ON SOME LIMITS OF THE EXCHANGE RATE AS A TOOL FOR INDUSTRIAL COMPETITIVENESS

Ariel Dvoskin

(CONICET-UNSAM)

Germán D. Feldman

(CONICET-UNSAM)

Guido Ianni

(Roma Tre University)

Abstract. By means of a simple two-tradable-sector model for an open, price-taking economy, which conceives the pattern of trade as a technical choice problem, we examine some difficulties with the recourse to of exchange-rate policy as a "light-switch", i.e. as a tool to promote sectorial competitiveness. To this aim, we distinguish between economies that only produce manufactures from those in which the most profitable sector exploits natural resources under conditions of differential rent. We show that, when both tradable sectors produce industrial goods, conventional devaluation does not generally allow one domestic sector to reach international competitiveness without damaging the other. While when the prevailing sector operates under conditions of differential rent, even though the development of a new sector -by setting the exchange rate at its "industrial-equilibrium" level- is possible, this requires that the policymaker determines the effect of changes in the exchange rate, both in direction and magnitude, on the other distributive variables.

We conclude that exchange-rate policy does not seem to be the most efficient tool to promote industrialization. Or, at least, that this policy should be heavily complemented by other tools, such as investment policy, public expenditure in R&D, credits to innovation, subsidies to imports of capital goods, etc.

I. INTRODUCTION

In the last decade we have witnessed the emergence of a growing literature that highlights the role of the real exchange rate as a key factor to accelerate economic growth in small open peripheral economies (see, among others, Rodrik, 2008; Bresser Pereira, 2008; Rapetti, 2013).

In previous contributions (Dvoskin and Feldman, 2018; Dvoskin, Feldman and Ianni, 2018), we have critically discussed some of the expansionary channels of devaluations addressed by this literature. By means of a simple two-tradable-sector model for a small (price taking) open economy, which conceives the pattern of trade as a technical choice problem, we shall here examine additional difficulties with one particular mechanism that aims to promote *structural change*: the role of the exchange rate as "light-switch". In other words, the idea that a higher exchange rate may *enrich* the prevailing productive structure with the development of new industrial sectors - potentially more dynamic-, that were not profitable before (i.e. at a lower exchange rate). To this aim, we distinguish between economies that only produce manufactures from those in which the most profitable sector exploits natural resources under conditions of differential rent.

We show that, when both tradable sectors produce industrial goods, conventional devaluation does not generally allow the development of one sector without damaging the other. While when the prevailing sector operates under conditions of differential rent, even though the development of a new sector by adjusting the exchange rate towards its "industrial-equilibrium" level is possible, this requires that the policymaker determines the effect of changes in the exchange rate, both in direction and magnitude, on the other distributive variables

The paper is structured as follows: in section II we present the analytical framework and examine the role of the exchange rate when both tradable commodities are industrial goods, while in section III we consider the case of a tradable primary good produced under conditions of differential rent. Section IV resumes the argument and presents the main conclusions of the article, which can be summarized in the following way: exchange-rate policy does not seem to be the most efficient tool to promote industrialization. Or, at least, this policy should be heavily complemented by other measures already emphasized by the old structuralist school (for instance, Diamand,

1972), such as investment policy, public expenditure in R&D, credits to innovation, subsidies to imports of capital goods, etc.

II. ANALYTICAL FRAMEWORK

Consider a price taking[1] peripheral economy, open to trade (and, eventually, capital flows), with persistent unemployment. The productive structure is characterized by the following features: there are two potentially tradable consumption goods $T = C, I$, which are produced by labour, an imported capital good (K), and a non-tradable capital good (NT), the latter produced by unassisted labour alone. As we shall see, which of the two T commodities is produced will be the outcome of a problem of technical choices.

Wages are paid *ante-factum*. If w stands for the uniform nominal wage rate across sectors, r for the normal rate of profits, l_{NT} and l_T (with $T = C, I$) the unitary labour requirements of sectors NT and T, k_T the unitary requirement of the capital good K in sector T^2, p_K^* its exogenously given price, b_T is the quantity of good NT used in the production of T and E is the nominal exchange rate[3]; then the costs of production or the *supply prices* of commodities NT (p_{NT}^S) and T (p_T^S) can be represented by the following equations:

$$p_{NT}^S = w l_{NT}(1 + r) \tag{1}$$

$$p_T^S = (w l_T + k_T E p_K^* + b_T p_{NT}^S)(1 + r) \qquad (T = C, I) \tag{2}$$

These supply prices represent the minimum amount of money per unit of output to regularly (under "normal conditions") deliver each commodity on the market.

---

[1] With the assumption that the economy is "price taker" we only mean that the domestic methods of production for tradable goods and the ruling income distribution do not affect the international price of tradable commodities. We do not mean, in other words, that the economy faces an infinitely elastic demand curve for these goods, as it is usually interpreted by some scholars (see e.g. Frenkel y Ros, 2006), because this assumption implies that every excess of production over domestic internal demand is automatically absorbed by exports, assuming therefore, the validity of Say's Law.

[2] The assumption that both tradable sectors employ the same capital good is no doubt restrictive. However, this is immaterial to the results reached in the paper and can be anyway easily relaxed when necessary.

[3] E is defined as the amount of domestic currency per unit of foreign currency, which means that E goes up with a depreciation of the local currency.

For reasons that will be clear below, it is useful to introduce a second notion of price, which we shall denominate *demand* or *selling price.* It represents the maximum amount of money that consumers are willing to pay for a certain commodity. If we abstract from transport costs, import tariffs and other expenses implied by international trade, we should notice that, since the domestic economy takes the international price of the tradable good (p_T^*) as given, once the level of the exchange rate is fixed, demand prices for tradable goods $T = C, I$ are univocally determined. These prices are:

$$p_T^d = E p_T^* \qquad (T = C, I) \tag{3}$$

While for the non-tradable commodity, the demand price is determined by its respective supply price, as it is the case with any commodity produced in a closed economy:

$$p_{NT} \equiv p_{NT}^d = p_{NT}^S \tag{4}$$

The five equations (1)-(2$_{C,I}$)-(3$_{C,I}$) have eight unknowns: $E, r, w, p_{NT}, p_{T,I}^S, p_{T,C}^S, p_{T,I}^d, p_{T,C}^d$. Therefore, there are three degrees of freedom left. To eliminate the first degree of freedom, it is convenient to define the variable $e \equiv E/w$, which is none other than the inverse of the money wage in foreign currency. The seven unknowns of the system are:

$$e, r, p_{NT}, p_{T,I}^S, p_{T,C}^S, p_{T,I}^d, p_{T,C}^d$$

II.1. The closure of the system by means of the pattern of specialization

To eliminate the last two degrees of freedom we must determine the pattern of specialization. We will distinguish between two cases: (a) the case in which both tradable goods are industrial goods and (b) the case in which one of the two commodities (say good C), is a primary commodity produced by a fixed factor (typically land) under conditions of differential rent (for simplicity we ignore absolute rent). We will here consider case (a), while the discussion of case (b) will be postponed to section III.

II.2. Two industrial goods

The fact is that it is not possible to ascertain which of the two tradable industrial commodities will be effectively produced *before* the relationship between demand and supply prices of each of these commodities is established. Hence, before income distribution is known. The pattern of specialization of the economy will be regulated by the following conditions:

$$p_T^d \leq p_T^s \ (T = C, I) \tag{5}$$

The generic tradable commodity T will be produced and (potentially) exported only if $p_T^d = p_T^s$. In contrast, when $p_T^d < p_T^s$, the sector will not be viable because its normal cost of production exceeds its demand price[4]. The case when $p_T^d > p_T^s$ can only be transitory, since, due to competition, this discrepancy will eventually be eliminated by a *rise* in the supply price of commodity T. Notice that this adjustment differs from the mechanism assumed to operate in a closed economy, where it is the demand price that *falls* to restore the equality with the (lower) supply price. But this cannot happen in the model under consideration because it would violate the price-taking assumption (if the demand price falls down to the lower domestic costs, this would mean that domestic conditions would eventually regulate the international price of T, i.e. the economy becomes a price-maker of good T)[5].

