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LONG-TERM CAPITAL REFLOW UNDER MACROECONOMIC STABILIZATION IN LATIN AMERICA

by

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SUMMARY

This paper focuses on the scope for stabilizing Latin American economies to repatriate capital for the financing of long-term investments and economic recovery in the region. In particular, a simple two-period investment model is developed to show that a government seeking capital repatriation may be tempted to introduce investment subsidies on such long-term capital inflows. Typically, however, such a government will be facing the following trade off: small investment subsidies may not be sufficient to attract large-scale repatriation, and high aggregate subsidies may trigger inflationary expectations. A decreasing subsidy scheme is shown to be optimal. Such a scheme has the following properties: it provides an incentive for investors to repatriate their capital early, and at the same time, it keeps government spending low enough not to jeopardize stabilization programmes. A decreasing subsidy scheme could account for the success that the Chilean debt-equity-swap programmes have had in attracting long-term capital inflows.

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PREFACE

Flight capital from Latin America is known to be unprecedently high in volume and very liquid in nature. It therefore represents an important foreign-currency source whose potential contribution to the financing of long-term investment and economic growth is far from negligible. For this reason, the identification of ways in which flight capital flows could be reversed from OECD countries to Latin America is of much relevance to the Development Centre's research within the context of its project on "Financial Policies for the Global Dissemination of Economic Growth".

This paper displays and discusses recent flight capital estimates, provides a non-technical discussion of the main analytical issues, explaining the motivations for capital flight, and of the incentive schemes to attract such capital. Finally, it provides a framework which helps to shed some light on the issue of how effective investment subsidies can be in the promotion of long-term capital inflows. A main policy implication that could be drawn is that, in their attempts to attract capital repatriation through investment subsidies, LDC governments should be careful to provide incentive schemes which do not endanger stabilization programmes.

The issues explored in this paper merit much deeper and wider reflection than they have received hitherto. Beatriz Armendariz's contribution to the debate is a useful basis for further research into this controversial topic.

Louis Emmerij
President of the OECD Development Centre
April 1991

I. INTRODUCTION

Recent estimates on the size of flight capital from Latin America reveal that US$150 billion, which is the equivalent of over half the region's external debt, had fled to OECD countries by the end of 1987. Estimates also reveal that nearly half that amount (over US$70 billion) is held in the form of liquid assets, and in particular, in the form of bank deposits across the region's border. Due to its considerable volume and liquid nature, flight capital represents an important foreign currency source whose potential contribution to the financing of long-term investment and economic recovery in Latin america is far from negligible[1].

In spite of on-going stabilization programmes taking place throughout the region most countries, however, have not yet benefited from the reflow of long-term capital. Selowsky (1989) explains that, at one end of the spectrum, such programmes are still at an early stage, as in Argentina, Brazil and Peru. In these countries, flight capital remains a major problem. At the mid-point, stabilization is more advanced, as in Bolivia and Mexico. At this stage flight capital is no longer as severe a problem. However, domestic investors are not reflowing such capital for financing long-term investment. (See, for example, Tornell (1990) for an illustration of the speculative nature of recent capital flows in Mexico). At the other end of the spectrum, stabilization has lasted for a sufficiently long period of time in countries such as Chile and Uruguay. In these cases, long-term capital inflows are no longer restricted by domestic factors but rather by a limited supply of external credit. Chile has nevertheless been able to attract a considerable amount of such flows from foreign savings and capital repatriation[2].

When looking closely at the Chilean experience one sees, however, that macroeconomic stability was not enough. In this case the long-term capital reflow is explained by investment promotion policies and, in particular, by the aggressive debt-equity swap programmes in place since 1985 [see Edwards (1990), for more on capital repatriation under debt-equity-swaps in Chile].

The debt-equity-swap device, however, has been strongly criticized notably because it involves government subsidies in countries where fiscal deficits are already burdensome. [See, for example, Krugman (1988), Rodriguez (1989), and Velasco and Larrain, (1990)].

A rationale for introducing subsidies to long-term capital reflow can be found in Dornbusch (1990a): in the aftermath of stabilization, there is a need for a mechanism to solve the co-ordination failure among investors holding liquid assets abroad, namely, that an individual investor will not find it profitable to repatriate capital unless other investors do the same, i.e., unless a front load of investment returns becomes sufficiently high to compensate investors for the risk of relinquishing the liquidity option of a wait-and-see position[3].

This paper develops a model of co-ordination among several investors contemplating the option of repatriating their liquid assets. The co-ordination problem arises from the existence of strategic complementarity among investors. The more

liquid assets that have been transformed into irreversible domestic investment, the more profitable it becomes — in certainty equivalent terms — for other investors to repatriate their assets[4]. When starting from a situation where all investors are holding on to their liquid option, there is then room for government intervention to trigger large-scale repatriation.

