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CONTRACTIONARY DEVALUATION IN THE SOUTHERN CONE

The Case of Chile

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This paper discusses the effects of a currency devaluation on output, employment and the trade balance in a small open economy (Chile). The structure of the foreign trade sector in terms of price elasticities, the sectoral differences in relative domestic value added intensities across exports and import competing industries and the degree of wage indexation, are the main determinants, in our model, of the impact of devaluation. A simulation carried out with a computable macro model for Chile, shows a currency devaluation to be contractionary in the short to medium run.

1. Introduction

The analysis of devaluation and of its impact on output and the trade balance has occupied a substantial body of economic literature.

In this paper, we ask again the question of whether a devaluation is contractionary or not.

Our approach to study the impact of devaluation focuses on three main factors: (i) the structure of the trade sector in terms of the response of trade flows to changes in relative prices, (ii) the relative intensity of domestic value added with respect to imported inputs in production across export and import competing industries, (iii) the degree of wage indexation.

To deal in a formal way with the effects of a devaluation we set up a simple computable macro model which incorporates mechanisms outlined above in determining whether or not a devaluation is contractionary.

This essay begins with a brief review of different devaluation approaches and related empirical studies. In section 2 we present the approach adopted to study the impact of a devaluation on real income, the trade balance and employment. This discussion is formalised in section 3, where we set out the model and carry out some simulations for Chile to show the path of GNP, the trade balance, and total employment following a 25 percent devaluation. The paper is closed in section 4 with conclusions.

*This paper draws from Solimano (1984, ch. 1). Useful comments made by Lance Taylor and Rudiger Dornbusch are gratefully acknowledged.

2. Devaluation theory and practice: A brief review

Exchange rate devaluation is usually undertaken to improve the trade balance and restore domestic competitiveness. However, its side effects on output and employment has been the subject of considerable attention in open economy macroeconomics. To trace back the origins of the debate we have to go directly to Hirschman (1949) who has shown that a devaluation, starting from an initial trade deficit, may lead to a fall in real income as long as the increase in spending on importables exceeds export receipts. Hence, the economy as a whole transfers real income to the rest of the world.

Another channel for a devaluation to be contractionary was offered by Díaz-Alejandro (1963). Using a three-goods model of exportables, importables and home goods with relatively price inelastic exports and imports and consumption functions based on higher saving propensities for non-wage earners, he shows that a devaluation may lead to a reduction in real income. The chief mechanism producing this result lies in the transfer of real income from labour, who receive a fixed nominal wage, to capitalists with higher propensities to save out of factor income.

Krugman and Taylor (1978), besides considering these two mechanisms for a contractionary devaluation (initial trade imbalances and distributional effects between labour and capital), also call attention to the potentially contractionary effects of a devaluation arising from fiscal effects. In particular, they consider an economy with ad valorem taxes on exports and/or imports, and show that in absence of redistributions of tax proceeds, a devaluation will generate a redistribution of income from the private sector to the government which has a saving propensity of unity in the short run, thus resulting in domestic economic contraction.

The monetary effects of a devaluation have also been the subject of considerable attention in the literature. The monetary model [Johnson (1972)], highlighted the depressing effect of devaluation on absorption operating through a fall in real balances. In this model the improvement in the current account comes entirely because of the cut in absorption brought about by the devaluation: the law of one price rules, so there is no place here for changes in relative prices or substitution effects. In the long run the initial, predevaluation stock of real balances is restored through the increase in the stock of nominal balances brought about by the current account surplus in absence of sterilisation.

Finally, authors like Van Wijnbergen (1986) have provided several mechanisms, focused on the supply side of the economy, through which a devaluation may cause an adverse effect on output (besides creating a spurt of inflation). In particular, he stresses the impact of a devaluation on the local currency costs of intermediate inputs, on nominal wages in presence of wage indexation, and its negative effect on the volume of real credit to firms needing funds to finance working capital.

2.1. Some empirical studies

A perhaps more thorough study of a devaluation is Díaz-Alejandro's (1965) analysis of the Argentinian experience of the period 1955–1961.