We can now derive for each industrial good T, an $e - r$ relationship that gives, for any level of e, the maximum affordable profit rate by each tradable sector under given technical conditions and international prices (or the minimum e that allows each

---

[4] Of course, there are other non-price factors that may allow a country to export specific commodities (e.g. product differentiation, etc.). The implications of this point are beyond the scope of this paper, since this issue is not considered by the models under examination.

[5] Although it is beyond of the scope of this article, the fact that, for an industrial good, the adjustment goes from supply to demand prices and not the other way around, suggests that the assumption of "price-taking" behavior as it is usually employed by the literature may not be sufficiently robust, and therefore should be carefully reexamined. The assumption, however, that the economy is *already* a price-maker of commodity T does not seem very promising either. First because in this case there would be no need of devaluation for boosting sectorial competitiveness. Second, since in this case the domestic conditions of production and distribution would affect international prices, to assess the final impact of devaluation the policy-maker would have to face the herculean task of identifying the input-output relations for the world economy. It could be finally envisaged the situation in which the economy initially does no produce good T (i.e. the country is, by definition, a price-taker of commodity I) and uses devaluation to become a price-maker. While the possibility also needs considering the input-output relations for the world economy, it additionally seems to be implausible, among other things, because this strategy could be easily counterbalanced by devaluation policies of trade partners.

sector to earn a given profit rate). This is obtained by equalizing supply and demand prices for each commodity T. Hence, from conditions (1)-(4) one obtains:

$$e_T = \frac{[l_T + b_T l_{NT}(1+r)](1+r)}{1 - k_T(1+r)} \qquad (T = C, I) \qquad (6)$$

where, for convenience, we have normalized the given international prices to one. Figure 1 represents a *possible* shape of these curves (clearly, however, the curves could easily intersect more than once, or even not intersect, but this point will be discussed below).

FIGURE 1: $e - r$ RELATION IN THE OPEN "PRICE-TAKING" ECONOMY
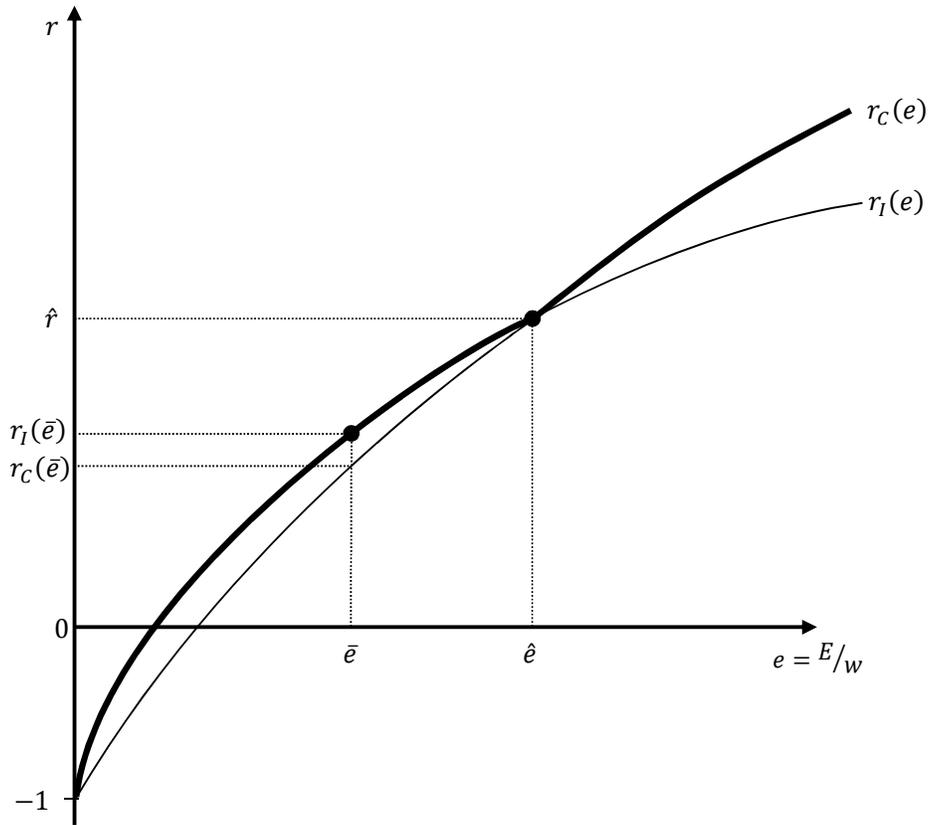
These curves can be used to determine the pattern of specialization of the peripheral economy as a problem of technical choices. In effect, due to the action of competition among capitals, the tradable sector of the economy will specialize in the production of that commodity which, for the given value of e, can afford the highest

6

profit rate (or alternatively, that is able to pay the highest wage in foreign currency -the lowest e- for a given profit rate). Then, the figure shows that for any level $e < \hat{e}$ there will be full specialization in the production of commodity I. In effect, if for instance: $e = \bar{e}(< \hat{e})$, then $r_I(\bar{e}) > r_C(\bar{e})$ and there will be no incentive to invest in sector C. The opposite occurs when $e > \hat{e}$. An only by a fluke $e = \hat{e}$, which is the level that allows the coexistence of the two tradable sectors in the economy.

The outer envelope of the curve (thick black line) illustrates the economically relevant pairs of e and r. In analytical terms, the $e - r$ relationship is given by:

$$r = \begin{cases} r_I(e) & \text{if} \quad e \leq \hat{e} \\ \\ r_C(e) & \text{if} \quad e > \hat{e} \end{cases} \qquad (7)^6$$

The above discussion allows us to determine the remaining two degrees of freedom in the following way: (a) either one fixes the variable e from outside the system and endogenously determines the corresponding level of r by condition (7), or alternatively, (b) one fixes r from outside the system and uses condition (7) to determine e. The *level* of the exogenous distributive variable (either e or r) in turn determines the pattern of specialization of the economy.

So far, the dynamics of the real wage has not been dealt with explicitly (the assumption of *persistent* unemployment only implies that the real wage do not necessarily adjust to clear the labor market, as in the marginal approach). In this respect, if $\lambda = (c_C, c_I)$ stands for the (given) unitary consumption basket of the representative worker, the level of the real wage (i.e. the number of consumption baskets that can be afforded by each worker) can be defined as:

$$\omega \equiv \frac{w}{E\,\lambda.p^*} = \frac{1}{e\,\lambda.p^*} \quad (\text{with} \ p^* = [p_C^*, p_I^*]) \qquad (8)$$

---

[6] From condition (6), one obtains:
$$r_T(e) = \frac{\sqrt{e^2 k_T^2 + 2e k_T l_T + l^2 + 4e b_T l_{NT}} - (e k_T + l_T + 2 b_T l_{NT})}{2 b_T l_{NT}}$$

Notice then that, since p^* and λ are both given, once the level of e is known, the level of ω is *univocally* determined by (8). Moreover, a rise in e decreases the real wage in the same proportion[7].

II.3. The exchange rate as a "light switch" and its limits

The model developed so far allows us to discuss the potential role of the exchange rate as a tool for boosting specific sectors of the economy. To see this, assume that the exchange rate is at the level e_0 ($< \hat{e}$) in Figure 1, and the corresponding level of the profit rate is given by $r = r_I(e_0)$. Under these conditions, the tradable sector fully specializes in the production of commodity I. For sector C to be developed, it is necessary to depreciate the domestic currency at least up to a level of the exchange rate equal to $\hat{e}$. This is, for instance, what authors like Frenkel and Ross (2006, p. 635) mean when they argue that "A more depreciated RER [real exchange rate] … encourages tradable activities that were not profitable before". Simple and appealing as the idea may be, it faces several important limitations.