Supposing a government intervenes by subsidizing long-term capital reflow, this paper shows that typically such a government will face the following trade off: small investment subsidies may not be sufficient to attract large-scale repatriation, and high aggregate subsidies may trigger inflationary expectations. A decreasing subsidy scheme is shown to be optimal. Such a scheme has the following properties: it provides an incentive for investors to repatriate their capital early, and at the same time, it keeps government spending low enough not to jeopardize stabilization programmes. This decreasing subsidy scheme could account for the success that the Chilean debt-equity-swap programmes have had in attracting long-term capital reflow.

This paper is structured as follows: Section II displays and discusses recent data on Latin American flight capital, and summarizes the main analytical issues, explaining the motivations for capital flight, and the mechanisms for attracting repatriation of such capital. Section III focuses on the debt-equity-swap mechanism. Section IV presents a modified and adapted version of Murphy-Shleifer-Vishny's (1989) investment model which allows for capital reflow under alternative subsidy schemes: a uniform scheme and a decreasing scheme, respectively. Section V spells out some concluding remarks and new avenues for research.

II. FLIGHT CAPITAL

Broadly speaking, flight capital refers to any investment made in a foreign currency — ranging from holdings of foreign currency i.e., bank notes to holdings of bank deposits, shares, or real estate abroad.

Cordoso and Dornbusch (1989) identify three main motivations for flight capital: inflation/exchange rate risk which leads investors to shift from domestic to foreign currency assets; political risk, which leads investors to shift assets to a safe haven; and tax reasons which involve taking assets underground or to foreign tax shelters.

There are two main channels for developing countries' residents to acquire external assets. Specifically, they are the official and the unofficial (black market) channels. In most Latin American countries both these capital flight vehicles are used. However, in countries where there are no capital controls or where such controls are ineffective, e.g. Mexico, most capital flowing out goes through the official channel[5].

Table 1

LATIN AMERICAN FLIGHT CAPITAL UP TO 1987[1]
(billions of US dollars)

Country	Total Aggregate	Time Pattern					
	(1973-1987)	1982	1983	1984	1985	1986	1987
Argentina	29.4	8.1	1.3	1.1	-2.0	-1.9	4.2
Brazil	15.5	0.3	-0.1	2.2	4.1	6.1	n.a.
Chile	-3.3	1.2	-0.3	-0.4	-0.5	-1.2	-0.3
Colombia	1.9	-0.3	0.4	0.2	1.4	1.2	n.a.
Mexico	60.9	6.1	8.9	3.7	6.2	4.0	6.3
Peru	2.5	0.3	-1.2	0.4	1.2	1.2	1.4
Uruguay	0.8	0.6	0.7	-0.2	0.3	-0.4	-0.1
Venezuela	38.5	-2.0	4.1	2.2	1.0	2.3	1.3
Other Countries[2)]	4.8	-3.1	5.6	-1.1	1.6	1.6	0.1
Total Latin America	151.0	11.2	19.4	8.1	13.3	12.9	13.5[3]

1. *Source: Pastor, M. (1989)*
2. The other countries figures are for ten other Latin American countries: Bolivia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Nicaragua, and Paraguay.
3. This figure does not include Brazil and Colombia for which data on flight capital for the year 1987 is not yet available.

On the contrary, in countries where there are capital controls or where underground earnings are involved, like Brazil, Peru, and Colombia, among others, most of the capital transferred abroad goes through the black market. The most common way by which foreign assets are accumulated to be sold on the black market is through over-invoicing of imports and/or through under-invoicing of exports (for more on this, see Dornbusch (1990b).

Measuring flight capital turns out to be an extremely difficult task for two main reasons. First, the data problems are countless (see Williamson, 1987, for a discussion on this issue). Second, economists disagree as to whether flight capital is to be defined in terms of its consequences or in terms of its motivation (Cordoso and Dornbusch, 1989).

Pastor (1989) provides the most recent estimates of Latin American flight capital stocks, and these are reproduced in Table 1. He points out that his definition of flight capital [the same as that used by Dooley *et. al*. (1984), Morgan Guarantee (1986), and Lessard and Williamson (1987)] is broader than others [particularly broader than those definitions provided by Cuddington (1987), and Conesa (1986)].

It should be noted, however, that Pastor (1989) seems to underestimate the stock of Latin American flight capital (at around US$150 billion) as of 1987. First, because earlier estimates (see notably, Lessard and Williamson, 1987) show that, indeed, over US$100 billion had already left the region by the mid-1980s. Secondly, because the over-invoicing of exports and the under-invoicing of imports cannot be fully accounted for (see, Dornbusch 1990b). Third, and most important, the US$150 billion estimate does not include the compounded value of non-repatriated interest on such a stock of flight capital. Adding compounded interests (assuming all investments yield the same returns as the US treasury bills) the Latin American flight capital, as of 1987, is estimated to be of around US$352 billion. This figure is the equivalent of almost twice the region's external debt for the year 1987!

How liquid is the Latin American flight capital? Figure 1 shows estimates on the stocks of bank deposits of Latin American residents abroad. In particular, liquid flight capital — in a narrower definition which refers to cross-border bank deposits only — is estimated to be around US$70 billion in 1987. Throughout the last three years such deposits have increased to nearly US$80 billion.