The author found the Argentinian experience of 1959 with devaluation highly consistent with his contention that devaluation may be contractionary because it induces a shift in income distribution toward high savers which, in turn, depresses consumption and real absorption. In addition to this the current account gets improved because of the fall in absorption relative to output (rather than through substitution effects brought about by a real devaluation), which was indeed the case in Argentina in that period.

Another study on the subject is Cooper (1971) which reviewed 24 devaluations involving 19 different developing countries during the period 1959–1966.

Cooper's findings give some empirical evidence that supports the hypothesis that devaluation improves the trade balance of the devaluing country but often the economy has to pay a price of some domestic slump in economic activity besides that of an acceleration in inflation in the short run.

Finally, a more recent paper on the impact of devaluation on real income and the trade balance is that of Gylfason and Schmid (1983). Those authors construct a log-linear macro model of an open economy which is evaluated for a sample of ten countries (both industrialised and semi-industrialised) using different estimates of the key parameters of the model. Their results show that a devaluation is expansionary (it raises real income) in eight out of ten countries which form the sample. The exceptions are the United Kingdom and Brazil where Marshall–Lerner elasticities are low enough to contribute to a contractionary devaluation. This study clearly favours the hypothesis that the expenditure switching effects of a devaluation are likely to dominate, so fears of an economic contraction following a devaluation may be unimportant.

3. Foreign trade response and cost structure: A framework

In our approach we study the question whether a devaluation is contractionary or not by following the 'elasticity tradition' focused on the response of trade flows to changes in relative prices brought about by a devaluation.

Nevertheless, we depart from the standard model in two respects: on the one hand we consider some features of the structure of the foreign trade sector in semi-industrialised economies (SIE) concerning the values for elasticities of supply for exports and demand for imports, that make the quantity response of trade flows rather insensitive to changes in relative prices, at least in the short run.

On the other hand, we explicitly consider the impact of a devaluation on domestic costs and competitiveness, both directly through the cost of

imported inputs and indirectly through its effects on wages when indexation mechanisms are in force.

A feature of the export structure we often found in developing countries is the existence of a single commodity – either mineral or agricultural – whose supply is very price inelastic in the short and medium run although its contribution to total exports receipts is quite significant.

For example, copper in Chile, coffee in Brazil, oil in Mexico, to name some Latin American countries. If this is the case, the response of total exports to a real devaluation will largely rely on the response of other exports, basically of manufactured goods, to changes in relative prices.

On the import side the story may not be very encouraging either. In a typical SIE the share of imported inputs in total imports is quite large (50 percent or more). If the range of domestic substitutes for those goods is narrow, we can expect them to be highly insensitive to changes in relative prices.

In summary, the trade structure sketched above provides some pessimism about foreign trade elasticities in economies with such an economic structure.

What about the impact of a devaluation on domestic costs and competitiveness? To discuss that issue we need some hypothesis concerning price formation.

One possibility would be to assume that the country is a price taker for all the goods it trades. Here the terms of trade would not be affected by a devaluation and its effect on the trade balance will depend just on the initial trade position of the economy. For instance, if trade is initially in balance it will remain totally unaffected by a devaluation. In a world of price markers (i.e., the country faces a downward sloping demand curve for its exports), the cost structure of export industries plays an important role in the analysis of a devaluation. Domestic costs are affected by a devaluation through two channels: on the one hand, it causes the cost of imported intermediate inputs to rise and thus increase domestic costs. The quantitative significance of this effect will depend on the share of imported intermediate inputs in unitary costs and the elasticity of substitution between domestic and foreign inputs (typically low in less developing countries).

Under these circumstances a devaluation will improve competitiveness provided it reduces the real price of domestic value added – labour – in terms of importables. Then, those sectors with a high labour share in unitary costs relative to the share of imported intermediate inputs will contribute relatively more to the increase in export revenues for given values of the foreign trade elasticities.

The other way in which a devaluation may affect domestic costs is through nominal wages. In economies in which wage indexation mechanisms are in force, typically adjusting wages to the consumer price index, the impact of a devaluation on domestic costs will be greater, and the effect on competitive-

ness lower, the higher the share of imported goods in the CPI and the higher the degree of overall wage indexation in the economy.

