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EMPLOYMENT POLICIES AND ECONOMIC DEVELOPMENT: THEORY AND EVIDENCE FROM PUBLIC AND PRIVATE ENTERPRISES

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1. INTRODUCTION

Over the last decade a major discrepancy has emerged between labor policies in the developing countries and the guidelines provided by the existing theoretical models. While leading development theories predict that, because of high wages, modern sector firms employ too few people, policy makers have been concerned with overemployment in much of the modern sector. This fundamental divergence of policies from the theoretical wisdom of course implies that either the policies are erroneous or that the profession is in need of a new theory. In this paper we provide a theoretical framework which nests these alternative hypotheses and we test the competing predictions with unique panel data on Tunisian public (state owned) and private enterprises.

The functioning of the modern-sector labor market has played a pivotal role in all the models of economic development. In the early models [see e.g. Lewis (1954), Ranis and Fei (1961) and Jorgenson (1964)], this labor market was deemed efficient in that its wage W was considered to be just high enough to guarantee abundant labor supply for firms which maximized profits by equating labor's marginal revenue product R_L to this wage (R_L=W). In contrast, the vast and ongoing literature initiated by Todaro (1969) and Harris and Todaro (1970) has viewed the high modern-sector wage set by the government and/or trade unions as the prime source of inefficiency. In terms of Figure 1, these later models contain outcomes that also lie on the marginal revenue product curve of labor R_L,[1] but they stress that the positive differential between the high wage W and the implicit market-clearing wage W^c leads to underutilization of labor [$L(W)<L(W^c)$] in the modern

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[1] Calvo's (1978) model is an exception to the rule.

sector.[2]

In the 1980s, development practitioners and policy makers have increasingly argued that many modern-sector firms are characterized by overemployment rather than underemployment and that the phenomenon is particularly acute in public (state) enterprises. Institutional analyses of labor markets in many developing countries indeed suggest that government and trade union pressures for more employment are substantial and that labor market regulations frequently prevent employers from laying off workers when "needed"[3]. The general belief is that pressures for excessive employment have been most effective *vis a vis* public enterprises, where government's influence is greater than in the private sector. As a result, virtually all structural adjustment policies in developing countries now include a public enterprise reform which aims, *inter alia*, at eliminating redundant labor.

As mentioned at the outset, a surprising aspect of these developments is that, while highly consequential measures have been widely undertaken in practice, the underlying ideas have been neither formulated theoretically nor tested empirically. Yet, the issues are analytically not as straightforward as is often assumed. In terms of Figure 1, it is worth noting that efficient outcomes from the

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[2] The numerous human capital earnings function studies which have dominated the applied micro literature on wage determination in developing countries also assume that $R_L = W$ (see e.g. Psacharopoulos (1985) for a survey). Van der Gaag and Vijverberg (1988), while using this human capital approach, are the first ones to admit explicitly its serious shortcomings when $R_L \neq W$.

[3] See e.g. Spinnanger (1984), Collier (1986), Fallon (1986), Macedo (1986), Ayub and Hegstad (1986), and Svejnar and Terrell (1988).

standpoint of a profit maximizing employer, who faces a high wage but is free to set employment, are only points on the R_L curve. All outcomes to the right of R_L (e.g. C, D, or E) are inefficient from the employer's standpoint, as higher profit could be generated by reducing employment and moving horizontally (at the given wage) to the R_L curve.

The various points on and off the R_L curve have very different implications from the social standpoint, however. While different dynamic models may yield different period-by-period employment outcomes that are socially efficient, the dominant criterion of efficient labor allocation implies that, in any given period, labor's marginal product should be equalized across alternative uses. Using this criterion, one finds that, for $W>W^c$, the vertical curve ADD' rather than the marginal product of labor curve R_L is the relevant yardstick. All outcomes to the left of the vertical curve ADD' signal underemployment because the firm's marginal product of labor exceeds labor's marginal productivity elsewhere in the economy ($R_L>W^c$), while outcomes to the right of ADD' reflect labor redundancy since $R_L<W^c$.