INSERT FIGURE

1. Prospects: Macroeconomic Stability, and the Waiting Option

Most economist agree on the fact that long-lasting stabilization will improve the prospects the region has to bring about capital reflow.

Going back to Table 1 we see that, indeed, macroeconomic stability can account for the pattern of flight capital in different Latin American countries. Argentina's flight capital, for example, which was very high in the early 80s, fell during the mid-decade stabilization efforts and has accelerated in the recent period. Mexico follows a similar, though less pronounced, pattern up to 1987. A remarkable example is Chile's stable macroeconomic environment which has brought about negative flight capital indicating that the Chilean residents brought capital back to their country.

However, recent literature on capital reflow [see, notably Dornbusch (1990a)] points out that macroeconomic stability is not enough. The reason is that throughout the stabilization process income is being redistributed away from labour to capital. Investors holding liquid assets abroad will then anticipate that governments will reverse stabilization policies under labour pressure. This will bias investors' decisions against domestic investments in plant and equipment. In particular, investors will persistently prefer to adopt a wait-and-see attitude to hold on to their liquid assets and systematically postpone domestic investment in plant and equipment.

Dornbusch's wait-and-see framework can account for the absence of long-term capital reflow in Mexico and Bolivia despite the fact that such countries have had a fairly stable macroeconomic environment for quite some time now.

2. Mechanisms

How can LDCs attract capital reflow? Literature on this question emphasizes real interest rates, real exchange rates, capital controls, financial transaction taxes, tax amnesties on repatriated capital, and the taxation of expatriated asset holdings by OECD countries.

Real interest rates: if LDCs keep real interest rates sufficiently high, domestic investors will be compensated for the risk they take when holding onto domestic currency denominated assets. However, very high real interest rates can a) discourage domestic investment in plant and equipment, and b) deteriorate public finance by increasing domestic debt service burdens (Dornbusch, 1987).

Real exchange rates: by keeping real exchange rates undervalued, export-producing firms in LDCs will be encouraged to invest more. However, undervalued exchange rates can a) have a very inflationary impact, and b) lower the living standard of wage earners (Cordoso and Dornbusch, 1989).

Capital controls: by introducing some form of capital controls — if possible — LDCs increase the transaction costs paid by investors attempting to shift to foreign-currency denominated assets. The capital controls issue is a very controversial one. Economists like Khan and Ul Hague (1987), for example, argue against capital controls on the following grounds: "Such controls are effective only in the short run, and tend not only to be circumvented in the long run, but also often create serious distortions and inefficiencies". Empirical analysis, however, shows that capital flight has been less severe in countries that have implemented some form of capital controls (see for example, Cuddington 1986, and Pastor 1989).

Financial transaction taxes: by introducing a special form of taxation on financial outflows — called Tobin Taxes — LDCs can reduce the variance of the real interest rates and induce more domestic investment in plant and equipment (see Tornell, 1990). Such taxes have not yet been implemented in most LDCs.

Tax amnesties: by providing an amnesty to those people who engaged in illicit capital export, LDCs will be able to attract capital repatriation. The main problem with amnesties is that they erode government credibility, and they become ineffective to the extent that people anticipate that the government will provide amnesties again in the future (see Dornbusch 1987 and Tornell 1988).

Tax on expatriated assets holdings: By introducing a high tax on expatriated assets holdings, OECD countries can contribute to discourage capital from flowing out of LDCs. So far, however, the trend has been an outright elimination of taxation on non-resident assets, which is exactly the opposite of what LDCs would hope for (see, for example, McLure's (1989) article on US Tax Laws and Capital Flight from Latin America).

III. DEBT-EQUITY-SWAPS

A debt-equity-swap consists of converting LDCs' foreign loans into domestic equity. The swaps were intended to benefit LDCs on two counts, they would cancel part of the debt burden and they would stimulate foreign direct investment.

Most economists agree, however, that swaps do not benefit LDCs in either way. Helpman (1988) for example, points out that swaps do not cancel LDC debt because they boil down to exchanging an old claim on a country for a new (equity) claim; and that domestic investment does not always increase as a result of the swap. In particular, he shows that investment could decrease if a higher demand for equity raises the price of capital.

Krugman (1989) highlights the following three problems inherent to the swaps:

1. They boil down to postponing debt-repayments, i.e., they boil down to debt-rescheduling, because an equity claim will normally provide a stream of repatriated earnings that rises over time with both growth and world inflation;

2. They can worsen the foreign exchange problem in LDCs because the possibility of round-tripping[6]; and because in absence of additionality (i.e., when a foreign firm uses a debt-equity swap to carry out an investment that it would have undertaken anyway) the country fails to obtain a foreign exchange inflow, and uses its own foreign reserves instead to buy its debt; and:

3. They can aggravate the LDCs fiscal problems mainly because:

    a. internal debt (at a very high interest rate) is generally created to buy back external debt — when, in particular, the government does not own the equity and must borrow on the domestic market, to pay the foreign investor who will, in turn, buy the equity from the private sector; and:

    b. there is an investment subsidy arising from the fact that the country pays a lower discount for its debt than secondary-market discount.

