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PARCELLISED CAPITAL AND UNDERDEVELOPMENT:
AN INTERPRETATION OF THE SPECIFIC-FACTORS MODEL

by

Emmanuel S. de Dios

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ABSTRACT

Where capital markets are undeveloped and political differences among capital owners predominate, capital becomes "parcellised" and is, for all intents and purposes, "specific" to the parcel. The familiar specific-factors model then becomes applicable. Parcellisation results in lower output and wages. Openness to world capital markets accentuates these effects as well as leads to the paradox of capital flight even from a capital-scarce country. Unproductive rent-seeking activities to defend one's parcel and to acquire others lead to a Cournot-Nash equilibrium which may be Pareto-inferior.

PARCELLISED CAPITAL AND UNDERDEVELOPMENT

An Interpretation of the Specific-Factors Model

Emmanuel S. de Dios[†]

1 Introduction

The specific-factors (henceforth the SF) model in international trade theory is usually interpreted in a physical or a temporal sense. That is, at least one factor of production, say K_i , is assumed to be unique to a sector i , either because it is physically distinct from other factors, or because moving this factor to other sectors requires time. (In the very short-run, of course, all factors are specific in this sense.)

This paper proposes a different interpretation: our starting point is the common historical and sociological observation in underdeveloped countries that non-economic, very often political, categories dominate economic decision-making. Various observers[‡] have noted the close links between economic and political influence in underdeveloped countries, and this link is arguably one of the most constant themes running through some of the writing on underdevelopment outside of mainstream economics. Leff (1979) has called attention to the existence and dominance of more or less stable "groups" in explaining the industrial organisation in many underdeveloped countries. In the Philippine literature, the existence of large business groups (often based on some extended family relationships) as the normal business form has been fairly well documented, albeit less well analysed, even prior to the Marcos dictatorship. In a related vein, Lande (1964) much earlier on described how, in the pre-martial law period, political office tended to be captured by various elite economic groups and used to dispense patronage. For the Marcos period, Doherty (1980) delineated distinct and competing groups in various lines of business. Notable examples of this phenomenon abound; more recently,

[†] Associate Professor, University of the Philippines School of Economics. The author wishes to thank R.V. Fabella, R.D. Ferrer, P. Hutchcroft, and M.F. Montes for helpful discussions but takes sole responsibility for remaining errors and omissions.

[‡] Political scientists have also recently referred to the importance of the state's "autonomy" vis-à-vis narrow private interest groups as an explanation for underdevelopment.

the monopolies in automobile-manufacturing, in cement, power distribution, telecommunications, etc. have attracted attention. Lind's (1984) work illustrates the close relationship between political patronage and economic privileges through the grant and guarantee of loans by the Marcos regime to favoured firms. More recently Yoshihara (1988) has argued that the dominance of such groups in many Southeast Asian countries constitutes a major reason they cannot be regarded as having fully imbibed "capitalism" and is an important obstacle to their development. A notable dimension here is the close links between family interests and foreign corporations (e.g. Tsuda 1978 but also Doherty 1980), even though there is also a tradition, associated with import-substituting protectionism, of resistance to foreign investment. Ferrer (1988) adds the observation that very often these groups simply take over economic "parcels", whose main economic features do not change, although they may change ownership.

In brief, past writing has progressed sufficiently to permit one to draw some "stylised facts" regarding industrial structure and development. To wit, "groups" based on distinct family or political ties are a common form of business organisation. Secondly these groups are more or less insulated from and compete with one another. Third, political mechanisms represent an important means for groups to takeover other business interests. The common upshot of this discussion is the hypothesis that some factors may indeed be physically identical, but owing to political or other distinctions, they may for all practical purposes be treated as "specific" factors. Hence, for example, total capital stock K could be physically indistinguishable, but may be functionally subdivided into impenetrable political categories, $K_1, K_2, \dots, K_N$. Support for this interpretation is given in the empirical observation that stock-markets in many developing countries only encompass a small portion of the total private capital[†]: rather many investments are self-financed from within the groups or their financial institutions, which remain more or less sufficient unto themselves. Another indication for this is the widely varying rates of return on various investments. "Parcellisation" is the term used here to describe this phenomenon.