Summing up, the size of the foreign trade elasticities and the impact of a devaluation on domestic costs and competitiveness are the cornerstones of our approach to the effects of a devaluation on output, employment and the trade balance.

3.1. A simple computable macro model of a devaluation

In this section we set up a macro model that formalises our previous discussion.

The model considers, on the export side, three categories of goods indexed by i: first, a mineral good, the single most important export good, offered with an almost price inelastic supply curve in the short and medium run and whose rate of domestic consumption is almost negligible.

The other two export categories are manufactured products and some agricultural goods, both significantly more price responsive than the mineral commodity in the medium and long run.

Concerning price formation for exportables we will assume that the domestic country faces a downward sloping foreign demand curve for its exports. Then, we can write down export functions for each type of good depending upon the relative price of the foreign goods competitive to our exportable, $eP^*E,i/P_i$, *and* upon the level of foreign income y^*; here e denotes the exchange rate, e.g., the domestic price of foreign currency, and P^*E,i is the foreign price of the good competing with our exportable. P_i is the corresponding domestic price of the exportable good i.

$$E_i = E_i \frac{(ep^*E,i,y^*)}{P_i}. \qquad (1)$$

In turn, we assume the production of exportable goods needs both labour, whose wage rate is w, and imported intermediate inputs whose price, in domestic currency, is given by eP^*M,i.

With competition and constant returns, prices of goods are equal to their marginal and average costs. We can write down a price equation for each good, in general form, as[1]

$$P_i = p_i(W, eP^*M, j), \qquad i=1,2,3. \qquad (2)$$

[1]If the production function exhibits constant returns to scale the cost function can be written as $c/y=\psi(\vec{w})$ where c/y=unitary costs and $\vec{w}$=vector of factor prices. Assuming competition, prices are equal to unitary costs.

Regarding imports, we assume that the domestic country is a price taker in the goods it imports.

These are, in turn, disaggregated into three categories indexed by j: consumption goods, intermediate inputs and capital goods.

Import functions depend, in general, on relative prices eP^*M, j/P_D and on the level of domestic output y. Indeed, we may expect the price elasticity of imports of intermediate and capital goods to be rather low (or close to zero for the intermediate) in an economy with a narrow range of competitive domestic production of those goods.

$$M_j = M_j \frac{(eP^*M, j, Y)}{P_D}, \qquad j = 1, 2, 3. \tag{3}$$

Again the price deflator for imports, P_D, depends on wages and imported intermediate inputs.

$$P_D = P_D(W, eP^*M, D). \tag{4}$$

Nominal wage behaviour is governed by the following rule, depending on whether we assume that indexation exists or not (CPI denotes the consumer price index and γ is an average coefficient of wage indexation).

$$\begin{aligned} W &= (\text{CPI})^{\gamma} \quad \text{under wage indexation,} \quad 0 < \gamma \leqq 1, \\ &= \bar{W} \qquad \text{without wage indexation.} \end{aligned} \tag{5}$$

For simplicity we will assume the consumer price index is a Cobb–Douglas index on wages and the exchange rate.[2]

$$\text{CPI} = W^{\theta} e^{1-\theta}, \qquad 0 < \theta < 1. \tag{6}$$

As for employment determination we will assume that it directly depends on the level of output. Real product wage also affects the demand for labour, but indirectly through its effects on competitiveness and aggregate demand. In other terms, our open economy is in a regime of Keynesian unemployment rather than one of classical unemployment.

$$L = \theta(y), \qquad \theta' > 0. \tag{7}$$

Finally real income, y, is demand determined and equal to the sum of domestic absorption $A(y)$, and the trade balance in domestic currency, T,

[2]We set foreign prices of importables at unity.

which, in turn, is a function of a vector of relative prices $\boldsymbol{P}$, and the levels of domestic and foreign income.[3]

$$y = A(y) + T(\boldsymbol{P}, y, y^*). \tag{8}$$

The model of eqs. (1)–(8) does not adopt specific functional forms for the behavioural equations. However, for analytical convenience, we will linearise the whole system around variables expressed in rate of growth form. The notation is defined in table 1.