To have a first glance at this feature, notice that, unless the policy-maker *exactly* manages to raise e up to $\hat{e}$, the only way to allow the competitiveness of sector C is at the expense of the *exclusion* of the *already existing* sector I.

Things are even more serious when more than two tradable commodities can be produced, because in this case there will *generally not be a value of e that allows the coexistence of all tradable sectors*, unless one admits heterogenous remunerations within social classes (i.e. differential wage or profit rates across sectors). To see this, we have recourse to Figure 2.

The figure shows that, if two sectors initially happen to coexist, as it would be the case with sectors C and I if the initial exchange rate is e_0, the development of the new sector M, which requires an exchange rate equal or higher than e_1, *necessarily* entails that sector C would no longer be competitive. And sector I will disappear too if, after devaluation, e is strictly higher than e_1.

---

[7] This condition would no longer hold had the consumption basket included non-tradable goods. But it would still be the case that e and ω would move in opposite directions.

**FIGURE 2: THE EXCHANGE RATE AS A "LIGHT-SWITCH"**
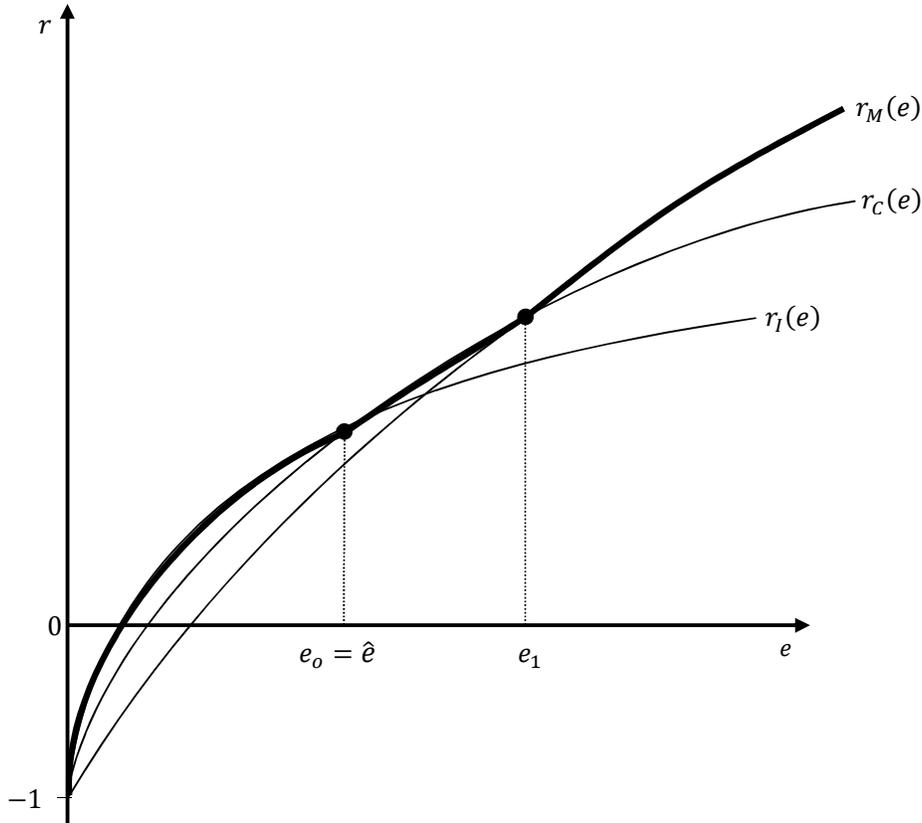
In other words, the implicit idea behind this policy, namely that the depreciation of the exchange rate is not damaging for other sectors, does not stand closed scrutiny when tradable goods are industrial goods (things will be different when one of the two goods is a primary good produced under conditions of differential rent).

A further difficulty is the following: if conditions of free capital mobility are considered, it is expected that the normal level of the domestic profit rate is determined by the international level (r^*), with the implication that e becomes the endogenously determined distributive variable in (7). In this case, devaluation policy is also bound to fail. This is shown in Figure 3, where the attempt to depreciate the currency from e_0 to e_1 to develop sector C also raises r above the initial level $r_0 = r^*$, and therefore, induces a capital inflow that ends up appreciating the domestic currency, until the equality between r and r^* is finally re-established. While this outcome could be overcome by monetary policy if it is decided to intervene in the foreign exchange market to sustain the higher value of the currency, the continuous inflow of FDI in the

tradable sector would, however, eventually lead the economy to become the world supplier of commodity C, therefore contradicting the price taking assumption.

**FIGURE 3: DEVALUATION UNDER FREE CAPITAL MOBILITY**
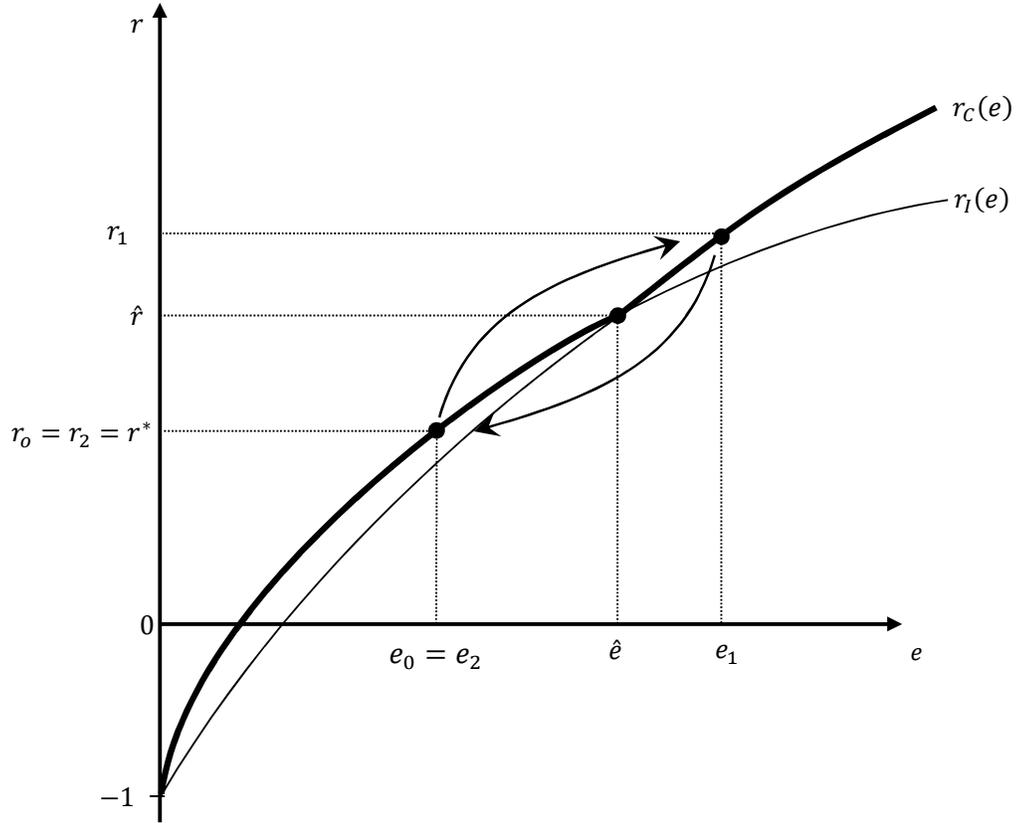
In any case, there is a third difficulty. Since a rise in e causes a decrease of the real wage in the same magnitude, it may well happen that the required rate of devaluation is not socially tolerable. If in Figure 4 α measures the minimum number of consumption baskets that allows workers to enjoy a normal standard of living, $1/e_\alpha$ measures the minimum wage in foreign currency that allows purchasing α. Therefore, if $\hat{e} > e_\alpha$, devaluation policy will face an insurmountable limit, and hence, sector C will not flourish.