† Notably the Philippines has one of the least developed stock-markets among comparable countries, both in terms of turnover and total capitalisation. This may be regarded as a *prima facie* reason to call for the development of stock markets. Our argument suggests, however, that the level of stock market development is a symptom, rather than a cause, of underdevelopment, and therefore represents no policy-handle. The result also raises an intriguing reason why (as Yoshihara suggests) overseas Chinese entrepreneurs have succeeded better than indigenous ones: they have not been involved in the political contests and have therefore not faced the obstacles to raising capital and investing it that indigenous entrepreneurs have. (I owe this observation to my student, B. Ong.)

We note that from here on the model becomes indistinguishable from the usual specific factors model, differing only in the interpretation of the essence of specificity.

Indeed our interpretation is more consistent with the political-economy literature on protection, in which the same specific factors model has made a large contribution. The typical paradigm here has been the conflict between landlords and capitalists, i.e. land and machines being the specific factors, and labour being the mobile one. The interpretation we propose here suggests that this may be carried over into industry. That is to say, industry itself may be parcellised into various "specific factors". It would locate the sociological mechanism for this specificity in the political antagonism that prevails in those countries.

2 Simple Analytics

Let output in sector i be a function of the specific factor K_i and the variable amount of the homogeneous factor labour, L_i employed in the sector, according to the production function $f_i(K_i, L_i)$. f_i is assumed well-behaved. Output-price is p_i , which is assumed fixed owing to the small-country assumption; w denotes the competitive wage.

In sector i , production is conducted so as to maximise:

$$\pi_i(K_i, L_i) = p_i f_i(K_i, L_i) - wL_i \quad (1)$$

An interior solution for the production sector, assuming it exists, is characterised by the following first-order conditions:

$$p_i f_{iL}(K_i, L_i) - w = 0 \quad \forall i \quad (2)$$

where f_{iL} is the marginal product of labour in sector or parcel i . Production equilibrium is then characterised by the system of equations (2), and the labour constraint:

$$\sum_i L_i = L \quad (3)$$

where L is the fixed endowment of labour. The $N+1$ equations (2)-(3) might then be solved for the wage w and the equilibrium sectoral levels of employment, $L_1^*, L_2^*, \dots, L_N^*$.

Given the L_i^* , the implicit rate of return per unit of the specific factors K_i , which we denote by ρ_i , may be known through:

$$\rho_i(K_i, L_i^*) = p_i \{f_i(K_i, L_i^*) - f_{iL}(K_i, L_i^*)L_i^*\} / K_i \quad (4)$$

making use of (2). From here it is a well-known result (see, e.g. Dixit and Norman 1980:43) that the own rate of return to specific capital is affected positively by an increase in sectoral employment, an increase in own-price, a fall in the price of other sectors' output, and a reduction in capital employed. On the other hand, wages are affected negatively by an increase in the labour-endowment and a fall in capital.

An important point to note is that although parcel-owners may have a monopoly of the specific factor, the small-country assumption (in particular the availability of imports at the price p_i) prevents them from exploiting it. Withholding K_i would indeed reduce domestic supply but lead to an equivalent increase in imports, keeping price from rising. One implication of this is that there is, for all practical purposes, no free disposal: all of K_i must be used, since not to do so would lower profits.[†]

The specific-factors model can be and has been used to explain the particularism typically attending trade regimes in many underdeveloped countries, as well as the extension of the discussion to rent-seeking. Nevertheless, the discussion is incomplete, unless one locates the source of factor-specificity. None of the typical interpretations of factor-specificity would do however. The physical interpretation would provide us with no usable policy handle. Indeed we would be unable to explain why rent-seeking would persist among sectors of industry. After all, in the temporal interpretation, differences would tend to vanish in the long-run. Yet typical observation commonly runs against this hypothesis.