Solving eqs. (2′) through (9′) we get the effect of a devaluation on output under the following assumptions: (i) initial trade balance, (ii) no wage

Table 1
List of symbols.

$\hat{x} = \frac{dx}{dt}\frac{1}{x}$	rate of change in the variable x
$\hat{P}^*, E_i = \hat{P}^*, M_j = 0\ \forall i, j$	normalisation rule
c, i, ξ	share of consumption, investment and government spending in national income
f	share of domestic absorption in national income
β	elasticity of consumption with respect to income
x, z	share of exports and imports in national income
t	share of the trade surplus in national income
g_r, g_M, g_A	price elasticity of exports of the mineral commodity, manufactured goods and agricultural goods
h_r, h_M, h_A	foreign income elasticity of exports of mineral, manufactured products and agricultural goods
U_c, U_I, U_K	price elasticity of imports of consumption goods, intermediate goods and capital goods
V_c, V_I, V_K	income elasticity of imports of consumption goods, intermediate and capital goods
a_r, a_M, a_A	elasticity of price of mineral, manufactured and agricultural goods with respect to wages
b_r, b_M, b_A	elasticity of price with respect to the exchange rate for exportable goods
n	elasticity of the output deflator P_D, with respect to wages
m	elasticity of the output deflator with respect to the exchange rate
θ	share of wages in the CPI
γ	coefficient of wage indexation
λ	overall output–employment elasticity

[3]We assume that domestic spending depends only on output and not on relative prices.

Table 2
The model in rate of growth form.

(1') $\hat{Y}=f\hat{A}+t\hat{T}$	output
(2') $\hat{A}=(c\hat{C}+i\hat{I}+\xi\hat{G})\frac{1}{f}$	absorption
(2'') $\hat{C}=\beta\hat{y}$	consumption
(3') $\hat{T}=(x\hat{E}-z\hat{M})\frac{1}{t}$	trade balance
(4') $\hat{E}=\sum_j \frac{E_j}{E}\hat{E}_i$	total exports
(5') $\hat{M}=\sum_j \frac{M_j}{M}\hat{M}_j$	total imports
(6') $\hat{E}_i=g_i(\hat{e}-\hat{P}_i)+h_i\hat{y}^*$	exports of good i
(7') $\hat{P}_i=a_i\hat{w}+b_i\hat{e}$	price of the exportable good i
(7'') $a_i+b_i=1$	
(8') $\hat{M}_j=-U_j(\hat{e}-\hat{P}_D)+v_j\hat{y}$	imports of good i
(9') $\hat{P}_D=n\hat{w}+m\hat{e}$	price deflator for imports
(9'') $n+m=1$	
(10') $\widehat{\mathrm{CPI}}=\theta\hat{w}+(1-\theta)\hat{e}$	consumer price index
(11') $\hat{w}=\frac{\gamma(1-\theta)\hat{e}}{1-\theta\gamma}$	wage growth under indexation
(12') $\hat{L}=\lambda\hat{y}$	employment

indexation, i.e., $\hat{w}=0$, (iii) a fixed level of public spending and investment, i.e., $\hat{I}=\hat{G}=0$.

$$\hat{y}=\frac{x\left(\sum_i (E_i g_i/E)(1-b_i)+\sum_j (M_j U_j/M)(1-m)-(1-m)\right)}{1-c\beta+x\sum_j (M_j V_j/M)}\hat{e}. \tag{9}$$

By looking at this expression it is clear that $\hat{y}/\hat{e}>0$, namely a devaluation raises output, as long as

$$\sum_i \frac{E_i g_i}{E}(1-b_i)+\sum_j \frac{M_j U_j}{M}(1-m)>1-m. \tag{10}$$

This condition says that a devaluation is expansionary provided the weighted sum of sectoral export and import elasticities times its corresponding labour shares exceeds the 'overall' labour shares of the economy $1-m$.