A third concept of efficiency emerges when management and unions/government bargain about both W and L. In that context, all points in the $AB'F'$ area are potentially efficient from the standpoint of the bargainers, depending on the union/government's bargaining power and preferences over W and L. Hence, if the union/government's emphasis on employment creation or maintenance is substantial, socially inefficient outcomes such as E' may be privately efficient from the

standpoint of the bargainers.[4]

In the next section we use a bargaining framework to formalize these ideas and derive testable predictions from a model which nests the competing hypotheses. In Section 3, we describe the data used in estimation and present the econometric model. Empirical estimates are reported in Section 4 and conclusions are discussed in Section 5.

2. THE THEORETICAL FRAMEWORK

In a general analytical framework, one can identify three main parties that jointly determine the firm's policies: managers, workers (or their representatives) and the government authorities. If U_M, U_L and U_G are their respective Von Neumann-Morgenstern utility functions, then under a set of plausible axioms the behavior of the firm can be characterized by the objective function

$$U = U_M^{\gamma_M} \; U_L^{\gamma_L} \; U_G^{\gamma_G} \quad , \tag{1}$$

where γ_M, γ_L and γ_G are the bargaining powers of the three partners with $0 \leq \gamma_M, \gamma_L, \gamma_G \leq 1$ and $\gamma_M + \gamma_L + \gamma_G = 1$.[5] This formulation has an appeal beyond that brought about by the uniqueness of the solution within the given axiomatic structure. In particular, objective function (1) nests as special cases the behavioral features of a profit

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[4] See e.g. McDonald and Solow (1981), Oswald (1982), Svejnar (1982, 1986), Svejnar and Smith (1984), MaCurdy and Pencavel (1986) and Brown and Ashenfelter (1986).

[5] The axioms generating this nonsymmetric Nash solution are the independence of equivalent utility representations, independence of irrelevant alternatives, strong individual rationality, and the equality of fear disagreement relative to bargaining power. See Svejnar (1986).

maximizing capitalist firm ($U=U_M$ as $\gamma_L=\gamma_G=0$), a pure government-run public enterprise ($U=U_G$ as $\gamma_L=\gamma_M=0$) and a trade union dominated or a labor-managed firm ($U=U_L$ as $\gamma_M=\gamma_G=0$). In analyzing the issues of labor allocation, we hence propose a model which nests a multiparty decisionmaking structure as well as particularly interesting special cases that are frequently found in developing countries.

A general objective function of trade unions can be specified as

$$V_L = V_L\ (W/C,\ L), \tag{2}$$

where W is the actual wage, C is the cost of living index and L is the actual employment level. This utility function can be 0-normalized to obtain

$$U_L = V_L - V_L^d \tag{2'}$$

where V_L^d is the union's threat point (disagreement) utility level and $U_L=0$ at disagreement.

In the context of our model, the goals of the government authorities are primarily employment generation, enterprise profits (tax revenue), and possibly higher (minimum) wages. The government objective function can hence be defined as

$$V_G = V_G(L, \Pi/C, W/C), \tag{3}$$

where $\Pi=R-WL-H$ is net profit, R is the firm's revenue and H is nonlabor cost. The 0-normalized utility function of the government authorities can then be defined as

$$U_G = V_G - V_G^d \tag{3'}$$

where V_G^d is their threat point utility level.

The utility function of managers (employers) is postulated to be a positive function of profits:

$$V_M = V_M\ (\Pi/C) \quad , \tag{4}$$

although in public enterprises the objective could contain employment generation as well.[6] The zero-normalized utility function of managers is

$$U_M = V_M - V_M^d. \tag{4'}$$

Objective functions (2'), (3') and (4') may be made operational in a number of ways. We assume that these functions can be approximated by Stone-Geary specifications which trigger disagreement outcomes for particular values of each of the arguments in (2'), (3') and (4'):

$$U_L = \emptyset\ (W/C - W^d/C)^{\alpha_L}\ (L - L^d)^{1-\alpha_L} \tag{2"}$$

$$U_G = \theta (L - L^d)^{\alpha_G^1}\ (\Pi/C)^{\alpha_G^2}\ (W/C - W^d/C)^{\alpha_G^3} \tag{3"}$$

$$U_M = \xi\ (\Pi/C)^{\alpha_M} \tag{4"}$$

where $\emptyset$, θ, $\xi > 0$ and real profit is defined in such a way that its

