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THE EFFECT OF A DEVALUATION ON OUTPUT REVISITED

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ABSTRACT: The paper analyzes the exchange rate policy in an externally indebted country and derives new results for the output effect of a devaluation in a static open economy framework. This effect is expansionary if the share of interest expenses on the foreign net debt in relation to imports is less than the price elasticity of imports and if the domestic price level rises less than the exchange rate depreciates. The case of nominal and real wage rigidity and the case where the country has market power in the export markets are also considered and the basic condition is qualified in this more general setting.

KEY WORDS: devaluation, output, nominal and real wage rigidity, market power

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TIIVISTELMÄ: Tutkimuksessa selvitetään valuuttakurssipolitiikan vaikutuksia maassa, jolla on ulkomaista nettovelkaa. Julkaisussa johdetaan tulos, jonka mukaan devalvaatio on ekspanstiivinen (kontraktiivinen), jos ulkomaisen nettovelan korkokulujen suhde tuontiin on pienempi (suurempi) kuin tuonnin hintajousto edellyttäen, että kotimaiset hinnat eivät nouse täysimääräisesti devalvaation seurauksena. Tapaukset, jossa palkat ovat nimellisesti tai reaalisesti jäykkiä ja jossa maalla on markkinavoimaa vientimarkkinoillaan, ovat myös tarkastelun kohteena ja niiden osalta johdetaan jo. perustuloksen laajennukset.

ASIASANAT: devalvaatio, tuotanto, nimellinen ja reaalin palkkajäykkyys, markkinavoima

SUMMARY

The traditional way to analyze the effects of exchange rate policies in a static demand-oriented framework produces the famous Marshall-Lerner condition, which states that the sum of the price elasticities of exports and imports should be greater than unity in order to have an improvement in the current account and an expansion in the domestic output as a result of a devaluation. This analysis is, however, based on the particular assumption that the country concerned prices its export products in the domestic currency. Furthermore, the supply side is disregarded as the domestic price level is considered as fixed after the devaluation. Finally, the role of the external net debt, often denominated in foreign currency, is omitted from the analysis.

This paper derives a new condition for the expansionary vs. contractionary effect of a devaluation on output, first, in the case of a small open economy which is a price taker in the world market for its export and import goods. A new sufficient condition for the devaluation to spur an expansion in the domestic output is that the share of interest expenses on foreign net debt in relation to imports is less than the price elasticity of imports. The necessary condition for this is the standard one that the domestic price level does not rise *pari passu* with the exchange rate.

The traditional Marshall-Lerner-condition and the Harberger-Laursen-Metzler-effect are special cases of the general framework presented in the paper.

As a second case, the paper introduces the supply side with wage setting behaviour and the determination of the domestic costs and prices. The basic result is now qualified. If the homogeneity of wages with respect to the export prices (in domestic currency) and the domestic price level is less than unity, a devaluation is expansionary, and neutral if this degree of homogeneity is unity.

Thirdly, the paper generalizes to the case where the country has market power in its export market. In this case the paper derives a revised condition for the effect of a devaluation on output, which is looser than the above mentioned basic condition. Finally, the empirical evidence for the new conditions is shortly evaluated, which broadly speaking tends to imply that a devaluation is still an expansionary measure, when considered as in the paper in a traditional sense in isolation and not as a part of economic policies aimed at implementing a credible anti-inflationary strategy over a longer period. However, a sharpening of the old vision on exchange rate policy is anyway relevant as such.

YHTEENVETO (Finnish summary)

Perinteinen devalvaatioanalyysi staattisessa kysyntä-orientoituneessa makrotaloudellisessa kehikossa tuottaa kuuluisan Marshall-Lerner-ehdon, jonka mukaan devalvaatio parantaa vaihtotasetta ja on tuotannon suhteen ekspansiivinen, jos viennin ja tuonnin hintajoustojen (itseisarvojen) summa on yli ykkönen. Tämä analyysi perustuu kuitenkin mm. siihen erityiseen oletukseen, että maa hinnoittelee vientihyödykkeensä kotimaan rahassa. Lisäksi talouden tarjontapuoli ja kotimaisten hintojen reaktio valuuttakurssiin on sivuutettu. Lopuksi ulkomaisen velan olemassaolo, joka on yleensä otettu ulkomaanvaluutoissa ja jonka vasta-arvo kohoaa devalvaation seurauksena, on sivuutettu.

