector wages. Second, short- and long-term effects of stabilization programs on wages and employment may vary in opposite directions. A proper time frame is thus essential to analyze empirically the effects of economic adjustment on the labor market.

The analysis developed here could be extended in a variety of directions. First, the analysis could be extended to account for imperfect labor mobility and open unemployment of the unskilled labor force.[23] Second, and perhaps more importantly, the existence of distortionary income and output taxes should be accounted for. As emphasized in numerous studies, a distinguishing feature of the informal sector is the lack of compliance not only with labor regulations (as assumed here) but also the avoidance of tax payments. Modeling the tax system and its budgetary implications implies that intersectoral shifts in production, employment and factor income induced by some of the policy measures considered here would have "second-round" effects and would alter significantly the adjustment process. Finally, the analysis could be extended to account for labor supply decisions and capital accumulation, in order to assess the effect of changes in relative factor prices on investment and resource allocation. The increased dimensionality of the model would then necessitate recourse to numerical solution methods.

[23] See Agénor (1998), who integrates in a simplified, non-optimizing version of the present model a Harris-Todaro migration mechanism | which emphasizes expected income opportunities | across the formal and informal sectors to generate "wait" unemployment.

Appendix I
Dynamic Form and Stability Conditions

Suppose that the government foregoes the issuance of bonds to finance its deficit ($b = 0$) and instead varies lump-sum transfers to balance the budget. Normalizing the constant level of domestic bonds to zero, equation (32) yields[24]

$$\zeta = z^{\pm}(g_I + g_M/z) + \omega_G n_G - p_G Y_E/\alpha - \theta b^{\star} - (i^{\star} + \varepsilon)z^{\pm}R^{\star}: \qquad (A1)$$

Substituting (27), the equilibrium condition of the market for informal sector goods (equation (26)), and the government budget constraint (equation (A1)) in the household's flow budget constraint (equation (17)) yields

$$\dot{a} = z^{\pm}(Y_E^S - c_M - g_M) + (i^{\star} + \varepsilon)(b^{\star} + z^{\pm}R^{\star}) - \mu a:$$

Because prices in the informal sector are fully flexible, z can jump in response to new information. Thus, because $a = z^{\pm}(R^{\star} + B^{\star})$ | given that holdings of domestic bonds are normalized to zero | real wealth in domestic currency terms will also be subject to jumps. However, measured in foreign currency terms, real wealth cannot jump. Thus, let $F = R^{\star} + B^{\star}$, so that $a = z^{\pm}F$. Consequently, using (25):

$$\dot{a} = z^{\pm}(\dot{R}^{\star} + \dot{B}^{\star}) + (\varepsilon - \mu)a:$$

Combining the previous two equations, together with (23), yields

$$\dot{F} = i^{\star}F + Y_E^S - (1 - \pm)z - \pm c - g_M; \qquad (A2)$$

which represents the consolidated flow budget constraint of the economy.[25]

To determine the market-clearing solutions for the real exchange rate and wages in the informal sector, consider first the equilibrium condition of the market

[24] Normalizing the constant level of domestic bonds to zero is not entirely innocuous. As can be seen from the derivations below, a positive b would imply the possibiliy of jumps in real private financial wealth | except in the case where government bonds are denominated in foreign currency terms. Nevertheless, this complication is ignored, given the already complex nature of the model.

[25] Integrating equation (A2) yields the economy's intertemporal budget constraint, which requires, subject to the transversality condition $\lim_{t \to \infty}(e^{-i^{\star}t}F) = 0$; that the current level of foreign assets be equal to the discounted stream of the excess of domestic absorption of imported goods over output of exportables.

for informal sector goods (equation 26). Solving this condition together with equation (13) yields the equilibrium value of z:

$$z = z(\omega_I; c; g_I): \quad |z_{\omega_I}| < 1 \tag{A3}$$

The equilibrium condition of the informal labor market with "luxury" unemployment is given by equation (28) and the equilibrium value of ω_I is given by (29). Substituting this result in equation (A3) yields[26]

$$z = z(c; n_G; p_G; g_I): \tag{A4}$$

An increase in the real price of government services, for instance, reduces the demand for unskilled labor in the exportable sector; The resulting increase in labor supply in the informal economy puts downward pressure on wages there, thereby stimulating output and requiring a real depreciation (a fall in the relative price of informal sector goods) to maintain equilibrium.