FIGURE 4: WAGE-RESISTANCE
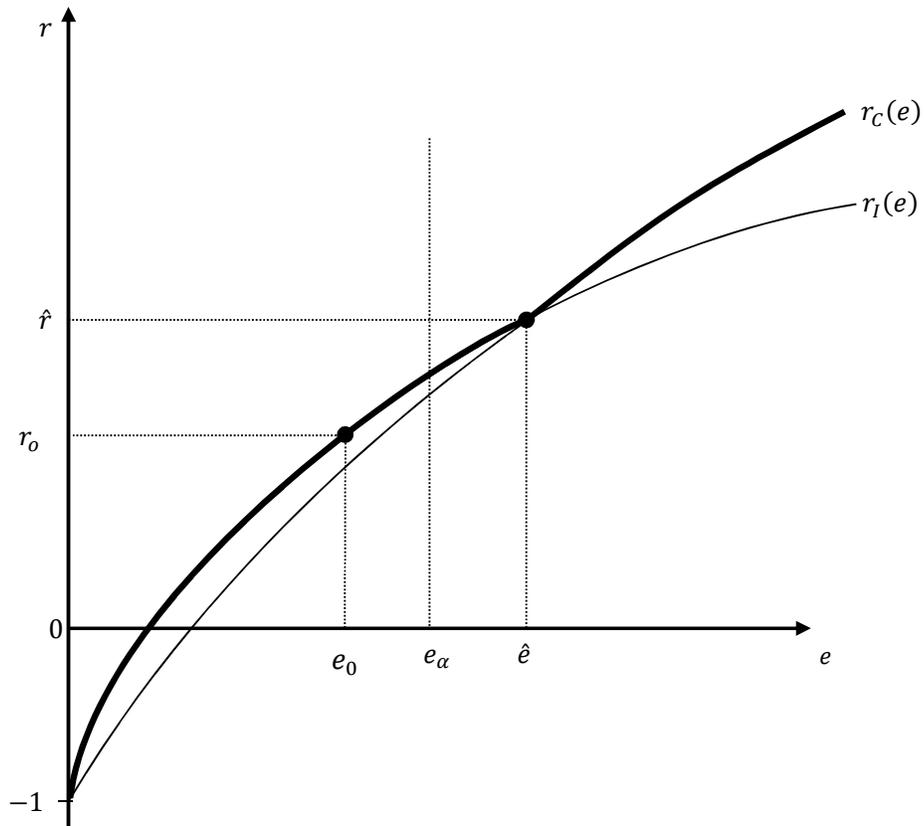
The problems continue. So far, we have been assuming that there is only one switch-point between productive sectors. However, at least two alternative situations are conceivable. First, that one curve is above the other for all possible levels of e. In other words, a situation in which there is no switch-point (see Figure 5). It is clear in this case that devaluation is in a blind alley, since it only causes a decrease of the real wage, without inducing structural change.

FIGURE 5: NO SWITCHES IN THE TRADABLE SECTOR
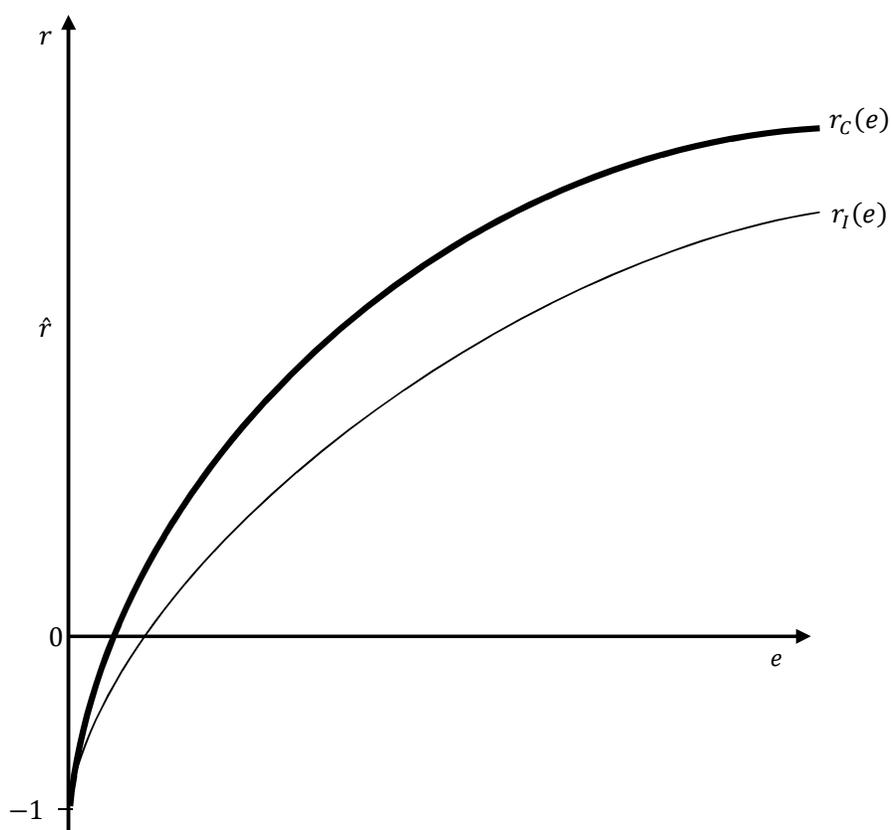
The other, perhaps more interesting, case occurs when there are two or more switch-points as in Figure 6. No *definite conclusions* regarding the direction of the exchange rate required to boost a particular sector can be reached here. For instance, devaluation enhances sector C if the exchange rate is below $\hat{e}_0$, while an appreciation of the currency is necessary if e happens to be initially higher than $\hat{e}_1$. On the same footing, when $\hat{e}_0 < e < \hat{e}_1$, the attempt to develop the other sector I could be equally achieved both through depreciation *and* appreciation policies.

FIGURE 6: MULTIPLE SWITCHES IN THE TRADABLE SECTOR
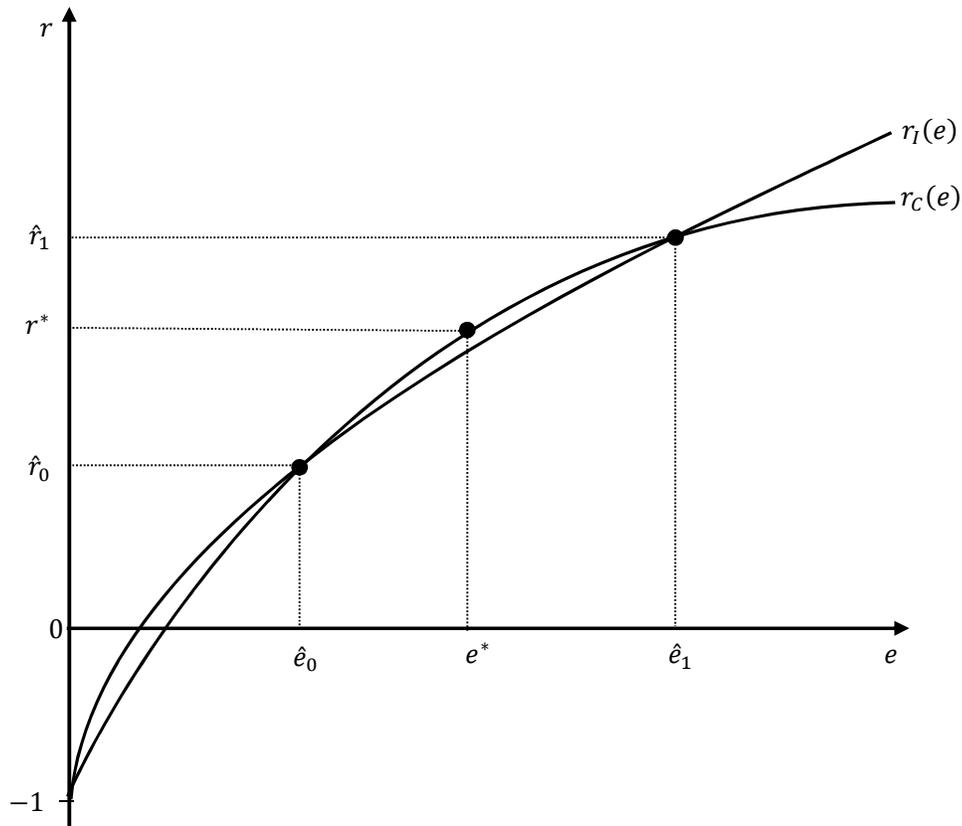
Moreover, consider this second case under free capital mobility across countries - the initial distributive configuration is (e^*, r^*)-. Assume further that the policy-maker has no other choice than to appreciate the currency to avoid social turmoil. Then, the required appreciation to promote sector I could not persistently reduce the domestic profit rate below r^* since, differently from the case discussed in Figure 3, the capacity of the Central Bank to sustain the exchange rate under capital outflows necessarily vanishes when the monetary authority runs out of international reserves.