Tämä paperi johtaa tässä laajemmassa kehikossa uusia ehtoja sen suhteen, onko devalvaatio kotimaisen tuotannon suhteen ekspansiivinen vai kontraktiivinen. Aluksi käsitellään pienen avotalouden tilannetta, jossa maa on täydellinen hinnanottaja viennissä ja tuonnissa. Riittävä ehto devalvaation ekspansiivisuudelle on se, että ulkomaisen velan korkomenojen suhde tuonnin arvoon on pienempi kuin tuonnin hintajousto itseisarvoltaan. Välttämätön ehto on tavanomainen, eli se, että kotimainen hintataso ei saa nousta täysimääräisesti valuuttakurssin heikkenemisen kanssa.

Perinteinen Marshall-Lerner-ehto ja Harberger-Metzler-Laursen-vaikutus saadaan esiin yleisen tapauksen erikoistapauksina.

Toisena tapauksena paperi tuo tarjontapuolen mukaan analyysiin ja spesifioi kotimaisten kustannusten ja hintojen määräytymisen sekä palkanmuodostuksen. Yo. perustulokselle johdetaan nyt laajennus. Jos palkkojen määräytymisen homogeenisuuden aste vientihintojen (kotimaan rahassa) ja kotimaisten kulutushintojen suhteen on alle ykkösen, devalvaatio parantaa tuotantoa. Jos taas tämä homogeenisuuden aste on ykkönen, devalvaatio on vaikutuksiltaan neutraali.

Kolmanneksi paperi yleistää analyysin tapaukseen, jossa maalla on markkinavoimaa vientimarkkinoillaan. Tässä tapauksessa johdetaan ehto devalvaation tuotantovaikutukselle, joka on löysempi kuin yo. perusehto. Lopuksi tutkitaan uusien ehtojen empiiristä paikkansapitävyyttä. Laajasti tulkittuna näyttäisi siltä, että devalvaatio on edelleen ekspansiivinen, kun sitä perinteisen analyysin tapaan tarkastellaan yksittäisenä toimenpiteenä, eikä osasena talouspolitiikkaa, joka tähtää uskottavan inflaationvastaisen maineen ja tulosten saavuttamiseen pitemmän ajan kuluessa. Kuitenkin perinteisenkin analyysin tarkentaminen on paikallaan.

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The effect of a devaluation on output revisited

1. Introduction

The European Union is heading towards EMU with the goal of a single currency. This would remove the exchange rate from an adjustment channel of the economy and also from the set of policy tools in the member countries. However, it is true that in a number of situations the possibility to take recourse to a devaluation has even recently been of vital importance for some EU countries, hit by an adverse shock. Therefore, entrance to EMU is debated contrasting the pros and cons of it, the latter including maintenance of the possibility to pursue exchange rate policy of at least some degree of independence.

Traditional analysis of the macroeconomic effects of a devaluation in a simple Keynesian framework is based on a number of conditions limiting its usefulness. First, its vital ingredient, the celebrated Marshall-Lerner condition assumes, as is also done in connection with the J-curve, that the exportables of a country are priced in the home currency and that their prices remain unchanged after the devaluation.¹ Secondly, only the reactions of exports and imports are taken into account, and the accumulated foreign debts and assets and the consequent capital gains and losses related to exchange rate changes are omitted. Thirdly, the supply side links between the domestic and foreign prices are disregarded in an unrealistic way by keeping the domestic costs of production unchanged even though the exchange rate changes.

¹ See e.g. Dornbusch (1980), chapter 4.

On the contrary, exports of many countries are priced in foreign currencies, and thereby the adverse terms of trade effect of a devaluation is much less pronounced, or even nonexistent, than in the traditional case where the Harberger-Laursen-Metzler effect plays a role. In practice, many countries which have faced serious macroeconomic imbalances and which have taken recourse to a devaluation in their stabilization efforts, have simultaneously been - even heavily - externally indebted. As the external debt, borrowed normally from the world capital markets, is denominated in the major currencies and only in a limited scale in the local currency, the consequent capital losses following a devaluation contract income and demand. The interdependence between foreign and domestic prices is also quite strong in the open economies. And finally, the more modern credibility issues related to exchange rate policy and their link to the interest differential between the home and international markets are key issues in the policy debate around EMU participation. So, in a number of important aspects the traditional analysis is deficient and does not describe adequately the actual situation where exchange rate policies are used - or eliminated - in the real world.