The next step is to eliminate the real money stock and the private stock of foreign bonds from the system. First, note that from equations (22), (30) and (33):

$$m = z^{\pm}(R^{\alpha} + B^{\alpha} - B^{\alpha}) = z^{\pm}F - b^{\alpha} = z^{\pm}F - [i^{\alpha} + \varepsilon - i(c; m)]/\delta:$$

Substituting out from (A4) for z yields, together with (A3):

$$m = \left\{\delta z(c; n_G; p_G)^{\pm}F - (i^{\alpha} + \varepsilon) + i_c c\right\}/(\delta - i_m);$$

so that

$$m = \phi(c; F; n_G; p_G; \varepsilon): \tag{A5}$$

In what follows, it is assumed that $\phi_c = (\pm\delta z_c F + i_c)/(\delta - i_m) > 0$. This condition holds if the initial level of foreign assets, F, is not too large.

Substituting (A5) in (21) yields

$$\dot{c}/c = \tfrac{1}{2}\{i[c; \phi(c; F; n_G; p_G; \varepsilon)] - \varepsilon + \pm\dot{z}/z - \rho\}: \tag{A6}$$

Assuming that changes in the price of government services, public sector employment and government spending occur only through step adjustments,

[26] Note that $1 - z_{\omega_I}\omega_z > 0$, since $|z_{\omega_I}| < 1$ and, from (29), $|\omega_z| < 1$.

equation (A4) yields $\underline{z} = z_c \underline{c}$. Substituting this result in the above equation yields

$$\underline{c} = G(\dot{c}^{+}; \dot{F}; n_G^{+}; p_G^{i}; \dot{\omega}). \tag{A7}$$

Substituting (9), (29), and (A3) in equation (10) yields

$$Y_E^S = y_E^S(\dot{c}; n_G^{i}; p_G^{?});$$

with $@y_E^S/@c = @y_E^S/@n_G = 0$ if $\Á_U$ or $q^U_{!_U=!_I} = 0$. The partial derivative

$$@y_E^S/@p_G = (@Y_E^S/@!_S)(@!_S/@p_G) + (@Y_E^S/@p_G);$$

remains ambiguous even if $\Á_U$ or $q^U_{!_U=!_I} = 0$, because the direct negative e®ect of an increase in the price of government services on output is partly o®set by the reduction in the optimal wage for skilled workers.

Substituting this result, together with (A4) in (A2) yields

$$\dot{F} = i^{\ddagger}F + y_E^S(c; n_G; p_G) - (1 - \pm)z(c; n_G; p_G)^{i\pm}c - g_M.$$

This equation can be written as

$$\dot{F} = i^{\ddagger}F + {}^{a}(\dot{c}; n_G^{i}; p_G^{?}) - g_M; \tag{A8}$$

where[27]

$$@{}^{a}/@c = @y_E^S/@c - (1 - \pm) + \pm(1 - \pm)\epsilon z_c;$$

$$@{}^{a}/@x = @y_E^S/@x + \pm(1 - \pm)\epsilon z_x; \quad \text{for } x = p_G; n_G.$$

Equations (A7) and (A8) allow us to express the dynamics of the system in terms of private consumption and the economy's stock of foreign assets, measured in foreign currency terms. A linear approximation around the steady-state yields

$$\begin{bmatrix} \dot{\underline{c}} \\ \dot{F} \end{bmatrix} = \begin{bmatrix} G_c & G_F \\ {}^{a}{}_c & i^{\ddagger} \end{bmatrix} \begin{bmatrix} \underline{c} - \bar{c} \\ F - \bar{F} \end{bmatrix}. \tag{A9}$$

These dynamic equations embed a continuous sequence of short-run momentary equilibria, which are such that the informal goods and labor markets clear

[27] Note that an increase in p_G exerts an additional, positive demand-side e®ect measured by $\pm(1 - \pm)\epsilon z_{p_G}$, which is related (as described earlier) to its e®ect on the relative price of informal sector goods. Note also that, although $@y_E^S/@n_G = 0$ when $\Á_U$ or $q^U_{!_U=!_I} = 0$, ${}^{a}{}_{n_G} = \pm(1 - \pm)\epsilon z_{n_G}$ is di®erent from zero | as a result of the e®ect of $!_I$ on z. Of course, the lower $\Á_U$ or $q^U_{!_U=!_I}$ is, the lower will ${}^{a}{}_{n_G}$ be in absolute value.

at every instant of time. A necessary and sufficient condition for the system described by (A9) to be saddlepath stable is that the determinant $(G_c i^{\alpha} - {}^{a}{}_{c} G_F)$ be negative. This condition is interpreted graphically in Figure 2, and can be interpreted as requiring that the interest rate on foreign assets be sufficiently small to prevent an explosive behavior of consumption driven by large wealth effects.