The relationship between the SF and the HOS models has been fairly well investigated. (For a recent treatment, see for example, Ethier 1987). Again the typical interpretation given is that differentials in the rates of return to capital persist because of short-run rigidities. Under our interpretation, however, in a closed economy, the persistence of wide differentials in the rate of return to capital is due not to a distinction between short and long-run, but rather to a persistent tendency for the capital market to be segmented. Here the distinction between the SF and HOS rates of return would measure the difference between what would obtain as between integrated and parcelised capital markets.

The revenue function is defined as $r(p, v) = \{px : px \geq px', \forall x, x' \in X(v)\}$, where $X(v)$ is the production set, x is the vector of output, and v is the vector of primary factors endowments. In the case of the HOS model, $X^A(K, L) = \{x : x_i \leq f_i(K_i, L_i), \forall i, \sum_i K_i = K, \sum_i L_i = L\}$. For the SF model, we may write $X^B(K_1^B, \dots, K_N^B,$

[†] That is, of course, unless the value of marginal product of specific capital is negative, something we do not consider.

$L) = \{x : x_i \leq f_i(K_i, L_i), \forall i, \sum_i K_i = K, K_i = K_i^B, \sum_i L_i = L\}$. Hence we denote by $r_A(p, K, L)$ and $r_B(p, K_1, \dots, K_N, L)$ the HOS and SF revenue functions, respectively.

Consider a situation where capital is not parcellised and may move freely across all sectors, the only restraint being imposed by the total factor endowment. Then there will be allocations K_i and L_i for all i which solve the revenue function. On the other hand, with capital parcellised, the allocation of K across sectors will be arbitrarily set by ownership and will generally differ from K_i . One implication of that is the following:

Proposition 1. *Where capital is parcellised, (a) national product is lower, and (b) the wage is lower than its value under integrated capital markets; (c) however, aggregate profits may be higher or lower.*

Proof. Given our interpretation, this proposition is proven by showing that the wage level under the HOS regime is no less than under the SF regime. Let $K_i^A(p, K, L) = [K_1^A(p, K, L), \dots, K_N^A(p, K, L)]$ be the sectoral allocation of capital that solves $r_A(p, K, L)$. Then this function may be rewritten as $r_A(p, K_i^A(p, K, L), K, L)$. On the other hand, let $K_i^B = [K_1^B, \dots, K_N^B]$ be any (arbitrary) allocation of the total endowment of capital K , and consider $r_B(p, K_i^B, L)$. Since $X^A(K, L) \supseteq X^B(K_i^B, L)$, the maximum of r_A cannot be less than that of r_B , i.e.,

$$r_A(p, K_i^A(p, K, L), K, L) \geq r_B(p, K_i^B, L) \quad (5)$$

with strict equality holding when $K_i^B = K_i(p, K, L)$, $\forall i$. This proves (a) of the proposition. Now consider an increase in L equal to ΔL ; it would still be true that:

$$r_A(p, K_i^A(p, K, L + \Delta L), K, L + \Delta L) \geq r_B(p, K_i^B, L + \Delta L) \quad (6)$$

In the initial position where $K_i^B = K_i(p, K, L)$, $\forall i$, (5) is a strict equality. Subtracting (5) as an equality from (6), dividing both sides by ΔL and taking limits, we obtain

$$(\partial r_A / \partial L) \geq (\partial r_B / \partial L) \quad (7)$$

Owing to duality, however, the first and second terms on the left hand side of this inequality are nothing but the wage-levels under regimes A and B , respectively. Hence (7) states that:

$$w^A \geq w^B$$

proving (b) of the proposition. Finally we may write aggregate profits under the two regimes, respectively, as:

$$\Pi^A = r_A - w^A L$$

$$\Pi^B = r_B - w^B L$$

From (a) and (b), however, we know that $r_A \geq r_B$ and $w^A \geq w^B$. Therefore no general statement may be made regarding aggregate profits. This proves (c).

The above results suggest a reason why workers in underdeveloped countries may have an intrinsic interest in seeing the suspension of the specificity of capitals and a stake in industrialisation. However, to the extent workers in a particular sector may partake of the rents to the specific capital in that sector, this result may be weakened, if not nullified.