The aim of this paper is, by using a static macroeconomic framework, to derive conditions for the expansionary vs. contractionary effect of a devaluation on output - leaving aside the old question of its effect on the current account - by incorporating extensions to the traditional analysis in some important respects. The literature on exchange rate policy is enormous indeed and has gradually developed to incorporate more sophisticated dynamic elements in the analysis.² However, the traditional Keynesian framework is still often used in policy oriented evaluations, and therefore a sharpening of this tool deserves attention and updating to correspond to the conditions prevailing in the real world. Gylfason and Risager (1984) have similarly deviated from the traditional approach in their analysis of the effects of the exchange rate on the current account and output, by incorporating many of the above mentioned channels, i.a. the external indebtedness, into their model. However, our analysis produces quite simple and clearcut new conditions for the effect of devaluation on output which should be more readily applicable. The basic result of the paper is the following. A

² See e.g. Risager (1987).

sufficient condition for the expansionary effect of a devaluation is that the interest payments on the external debt in relation to imports are less than the price elasticity of imports. This is derived in section 2. Section 3 enlarges the analysis to cover the supply side and nominal or real rigidity of the domestic costs and derives an extension to the basic result. Section 4 considers the case of imperfect competition in the export market and modifies the basic condition for output expansion under conditions of optimal monopolistic export price behaviour. Finally, section 5 briefly considers the empirical relevance of the theoretical results derived in the paper and section 6 concludes.

2. The basic output effect of a devaluation

Let Q be the domestic production (GDP), D domestic demand (consumption and investment), being allocated on both domestic and imported goods, X exports and M imports, all in volume terms. The domestic production is determined in the usual Keynesian way by aggregate demand, net of imports,

$$(1) \quad Q = \frac{eP_X}{P} X + \frac{P_D}{P} D - \frac{eP_M}{P} M,$$

where e is the exchange rate, price of a unit of foreign currency in terms of the home currency, P_i is the price of the demand and supply item i and P the price (index) of domestic production. We assume that the country produces at least two goods, one of which is exported and one is domestically consumed. Note that in (1) the export and import prices P_X and P_M are defined in terms of the foreign currency. The real income Y is defined by deflating the nominal income (GNP) by the price on the domestic expenditure,

$$(2) \quad Y = \frac{PQ - ei * B}{P_D},$$

where the second term in the numerator is the interest expenses on the net foreign debt, the stock of which is B in foreign currency, i^* being the international rate of interest on it.³

The reaction of expenditure to a change in prices can only be dealt with in an adequate way in an intertemporal framework, as discussed by Svensson and Razin (1983) and Persson and Svensson (1985) in connection with a terms of trade change. In general, the real expenditure depends on the current and future real incomes and the real interest rate. Only by assuming a stationary state with identical current and future real income and unchanged real interest rate, can we specify the current real expenditure as a function of current real income only, see Svensson and Razin (1983). Here we assume that the country faces a given world nominal interest rate and that the changes in the price level P_D , induced by the devaluation, remain permanent, because, as in the traditional analysis, the policy measure is taken to be unexpected and sustained over time. Now, the conditions are met for the specification of the real expenditure function D in the following way, similarly as by Dornbusch (1980),

$$(3) \quad D = f(Y), \quad 0 \leq f' \leq 1.$$

The export demand by foreigners is a function of the relative price P_X/P^* , where P^* is the constant foreign price level, $X = X(P_X/P^*)$, $X' < 0$. The home demand for imported goods is specified, as typical in econometric models, so that it is a function of domestic production and the relative price between the import prices and prices on domestic production, $M = M(Q, eP_M/P)$, $M_1 > 0$, $M_2 < 0$.⁴

³ This is also equal to the real rate of interest as the foreign price level is stationary. In national income accounting i^* is identified as the nominal rate of interest, but in a behavioural sense the real rate is more relevant, because in the nominal interest rate the inflation component represents the capital gain caused by the fall in the real value of the foreign debt.