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[6] This would for instance be the case if managers were appointed by the government and their promotion reflected compliance with government goals. Our empirical analysis is unaffected by the inclusion of L (or even W/C) in V_M.

threat point level is zero.[7]

Combining (2"), (3") and (4") with (1) yields an enterprise objective function of the form

$$U = \Psi_1(W/C - W^d/C)^{\gamma_1}\ \Psi_2(L - L^d)^{\gamma_2}\ \Psi_3(\Pi/C)^{\gamma_3}, \tag{5}$$

where $\gamma_1 = \alpha_L\gamma_L + \alpha_G^3\ \gamma_G$, $\gamma_2 = (1-\alpha_L)\gamma_L + \alpha_G^1\gamma_G$, $\gamma_3 = \alpha_G^2\gamma_G + \alpha_M\gamma_M$, and Ψ_1, Ψ_2, $\Psi_3 > 0$. Equation (5) thus has the desirable property that the extent to which firms maximize wages, employment or profits depends on (a) the importance that each of these goals has in the objective functions of the three decisionmakers and (b) the bargaining power that these decisionmakers have relative to one another.

Within a dynamic framework, the levels of earnings and employment in a given firm may be seen as representing a solution to the maximization problem

$$\max_{W_t, L_t}\ E \sum_{j=0}^{\infty} \beta^j\ \Psi_1(W_{t+j}/C_{t+j} - W^d_{t+j}/C_{t+j})^{\gamma_{1,t+j}}\ \Psi_2(L_{t+j} - L^d_{t+j})^{\gamma_{2,t+j}}$$

$$\Psi_3(\Pi_{t+j}/C_{t+j})^{\gamma_{3,t+j}} \tag{6}$$

where $\beta < 1$ is a constant discount rate, $\sum_{i=1}^{3} \gamma_{i,t+j} = 1$ and expectations E apply to the joint distribution of the entire sequence of future revenues, nonlabor cost, threat point earnings, employment, profit, and the bargaining power parameters $\gamma_{i,t+j}$ (i=1,2,3). The first-order conditions for earnings and employment in period t + j yield:

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[7] We abstract here from the possibility that the threat point levels of wages, employment and profit may vary across the three partners.

$$R_{L,t+j} = W_{t+j} - \eta_{t+j} \frac{(W_{t+j} - W^d_{t+j})L_{t+j}}{L_{t+j} - L^d_{t+j}} \tag{7}$$

where $\eta_{t+j} = \gamma_{2,t+j}/\gamma_{1,t+j}$ is the weight that the firm places on employment generation relative to worker earnings in period t+j. In the absence of adjustment costs, the firm satisfies equation (7) in each period and time subscripts may be omitted for the sake of simplicity of notation. We follow this approach but we allow η to vary across firms according to ownership and we test (and reject) the presence of adjustment costs within a linear model.

In the context of equation (7), it is worth noting that $\gamma_2 = 0 \rightarrow \eta = 0$ and $R_L = W$. This case corresponds to the traditional models of economic development reviewed in Section 1 and represented by contract curve ABB' in Figure 1. However, equation (7) nests a variety of other cases. For instance, if $L^d = 0$ and $\eta = 1$ $(\gamma_1 = \gamma_2)$, then $R_L = W^d$, the firm operates on the vertical contract curve ADD' and, assuming $W^d \approx W^c$, the outcome is efficient from the social standpoint as defined in Section 1.[8] A positively sloped contract curve, corresponding to labor redundancy from both the employer and social standpoints ($R_L < W^c$), is generated by $L^d = 0$ and $\gamma_2 > \gamma_1$.