Despite such widespread criticisms, LDCs have implemented large-scale conversions of debt into equity.

1. Debt-Equity-Swaps in Latin America: Some Facts

Debt-for-equity conversions in Latin America have been huge. Table 2 shows that for the 1983-89 period over 50 per cent of foreign direct investment in the region took place under the debt-equity-swap programmes, especially in countries like Brazil, Chile, and Venezuela.

These facts are not surprising since countries undertaking the swap programmes provide an up-front discount on the cost of an investment project. A recent study by the IFC shows that such an up-front incentive accruing to the investor equals somewhere between a quarter and a third of the total cost of an investment project.

Typically, the incentive accruing to the investor results from the difference between the secondary market price, i.e. the discounted price at which each unit of debt is bought by the investor, and the redemption price, i.e. the price at which the country buys back (or redeems) each unit of its debt from the investor. Since the secondary market price is lower than the redemption price, the investor gets an investment subsidy.

However, we should expect such a subsidy to be proportionally lower when the secondary market price increases for whichever reason, — because the country undertaking the swap has a lower debt level when the expected probability of repayment becomes higher, or because the country resumes payments on its defaulted obligations.

Table 2

FOREIGN DIRECT INVESTMENT IN LATIN AMERICA (1983-89)[1.]
(millions of 1985 dollars)[2.]

Country	Excluding swaps	Including swaps
Argentina	3 251	3 990
Brazil	3 890	9 315
Chile[3]	782	4 129
Colombia	3 610	3 610
Costa Rica	466	466
Ecuador	454	454
Mexico	7 537	10 607
Peru	72	72
Uruguay	-19	-3
Venezuela	76	309
Total	20 120	32 950

1. Net flows on Balance of Payments basis, including equity and reinvestment flows
2. Deflated by the US index of capital equipment prices.
3. Reinvestment not reported by recipient country.

Source: *The Institute of International Finance, July 1990.*

2. The Debt-Equity-Swaps in Chile

Chile was among the first Latin American countries to have adopted an active debt-for-equity conversion programme starting in 1985. Broadly speaking, such a programme divides up into two different schemes commonly referred to as Chapter 18 and Chapter 19 operations which apply, respectively, to swaps undertaken by domestic residents and by foreign residents. [For more on this, see Edwards 1990), and Ffrench-Davis (1990)].

Edwards (1990) estimates that upon the adoption of the debt-for-equity conversion scheme Chile has been able to reduce its foreign debt from US$17.2 billion in 1982 to approximately US$8 billion in 1990. At the same time, the price of Chilean debt in the secondary market has increased in recent years from around 60 to 80 cents on a dollar face value in 1985 and 1990, respectively. (See the LDC debt reports.)

Such an increase in Chilean debt prices translates into lower up-front investment subsidies — as long as redemption prices do not increase. In fact, Ffrench Davis (1990) reports that redemption prices have decreased from 93 to 85 cents on a dollar face value in 1985 and 1988, respectively.

The effect of the debt-equity swaps on additional domestic investments in Chile remains much of an empirical question which is out of the scope of this paper. Most observers seem to agree, however, that the swaps did help Chile on the promotion of foreign direct investment inflows (see Table 3), and on the attraction of capital repatriation [especially through the so-called Annex 4 of Chapter 18 swaps, Edwards (1990)]. See also the Report by the Institute of International Finance (July 1990). Furthermore, the investment subsidies embodied in such swap programs did not compromise macroeconomic stability.

In the following section we provide a rationale as to why investment subsidies, when especially designed, can help a developing country to improve its investment climate and brighten its prospects for attracting a reversal of flight capital.

Table 3

UP-FRONT INVESTMENT SUBSIDIES, AND INVESTMENT INFLOWS IN CHILE
1987-1989

Year	Investment Subsidy[1]	Investment Inflows[2]	
		With subsidy (through swaps)	Without subsidy
1987	31.6	436.0	105.0
1988	30.1	515.7	124.2
1989	23.4	796.4	268.6

1. The up-front subsidy embodied in the swap is defined as the difference between yearly average secondary market prices of Chilean external debt and yearly average redemption prices. Secondary market prices are from LDC Debt Reports published weekly by American Banker, New York. Redemption prices are from Corporación de Investigaciones Económicas para Latinoamérica (CIEPLAN), Nota Técnica No. 129, by Ffrench Davis, July 1990.

2. These figures are in US$ millions. Net investment with subsidy, i.e., through swaps, are estimated at yearly average secondary market prices for Chilean external debt. Net Investment without subsidy refers to standard long-term capital inflows, i.e., investment undertaken without the use of the swap mechanism. Investment inflows include reinvested profits.

Source: CIEPLAN, Nota Técnica No. 129.