2 Specific Factors and Foreign Capital

Where capital markets are integrated, only a single domestic interest rate, denoted by ρ , would prevail. The country would be an unambiguous net importer or exporter of capital depending on whether the world rate of interest, R , is less or greater than ρ . With parcellised capital, however, it is not possible to define a single domestic rate of return to capital; rather each sector may be a net exporter or importer of capital, depending on the relationship between R and the sectoral rate of return, ρ_i .

Proposition 2. (Asymmetry) *Where capital is parcellised, a country with scarce capital resources may still be a net capital-exporter. Capital will be exported if the specific return to capital ρ_i is lower than the world rate of interest R . On the other hand, if ρ_i is higher than the world rate of interest, there is no incentive for the sector to attract foreign capital. In equilibrium, $\rho_i \geq R, \forall i$.*

Proof. (a) Suppose $R \geq \rho_i$. Then from the definition of ρ_i we can write:

$$R \geq \rho_i \{f_i(K_i, L_i^*) - f_i(K_i, L_i^*)\} / K_i,$$

$$RK_i \geq \rho_i \{f_i(K_i, L_i^*) - f_i(K_i, L_i^*)L_i^*\}$$

This implies that if the capital parcel K_i were entirely remitted abroad, the total return from doing so would be higher than from its current domestic employment in sector i . Under profit-maximisation, therefore, at least some amount of capital would be exported. Denote by K_i^h the amount of capital that remains at home; then $K_i - K_i^h$ is the amount that flows abroad. Profit maximisation implies that:

$$R(K_i - K_i^h) = \rho_i \{f_i(K_i^h, L_i) - f_i(K_i^h, L_i)L_i\}$$

where $(K_i - K_i^h) \geq 0$.

(b) On the other hand, suppose $p_i \geq R$. We need to show that there is no incentive for owners of parcel K_i to attract the entry of foreign capital into sector i . If foreign capital ΔK_i^f were to enter, then the return to the owners of parcel K_i would be:

$$p_i(K_i + \Delta K_i^f, L_i) \cdot K_i.$$

However, it is known that p_i is decreasing in the argument K_i so that total profits for the domestic parcel-holders would be lower with any additional influx of capital. Taking (a) and (b) together, therefore, we see that while there is an incentive for some parcel-owners to export capital abroad, there is no corresponding incentive for anyone to import capital. This establishes the proposition that a capital-poor country may be a capital exporter.

Large amounts of capital flowing out of developing countries have become a stylised fact. These have heretofore been typically explained by alluding to differential taxation rates and the threat of drastic foreign-exchange changes. What such explanations cannot account for is the continuing flight of capital from developing countries even during normal periods, nor can they account for the paradox that even heads of autocratic regimes, (typified by the Marcoses in the Philippines) who may safely be presumed to exercise a large amount of autonomy in determining economic policies themselves engaged in large-scale capital flight, rather than ploughing back accumulated wealth into the domestic economy.[†] The argument here locates the reason for both phenomena in the paradoxical lack of investment opportunities for such capital owners.

After the export of capital has occurred, we may characterise the new equilibrium as follows:

$$\pi_i(K_i^h, L_i) \geq R(K_i - K_i^h) \geq 0 \quad \forall i \quad (8)$$

Proposition 3. *The final equilibrium after the export of capital has occurred is associated with lower wages than either the case of integrated capital or the case of parcellised capital without capital export.*

Proof. Denote the aggregate endowments of capital before and after capital-flight has occurred by K^0 and K^* respectively, with $K^* \leq K^0$. Domestic product will be given by $r_A(p, K^*, L)$, which is less than or equal to $r_A(p,$

[†] J. Boyce (1989) estimates the amount of capital flight from the Philippines over the period 1965 to 1986 at some \$22 billion. Estimates of the Marcoses' foreign assets vary widely.