Assuming that $L^d = 0$, the production technology is of the CES form, and the revenue function reflects a constant price elasticity of product demand, one can transform equation (7) into the following estimable equation:

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[8]See Svejnar (1982) for a more detailed elaboration of this case.

$$\ln(L/Q) = \tilde{\beta}_0 + \sigma \ln P - \sigma \ln[(1 - \eta)W + \eta W^d], \tag{8}$$

where $\tilde{\beta}_0$ is a term containing production function and the elasticity of product demand parameters, σ is the elasticity of input substitution and P is the product price.[9] Equation (8) is similar to that used by Brown and Ashenfelter (1986) in the U.S. context. Our empirical results in Section 4 are based on this type of specification.

3. THE DATA AND EMPIRICAL SPECIFICATION

The Data

Our data set consists of an eight year (1977-84), unbalanced panel of 53 public and 24 private Tunisian enterprises.[10] The public firms are defined by the Tunisian government to be all firms with government participation in capital of at least 34 percent. This makes the firms fall under the tutelage of a particular ministry and ensures that top managers are appointed and recalled by the government.

The summary statistics of the main variables by industry are given in Table 1. The variables used in our empirical work are defined as L = the average number of employees in each firm, Q = the firm's value added, P = the value added deflator, W = the average earnings per employee in each firm, and W^d = the minimum industrial wage (SMIG).

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[9] The production function is therefore assumed to be of the form $Q = Ae^{dt}(\delta L^{-\rho} + (1-\delta)K^{-\rho})^{-1/\rho}$, where K = capital. Moreover, it is assumed that $R = P(1-\epsilon)Q$, where ϵ is the elasticity of product demand.

[10] The data for the public enterprises were collected by Salem Miladi and those for the private enterprises by a team led by Fouad Charfi, both of the Tunisian Ministry of Planning. We are indebted to them for making the data available.

The Empirical Specification

For the purposes of empirical estimation, equation (8) is specified as

$$\ln(L/Q)_t = \tilde{\beta}_{oi} + \tilde{\beta}_1 t + \tilde{\beta}_2 t^2 + \sigma \ln P_t - \sigma \ln[(1 - \eta_1 - \eta_2 D)W_t + (\eta_1 + \eta_2 D)W_t^d], \quad (9)$$

where the polynomial in time is entered to allow for the possible variation in the elasticity of product demand over time. In our empirical work we test the hypotheses $\tilde{\beta}_2 = 0$ and $\tilde{\beta}_2 = \tilde{\beta}_1 = 0$ in order to select the functional form best supported by the data. In order to assess whether employment policies of the firms vary with public vs private ownership, we allow η to depend on ownership: $\eta = \eta_1 + \eta_2 D$, where $D = 1$ for private enterprises and 0 otherwise. Since technology, market conditions, and the bargaining process (relative powers) may vary across industries, we estimate equation (9) separately for each industry. In doing so, we allow for firm-specific fixed effects β_{oi} within each industry. Finally, since W is endogenous in our framework, we instrument it and estimate equation (9) by nonlinear two-stage least squares (N2SLS).[11]

It should be noted that for small values of $(W-W^d)/W$, equation (9) can be approximated by a loglinear form:

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[11]. The instruments used are firm dummies, prices, SMIG, and a second-order polynomial in time.

$$\ln(L/Q)_t = \tilde{\beta}_{oi} + \tilde{\beta}_1 t + \tilde{\beta}_2 t^2 + \sigma \ln P_t - \sigma(1 - \eta_1 - \eta_2 D)\ln W_t$$

$$- \sigma(\eta_1 + \eta_2 D)\ln W_t^d \qquad (10)$$

However, since the mean relative differential between the actual wage and our proxy for the disagreement wage (SMIG), $(W-W^d)/W$, ranges between 60 and 80 percent in Table 1, we prefer to rely primarily on equation (9) rather than (10). The advantage of equation (10) is of course that it lends itself to a dynamic specification along the lines proposed for instance by Hendry and Mison (1978). We follow this approach and estimate a general approximation to a dynamic (cost of adjustment) model with one period lags in all the relevant variables.[12]

$$\ln(L/Q)_t = \tilde{\beta}_{oi} + \tilde{\beta}_1 t + \tilde{\beta}_2 t^2 + \tilde{\beta}_3 \ln(L/Q)_{t-1} + \tilde{\beta}_4 \ln P_t$$