IV. AN INVESTMENT MODEL OF CAPITAL REFLOW WITH GOVERNMENT SUBSIDIES[7]

Let us consider a two-period economy with many sectors of production. Each one of these sectors has a competitive fringe of firms that produce the same type of goods by using a constant returns to scale (CRS) technology. In addition to this, each sector has a unique firm, i.e., a unique potential monopolist, which can produce the same goods by using an increasing returns to scale (IRS) technology. This is a lagged-technology requiring one-period production. In particular, every monopolist deciding to use IRS technology has to pay F (fixed cost which is measured in units of labour income) in the first period and then produce $\alpha > 1$ units of output per unit of labour input in the second period.

Consider the case where all potential monopolists in this economy are domestic investors who hold their money abroad[8]. The main question addressed in this model is whether it will be profitable for each individual investor to repatriate capital for producing under an IRS technology. To answer this question let us first make the following assumption: upon deciding to repatriate his capital for investing in an IRS technology a monopolist creates a positive demand spillover on the other potential monopolists. This assumption can be justified as follows: in a given sector of the economy of a developing country it is generally observed that large firms pay higher wages to their employees than do small firms, mainly because the former have a productivity gain from investing in an IRS technology. But such an increase in employees' wages contributes to creating an increased demand for goods which can be produced by other potential monopolists. This assumption is particularity relevant for the case of developing countries facing high transportation costs to send goods abroad, otherwise potential monopolists could decide to repatriate their capital for producing exportable goods. Such transportation costs are presumably very high in many developing countries whose infrastructure in roads, railways, ships, etc. to send goods abroad is quite poor.

The above assumption implies that there is strategic complementarity on the investors' decisions to repatriate their capital. In particular, the higher the number of investors who repatriate their capital into IRS technologies the more attractive it becomes for other investors to do the same.

As it is typically the case in all strategic complementarity set-ups, this model will have multiple equilibria. In particular, we will have at least two equilibria: a `good' equilibrium where investment in IRS technologies is booming as all investors repatriate their capital, and a `bad' equilibrium where there is very little investment; i.e., no potential monopolist finds it profitable to repatriate capital.

Let us now go back to our original question as to whether it will be profitable for every individual monopolist to repatriate capital.

Let y_1 and y_2, respectively, be the first and second period income of a representative monopolist in the good equilibrium:

$$y_1 = L - F \qquad (1)$$

where: L = labour income when wages are set equal to one (L is assumed to be in the same in both periods), and

F = fixed cost (measured in units of labour income) that the monopolist pays in period one upon deciding to invest in IRS technology.

$$y_2 = L + \Pi_2 = L + ay_2 = \alpha L \qquad (2)$$

where: Π_2 = monopolist's profits valuated at period two, and

a = $1-(1/\alpha)$ = marginal profit rate of the monopolist per dollar of sales.

In the above expressions we see that, in the good equilibrium, the monopolist's first period income is lower than his second period income, i.e., $L-F < \alpha L$ for all $\alpha > 1$. For a representative monopolist to accept a lower income in period one than in period two, the discount factor of the economy in such a good equilibrium must be:

$$\beta^* = \frac{1}{1+r^*} = \beta \left(\frac{\alpha L}{L - F} \right)^{\theta - 1} \qquad (3)$$

where: r^* = equilibrium interest rate,

β = subjective discount factor of a representative monopolist, and

θ = parameter measuring intertemporal substitution.

The interest rate rises in equilibrium as a result of higher investment in the economy. Such an increase in interest rate will, in turn, prevent consumption-smoothing behaviour. It will, in particular, prevent the representative consumer in this economy from wanting to borrow for increasing his first period consumption. The higher is θ, the less adverse is the consumer to sacrifice consumption today for increased consumption tomorrow, and hence the lower is the interest rate needed to equibrate the loan market at zero. In the limiting case in which $\theta=1$, the consumer is perfectly happy to substitute consumption between periods one and two, and the equilibrium discount rate, β^*, is simply the rate of time preference β.

A monopolist expecting income y_2 from (2) and faced with a discount factor from (3) will decide to invest in the first period provided:

$$a \alpha L \beta \left(\frac{\alpha L}{L-F}\right)^{\theta-1} - F > 0 \qquad (4)$$

When condition (4) holds the interest rate does not rise by too much when consumption is growing and, hence, investment in IRS technologies in other sectors of the economy will not be discouraged. Indeed, for such a good equilibrium to exist, it suffices that a potential monopolist invests in anticipation that other potential monopolists will invest as well, and that domestic income will rise as a result. In fact, in such a good equilibrium situation, all the potential monopolists will invest in anticipation of profiting from higher income, i.e., all investors will reflow their capital into IRS technology. In other words, for such a good equilibrium to exist the interest rate effect must be dominated by the income effect — by the positive demand spillover every monopolist creates upon deciding to invest in IRS technology.