References

Agénor, Pierre-Richard, "The Labor Market and Economic Adjustment," IMF Staff Papers, 43 (June 1996), 261-335.

———, Capital-Market Imperfections and the Macroeconomic Dynamics of Small Indebted Economies, Princeton Study in International Finance No. 82 (June 1997).

———, "Fiscal Adjustment and Labor Market Dynamics in an Open Economy," unpublished, International Monetary Fund (December 1998).

Agénor, Pierre-Richard, and Joshua Aizenman, "Trade Liberalization and Unemployment," Journal of International Trade and Economic Development, 5 (September 1996), 265-86.

———, "Macroeconomic Adjustment with Segmented Labor Markets," Journal of Development Economics, 58 (April 1999), 277-96.

Agénor, Pierre-Richard, and Peter J. Montiel, Development Macroeconomics, Princeton University Press (Princeton, New Jersey: 1996).

Agénor, Pierre-Richard, and Julio A. Santaella, "Efficiency wages, Disinflation, and Labor Mobility," Journal of Economic Dynamics and Control, 22 (February 1998), 267-91.

Banerjee, Biswajit, and Gabriella A. Bucci, "On-the-Job Search in a Developing Country: An Analysis Based on Indian Data on Migrants," Economic Development and Cultural Change, 43 (April 1995), 565-83.

Bufie, Edward F., "Stabilization Policy and Public Sector Prices," Journal of Monetary Economics, 29 (April 1992), 253-76.

Cárdenas, Mauricio, and Catalina Gutiérrez, "Efficiency and Equity of Structural Reform: The Case of Colombia," unpublished, Fedesarrollo (July 1996).

Hirata, Helena, and John Humphrey, "Workers' Response to Job Loss: Female and Male Industrial Workers in Brazil," World Development, 19 (June 1991), 671-82.

Hoddinot, John, "Wages and Unemployment in an Urban African Labour Market," Economic Journal, 106 (November 1996), 1610-26.

Horton, Susan, Ravi Kanbur, and Dipak Mazumdar, "Overview," in Labor Markets in an Era of Adjustment, Vol. I, ed. by Susan Horton, Ravi Kanbur, and Dipak Mazumdar, the World Bank (Washington, DC: 1994).

Moene, Karl O., Michael Wallerstein, and Michael Hoel,"Bargaining Structure and Economic Performance," in Trade Union Behavior, Pay Bargaining and Economic Performance, ed. by Robert Flanagan, Karl O. Moene, and Michael Wallerstein, Oxford University Press (Oxford: 1993).

Pradhan, Menno, and Arthur van Soest, \Household Labor Supply in Urban Areas of Bolivia," Review of Economics and Statistics, 79 (May 1997), 300-10.

Roberts, Mark J., and Emmanuel Skou¯as, \The Long-Run Demand for Skilled and Unskilled Labor in Colombian Manufacturing Plant," Review of Economics and Statistics, 79 (May 1997), 330-34.

Turnovsky, Stephen J., \Domestic and Foreign Disturbances in an Optimizing Model of Exchange Rate Determination," Journal of International Money and Finance, 1 (March 1985), 151-71.

Yamada, Gustavo, \Urban Informal Employment and Self-Employment in Developing Countries: Theory and Evidence," Economic Development and Cultural Change, 44 (January 1996), 289-314.

World Bank, Workers in An Integrating World, World Development Report (Washington, DC: 1995).