⁴ Theoretically a more satisfactory solution would be to separate the imported final goods from raw materials and intermediate goods and specify separate relationships for these categories. The former would be a function of total expenditure and the relative price eP_M/P_D . This change would, however, lead to a similar outcome as (7) below with the addition that the expansionary effect of a devaluation is bigger than that given in (4) and (7), but the basic sufficient condition stated in proposition 1 remains unchanged.

Let the initial exchange rate and all the prices be normalized to unity. Inserting (2) into (3) and then into (1) and by differentiating with respect to the exchange rate we get after some manipulation

$$\begin{aligned}
 (1-a) \frac{dQ}{de} &= (X-M)[1-\varepsilon(P,e)] + \varepsilon(P_X,e)X - \varepsilon(P_M,e)M + \varepsilon(P_X,e)X' \\
 (4) \quad &+ [\varepsilon(P_D,e) - \varepsilon(P,e)][D - f'Q] \\
 &- f' i^* B + \varepsilon(P_D,e)f' i^* B - M_2[1 + \varepsilon(P_M,e) - \varepsilon(P,e)],
 \end{aligned}$$

where a , the marginal propensity to consume domestic goods, $a = f' - M_Q$ (positive) and is assumed in the normal way to be less than unity, and $\varepsilon(x_i, x_j)$ is the elasticity of x_i with respect to x_j (note: not its absolute value). The effect of a devaluation in (4) on output is composed of several terms, in addition to those related to the traditional Marshall-Lerner condition, which is a special case of (4). To see this, specify in (4) exports and imports to be initially in balance, $X = M$, and that exports are priced in the domestic currency so that $\varepsilon(P_X, e) = -1$. The cost of production is kept unchanged and the price of domestic production does not react to the exchange rate, $\varepsilon(P, e) = 0$. Further, imports are priced in foreign currency so that $\varepsilon(P_M, e) = 0$ and the link between the price of domestic expenditure and the exchange rate is omitted, $\varepsilon(P_D, e) = 0$, and finally, there is no external debt denominated in foreign currency, $B = 0$. Inserting this chain of assumptions into (4) produces the familiar Marshall-Lerner result,

$$(5) \quad (1-a) \frac{1}{M} \frac{dQ}{de} = -\varepsilon(X, P_X) - \varepsilon(M, eP_M) - 1.$$

The Laursen-Metzler effect is now allowed for through a rise in P_D/P after a devaluation. The extension produced by this effect to (5) takes into account the fact that if the devaluation results in a simultaneous deterioration in the terms of trade, the reaction of the domestic expenditure to this has to be taken into account as well, in (4) through the positive term

$[\varepsilon(P_D, e) - \varepsilon(P, e)]D$. The expansionary effect of a devaluation is magnified from that in (5), because the rise of import prices in relation to prices of the domestic production leads to a substitution of the domestically produced goods for imports. In the term on the second row in (4) there is, however, in the general case added a negative income effect, as the terms of trade weakening lowers the real income. However, the combined effect of these two terms is positive.⁵

In an ultimate case, a small open economy is a complete price taker in the world market. This implies that $\varepsilon(P_X, e) = 0$ and $\varepsilon(P_M, e) = 0$, which means that there is no terms of trade loss and the terms on the first row in (4) vanish. Let us now consider more closely the Harberger-Laursen-Metzler effect and the negative income effect, the second row in (4). As aggregate demand is identically equal to aggregate supply, their prices are too, and we have the following identity,

$$(6) \quad \varepsilon(\bar{P}, P_D) \varepsilon(P_D, e) + \varepsilon(\bar{P}, eP_X) \varepsilon(eP_X, e) = \varepsilon(\bar{P}, P) \varepsilon(P, e) + \varepsilon(\bar{P}, eP_M) \varepsilon(eP_M, e),$$

where $\bar{P}$ is the price index of aggregate demand and supply. In the small open economy case $\varepsilon(eP_M, e) = \varepsilon(eP_X, e) = 1$. If exports and imports are initially in balance, the domestic expenditure D and domestic production Q are also equal. As in general the elasticity of a price index with respect to its individual price is equal to the value share of the good concerned in the relevant budget, (6) gives the important outcome that now $\varepsilon(P_D, e) = \varepsilon(P, e)$, if $X = M$ initially. Thereby also the term in the second row in (4) vanishes in this case and we are left only with the last row in (4). In it, the first term is negative indicating that the direct burden of interest payments abroad rises, the second positive implying that the inflationary impact of a devaluation reduces the real burden of the foreign debt, and the third, the reduction in imports, is again positive. Dividing in expression (4) by imports M , we now reach the following expression for the effect of devaluation on output in a price-taker small open economy,