K^o, L). From standard HOS results, we know that $w^A(p, K^o, L) \geq w^A(p, K', L)^\dagger$.) However in view of Proposition 1, we also have $w^A(p, K', L) \geq w^B(p, K', K, L)$, which proves the proposition.

We therefore identify two channels by which wages may be lowered, first the fact that capital is parcellised; second the fact that it is exported.

4 Rent-seeking and Pareto-Inefficiency

What is true for international capital flows is true for domestic relations among parcel-holders as well, that is, investment by others in some parcel i would be resisted, while there would be attempts by each parcel-holder j to enlarge holdings. For the moment we abstract from transactions costs in order to highlight the principle involved. Then we find that:

Proposition 4. *It is in the interest of the owner of each capital-parcel to capture additional parcels and to resist attempts of other parcel-holders to invest in its own parcel.*

Proof. A particularly simple proof may be delivered when capital-flight is possible.[†] Denote the profits from any two distinct parcels i and j by:

$$\pi_i(K_i^h, L_i) \geq RK_i^h$$

$$\pi_j(K_j^h, L_j) \geq RK_j^h$$

The direction of the inequalities follows from Proposition 2. The take-over by parcel-holder i of parcel j will result in joint profits, which we denote by Π_i . The holder of two parcels is now assumed to solve the problem:

$$\max \Pi_i(K_i^h, K_j^h, L_i, L_j) = p_i f_i(K_i^h, L_i) + p_j f_j(K_j^h, L_j) - w(L_i + L_j) + (K_i + K_j - K_i^h - K_j^h)$$

$$\text{subject to } (K_i + K_j - K_i^h - K_j^h) \geq 0.$$

The set over which Π_i is maximised obviously contains the sets over which π_i and π_j are maximised when they were separate. Therefore we obtain the result:

[†] If the endowments lie in the same "diversification cone", then wages will be identical in both regimes; we are assuming the change in endowments is sufficiently large.

[‡] This functions like a free-disposal assumption.

$$\max \Pi_i \geq \max \pi_i + \max \pi_j \geq R(K_i^h + K_j^h)$$

Since the maximisation problem for Π_i is carried out over a (compact) set containing that over which π_i and π_j are maximised, the first inequality follows. On the other hand, the second inequality says that potential earnings at the world rate of interest provide a lower bound for profits. Losing the parcel implies losing all profits from it (since by hypothesis no sharing arrangements are possible between antagonistic interests). Therefore the second half of the proposition follows as well.

The assumption of zero transactions costs is unrealistic, of course. In reality, because of the potential gains and losses, parcel-holders will be prepared to expend resources in order to gain additional holdings and defend existing ones, the amounts spent depending on the prospective returns involved. This is what the literature now calls "rent-seeking" (Krueger 1974) or "directly unproductive activities" (Bhagwati 1982). It will be noted, however, that in our discussion we have shown that Pareto-inefficiency exists even *without* the presence of rent-seeking: national income is lower than its potential owing to the parcellisation of capital alone, although this is not to detract from the fact that capital parcellisation *also* leads to the peculiar losses associated with rent-seeking.

In order to gain an insight into the problem, a way must be found to incorporate the possible gains and losses which a parcel-holder may obtain from engaging in rent-seeking activities, which then determine the level of expenditure on such activities.

One way to do this, though certainly not the only one, is to assume each parcel-holder i maximises expected net-profits. Suppose θ^i represents the probability of retaining parcel i , and θ^j the probability of parcel-holder i capturing parcel j . If T_{ij} represents the amount by holder i in an attempt to capture parcel j (and where it is understood that T_{ii} is the amount spent to defend one's own parcel), then we suppose that $\theta^i = \theta^i(T_{ii}, T_{ki})$, $k \neq i$, and $\theta^j = \theta^j(T_{ij}, T_{kj})$. That is, the probability of retaining i (resp., capturing j) depends on what i spends in order to do so, relative to what others do. We shall suppose that $\partial \theta^i / \partial T_{ii} > 0$; $\partial^2 \theta^i / \partial T_{ii}^2 < 0$, for all j , and for all $k \neq i$. The foregoing imply that the likelihood of retaining one's parcel and of capturing others increase with higher rent-seeking expenditure, but at a diminishing rate, and with less effect, the higher is expenditure by others.