III. PRODUCTION OF A PRIMARY GOOD UNDER CONDITIONS OF DIFFERENTIAL RENT

Consider now the case in which good C is a primary good. The difference with the two-industrial good case is the following: since, besides labour and the capital goods, C is produced by a fixed factor, typically land, if there is a *positive* gap between demand and supply prices of C, namely $p_C^d > p_C^s$, this magnitude is not necessarily eliminated by

competition through a rise in the profit rate (or in e) as in the model of section II, but is eventually appropriated by land-owners in the form of differential rent. In formal terms:

$$\rho = p_C^d - p_C^s \tag{9}$$

This, in turn, encounters the following difficulty. When both commodities are industrial goods, for a given e, the profit rate is univocally determined by condition (7), or vice versa, and both variables are *necessarily* positively related. When C happens to be the traded commodity, and the equality between supply and demand prices no longer holds, condition (7) is not necessarily valid, with the implication that the system gains an *additional degree of freedom* (there is an additional distributive variable, ρ, to be determined). Formally, the four price equations (1)-(2c)-(3c) and (9) have the following six unknowns: $e, r, \rho, p_C^s, p_C^d, p_{NT}$ (notice that these equations already imply that sector C is the more profitable sector).

Figure 7 shows the interaction among distributive variables in the presence of differential rent in sector C, and hence, when there is an additional degree of freedom left (the fact that the feasible distributive configurations are now illustrated by the grey area in the figure rather than by a curve, shows this additional degree of freedom). The following features can be seen from the figure. For a given $e = \bar{e}$: (i) $\bar{e} > \hat{e}$, since C is assumed to be the most profitable tradable sector; (ii) there is a range of possible values for the effective profit rate, $\bar{r}$, that are compatible with the assumed productive structure. This rate is necessarily *below* $r_C(e)$ and *above* $r_I(e)$. This means that, while sector C is persistently "supra-competitive", and hence yields a rent, commodity I will not be profitability produced[8].

FIGURE 7: WAGES, SECTORIAL PROFIT RATES AND LAND RENT

---

[8] Actually, $\bar{r}$ can also be *over* $r_I(e)$. In this case, sector I earns the normal profit rate, and therefore, can coexist with the rentistic sector C (see III.1. below). But if this rate were below $r_I(e)$, the distributive configuration would not persist, since it would imply that sector I would be earning a higher profit rate than sector C, and therefore, its supply price would necessarily rise.
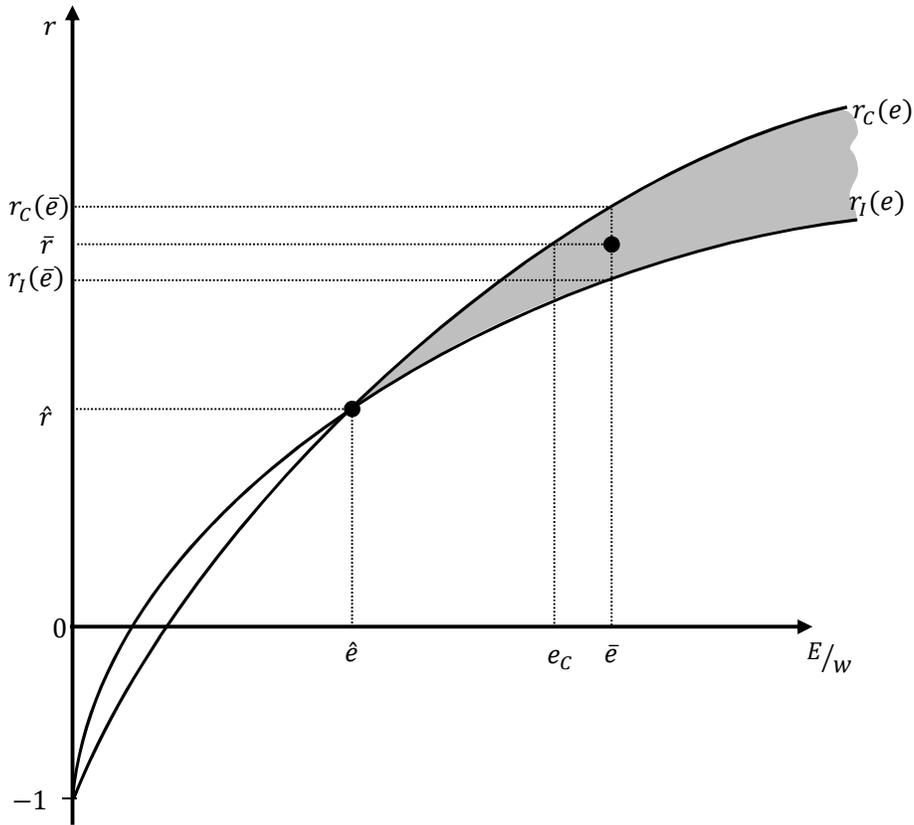
In Figure 8, the rent can be observed, so to speak, in two different ways: (i) given $\bar{e}$, through the difference between the effective profit rate, $\bar{r}$, and the maximum profit rate, $r_C(\bar{e})$, that industry C could afford; (ii) for a given $\bar{r}$, as the difference between e, and the highest level (e_C) that the sector could support.

The closure of the system still needs to ascertain how r changes with e when there is differential rent. And this relation does not seem to obey any *general* rules. One can in fact think of reasons why the profit rate rises, remains constant or even decreases with e.

To see this more closely, let us express the domestic profit rate as the sum of two independent factors: the level of the riskless interest rate, i, and a profit of enterprise, σ, that compensates for the "risks and troubles" of investing in the productive sphere of the economy (for simplicity, we assume that σ is homogenous across sectors). Formally, we have:

$$r = i + \sigma \tag{10}$$

15

If we assume i to be exogenously determined by the monetary authority, then the level of r will depend on the behavior of σ. We can now use equation (10) to characterize the three possible abovementioned interactions between r and e.

First, if the elements that determine these risks and troubles are sufficiently stable over time, it seems possible to argue that they will be *independent* of ruling market conditions, and, in particular, of the behaviour of the exchange rate. Under these circumstances, both elements on the right-hand side of equation (10) will be given before prices and distribution are determined (see for instance, Pivetti, 1985 and Panico, 1988), and therefore, a rise in e would have *no effect* on the normal profit rate. Formally, we will have:

$$r = \bar{\imath} + \bar{\sigma} \tag{10A}[9]$$

In this case, when e rises the whole burden of the adjustment will fall on the real wage ω - see equation (9)-, which will decrease at the expense of ρ.[10]

A second possibility is to envisage a situation in which the profit rate rises with e. For instance, if devaluation increases the country's default risk as perceived by investors, which will be reflected in the rise of σ. Under these conditions:

$$r = \bar{\imath} + \sigma(e), \text{ (with } \sigma'(e) > 0) \tag{10B}$$

In this case, devaluation raises both land rent and the profit rate at the expense of the real wage, ω.