The above equilibrium condition, however, does not reflect the situation prevailing in many developing countries. In most Latin American countries, in particular, investment performance has been poor and little capital reflow has come about. Such economies are, so to speak, in the bad equilibrium situation. The question then is whether there is room for government intervention to bring about a good equilibrium situation like the one we have just described. This question is dealt with below.

1. A Uniform Investment Subsidy Scheme

Suppose the government intervenes by introducing a uniform investment subsidy to IRS technology. The problem then is that such a government will be facing the following trade-off: small investment subsidies may not be sufficient to attract capital reflow, and too large aggregate subsidies may also prevent investors from repatriating their capital, as they will rationally anticipate that increased government spending translates into higher taxation of future profits, i.e., investors anticipate that higher taxation of future profits will come about either directly, or indirectly, say, via inflationary taxation, and/or, exchange rate devaluations which will increase the domestic price investors pay for imported inputs.

Consider the case where a devaluation is expected to come about as a result of increased government spending in investment subsidies. To see how such a devaluation will affect the monopolist's profits negatively, let's first re-define such profits (valuated in the second period):

$$\Pi_2 = ay_2 - P_2K \qquad (5)$$

Where: P_2K = fixed cost spent in foreign input which is pushed on into period two;
P_2 = unit cost of input K expressed in domestic currency; and in particular,

$$P_2 = eP^* \qquad (6)$$

where: e = domestic currency price of foreign exchange, and
P* = foreign currency price of the input.

By substitution of equation (5) into equation (3), we have:

$$y_2 (1-a) = L - P_2K \qquad (7)$$
$$\Rightarrow \quad y_2 = \alpha (L - P_2K) \qquad (7')$$

The equilibrium discount factor will now be given by:

$$\beta^* = \beta \left(\frac{\alpha (L - P_2K)}{L - F} \right)^{\theta - 1} \qquad (8)$$

A representative investor expecting y_2 from (7′) and facing a discount rate from (8) will invest in IRS technology in period one provided:

$$a\alpha (L - P_2K)\beta \left(\frac{\alpha (L - P_2K)}{L - F} \right)^{\theta - 1} - F > 0 \qquad (9)$$

Let us now analyse how large a subsidy the government should provide (to each investor) in order to attract capital reflow, i.e., for condition (9) to hold.

Suppose such a subsidy finances part of the fixed cost, F, the investor pays in the first period. For the subsidy to be effective on attracting capital reflow, a representative investor's profits (valuated at period one) must be positive. In particular:

$$\Pi_1 = \beta\ [aL - P_1K] - F > 0 \qquad (10)$$

where: a = 1-(1/α) = marginal profit rate of the monopolist per dollar of sales, and
P_1 = unit price of intermediate inputs valuated in period one.

We assume that for the above expression (10) to hold, the government must give a positive subsidy to the investor of at least:

$$\Delta G = F - \beta\ (aL - P_1K) \qquad (11)$$

Where: ΔG = change in government spending on each investor, and
P_1 = unit price of intermediate inputs valuated at period one.

Suppose such an increase in government spending is financed by money creation[9], then,

$$\Delta M = F - \beta\ (aL - P_1K) + W \qquad (12)$$

where: ΔM = change in money creation, and
W = money wage compensation, i.e., a compensation to labour income needed to keep real wages unchanged[10].

The link between money creation and the exchange rate is given by:

$$e = \left(\frac{M}{M*}\right)\left(\frac{m*}{m}\right) \qquad (13)$$

where: M and M* = domestic and foreign money stocks, respectively, and
m and m* = domestic and foreign real balances, respectively.

Assume m* and m are kept constant; then,

$$\hat{e} = \frac{\Delta e}{e} = \frac{\Delta M}{M} - \frac{\Delta M*}{M*} \qquad (14)$$

By keeping the second term in the above expression constant we have that, as a result of an increased government spending financed by money creation, the exchange rate depreciates by:

$$\hat{e} = \frac{\Delta e}{e} = \frac{F\,\beta aL + \beta P_1 K}{M} \qquad (15)$$

From (15) we can obtain a new unit price for intermediate inputs, i.e., a new unit price for inputs valuated at period two:

$$P_2 = (e + \Delta e)\, P* \qquad (16)$$

or,

$$P_2 = eP* \left(1 + \frac{F - \beta aL + \beta P_1 K}{M} \right) \qquad (17)$$

where: P_2 = domestic unit price of intermediate inputs valuated at period two, and
P* = foreign price of intermediate inputs.

Note that in expression (17) the first term is $eP* = P_1$, and the term in parenthesis is greater than one. This implies that $P_2 > P_1$.

Such an increase in price of intermediate inputs will be perfectly anticipated by the potential monopolists in this economy. As a result, they will evaluate profits in the `low' state, i.e., in the state when P is the highest, and hence, no potential monopolist will reflow his capital, and in particular,

$$\Pi = \beta\,[aL - P_2K] - F + \Delta G < 0 \qquad (18)$$

What the above expression tells us is that the government must `overshoot' spending if it wants to attract capital reflow. In particular, the government should spend on each investor:

$$\Delta G > F - \beta\,[aL - P_1K] \qquad (19)$$

The problem then is that, an overshooting of government spending will make P_2 rise by still more! Typically, the government will be persistently spending more and more in subsidies than it would otherwise, i.e. if the exchange rate did not depreciate and if the price of intermediate inputs did not rise. Is there a fixed point to such an inflationary process that the government triggers on when trying to attract capital reflow?