Expected net profits from the retention of parcel i , then amount to $\theta^i(T_{ii}, T_{ji}) \pi_i - \sum_j T_{ij}$ and from the capture of parcel j , $\theta^j(T_{ij}, T_{kj}) \pi_j - \sum_k T_{jk}$. Here we are assuming that the expenditures on directly unproductive activities arise with certainty.

We now proceed to write out *expected net-profits of i* as:

$$\begin{aligned} H_i(K_i^h, L_i, T_{11}, \dots, T_{1n}; T_{k1}, \dots, T_{kn}) &= \theta^i \{ \pi_i(K_i^h, L_i) \} - \sum_j T_{ij} + \sum_j \theta^j \pi_j(K_j^h, L_j) \\ &\quad + \sum_j \sum_k T_{jk} \\ &= \theta^i(T_{ii}, T_{ji}) \pi_i(K_i^h, L_i) - \sum_j \theta^j(T_{ij}, T_{kj}) \pi_j(K_j^h, L_j) - \sum_j T_{ij} - \sum_j \sum_k T_{jk} \end{aligned} \quad (9)$$

with the restriction that H_i be nonnegative. Maximising H_i with respect to T_{ii} and T_{ij} and using the first-order conditions implies:

$$(\partial \theta^i / \partial T_{ii}) \pi_i - 1 = 0 \quad (10)$$

$$(\partial \theta^j / \partial T_{ij}) \pi_j - 1 = 0 \quad \forall j \neq i \quad (10')$$

which imply that T_{ii} and T_{ij} are inversely related to π_i and π_j , respectively, if $(\partial^2 \theta^i / \partial T_{ii}^2)$ and $(\partial^2 \theta^j / \partial T_{ij}^2)$ are negative, as assumed above. (See Figure 1.) To show how T_{ii} changes in response to T_{ki} , we differentiate (10) implicitly with respect to the latter and obtain:

$$\partial T_{ii} / \partial T_{ki} = - (\partial^2 \theta^i / \partial T_{ii} \partial T_{ki}) / (\partial^2 \theta^i / \partial T_{ii}^2) \quad (11)$$

which is negative, given the assumptions made regarding the derivatives. A similar derivation shows that $\partial T_{ij} / \partial T_{ki}$ is also negative. These results allow us to state the following:

Proposition 5. *The amounts spent by i on self-defence and attempts to capture additional parcels decrease with what others spend in seeking to capture i and increase with the production profits from the parcels.*

For given T_{ii} , T_{jk} , the conditions (10) and (10') determine T_{ij} and T_{ik} . A Cournot-Nash equilibrium exists when there is a nonnegative n^2 -vector, $T^* = [T_{11}^*, \dots, T_{1n}^*, \dots, T_{n1}^*, \dots, T_{nn}^*]$, which solves the system (10)-(10') for all i . It is evident that the amount others spend are variables exogenous to the decision of parcelholder i . Various equilibria are conceivable, therefore, with some entailing higher amounts of rent-seeking expenditure across all parcelholders. These are evidently Pareto-inferior.

This may be illustrated for the case $n = 2$. Given the signs of the derivatives above, the reaction-functions of both parcelholders 1 and 2 will be downward-sloping on the T_{11} - T_{21} plane.[†] (Figure 2.) Stability will require, however, that the reaction function of 1, shown in the figure as R_1 , be flatter than that of 2, denoted by R_2 .

[†] The reaction-function of 1 is given by: $-(\partial^2 \theta^1 / \partial T_{11} \partial T_{21}) / (\partial^2 \theta^1 / \partial T_{11}^2)$, while that of 2 is given by $-(\partial^2 \theta^2 / \partial T_{21} \partial T_{11}) / (\partial^2 \theta^2 / \partial T_{21}^2)$.