$$+ \tilde{\beta}_5 \ln P_{t-1} + \tilde{\beta}_6 \ln W_t + \tilde{\beta}_7 \ln W_{t-1} \qquad (11)$$

$$+ \tilde{\beta}_8 \ln W_t^d + \tilde{\beta}_9 \ln W_{t-1}^d$$

Equation (10), which reflects the case of no adjustment costs, is linearly nested in equation (11) and standard F-tests can be applied for model selection. Our empirical strategy is hence to base our conclusions on the estimates of equations (9), (10), and (11), with appropriate tests pointing to whether equation (11) or (10) (or an intermediate case) is a superior loglinear specification.

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[12] The relatively short and unbalanced nature of the panel makes it unreasonable to experiment with two or three period log structures.

4. THE EMPIRICAL RESULTS

The estimated parameters of equation (9) are reported in Table 2. The point estimate of η_1, the relative weight that public enterprises place on employment is positive in all the industries and it ranges from 0.36 to 1.17. However, with the exception of the chemical industry and the industry of construction materials and ceramics (IMMC), the asymptotic standard errors are too large to permit one to draw the conclusion that $\eta_1 > 0$ or distinguish statistically between $\eta_1 = 0$ and $\eta_1 = 1$. In contrast, the estimates of η_1 in chemicals and IMMC are both significantly different from zero and close to unity. In these two industries, one cannot reject the hypothesis that $\eta_1 = 1$ and that the contract curve is vertical ($R_L = W^d$).

The estimates from the public enterprises hence present some strong and some weak evidence that the traditional labor demand model ($R_L = W$) does not adequately reflect the wage and employment setting practices in the modern sector of developing countries and that a more general model, allowing for $W > R_L$, would provide a superior description of the reality. To the extent that the SMIG approximates the implicit competitive wage W_c, our estimates of η_1 for chemicals and IMMC suggest that the extent of employment in these two industries is socially efficient in the static framework. In reality, SMIG probably overestimates W^c and our findings therefore suggest that labor utilization is insufficient from the social standpoint in all six sectors.

Estimates for private firms are available in the textile and metallurgy & metal processing (IMME) industries. Contrary to

institutional expectations, the two estimates of η_2 are not significantly different from zero, thus suggesting that employment policies of private firms do not differ from those of their public counterparts. In the context of these two industries, it is hence impossible to draw sharp conclusions about whether the wage-employment outcome is on or to the right of the marginal revenue product curve of labor.

Estimates of equation (11) yielded insignificant coefficients on the lagged variables in all industries and F-tests confirmed the superiority of equation (10) relative to (11). These results suggest that costs of adjustment are relatively unimportant in Tunisian industry and that the static modelling underlying equations (9) and (10) is appropriate.

The estimates of the main parameters from equation (10) are reported in Table 3.[13] With two exceptions, all the coefficients on $\ln W_t$ and $\ln W_t^d$ are insignificant, thus preventing us from drawing strong conclusions about the underlying employment behavior. As the results in Table 2 and the specification of equation (10) suggest, the insignificant coefficients in Table 3 are probably brought about by our inability to estimate precisely the elasticity of substitution, σ. Indeed, the two significant coefficients on $\ln W_t^d$ in Table 3 are found in those cases (textiles and IMMC) where the estimate of σ in Table 2 is either significant or nearly so. In the case of textiles, the estimate of σ in Table 2 has the expected positive sign. The

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[13] The reported estimates constrain η_2 to zero since the hypothesis $\eta_2 = 0$ could not be rejected in any of the regressions.

corresponding coefficient on $\ln W_t^d$ in Table 3 is negative, as expected. For IMMC t' estimated σ is negative (though insignificant) in Table 2 and the corresponding coefficient on $\ln W_t^d$ in Table 3 is accordingly positive. Overall, the inability of the linear model to separate the estimates of σ and η, and the potential bias inherent in this model because of high values of $(W-W^d)/W$ make it preferable to draw conclusions from the nonlinear specification (9) which is derived directly from the theoretical framework.