Consider the following price and profit equations, respectively:

$$P(\Delta G) = P_1\left(1 + \frac{\Delta G + W(\Delta G)}{M}\right) \qquad (20)$$

$$F(\Delta G) = \beta\,(aL - P(\Delta G)\,K) - F + \Delta G \qquad (21)$$

If the profit equation (21) becomes positive for $\Delta G > 0$ then investors will reflow their capital under a uniform investment subsidy scheme. To see this we substitute (20) with (21) which gives us:

$$F(\Delta G) = \beta\left[aL - \left(P_1\frac{(1 + \Delta G + W(\Delta G))}{M}\right)K\right] - F + \Delta G \qquad (22)$$

By differentiating the above expression on ΔG we have:

$$F'(\Delta G) = \beta P_1 K \left(\frac{1 + W'(\Delta G)}{M} \right) + 1 \qquad (23)$$

By looking at this last expression we see that it becomes negative when W/ is large enough. This result has a straightforward interpretation: when investors anticipate a very high inflationary effect as a consequence of too high aggregate subsidies, then, there does not exist a ΔG such that investors will find it profitable to reflow their capital.

One reason why aggregate subsidies may be too inflationary is because, under the uniform subsidy scheme, the government offers the same subsidy to all individual investors, and there may be too many of them. An alternative subsidy scheme would be a decreasing one: the government offers a high subsidy to the first investor, and then less to the second, and then still less to the third, and so on and so forth. Could such a decreasing subsidy scheme succeed in keeping inflationary pressures low and, at the same time, attracting capital reflow? This question motivates the following:

2. A Decreasing Investment Subsidy Scheme

Let n be the number of potential investors in IRS technology, with nε (0,1). Provided all investors reflow their capital, second period income is given by:

$$y_2 = L + n(ay_2 - PK) \qquad (24)$$

$$\Rightarrow \quad y_2(n) = \frac{1}{1 - na}(L - nP_2K) \qquad (25)$$

By differentiation of the above expression we have:

$$\frac{dy_2(n)}{dn} = \frac{a(L - nP_2K)}{(1 - na)^2} - \frac{P_2K}{1 - na} \qquad (26)$$

$$= \frac{ay_2(n) - P_2K)}{1 - na} > 0 \qquad (27)$$

This means that second period income increases the higher the number of investors reflowing their capital. Profits valuated at period two will also increase in n:

$$\Pi_2 (n) = a y_2 (n) - P_2 K \quad (28)$$

$$\frac{d_2 \Pi (n)}{dn} = a \frac{dy_2 (n)}{dn} > 0 \quad (29)$$

Note that strategic complementarity, i.e., the fact of having higher profits the higher is the number of investors reflowing their capital, is mainly a result of positive demand spillovers and the existence of fixed costs. In particular, the higher is the demand spillover parameter, *a*, the more rapidly profits will increase with the number of investors reflowing their capital.

Profits valuated at period one are:

$$\Pi_1 (n) = \beta^* \Pi_2 (n) - F \quad (30)$$

where:

$$\beta_n^* = \beta \left(\frac{y_2 (n)}{L - F} \right)^{\theta - 1} \quad (31)$$

Note that expression (31), above, decreases with n. This implies that the higher the investment is in real capital, the higher will the equilibrium interest rate be since $\beta^* = 1/1+r^*$. Higher interest rates do not have a negative effect on investment, however, because the spillover effect dominates.

Consider the effect of a decreasing subsidy scheme introduced by the government for attracting capital reflow. By substitution of (28) into (30), and by adding government spending we have the following expression for first period profits:

$$\Pi_1 (n) = \beta_n^* [a y_2 (n) - P_1 K] - F + \Delta G_n \gtrless 0 \quad (32)$$

Should this expression be positive the government succeeds at eliminating the bad equilibrium.

Theorem:

If *a* is sufficiently large, and if inflationary expectations are not too high, there exists a decreasing subsidy scheme that would eliminate the undesirable equilibrium.

Proof:

Consider the following expression for the change in government spending:

$$\Delta Gn = F - \beta_n^* (ay_2 (n) - P_1 K) \qquad (33)$$

We know from equation (31) that β_n^* is decreasing in n (the interest rate effect). ay_2 (n) - P_1K, on the other hand, is increasing in n (the spillover effect). By assumption, however, the spillover effect dominates the interest rate effect. Hence ΔGn is decreasing in n, and all the more rapidly when *a* is large enough.

