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Capital Flight, Saving Rate and the Golden Rule Level of Capital: Policy Recommendations for Latin American Countries

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ABSTRACT:
This paper seeks to analyze the determinants of capital flight in selected Latin American countries throughout the 1990s, and gives some insights into what economic policies would be adequate under capital flight conditions. Finding, empirically, the saving rate to be a new determinant of capital flight, this paper discusses whether or not achieving the golden rule level of capital would be desirable and what source of government revenue (direct or indirect taxation) would be appropriate under those conditions.

JEL Classification Codes: F43; O54

Key words: determinant; direct taxation; indirect taxation

1. INTRODUCTION

According to existing literature on capital flight, most of the Latin American countries have experienced this phenomenon during the last three decades[1]. Capital flight has been observed in Latin America since the 1970s, when researchers found that many Latin American residents have been sending money abroad for investment purposes. In some situations it was to protect their investments from the political and macroeconomic instability and lack of legal protection for their assets, while at other times, it was solely to avoid domestic taxes.

Throughout economic literature, the definition of capital flight has been interpreted in different ways. However, we will interpret capital flight following Pastor (1990), simply as the resident capital outflows*,* where capital can be represented by any asset local residents have sent abroad, maintaining them out of reach of national regulations. Capital flight from Latin American countries has been studied mostly in the 1970s and 1980s when most of Latin American countries experienced political and macroeconomic instability[2]. Only few studies, however study this issue in the 1990s[3].

The 1990s was an interesting decade as the region attempted to restore both political and macroeconomic stability; existing literature[4] suggested stability of a country affects the level of confidence in local residents' investment decision. During this decade, the region had democratically elected government[5] and the macroeconomic

[1] Cuddington, J. T. (1986) and Pastor, M. (1990) had observed this phenomenon in Latin America in the 1970s and 1980s whilst Schneider, B. (2003) in Argentina and Chile in the 1990s.
[2] Macroeconomic instability refers to the period when many Latin-American countries experienced high level of inflation, high level of external debt, fiscal deficit, and current account deficit.
[3] Schneider, B. (2003) studied capital flight in Argentina and Chile in the 1990s.
[4] Referred to Pastor, M. (1990).
[5] With the exception of Cuba and Haiti.

policies were determined by the so-called Washington consensus. The Washington consensus was formulated in 1989 by a former International Monetary Fund advisor John Williamson – though, these policies were gradually abandoned by most Latin American countries in the early 2000s[6]. The Washington consensus include the following major reforms: fiscal discipline and tax reform, liberalization of financial and exchange markets, liberalization of trade and foreign investment, privatization, and deregulation. The principal objective of these policies was to reduce poverty but also aimed to bring macroeconomic stability to the region. Both political and macro-economics stability was expected to increase the level of confidence of local investors, thus reducing the incidence of capital flight. The magnitude of capital flight in the decade of 1990 is summarized in appendix A.

The total capital flight for the six countries studied in this paper (Argentina, Brazil, Chile, Colombia, Mexico and Venezuela) throughout 1990s was 229 billions of American dollars, which represents 2.68 percent of aggregated GDP. These six countries show capital outflow over the decade, with Venezuela being the most affected with an average of 6.87 percent of capital flight as a percentage of GDP. Furthermore, capital flight is not an exclusive problem of Latin American economies. This phenomenon has been witnessed in other countries such as Russia in the 1990s, India and Nigeria between 1970 and 1990 and Thailand from 1980 to 2000, according to several authors[7].

The consequences of capital flight are well-known and have been outlined in Pastor (1990). Firstly, capital flight reduces the domestic level of capital per worker, which is one of the most important sources of economic growth. Secondly, capital abroad is difficult to tax, as the domestic fiscal authority has little information regarding investments abroad and no legal power to enforce the law in other countries. Finally, capital flight produces an unequal welfare distribution because large amounts of money and a good knowledge of investment abroad are required to open off-shore bank accounts. Only the wealthiest people in the society are able to gain access to those types of investment opportunities. Consequently, inequality occurs as the wealthiest people in the society have access to investment schemes protected by better legislation, therefore enjoying asset diversification as well as avoiding domestic taxes. Meanwhile, the least wealthy people in the society have little choice other than to invest locally, paying tax on investment return and suffering the lack of investment protection from the local government[8].