This condition modifies the standard Marshall–Lerner condition by considering that a devaluation does not produce a one to one increase in the relative price of importables when imported intermediate goods are used as an input in the production process.

If we divide both sides of the inequality (10) by $1-m$ we can see that the higher the sectoral export and import elasticities, g_i and U_j, and the higher the labour share in export industries as compared to the economy-wide labour share, the more likely will be an improvement in the trade balance in domestic currrency and an output expansion brought about by a devaluation.

This condition also shows that for given values of export and import price elasticities, the higher the share of the 'low elasticity exportable good', namely our mineral commodity and the higher the share of the 'low elasticity importable good', i.e., intermediate inputs, the less likely a devaluation will be expansionary.

Let us now relax the assumption that the nominal wage remains constant after the devaluation, and introduce an indexation mechanism for wages tied to the consumer price index.

$$\hat{w}=\gamma\widehat{\mathrm{CPI}} \quad \text{where} \quad \gamma<1 \quad \text{and} \quad \widehat{\mathrm{CPI}}=\theta\hat{w}+(1-\theta)\hat{e}, \tag{11}$$

then

$$\hat{w}=\frac{\gamma(1-\theta)\hat{e}}{1-\gamma\theta}.$$

An expression for the effect of a devaluation on income under partial wage indexation, assuming initial trade balance, follows.

$$\hat{Y}=\frac{x\left(\sum_i (E_i g_i/E)(1-b_i-\gamma(1-\theta)a_i/(1-\gamma\theta))\right)}{1-c\beta+x\sum_j M_j V_j/M}$$

$$+\frac{\sum_j (M_j U_j/M)(1-m-\gamma(1-\theta)n/(1-\gamma\theta))-(1-m)+n\gamma(1-\theta)/(1-\gamma\theta)}{1-c\beta+x\sum_j M_j V_j/M}\hat{e}.$$

This expression shows that the higher the average coefficient of wage indexation in the economy, γ, and the higher the share of importables in the CPI (the higher $1-\theta$), the smaller the real effects of devaluation. In the limiting case, under full wage indexation, namely $\gamma=1$, a devaluation has no

real effects in the economy altogether [note that if $\gamma=1$, $\gamma(1-\theta)/(1-\gamma\theta)=1$, $a_i=1-b_i$ and $n=1-m$, so $\hat{y}/\hat{e}=0$].

Finally, if we start from a trade deficit the required condition for an expansionary devaluation under fixed nominal wages is given by

$$x\sum_i \frac{E_i g_i}{E}(1-b_i)+z\left(\sum_j \frac{M_j U_j}{M}(1-m)+m\right)>z.$$

From the point of view of total real labour income (deflated by the consumer price index), the effects of a rise in the exchange rate under fixed nominal wages, i.e., $\hat{w}=0$, will depend on two parameters: (i) the share of importable goods in the CPI, and (ii) the elasticity of total employment with respect to the exchange rate. Formally, let Y_L be total real labour income and η_{Le} the elasticity of employment with respect to the exchange rate.

$$Y_L=\frac{w}{\text{CPI}}L.$$

Log-differentiation of this expression gives us

$$\hat{Y}_L=\hat{e}(\eta_{L,e}-(1-\theta)).$$

Therefore $\hat{Y}_L/\hat{e}>0$ if $\eta_{L,e}>(1-\theta)$; namely a devaluation will increase total real labour incomes if the elasticity of employment with respect to the exchange rate is greater than the share of traded goods in the CPI. A perhaps unlikely result in the short run when $\eta_{L,e}$ is small or even negative.

3.2. *An empirical evaluation for Chile*

The preceding analysis shows that we cannot tell the direction of the real effects of devaluation on an a priori basis; hence it seems worthwhile to provide an empirical evaluation of our model. That evaluation is based on Chile. To do so we borrow elasticities from three recent econometric studies on the Chilean economy: one on the foreign trade sector [De Gregorio (1983)], one on price equations [Corbo (1985)] and another on labour demand schedules [Solimano (1983)]. Furthermore, shares are taken from National Accounts.[4]

Table 3 reports the results of a simulation of the behaviour of real income, the trade balance and employment following a 25 percent devaluation.