Let's now consider the *ex-post* domestic price of foreign inputs:

$$P_1 = P_o \left[1 + \frac{\Sigma \Delta Gn + W'(\Sigma \Delta Gn)}{M} \right] \qquad (34)$$

This expression shows that, when ΔGn decreases rapidly, and when $W^{/}$ is not too large then the *ex-post* price for foreign inputs will be bounded above at such a low level that the undesirable equilibrium will be eliminated.

V. CONCLUDING REMARKS

This paper has shown that corrective government intervention can be effective at resolving the co-ordination failure among investors who would otherwise postpone the repatriation of their assets.

It should be noted however that in our framework, large-scale repatriations arrive simultaneously when the appropriate subsidy scheme is implemented. We therefore miss an important element, which is the pattern of repatriations over time. In one instance such a pattern could be accounted for in future research by assuming that investors are heterogeneous, in the sense that some of them are more eager than others to repatriate their capital. Typically, this type of framework (see, notably, Farrell and Saloner, 1985) will give rise to sequential decision making which would take into account repatriations coming about gradually—for a repatriation stream of a band wagon type. How would the optimal investment subsidy scheme look in such a framework?

Our framework highlights the issue of extra costs; costs that are additional to those born out of macroeconomic stabilization policies, which may be needed to attract long-term investments from abroad. The question then, is whether such costs should be shared by industrialised countries. In particular, these countries could co-operate with LDCs by a) implementing a very high tax on expatriated capital, and b) exempting from taxation the income earned out of foreign direct investment in LDCs.

Are subsidies still necessary to foster long-term financial flows to Latin America in the context of US President Bush's free exchange zone project? Perhaps some countries will still need to subsidise investment from abroad because they are disadvantageously located with respect to the North American market. Should Canada and the United States grant preferred treatment to such countries' exports for a more equitable development within the Latin American region?

It is important to bear in mind that the model developed in this paper may not be appropriate to the analysis of investment-incentive schemes in free-trade zones, because of its heavy reliance on domestic demand considerations.

However, such a model does serve as a stepping stone to deal with more general questions on public spending allocation. In particular, it can easily be extended to justify increased spending on infrastructure to attract long-term financial flows. To the extent that this supply-side spending is limited, we should not expect its inflationary impact to be as great as that of government subsidies for demand-driven investments.

Finally, the model could be extended to spot the linkage between investment in infrastructure and debt relief. Does the latter have a positive impact on the former? If not, the question arises as to why debt relief is not made conditional upon increased public investment in infrastructure.

NOTES AND REFERENCES

1. See Pastor (1989), and Lessard, D.R., and John Williamson (1987) for capital flight estimates. Cross-border bank deposits of the Latin American residents can be found in the Quarterly US Treasury Bulletins and also in the IMF Financial Statistics.

2. See The Institute for International Finance (1990) for evidence on direct investment flows, and Pastor (1989) for evidence on capital repatriation in Chile. Edwards (1990) explains that Chilean capital repatriation has translated into long-term investment through the debt-equity swap programme, and in particular, through the so-called *Annex 4 of Chapter 18* operations. See, also Section III, below.

3. Pioneer rents are assumed away in this framework. The reason being that no one investor finds it profitable to make an irreversible (domestic) investment because he/she anticipates that stabilization policies will be reversed -- when, in particular, stabilization policies involve income redistribution away from labour and towards capital, and every investor anticipates that such policies will be reversed under labour pressure. (See, Section II.1, below).

4. As Pastor (1989) puts it ...*"Business, after all, faces a sort of prisoner's dilemma: if one business invests alone, it may find neither final markets nor suppliers, whereas if many businesses invest simultaneously, they help create each others' final markets and input supplies"* ... pp. 23.

5. Mexico shares a 2 013-mile frontier with the United States which makes it virtually impossible for the Mexican authorities to enforce any type of capital controls.

6. Round-tripping refers to the following transaction: after having swapped the debt for equity, the investor can sell the equity and withdraw the proceeds from the developing country back to the creditors' country.

7. The first section of this set up follows exactly the formalisation adopted by Murphy-Sheifer-Vishny (1989) in their two-period investment model. We modify this model next, in Sections IV.1 and IV.2 to allow for government intervention.

8. More generally, the model presented in this section applies both to capital repatriation and to foreign direct investment.

9. This assumption can be justified as follows: most LDC governments cannot raise taxes immediately to finance their increased spending, i.e. LDC governments face fiscal rigidities (for more on this see Ize and Ortiz, 1987). The other alternative could be debt financing which, under certain conditions, can be as inflationary as money financing. The main reason being that most

LDCs have a weak fiscal stance because public debt (both foreign and domestic) is already too high. As a result, domestic holders of public debt ask for very high risk premiums to hold domestic public bonds. This makes LDC governments increasingly burdened by domestic debt servicing, and such a burden can increase the equilibrium rate of inflation (see, for example, Dornbusch 1986).

10. For simplicity we will be considering the case where real wages are indexed. Otherwise, a reduction in real wages arising from inflation will have a negative effect on the demand for the monopolists' products, and in overall investment in IRS technology. Such a negative demand effect is out of the scope of this model.

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