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[6] Note that not all countries implemented all the policies (e.g. Argentina did not have fiscal discipline during those years), and not all the countries in the region abandoned all the policies (e.g. Chile maintain most of these policies).

[7] Boyrie, M.E., Pak, S. J. and Zdanowcz, J.S. (2005) discuss capital flight in Russia; Chipalkatti, N. and Rishi, M. (2001) in India; Onwioduokit, E.A. (n.d) in Nigeria and Almounsor, A., Beja Jr, E., Juvith. P. and Ragusett, J. (2003) in Thailand.

[8] The lack of investment protection from local government includes the confiscation of savings that took place in Argentina (1989 and 2001) and Ecuador (1999). It also refers to the period of high inflation or hyperinflation in Argentina and Brazil (1989).

2. MEASUREMENT METHODS

Three main methods of capital flight measurement can be distinguished in the literature (Lensink, Hermes and Murinde 1998). The first measurement method is an indirect method, the so-called "residual method" developed by the World Bank and Erbe (1985), where they take capital flight as a residual of other balance of payment and not balance of payment components, and then compare the sources of capital inflows with the uses of these capital inflows. The second measurement method is a direct method first used by Cuddington (1986), which employs data from the balance of payment statistics to identify capital flight as one or more categories of short-term capital outflows (Kant 1996). This capital outflow, which responds quickly to political or financial crisis, is presumably also the capital that has the potential for returning quickly to the country when conditions change (Kant 1996). The third measurement method was proposed by Dooley (1986) which aims at measuring abnormal and illegal outflows using a combination of direct and indirect methods. With this method, Dooley (1986) defines capital flight basing on the desire to place assets beyond the control of domestic authorities, but excluding normal outflows.

The study is concerned with the overall effect of capital outflow (recorded and unrecorded such as abnormal and illegal outflows), without distinguishing short or long term, therefore the residual method is used. Under the residual method, source of capital inflows, increase in external debt and foreign direct investment, are used to finance current account deficit and the increase in international reserves. The residual from the above is capital flight. Mathematically:

$$CF = \Delta D + NFDI + CAB + \Delta IR \tag{1}$$

or

$$CF = \Delta D + NFDI - (CAD + \Delta IR) \tag{2}$$

Where:
ΔD = Change in debt (from World Bank Indicators)
NFDI = Net foreign direct investment (from International financial statistics (IFS) indicators, lines 78bdd, 78bed, 78bkd and 78bmd)
CAB = Current account balance (from IFS indicators, line 78ald)
CAD = Current account deficit
ΔIR = Change in international reserve (from IFS indicators, line 79dbd)

In summary, equation 1 is interpreted as "the capital flows that do not finance the current account deficit and/or the increase of international reserve leave the country as a capital flight". When capital flight has a positive (negative) sign, it is interpreted as capital outflows (capital inflows). This method allows us to work with different data sources – in particular World Bank data to estimate changes in external debt and IFS data to estimate the other three variables (NFDI, CAB and ΔIR). This is because the balance of payment record does not provide an accurate measurement of external debt.

3. DETERMINANTS OF CAPITAL FLIGHT IN PREVIOUS STUDIES

Previous studies in Latin America have shown that capital flight depends upon inflation, change in inflation, real exchange rate, exchange rate regime and the interest rate spread[9] corrected and not corrected by currency depreciation, as summarized in Table 1.

Table 1: Determinants of capital flight in Latin America: previous studies

Author(s)	Countries	Period	Technique	Determinant
Cuddington (1986)	Argentina, Brazil & Chile	1974-1982	OLS*	REER, FINC
Cuddington (1987)	Argentina, Mexico Uruguay & Venezuela	1974-1984	OLS	REER, FINC, INFL
Ketkar (1989)	Argentina, Brazil & Mexico	1977-1986	OLS	REER, DUMG SPREAD
Pastor (1990)	Argentina, Brazil, Chile Colombia, Mexico, Peru Uruguay & Venezuela	1973-1987	OLS	∆INFL, FINC OVAL

*Ordinary Least Square.
Abbreviation:
REER: Real effective exchange rate
FINC: Financial incentive to capital flight
INFL: Inflation
DUMG: Dummy variable for regime exchange change
SPREAD: Interest rate spread (the United States interest rate minus the domestic interest rate)
∆INFL: Change in inflation
OVAL: Degree of currency overvaluation.