Parameter changes such as, say, an exogenous increase in production profits, will shift both curves, and the new equilibrium may result in higher levels of rent-seeking expenditures than before. The possibility of "immiserising growth" (to use Bhagwati's term) cannot be ruled out.

We have therefore gained an insight into the observation that societies with fragmented elites tend to be underdeveloped. The losses, following this analysis, occur through two distinct channels, first, through the lower efficiency that results from the parcellisation of capital, the inability to undertake large-scale projects, and capital flight. The second channel, more prominent in the literature, is rent-seeking, the expenditure of resources in activities designed to capture parcels and defend one's turf. Both, however, arise from the parcellisation of property itself and the predominance of political mechanisms to expand it, or what others have termed "semifeudalism". What may prove disconcerting to some is that the remedy to such a situation is not preeminently an economic but a political or distributional one: either a conservative regime, possibly a bureaucratic-authoritarian one, reduces rent-seeking behaviour by asserting a monopoly of political power, or a revolutionary regime suspends the parcellisation of capital through expropriation and redistribution.

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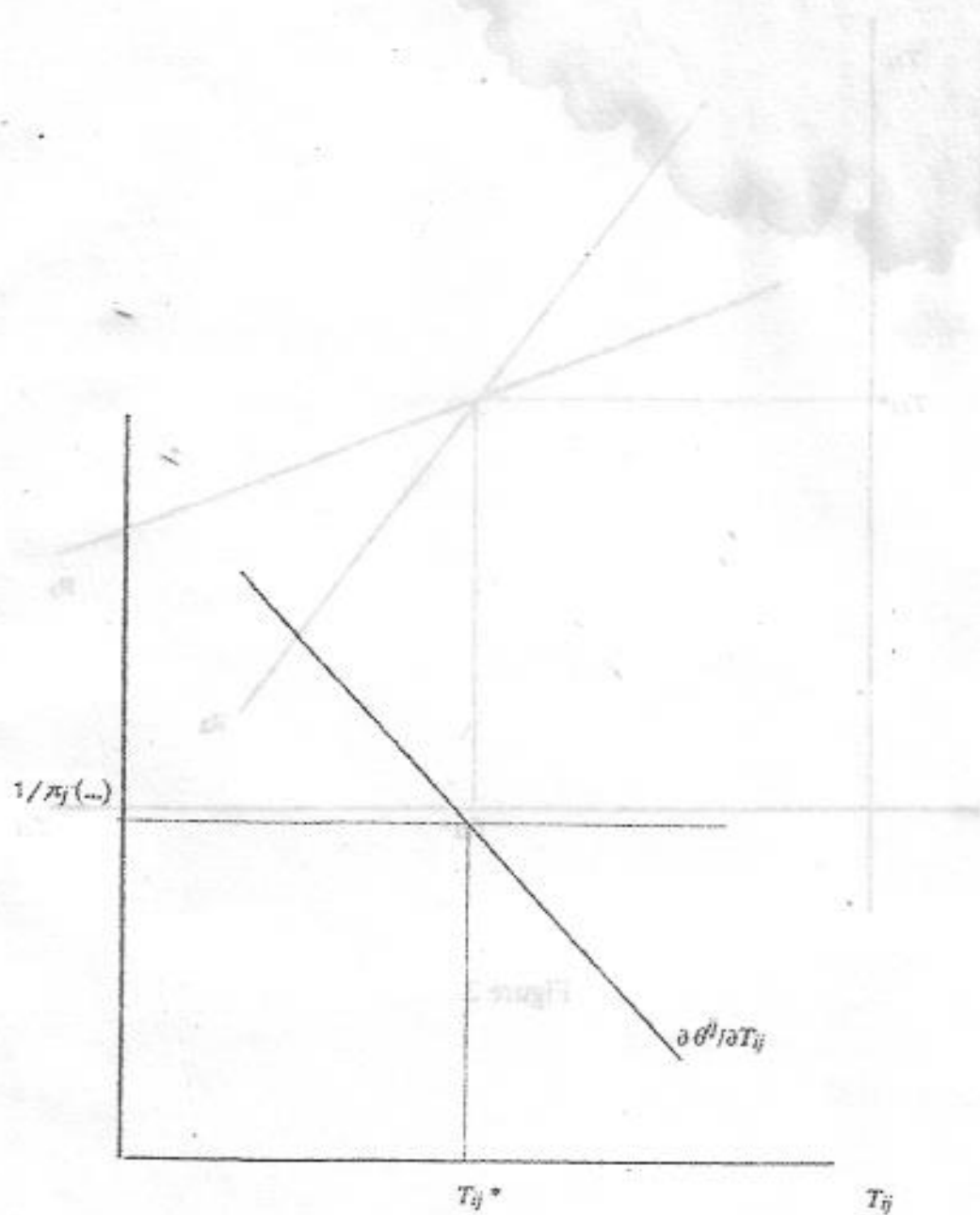