The simulations are carried out under the assumption that the trade

[4]See the appendix for documentation of parameter values, estimation techniques and the sample periods of these studies.

Table 3

Effects of a 25 percent devaluation on real income, employment and the trade balance.

	(1) Effect on real income (changes in %)		(2) Effect on trade balance (in % of GNP)		(3) Effect on employment (changes in %)	
Quarter	Fixed nominal wage case (a)	Nominal wage adjustment case (b)	Fixed wages case (a)	Nominal wage adjustment case (b)	Fixed nominal wage case (a)	Nominal wage adjustment case (b)
1	−3.25	−0.625	−1.53	−0.293	−0.30	−0.58
2	−2.25	0.075	−1.06	0.035	−0.43	0.014
3	−1.75	0.01	−0.82	0.046	−0.44	0.025
4	−1.44	0.0	−0.68	0.0	−0.40	0.0
6	−0.90	0.0	−0.42	0.0	−0.32	0.0
8	−0.23	0.0	−0.11	0.0	−0.10	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0
Long run	1.17	0.0	0.55	0.0	0.54	0.0

balance is initially in equilibrium. Concerning the behaviour of nominal wages in the economy we examine two cases. In the first case we assume that nominal wages are fixed in nominal terms [columns 1(a), 2(a) and 3(a)]. The second case, in turn, refers to a situation in which nominal wages are indexed to the consumer price index (CPI) in such a way that, at the end of the year, workers get a 100 percent adjustment in nominal wages to compensate for immediate past inflation. The elasticity of wages with respect to the CPI, the parameter γ, takes values of 0.2, 0.5, 0.8 and 1.0 in the first, second, third and fourth quarter, respectively [see columns 1(b), 2(b) and 3(b) in table 3].

The results reported for Chile in table 3 raise various important points:

(i) In the case of fixed nominal wages a devaluation is contractionary in the short to medium run. Moreover, the contractionary effect lasts a non-negligible period of time – two and a half years (ten quarters are necessary for the expenditure-switching effect to operate). Furthermore, the impact, say, in the first quarter of a 25 percent devaluation is quite sizeable – national income drops by more than three percent – although its effects on employment are substantially less (−0.30 percent in that quarter). It is interesting to note that the larger effects on employment occur two quarters after the devaluation has taken place, reflecting perhaps the fact that labour is a quasi-fixed factor in the very short run.

The contractionary result shows that our extended Marshall–Lerner condition is not satisfied, at least in the short run, in an economy with a foreign trade structure like the Chilean one.

From looking at table 3 and fig. 1 it is clear that the path of output closely mimics the pattern of the trade balance in domestic currency when the devaluation occurs (which in turn roughly fits the so-called J-curve shape).

What more can be said about the response of the trade flows which make up this result?

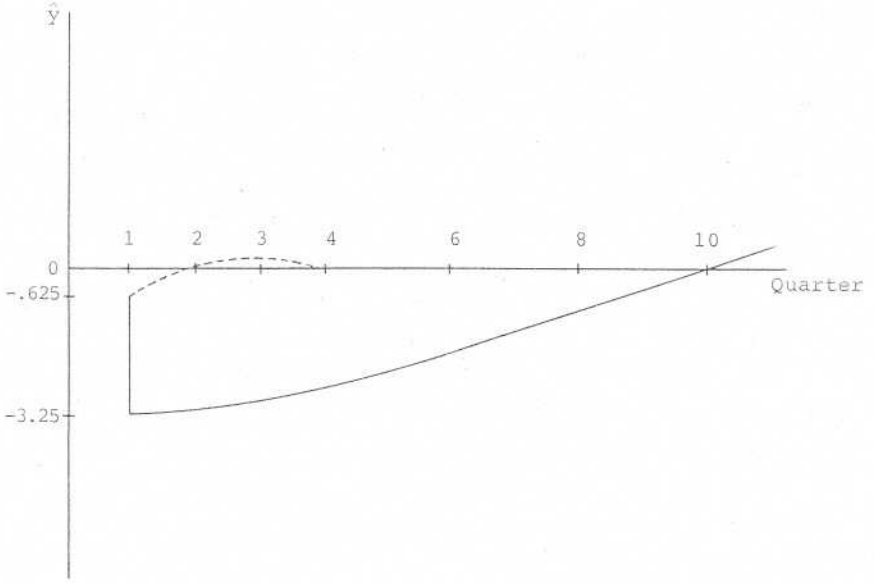

Fig. 1. Effects of a 25 percent devaluation on real income. The dotted line represents the effect of devaluation under wage indexation.