4. REGRESSION ANALYSIS

The basic model is:

$$\text{Capital Flight} = \beta_0 + \beta_1\,\text{FINC} + \beta_2\,\text{SR} + \beta_3\,\text{IUS} + \beta_3\,\text{REER} + \varepsilon \qquad (3)$$

The above econometric model was constructed using the dependant variable capital flight as a percentage of GDP, and the independent variables, which are: financial incentive to capital flight (FINC), saving rate (SR), the United States interest rate (IUS), and real effective exchange rate (REER) – these variables are detailed in table 2.

[9] The interest rate spread refers to the United States interest rate minus the domestic interest rate.

Table 2: Determinants of capital flight: descriptions of independent variables.

Independent variable	Name	Expected sign
FINC	Financial incentive for capital flight FINC = $\ln(1 + i^{us}) - \ln(1 + i^{d}) + \ln(e) - \ln(e^{-1})$*	(+)
SR	Saving rate as % of GDP	(+)
IUS	The US interest rate**	(+)
REER	Real effective exchange rate CPI (domestic)/CPI(US)×official ER	(-/+)
COUNTRY NAME	Dummy variable for each individual country***	
ε	Error term	

*Where: i^{us} = Interest rate in the US (Treasury bill)
i^{d} = Interest rate in domestic country
e = Ratio of local currency to dollar
**Calculated as the deposit interest rate in the United States minus the United States inflation.
*** Brazil is the reference country for these dummy variables.

Where:
FINC: Following Dooley (1986), financial incentive for capital flight is described as the difference between the US and domestic interest rate corrected by the exchange rate variations. The logarithmic function ensures that the financial incentive flattens at higher rates, as beyond a certain point, incentives may not be very important, since one has already reallocated as much capital as possible (Pastor 1990). The expected sign for this variable is positive, as an increase in the difference between the US and the domestic interest rate provides a financial incentive for capital flight.
SR: Gross domestic savings are calculated as the difference between GDP and total consumption as a percentage of GDP. The expected sign for this variable is positive, because as economic agents save more, then more capital can be reallocated abroad.
IUS: The real interest rate in the US is expected to have a positive sign and it follows the same principles of FINC. However, this variable shows that an increase in the US interest rate can cause capital flight regardless of domestic interest rate movements.
REER: The real effective exchange rate as a determinant of capital flight is expected to bear a negative sign because it represents the notion that domestic currency depreciation reduces purchasing power, and therefore capital flight rises as investors seek to protect their assets.

Nevertheless, the positive sign has also been found as a determinant of capital flight in other studies[10]. Local investors can expect future devaluation or financial crisis if the domestic currency appreciates. As a consequence, accruing assets abroad in a period of currency appreciation may be an effective way of speculation.

5. DATA ISSUES

The dependant variable (capital flight) was constructed using the data from IFS and Word Bank Indicators as specified in section 2. The independent variables (financial incentive to capital flight, saving rate, US interest rate and real effective exchange rate), however, were based solely on the data from Word Bank Indicators.

The regression analysis was carried out using annual pooled data from six Latin American countries: Argentina, Brazil, Chile, Colombia, Mexico and Venezuela, over the period 1989 to 1999. Only the data for these six countries were included in the regression because the data to construct the dependant variable, net foreign direct investment (IFS lines 78bdd, 78bkd and 78bmd), were not available from IFS for others Latin American countries. Similarly, annual data, as opposed to quarterly data, was chosen due to data unavailability with net foreign direct investment (IFS lines 78bdd, 78bkd and 78bmd) as well as change in international reserve (IFS line 78ald).

Furthermore, the pooled data technique is used in order to counter the problem of data unavailability associated with capital flight, as noted in Lessard and Williamson (1987). Finally, data from 1989 was included in the regression in order to increase number of observations.

6. ECONOMETRIC RESULTS

The regression analysis in table 3 was performed using five different econometric models. The independent variables were chosen based on the two variables (FINC and REER) that were used in many previous studies (e.g., Cuddington 1986 and 1987). However, for the variables: INF, ∆INF, SPREAD, DUMG, and OVAL, which were used occasionally in previous studies, no significant relationship were observed, and therefore were excluded from the model. We also included SR and IUS which are statistically significant in table 3 (below), as new variables in the model.