Lastly, the opposite situation is equally possible, namely when devaluation is seen as a necessary measure to "correct" the alleged deviation of the actual path from the one determined by the so-called "fundamentals". Whether these fundamentals play an actual role or not, is irrelevant for the argument; the important thing is that investors think they do. This means that,

$$r = \bar{\imath} + \sigma(e), \text{ (with } \sigma'(e) < 0) \tag{10C}$$

---

[9] A similar result will hold if, due to capital mobility, the domestic profit rate is determined by the international rate, r^*.

[10] This first case seems to be the one implicitly considered in Bresser's contributions to the topic, in which the industrial equilibrium exchange rate can be conceived as independent of the profit rate.

and therefore, devaluation raises ρ and decreases both r and ω[11].

Which of the three possible interactions between e and r actually prevails in the real world *cannot be determined a priori*, but must be rather ascertained case by case. As we shall see, this result has important consequences for the usage of e as a tool to boost a particular industrial sector. To this we turn next.

III.2 The exchange rate under conditions of differential rent

Let us examine what happens when the exchange rate is used to develop a sector of the economy when there is differential rent. A first thing to be noticed is that, differently from the two-industrial-goods case, now it is indeed possible to develop a certain sector of the economy without in principle affecting the normal profitability of the existing ones.

If, for a given $e = \bar{e}$, sector C yields the profit rate $\bar{r}$, it is possible to determine the minimum level of e that would allow the other tradable sector (in this case, industry I) to yield this same level of the profit rate. This level, e_I, is no other than the level that equalizes supply and demand prices for this sector, and is determined by condition (6) of section II, applied to the specific sector I:

$$e_I = \frac{[l_I + b_I l_{NT}(1+r)](1+r)}{1 - k_I(1+r)} \tag{6'}$$

Note that, at the level e_I, both sectors would earn the *same* profit rate, $\bar{r}$, and therefore could *coexist* (besides the normal profit rate, sector C would also earn a differential rent). But then, this would further seem to suggest that, for sector I to be equally profitable than sector C, devaluation of magnitude Δe_I is needed, with:

$$\Delta e_I = e_I - \bar{e} \tag{11}$$

Equation (11) measures the difference between the actual level of the exchange rate, and what Bresser (2008) calls the "industrial-equilibrium" exchange rate. And it seems to provide a sort of *sectorial index of competitiveness*: the lower the value of Δe_T

---

[11] That in all the three cases devaluation decreases the real wage is expected, since the fact that both consumption goods are tradable goods imply that ω is *univocally* determined by e, and both variables move in opposite directions.

for a specific tradable sector T, the greater its comparative advantages relative to other sectors seem to be. In graphical terms[12],

**FIGURE 8: «REQUIRED» DEVALUATION OF SECTOR *I***
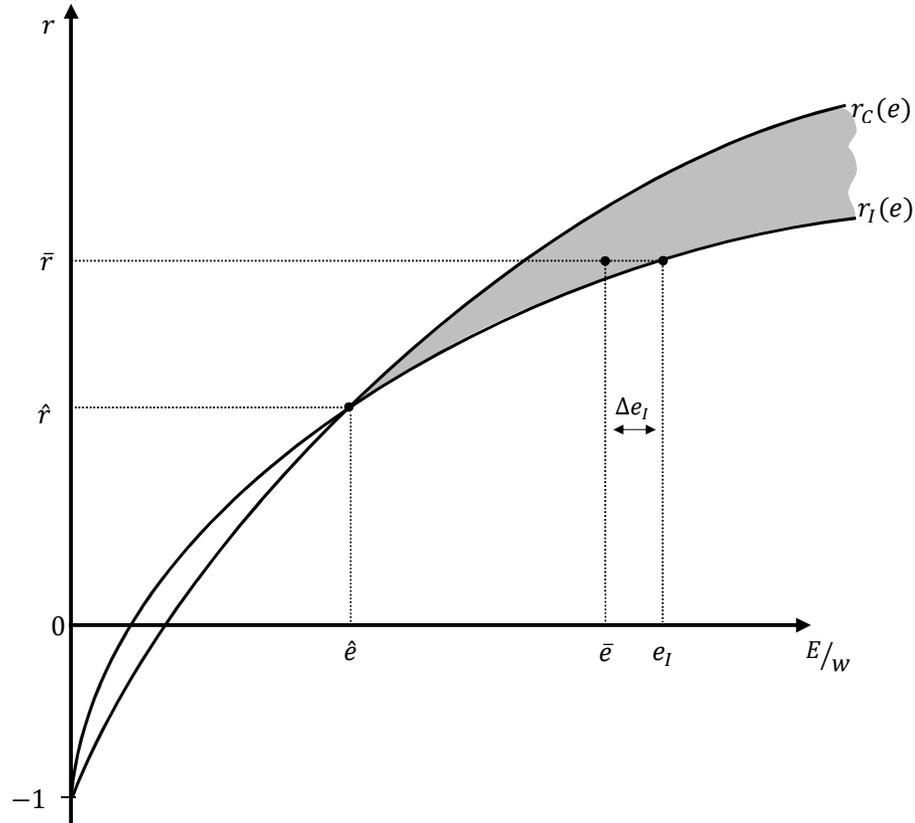
The problem for the policy-maker emerges in this case when she attempts to calculate, for *practical purposes*, the required magnitude of devaluation for a generic tradable industrial sector T, since this now needs *very carefully* considering both the *direction* and *magnitude* of the possible interactions among distributive variables. In fact, the attentive reader may have already noticed that the magnitude of Δe_I in (11) is a function of the normal profit rate, whose behaviour, as we have seen in the previous subsection, must be ascertained *case by case*. Therefore, at least the following three scenarios are conceivable:

---

[12] The technical coefficients of production that support these shapes of the curves are the same ones than those used in Figure 1 with $\bar{e} = \bar{r} = 2$ and $e_I = 3$.

Scenario 1: consider first the case in which the profit rate is an increasing function of e, $g(e)$, as in equation (10B). The initial distributive configuration is represented by point A in Figure 9. In this case, equation (11) *underestimates* the magnitude of devaluation to include sector I in the productive structure, since it does not incorporate the *endogenous* movement of r when e varies. In the figure, the e–coordinate of point B, e_I, represents the required exchange rate according to (11), while the corresponding e-coordinate of point C, e^*, indicates the higher level of the exchange rate effectively needed, once the change in normal profitability according to $g(e)$ -whose possible trajectory is depicted by the dotted black arrow- is considered.

FIGURE 9: DEPRECIATION AND PATTERN OF SPECIALIZATION UNDER SCENARIO 1
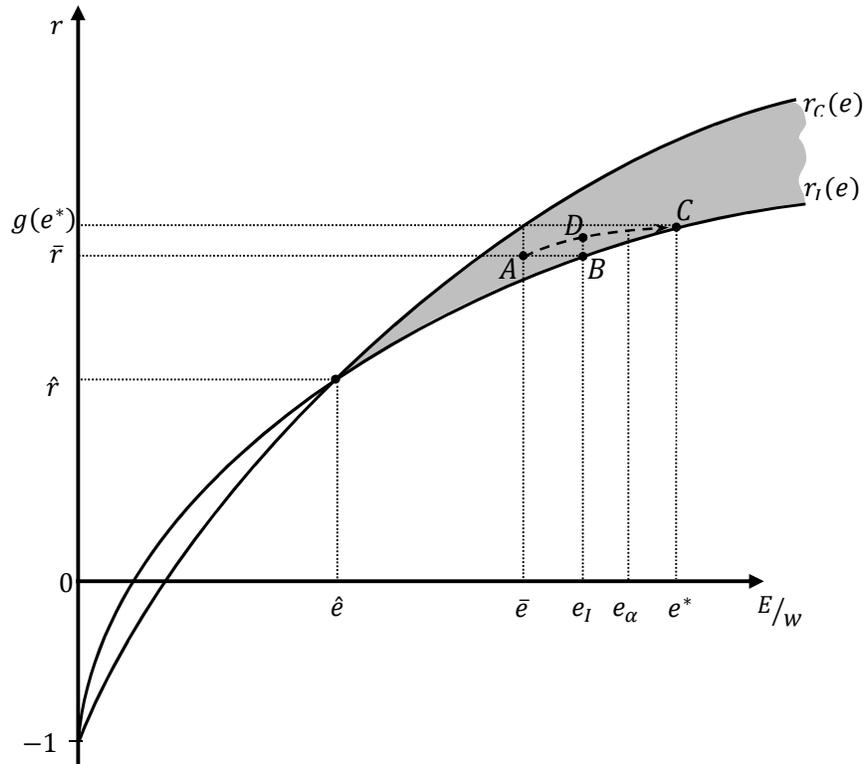
As a result, Figure 9[13] shows two possible outcomes. If the effective exchange rate is initially raised up to e_I, either devaluation stops there and the final distributive configuration is reflected by D (which, differently from B, does capture the effective