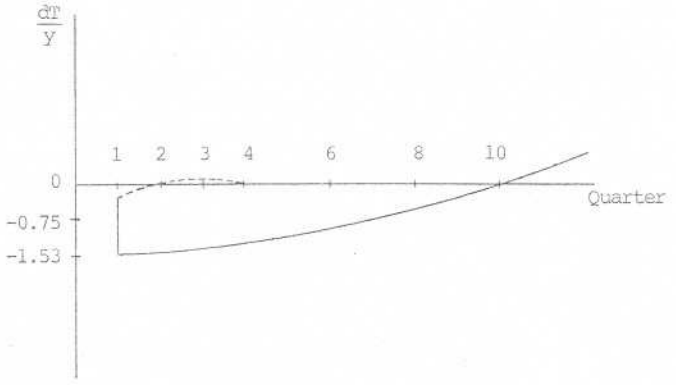

Fig. 2. Effects of a 25 percent devaluation on the trade balance.

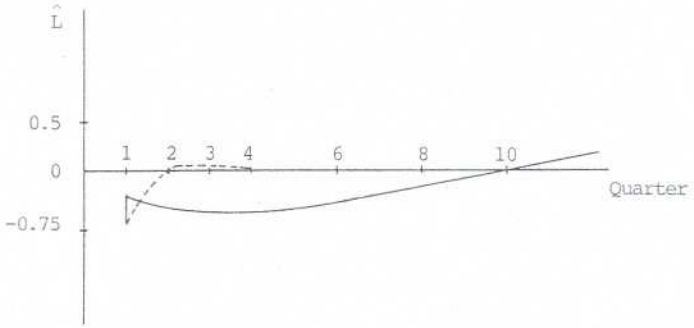

Fig. 3. Effects of a 25 percent devaluation on employment.

Basically both on the export and import side, price elasticities are low. Our mineral commodity, in this case copper, has a supply elasticity below 0.2 in the short and 'long' run (its share in total exports has been roughly 50 percent). On the import side, intermediate goods are inelastic and no significant differences in response between the short and long run were found for its different components [cf. De Gregorio (1983)]. What about manufactured exports? They are also quite price inelastic in the short run (0.376, and their mean lag is around four quarters), although they become considerably more price responsive in the long run (their elasticity is 1.76).

(ii) On the cost side it is worth noting that the presence of wage indexation substantially dampens the contractionary effects of a devaluation (cf. fig. 1). Of course, the dampening effect is due to the lower *real* devaluation, i.e., lower $\hat{e}-\hat{w}$, produced by the subsequent adjustment in nominal wages following the rise in the CPI after the devaluation takes place.

In particular, there are real effects associated with a devaluation as long as a wage lag exists. In our case, nominal wages fully catch up with domestic price inflation in the fourth quarter; hence any effect of devaluation on output, employment and inflation lasts no more than four quarters.

Needless to say, real labour incomes also fall in the short to medium run, not only because of the reduction in real wages, in terms of CPI, but also because of the fall in employment. Assuming away indexation, a 25 percent devaluation will reduce real labour income by around 12 percent.

What about fiscal policy? Since a devaluation fails to accomplish its intended expenditure-switching effect in the short run and the contraction lasts for a non-negligible period of time, expansionary demand policies are called for.

In our model, public consumption is the natural candidate for doing that. (Monetary policy plays no role here since real investment is set as exogen-

ously determined by assumption and consumption is independent of the stock of real balances.)