⁵ As initially exports and imports are assumed to be in the traditional manner equal (see above), domestic demand D and production Q are equal, and therefore the term $D-f'Q$ in (4) is positive.

$$(7) \quad (1-a) \frac{dQ}{de} \frac{1}{M} = \left[\frac{-f' i^* eB}{M} - \varepsilon \left(M, \frac{eP_M}{P} \right) \right] [1 - \varepsilon (P_D, e)].$$

Let us leave the second factor aside for a while and assume it to be positive. As the marginal propensity to spend f' is less than unity, we can state,

Proposition 1. A sufficient condition for a devaluation to expand the domestic production in a small economy being a price-taker in the world markets is that the price elasticity of imports is in absolute terms bigger than the interest payments on the foreign debt in relation to imports.

We immediately reach the following outcome.

Corollary. If the small economy being a price-taker in the world markets is not externally indebted or is a net lender, devaluation will always expand its domestic production.

However, there is a second term in the expression (7), which is also of crucial importance.

We get the following usual outcome,

Proposition 2. A necessary condition for the devaluation to expand output in the small open economy is that the domestic price level rises less than with unitary elasticity with respect to the exchange rate.

3. Introducing the supply side with nominal or real wage rigidity

As normal in traditional Keynesian analysis of the open economy, the above assumes that the domestic costs, especially nominal wages remain unchanged after the devaluation. From

a more relevant point of view, the possibility of a rise in domestic costs or even the real rigidity of them should be added to the analysis.

In order to do so, let us specify the supply side so that there is one domestic variable factor of production, labour, W being the wage rate, and imported raw materials and intermediate goods are the other factor (capital is considered fixed in the short run analysis). Let us assume that the labour market behaviour produces a wage rate which reacts to both the consumer prices P_D and export prices P_X , the latter reflecting the company profitability of the open sector,

$$(8) \quad W = A(P_D)^\alpha (eP_X)^\beta, \quad 0 \leq \alpha, \beta \leq 1, \quad \alpha + \beta \leq 1.$$

This includes the small open economy case under perfect competition in the labour market so that we have constant product wages in the export sector and thus the nominal wage depends solely on the export prices of the economy. In this case $\alpha = 0, \beta = 1$. Or alternatively, wages are determined through real (consumption) wage rigidity, $\alpha = 1, \beta = 0$. The case of nominal wage rigidity is the situation where $\alpha = \beta = 0$.

Let further the price index P of the domestic production be based on the prices of export goods (the contribution of the production being exported) and the prices on the sheltered sector goods P_H , the latter being priced with a mark-up on the unit cost of the domestic production,⁶ which depends in the following manner on the wage cost and the prices of the imported intermediate goods,⁷

⁶ We still assume that $\epsilon(P_X, e) = 0$ (and $\epsilon(P_M, e) = 0$). This small open economy assumption will be relaxed in the next section.

⁷ Strictly, the cost function (9) means that the corresponding constant return to scale production function is of the C-D form. However, we can easily generalize it to CES by interpreting in (12) the parameter γ as the cost share of labour in total costs, as normally in index number theory the elasticity between the total cost and the price of a single factor is the cost share of the factor concerned. It should also be noted that, of course, the price elasticity of imports above in (7) also includes the elasticity of substitution both in consumption and in production between the domestic goods or factor and the imported goods, so that they are not present in (12) or in (7) as separate items, see footnote 4 above.

$$(9) \quad c = W^\gamma (eP_M)^{1-\gamma}, 0 \leq \gamma \leq 1.$$

The price of the domestic production sold to the domestic market depends through the mark-up factor m on the marginal cost,

$$(10) \quad P_H = (1 + m)c, m > 0.$$

The price of the domestic demand D depends both on the prices of the domestic goods and of imports,

$$(11) \quad P_D = P_H^\delta (eP_M)^{1-\delta}, 0 \leq \delta \leq 1.$$

From these elements, with a manipulation, we can derive the following expression

$$(12) \quad \varepsilon(P_D, e) = \frac{(1 - \gamma(1 - \beta))(1 - \delta) + \delta}{1 - \alpha\gamma(1 - \delta)} (\geq 0).$$

By inserting this into (7) we get an explicit expression for the output effect of a devaluation and the following proposition.