5. CONCLUSIONS

Our estimates present some evidence in support of the recent institutionally-based hypotheses that modern sector firms in developing countries employ workers beyond the point where labor's marginal product equals its cost. This evidence suggests that the labor demand specification used in traditional models of economic development and the corresponding policy prescriptions may be flawed. However, contrary to the recent interventionist policies aimed at reducing excess labor, our estimates suggest that the observed labor hoarding is socially optimal in that it reduces the dispersion of labor's marginal products across uses. Finally, our data on private firms indicate that the extent of labor hoarding does not vary significantly with public vs private ownership.

TABLE 1

SUMMARY STATISTICS OF RELEVANT VARIABLES BY INDUSTRY

Industry	L		Q		W		W^d		P		$(W-W^d)/W$		N
	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.	
Mining	4319.0	5502.7	13945.6	20508.7	2376.9	1101.6	791.2	259.6	1.01	0.206	0.629	0.116	25
Energy	1129.3	1991.8	27853.3	35483.3	4187.2	1258.9	791.2	257.5	1.01	0.205	0.799	0.053	59
Chemicals	514.5	497.3	3343.9	3306.9	2903.9	940.8	791.2	257.3	1.01	0.205	0.681	0.273	64
IMMC (6)	557.1	424.6	3601.9	3647.8	2695.7	1109.7	791.2	256.6	1.01	0.204	0.684	0.080	102
IMME (7)	664.3	667.8	2816.7	4191.1	2227.6	929.1	781.9	235.2	1.01	0.178	0.608	0.161	121
Textile	802.6	556.2	1904.6	2417.4	2222.9	977.8	770.8	207.2	1.02	0.430	0.592	0.592	32

Notes:
(1) L is the number of workers.
(2) Q is the value added in million Dinars.
(3) W and W^d are measured in Dinars.
(4) P is the value added price index with value 1.00 in 1982.
(5) N is the number of observations.
(6) IMMC is the sector of construction materials and ceramics.
(7) IMME is the sector of metallurgy and metal processing.

TABLE 2

FIRM-SPECIFIC FIXED EFFECTS ESTIMATES OF THE NONLINEAR EMPLOYMENT EQUATION PARAMETERS BASED ON INDUSTRY-SPECIFIC C.E.S. TECHNOLOGY AND JOINT UTILITY MAXIMIZATION

(Values in Parentheses are Asymptotic Standard Errors)

Industry	η_1	η_2	σ	$\tilde{\beta}_1$	N
Mining	0.357 (2.935)	———	-0.710 (1.124)	-0.071 (0.077)	25
Energy	0.759 (0.969)	———	-0.374 (0.519)	-0.032 (0.030)	59
Chemicals	0.874* (0.174)	———	-0.645 (0.416)	-------	64
IMMC	1.167* (0.089)	———	-0.409 (0.263)	-------	102
IMME	0.378 (0.661)	0.741 (0.719)	1.157 (0.655)	0.099* (0.046)	121
Textiles	0.756 (0.690)	-0.161 (1.216)	1.937* (0.422)	-------	32

Notes: (1) * = statistically significant at 5%.
(2) IMMC is the sector of construction materials and ceramics.
(3) IMME is the sector of metallurgy and metal processing.

TABLE 3

FIRM-SPECIFIC FIXED EFFECTS ESTIMATES OF THE

LOGLINEAR APPROXIMATION TO THE EMPLOYMENT EQUATION

Industry	$\ln W_t$	$\ln W_t^d$	$\ln P_t$	t
Mining	1.053 (0.960)	-0.026 (1.992)	0.815 (1.972)	-0.251 (0.380)
Energy	2.5E-4 (2.4E-4)	0.392 (0.738)	0.231 (0.786)	-0.194 (0.162)
Chemicals	0.140 (0.301)	0.644 (0.432)	-1.034 (0.648)	———
IMMC	-0.655 (0.899)	2.106* (0.779)	0.519 (0.922)	-0.246 (0.188)
IMME	0.499 (0.629)	-1.755 (1.181)	0.973 (1.255)	0.128 (0.224)
Textiles	1.268 (0.660)	-2.287* (0.913)	-0.744 (1.439)	———

Notes: (1) * = statistically significant at 5%.
(2) IMMC is the sector of construction materials and ceramics.
(3) IMME is the sector of metallurgy and metal processing.