---

[13] The technical coefficients of production that support the shapes of these curves are the same as those of Figure 1, with $A = (2; 2)$, $B = (3; 2)$, $C = (4; 11/5)$ and $D = (3; 21/10)$.

interaction between r and e). This only causes a decrease in the money wage in foreign currency -and in the real wage-, and a rise in r (and eventually in ρ), but it is unable to modify the prevailing productive structure. Alternatively, the policy-maker, who is decided to transform the productive structure, attempts to further devalue the currency to complete the effective path of $g(e)$, described by trajectory DC. However, in this latter case, since the effective magnitude of the required devaluation may be considerably higher than the one originally projected, the possibility that the decrease in the real wage is so drastic that workers are prevented from consuming the minimum quantity of necessary consumption goods, cannot be excluded, and therefore, devaluation policy is bound to fail. As in Figure 3, this upper bound of the exchange is e_α which is lower than the required exchange rate e^*.

Scenario 2: policy-makers could be tempted, when there is more than one possible industrial sector in the economy, to encourage the generic industry M in Figure 10, either because it is considered "strategic" for the economy; or simply because, on the basis of (11), it is the sector that exhibits "comparative advantages"; namely the sector that is believed to be closer to the competitiveness threshold, and therefore to require the lowest rise in e to be profitably produced (this sector, incidentally, is also believed to be the least costly in distributive terms). To this end, e is raised from its initial level, $\bar{e}$, up to e_M. However, if the effective distributive interactions are instead reflected by conditions (10C), it is conceivable that the rise in e ends up promoting, since it negatively affects both the real wage and normal profitability, the *less-desired* sector N. In Figure 10[14], this is shown by point C.

FIGURE 10: DEPRECIATION AND PATTERN OF SPECIALIZATION UNDER SCENARIO 2

---

[14] The technical coefficients of production that support the shapes of these curves are the same as those of Figure 1, where sector M is the one previously labeled as sector I. Technical coefficients of sector N are $l_N = 19/63$ and $k_N = 1/8$. Point $C = (9/4\,;9/5)$ and function $f(\cdot)$ is defined by $(c_{NT}, c_M, c_N) = (5/23\,;2/23\,;2/23)$. Finally, $\bar{r} = \bar{e} = 2$ and $e_B = 3$.
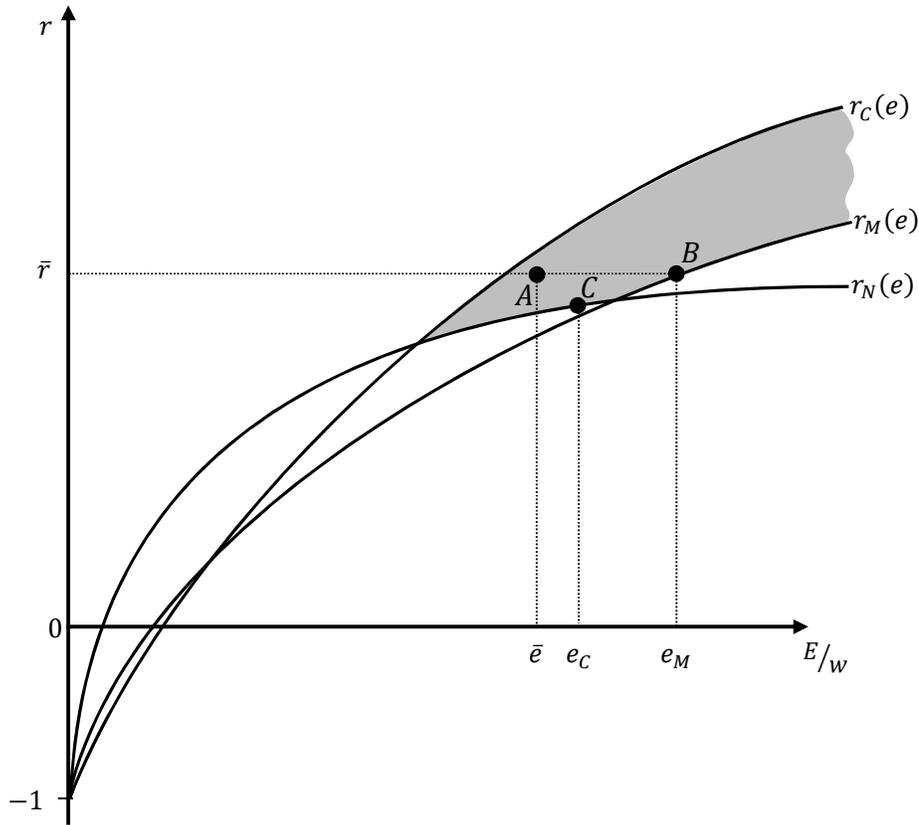
Scenario 3: Finally, the most problematic scenario seems to emerge in the following case. Suppose distributive conditions are such that, besides the rentistic sector C, there simultaneously is another industrial sector N that is already competing abroad. However, due to its higher number of linkages with the remaining sectors of the economy, policy-makers decide to develop a different industrial sector M. The economy is initially at point A in Figure 11 and therefore, the policy-maker uses competitiveness index (11) to determine the level of e needed for sector M to earn the ruling profit rate, $\bar{r}$, e_M. Therefore, she fails to capture the actual relationship between e and r, reflected by function $g(e)$ in the figure. Here exchange-rate policy faces two potential problems. First, this rate of devaluation fails to develop sector M, since at the higher level e_M, the actual profit rate rises to $g(e_M)$, which is unaffordable by the sector. Second, and perhaps more serious, this policy also excludes the existing sector N from the productive structure, since $g(e_M)$ is higher than the maximum profit rate affordable by industry N (r_N). The conclusion is that devaluation policy not only does not improve, but also deteriorates national competitiveness.
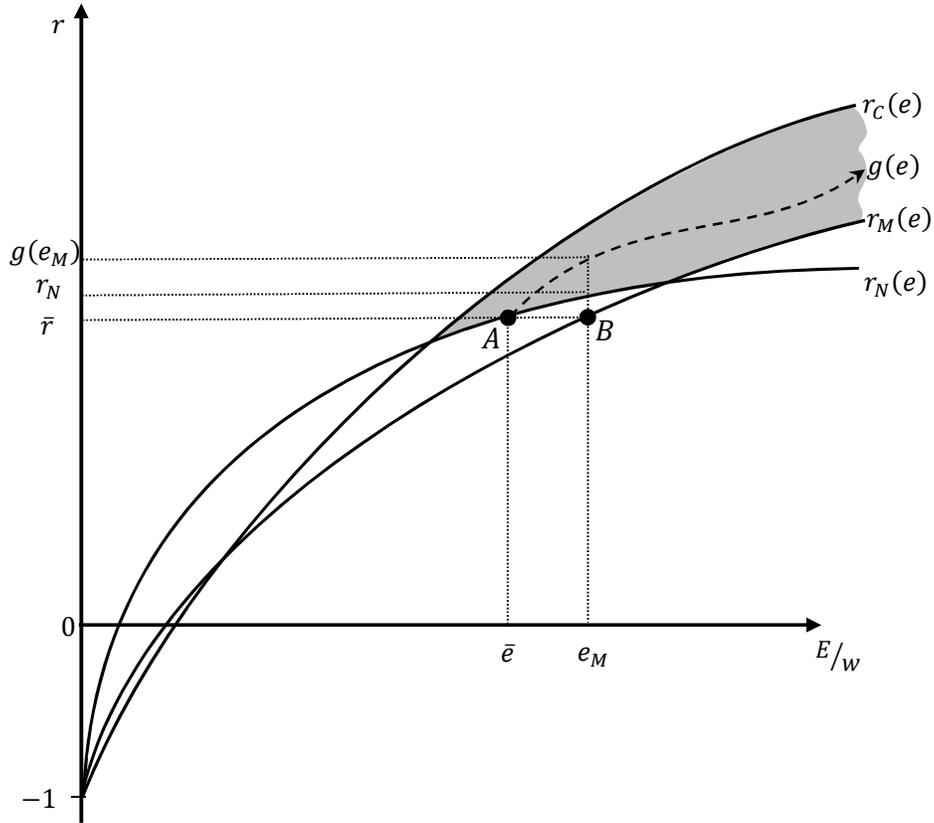
IV. CONCLUDING REMARKS