Figure 1

Determination of the Equilibrium Wage for Skilled Workers

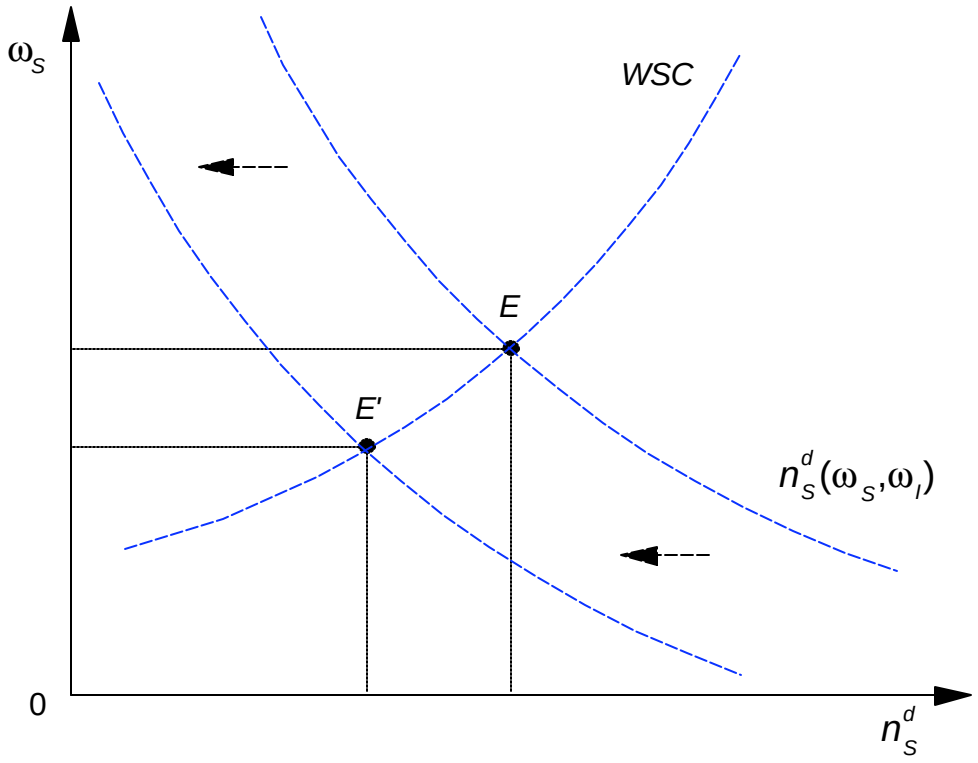

Figure 2

Steady-State Equilibrium