Proposition 3. When the degree of homogeneity in wage setting (in the short run) $\alpha + \beta < 1$, the elasticity (12) is less than unity and devaluation is expansionary under the condition mentioned in proposition 1. Especially, with nominal wage rigidity, i.e. when $\alpha = \beta = 0$, the elasticity $\varepsilon(P_D, e)$ reaches its lowest value and is equal to $1 - \gamma(1 - \delta) < 1$. With linearly homogeneous wage setting, $\alpha + \beta = 1$, the elasticity (12) is equal to unity, and devaluation is always neutral with respect to output. The neutrality result also holds in general, if the cost share $(1 - \gamma)$ of imported goods in production rises to unity.

4. The case of imperfect competition in the export market

Both the cases presented in section 2 leading to the Marshall-Lerner condition and to the new small open economy condition presented in (7) are special cases with respect to the reaction of the terms of trade after the devaluation. The Marshall-Lerner condition and the Harberger-Laursen-Metzler effect assume that the terms of trade deteriorate by the full amount of the devaluation, a 10 per cent devaluation leading to a worsening of the terms of trade also by 10 per cent. The small open economy assumption, on the other hand, is based on the assumption that the terms of trade remain unchanged after the devaluation. In reality, however, we often encounter situations where the terms of trade change, but not by the full amount of the change in the exchange rate. It is true that exports of even many small countries are concentrated on a limited number of key products and therefore the countries have some market power in the international markets of these goods - they are "almost" small open economies so that a change in e affects P_X . However, in imports we still throughout consider the country to be small, so that the import price P_M in the foreign currency remains unchanged after a change in the exchange rate, the supply of import goods is perfectly elastic at the foreign price P_M .

In order to study this imperfect competition case, we have to consider explicitly the export pricing decision and its relation to the exchange rate and the change in the domestic costs. The optimum export decision under imperfect competition is given by

$$(13) \quad eP_X(1 + \varepsilon(P_X, X)) = c, \text{ where } \varepsilon(P_X, X) = 1 / \varepsilon(X, P_X),$$

and c is the marginal cost similar to that in the previous section. In the following let us assume that there is Cournot competition in the export markets and for simplicity that these markets consist of homogeneous goods. Let us denote by s the market share of the country concerned in these markets. Under these conditions we have (see e.g. Alho 1996)

$$(14) \quad \varepsilon(P_X, X) = s \varepsilon_D^{-1},$$

where ε_D is the price elasticity of demand in the world market. A necessary condition for (13) to produce a meaningful result is that in absolute terms the price elasticity of exports $\varepsilon(X, P_X)$ is bigger than unity (and in (14) that ε_D is bigger than unity).

Differentiating (13) logarithmically with respect to the exchange rate e and combining the wage determination in section 3 into the marginal cost c , we get after some manipulation the following expression

$$(15) \quad \varepsilon(P_X, e) = \frac{-\gamma + \gamma \beta + \gamma \alpha \varepsilon(P_D, e)}{1 + s \varepsilon_D^{-1} (1 + \varepsilon_X) - \gamma \beta},$$

where ε_X is for short the price elasticity of exports of the country. However, in this case also the elasticity $\varepsilon(P_D, e)$ is different from that in (12) as the derivation of it assumed that $\varepsilon(P_X, e)$ is zero. Allowing for this to be different from zero in the derivation of (12) and solving then simultaneously for $\varepsilon(P_D, e)$ and $\varepsilon(P_X, e)$ using (15), the general intuitive result that a devaluation leads the domestic firms to take advantage of the improved competitive position in the export markets, i.e. that $\varepsilon(P_X, e) \leq 0$, can be inferred from (15) and that it is zero, if and only if $\varepsilon(P_D, e) = 1$.⁸ If the latter is the case, at the same time also $\varepsilon(P, e) = 1$ (see (16) below) and the analysis in section 1 and proposition 2 apply as such.

However, when $\varepsilon(P_X, e)$ is negative, we also have $\varepsilon(eP_X, e) < 1$, and because of (6),

$$(16) \quad \varepsilon(P_D, e) - \varepsilon(P, e) = -\frac{M}{Q} \varepsilon(P_X, e) > 0.$$

So, the term in the second row in (4) differs from zero. This term consists of the Laursen-Metzler effect and the income effect and is positive because of (16), see footnote 5 above.