Formally it can be shown that *contractionary* devaluation accompanied by an increase in public spending, in rate of change, of

$$\hat{G}=\frac{x}{\xi}\left\{\sum_i \frac{E_i g_i}{E}(1-b_i)+\sum_j \frac{M_j U_j}{M}(1-m)-(1-m)\right\}\hat{e}$$

will maintain a constant level of real income.

In particular the contractionary effect of a 25 percent devaluation could be offset by a rate of increase in public consumption of 13 percent in real terms (using first quarter elasticities). This number looks large, however we must also consider that a devaluation is likely to come along with an increase in tax revenues provided ad valorem taxes are levied on relatively inelastic imports.

4. Concluding remarks

It has been shown in this paper that the effects of a devaluation on output, employment and the trade balance are crucially dependent upon the size of foreign trade elasticities, the cost structure of the traded goods industries and the behaviour assumed for nominal wages in the economy. In turn, the dynamic response of the trade balance to an adjustment in relative prices and the duration of the wage lag are the key determinants of the dynamics followed by real variables in the economy after a devaluation.

In particular, using Chilean data for a computable macro model, a currency devaluation is found to be contractionary in the short to medium run. Furthermore, its magnitude is not negligible: a 25 percent devaluation starting from an initial trade balance, assuming that wages are fixed in nominal terms, will be followed by a GNP drop of close to three percent in the first two quarters. Hence our extended Marshall–Lerner condition is not satisfied in the short to medium run in an economy with a foreign trade structure like the Chilean one. It takes roughly two years and a half for the contractionary effect of a devaluation on output and employment to disappear.

A low short run response of exports, including that of manufacturing, and the inelasticity of imports of intermediate goods and raw materials make up the contractionary result. Counter-cyclical expansionary fiscal policies could, in principle, avoid the negative side effects of a devaluation on output and employment.

Once we relax the assumption that nominal wages are fixed, and we allow for wage indexation, it is shown that the real impact of a devaluation (being

contractionary in the very short run) vanishes as soon as the wage lag disappears and nominal wages fully catch up with inflation.

Appendix A: Estimates of parameters for Chile

Elasticities for the different components of exports and imports besides factoral shares and output–employment elasticities are given in tables A.1 and A.2. Shares of different components of domestic absorption, and the trade balance come from national accounts.

Appendix B: Models specification and estimation techniques

De Gregorio (1983) estimated export and import equations for price maker export industries and price taker import competing industries using a Koyck distributed lag structure. The equations were estimated by two stages least squares. (The sample runs from 1960–1981). Corbo (1985) estimated a version of the so-called Scandinavian model with a disaggregated structure for the traded goods sector. The model is estimated with a full information maximum likelihood estimator for the sampling period 1960–1982.

Table A.1

c	ξ	f	t
0.8	0.12	1.028	−0.28
β	x	E_R/E	E_M/E
1.0	0.17	0.525	0.393
E_A/E	z^a	M_C/M	M_J/M
0.081	0.19	0.22	0.572
M_K/M	h_r	h_M	h_A
0.209	1.0	0.55	0.58
U_r	U_T	U_K	V_C
−0.50	0.0	−0.23	1.6
V_T	V_K	b_r	b_M
1.58	1.58	0.75	0.46
b_A	n	θ	
0.30	0.56	0.56	

[a]When simulations assumed initial trade balance $x=z=0.17$.

Table A.2[a]

Quarter	g_r[b]	g_M	g_A	λ	γ
1	0.103	0.376	0.591	0.093	0.2
2	0.122	0.723	0.709	0.19	0.5
3	0.132	0.931	0.797	0.25	0.8
4	0.138	1.08	0.887	0.28	1.0
6	0.14	1.35	1.04	0.35	
8	0.14	1.62	1.18	0.43	
10	0.141	1.74	1.27	0.45	
Long run	0.142	1.76	3.56	0.458	

[a]*Sources:* Banco Central (1981b, 1983), Corbo (1983), De Gregorio (1983), Solimano (1983).
[b]g_r denotes the price elasticity of supply of copper.

In Solimano (1983) labour demand schedules with adjustment costs are estimated using quarterly data for 1974–1978. An instrumental variable estimator is used.

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