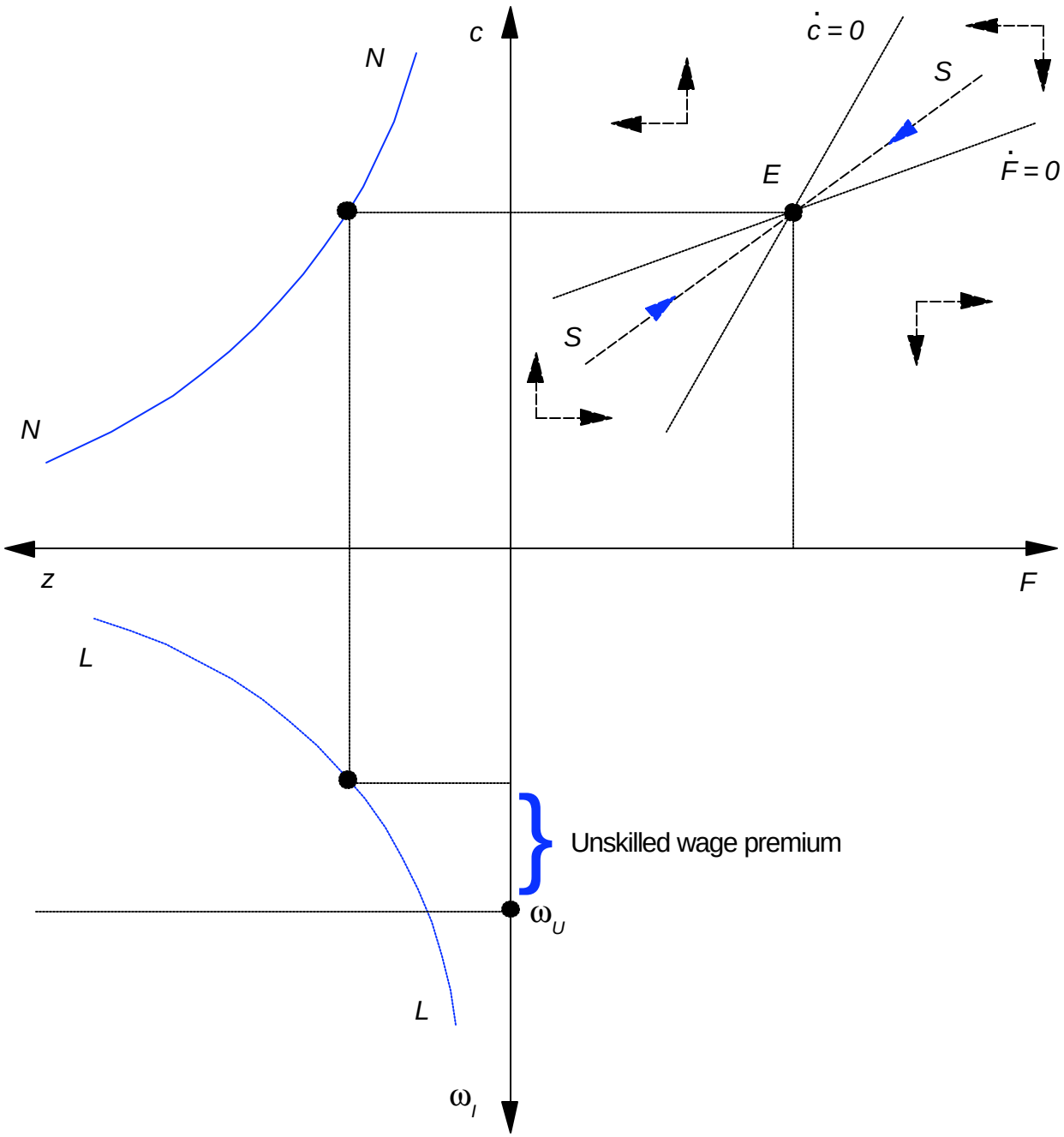

Figure 3

Equilibrium of the Labor Market

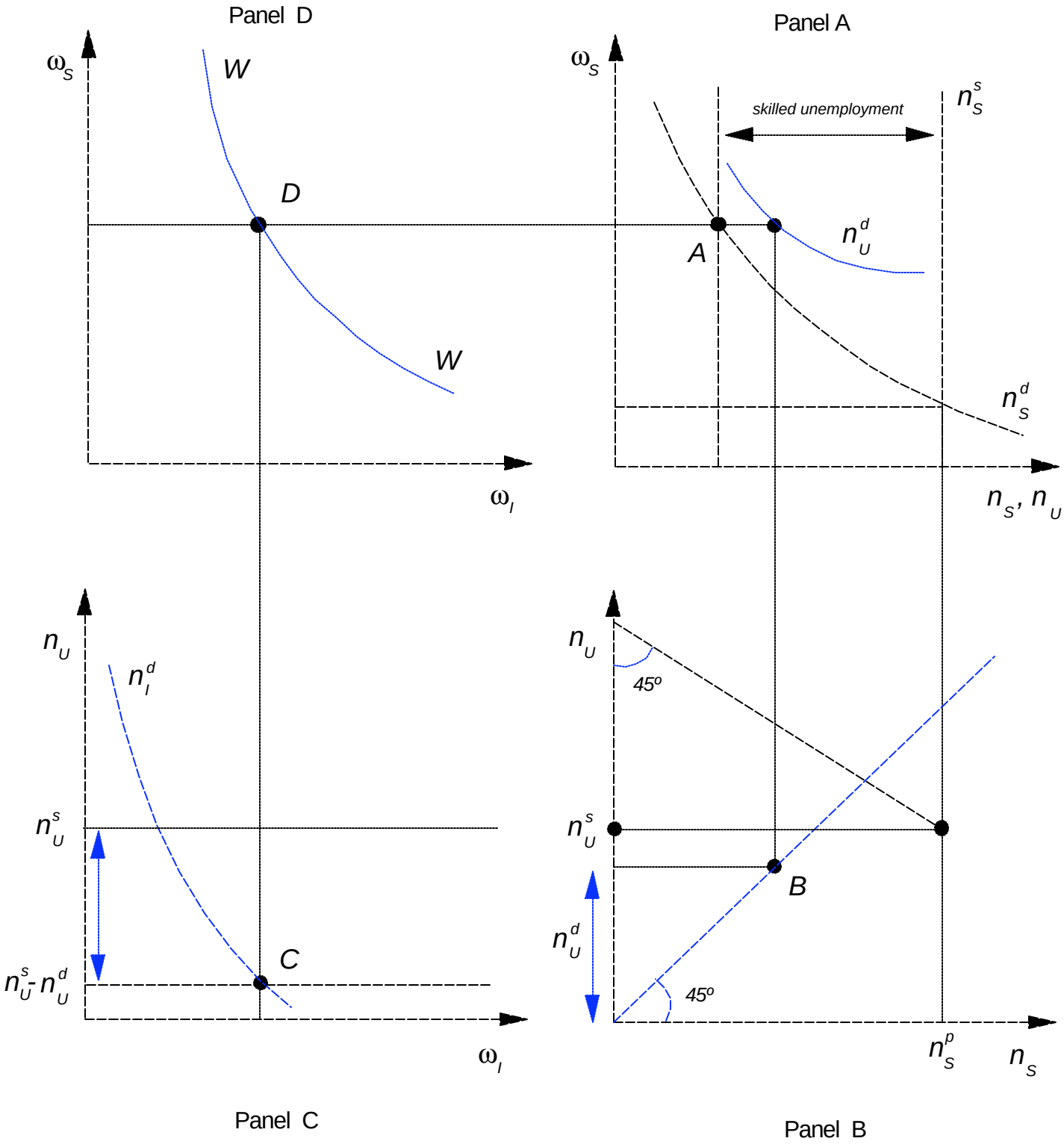

Figure 4

Reduction in the Devaluation Rate