Figure 1

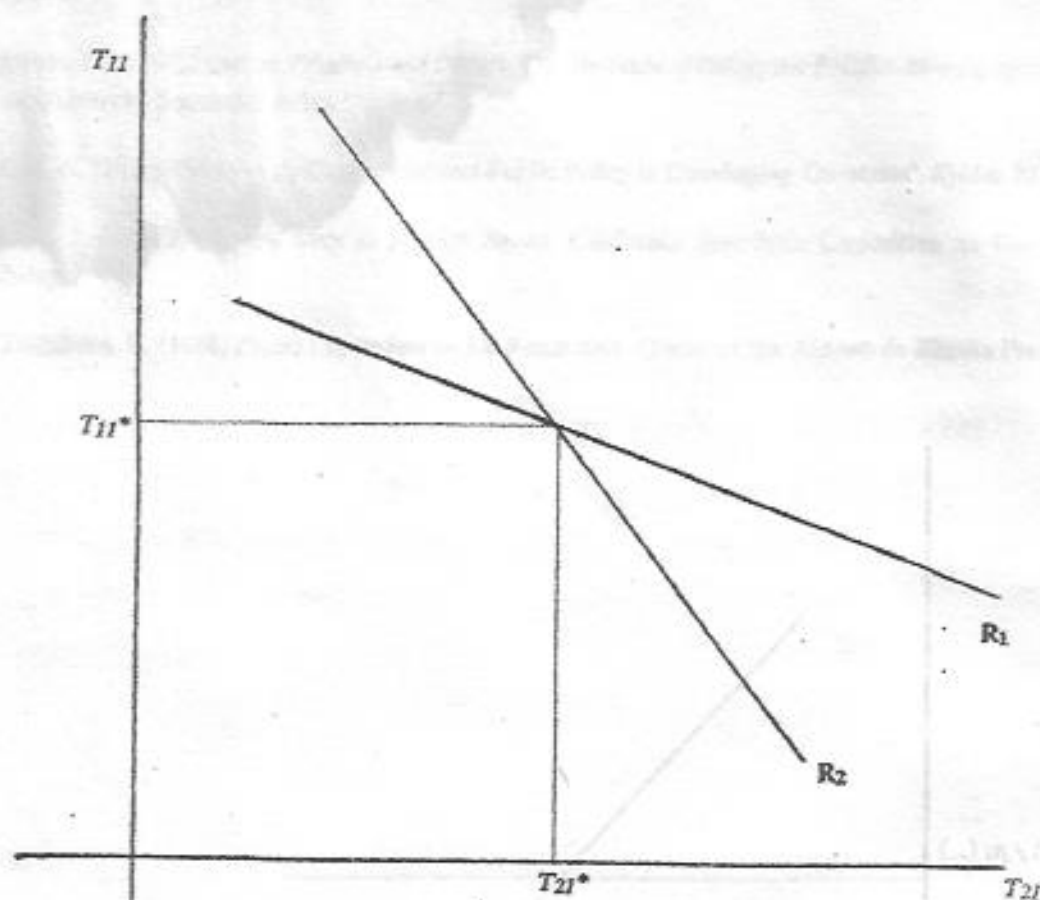


Figure 2