By means of a two-tradable-goods simple model, throughout this work we have discussed the role of the exchange rate as a tool to boost sectorial competitiveness. We have first shown that, when both tradable sectors are industrial sectors, it is generally not possible to include one sector into the productive structure without excluding the already existing one. Beyond this difficulty, which *in itself* seriously challenges the idea that the export basket can be diversified with devaluation, we have further seen that, this policy may clash with the distributive limit, reach indeterminate results when the $e - r$ curves intersect more than once, and be totally ineffective if the curves happen not to intersect.

On the other hand, when the tradable good is produced by means of a fixed factor in short supply, typically natural resources, the structural-change channel may work properly, but may be very difficult to implement. This is due to the fact that the existence of differential rent introduces an additional degree of freedom into the price

system that renders the interaction among distributive variables indeterminate. And, even if the direction of this link could be somehow predicted by the policy-maker, this would not be enough to measure the required rate of devaluation, being also necessary to determine the *exact* magnitude of this relationship -both its direction and magnitude. If all this is not duly considered, it may well happen that the attempt to develop a particular sector of the economy not only will be ineffective, but it will also damage sectors that were already competitive.

Given all these potential problems, we conclude with the following consideration. Instead of shifting income distribution to promote industrial competitiveness, it seems more desirable, although not much less difficult to implement (longer-term horizons and strong State capacities are needed, to name just a few requisites), that policy-makers attempt to affect the relationship between the supply and the demand prices of the tradable goods (i.e. to shift the $e - r$ curves) by means of industrial policy. For instance, public investment in R&D and infrastructure, development finance, subsidies, etc. Although a full assessment of the impact of these industrial policies is left for further research, an intuition of these effects can be given by means of Figure 12, where a possible positive interaction between the public and private sectors is analyzed. Consider the case of two generic industrial goods. Due to its linkages with other productive sectors, or simply because of strategic reasons, the government decides to promote sector C by, for instance, devoting public resources to R&D. Then, instead of a movement along the $e - r$ curve of sector C, this measure would have the effect of *shifting* the curve upwards, with the implication that a Pareto improvement in income distribution can be achieved (there is no need to erode real wages in order increase the profitability of the tradable sector). And since sector C would now be able to pay the highest profit rate of the economy, private investors themselves would find it convenient to get involved in the development of this productive branch.

FIGURE 12:
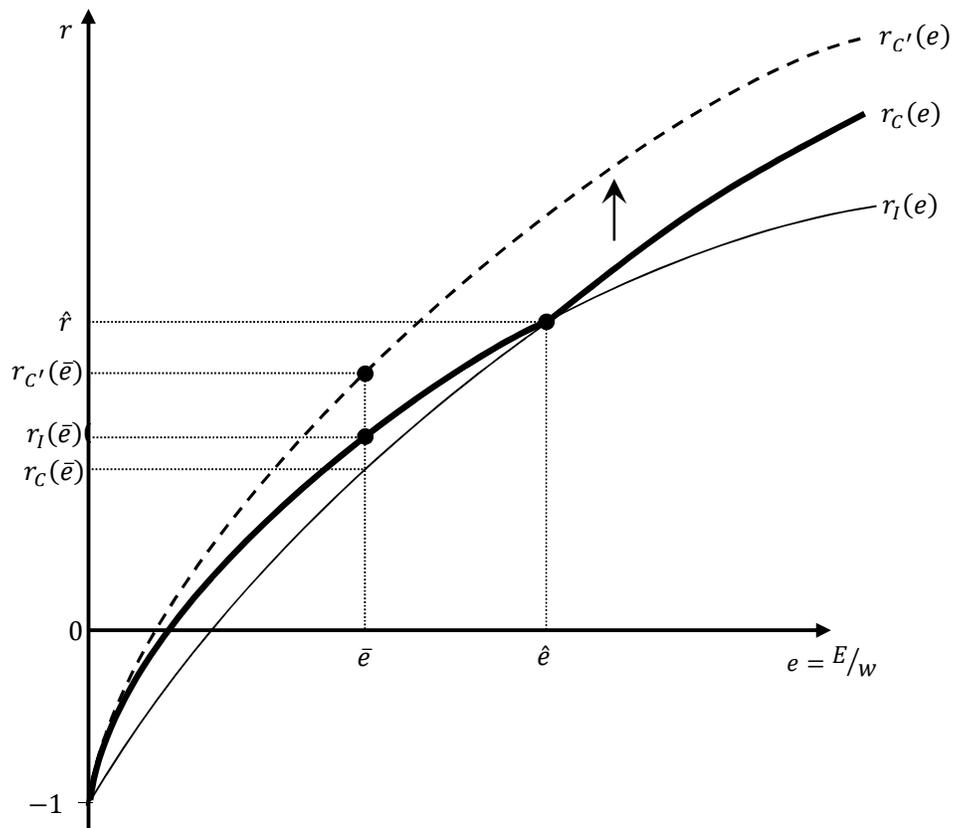
REFERENCES

Bresser Pereira, L. C. (2008). The Dutch Disease and its Neutralization: A Ricardian Approach, *Brazilian Journal of Political Economy*, 28(1), 7-71.

Diamand, M. (1972). La Estructura Productiva Desequilibrada Argentina y el Tipo de Cambio, *Desarrollo Económico*, Vol. 12(45), 1-23.

Dvoskin, A.; Feldman, G. (2018). A Formal Assessment of New-Developmentalist Theory and Policy, *Brazilian Journal of Political Economy,* Vol. 38 (3), 395-413.

Dvoskin, A.; Feldman, G.; Ianni, G. (2018). New-Structuralist Exchange-Rate Policy and the Pattern of Specialization in Latin American Countries, *Centro Sraffa Working Paper* 28, February.

Frenkel, R.; Ros, J. (2006). Unemployment and the Real Exchange Rate in Latin America, *World Development*, 34(4), 631–646.

Panico, C. (1988). *Interest and Profit in the Theories of Value and Distribution*. London: Macmillan.

Pivetti, M. (1985 [1990]). "On the Monetary Explanation of Distribution". in K. Bharadwaj, & B. Schefold (Edits.), *Essays on Piero Sraffa: Critical Perspectives on the Revival of Classical Theory*. London: Unwin Hymann.

Rapetti, M. (2013). Macroeconomic Policy Coordination in a Competitive Real Exchange Rate Strategy for Development, *Journal of Globalization and Development,* 3(2), 1-31.

Rodrik, D. (2008). The real exchange rate and economic growth, *Brookings Papers on Economic Activity* 39(2), 365–439.