⁸ The elasticity $\varepsilon(P_X, e) = -1$, i.e. the Marshall-Lerner case, only if $\alpha = \beta = 1 - \gamma = 0$ and $s = 0$.

The last term in (4) also slightly differs from that in (7) because of (16), i.e. it is now more positive.

We also take into account the terms in the first row in (4). Altogether the expansionary effect of a devaluation is now bigger than in the basic small open economy condition in (7), if the price elasticity of exports ϵ_x is higher than unity in absolute terms, as it has to be in this theoretical framework. We get the result,

$$(17) \quad (1-a) \frac{dQ}{de} \frac{1}{M} = \epsilon(P_x, e)(\epsilon_x + f' - \frac{M}{Q} \epsilon_M) + (\frac{-f' i^* e B}{M} - \epsilon_M)(1 - \epsilon(P_D, e)).$$

and consequently,

Proposition 4. The sufficient condition stated in proposition 1 for the expansionary effect of a devaluation holds also under imperfect competition in the export markets, if the price elasticity of exports ϵ_x is bigger than unity in absolute terms which is also required by the theoretical framework. The neutrality result in proposition 3 concerning the wage setting behaviour holds also in this more general setting. It holds also, if the cost share $(1-\gamma)$ of imported goods in production approaches unity.

Under perfect competition in the goods and labour markets, on the other hand, the domestic wage cost is determined by both the given world price level and the exchange rate, $\alpha = 0$, $\beta = 1$, and we are in fact back in the situation prevailing in proposition 3, i.e. a devaluation is an ineffective means to expand the economy.

5. On the empirical relevance of the new condition

The empirical estimates of the price elasticity of imports are often based on Goldstein and Kahn (1985), see also Gylfason (1987). Of the 15 OECD countries the average price

elasticity of imports is 0.99, with the smallest being 0.65 (for the UK) and the largest 1.28 (for Canada). In a group of nine developing countries, these estimates are 1.5, 0.8 and 2.7, respectively.

The expenses on the net foreign debt in relation to imports are normally clearly smaller than these elasticities. In the OECD countries, the average share of net investment expenses on foreign debt was in 1990 slightly negative, - 0.7 per cent in relation to imports of goods and services. The highest figures were in Iceland (12 per cent), Canada (11.6 per cent), Denmark (10.9 per cent) and Finland (8.7 per cent). The biggest foreign creditor was Switzerland (-13.9 per cent).

Of the developing countries the IFS of the IMF recognizes total foreign factor income, net. In the above group of the developing countries the average share of these expenses in total imports was 13 per cent, the highest being in Argentina, as much as 75 per cent, and the smallest in Korea, 0.6 per cent.

So, we can conclude that the basic sufficient condition in proposition 1 for the short-run expansionary effect on output of a devaluation should be met in practice. The supply side and nominal vs. real wage rigidity is another matter. The wage equations usually give the outcome of full offset of devaluation in the long run. What we are interested in here is the situation in the short, or at most in the intermediate run - or more exactly the labour market behaviour in a recessionary situation where the unions do not, or cannot, drive a claim on full compensation or may even find it reasonable to be satisfied with the pre-devaluation level of nominal wages. As regards the second new condition (17), the evidence mentioned and quoted by Gylfason (1987) shows that the average value for the export elasticity in the case of the above mentioned group of countries is slightly bigger than unity, 1.11, and thereby the effect of a devaluation should be magnified from that in (7). However, some estimations give values less than unity for this elasticity which are in contradiction with the theoretical framework of section 4.

6. Concluding remarks

The paper has taken a narrow view on the policy change leading to a devaluation. All the factors linking the monetary policies and the likely diverse interest rate developments and those dealing with policy credibility to a weakening of the exchange rate have been disregarded. The domestic financial markets have thereby been left aside of the analysis. So, i.a. the question how the change in the exchange rate is put into effect through monetary policies under floating or through a change in the parity in a fixed exchange rate system like the ERM, is skipped. These would lead to a more complicated, and of course, more realistic picture of the policy effectiveness analysed here. However, even as it now sticks to the traditional framework of analysing the exchange rate change, the paper sheds new light on the old results on the effects of the exchange rate policy.

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