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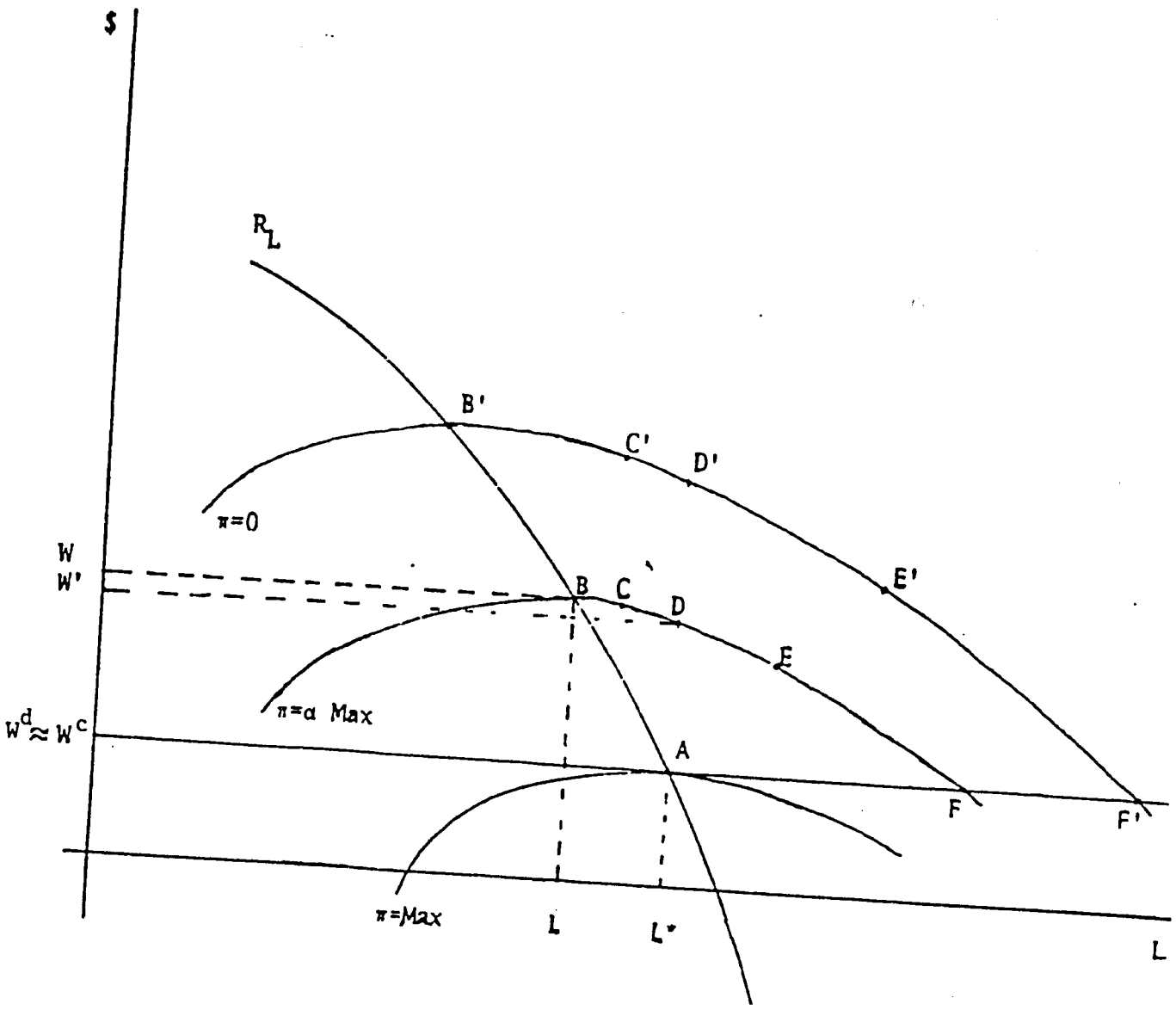

Figure 1