The Ramsey regression error-specification test for omitted variables was used on OLS regression to test for any specification errors in the functional form, which may include omitted variables. The null hypothesis of correct specified model can not be rejected even at 10% level (p-value = 0.348).

The results from the OLS estimation in column 1 show that all variables are statistically significant at conventional levels. To correct for any heteroskedasticity that may arise, the OLS robust standard error is estimated in column 2, ratifying the same conclusion for each independent variable coefficient.

To test for autocorrelation, the Wooldridge test for autocorrelation in panel data (Wooldridge 2002, 282), was performed for OLS regression and the null hypothesis of

[10]Cuddington, J. T. (1986), Hermes, N. and Lensink, R. (1992), and Pastor, M. (1990) have found a positive sign for real exchange rate variable.

no first autocorrelation is rejected at 5% level (p-value= 0.029). To correct for autocorrelation, the Prais-Winsten correction regression was performed (column 3). This estimation confirms the significance of all coefficients at the conventional levels.

Column 4 and 5 report fixed effect and random effect estimation respectively; using fixed effect model, all coefficient dummy variables by countries, as well as real exchange rate, are not statistically significant. Random effect however, shows once again that all basic variables in the model are statistically significant at the conventional levels. The Hausman test was conducted to decide whether fixed effect or random effect estimation is preferred. With p-value of 0.145, this result indicates the random effect estimation may be preferred.

All five estimations produce similar results, which indicating the model is robust.

Table 3: Determinants of capital flight

Dependant variable - capital flight as a percentage of GDP

Coefficient	OLS (1)	Robust OLS (2)	Prias-Winsten (3)	Fixed Effect (4)	Random Effect (5)
CONSTANT	-6.530*	-6.530*	-6.613*	-10.948**	-6.532*
	(3.467)	(3.433)	(3.764)	(5.38)	(3.467)
FINC	4.392***	4.392***	4.288***	3.643**	4.392***
	(1.216)	(0.949)	(1.208)	(1.449)	(1.216)
SR	0.447***	0.447***	0.455***	0.467***	0.447***
	(0.106)	(0.129)	(0.11)	(0.172)	(0.106)
IUS	0.860***	0.860***	0.782**	0.783**	0.860***
	(0.283)	(0.226)	(0.361)	(0.293)	(0.283)
REER	-0.049**	-0.049**	-0.046**	-0.011	-0.049**
	(0.021)	(0.019)	(0.021)	(0.032)	(0.021)
ARGENTINA		-	-	1.725	-
	-			(1.615)	
VENEZUELA		-	-	2.679	-
	-			(1.832)	
MEXICO		-	-	-1.937	-
	-			(2.039)	
COLOMBIA		-	-	0.652	-
	-			(1.595)	
CHILE		-	-	0.808	-
				(1.81)	
Observations	66	66	66	66	66
R^2	0.468	0.468	0.404	0.535	0.468
Adj.R^2	0.434	-	-	0.461	-

*Indicates coefficient is significantly different from zero at the 10% level.
** Indicates coefficient is significantly different from zero at the 5% level.
*** Indicates coefficient is significantly different from zero at the 1% level.

7. NEW DETERMINANTS OF CAPITAL FLIGHT

The results from the above regression suggest two new determinants of capital flight: US interest rate and saving rate. The finding of saving rate as a determinant of capital flight has some interesting economic implications.

Following the neo-classical growth model, an increase in saving rate leads to an equal increase in investment and an equal decrease in consumption. Base on our findings, we can argue that this principle does not hold under capital flight conditions. Specifically, an increase in the saving rate also increases investment but by proportionately less than under neutral capital flight conditions. However, consumption decreases in the same proportion as saving rate increases, leading to a net loss for the economy. On the contrary, under capital flight conditions, a reduction in saving rate can increase consumption in greater proportion than the initial reduction, as a decrease in saving rate also decreases capital outflows, resulting in a net gain for the economy.

8. THE SOLOW MODEL

The Solow model explains how growth in the capital stock, growth in the labor force, and advances in technological progress affect output. As this paper examines the issue of capital flight and its determinants, we will only focus on how the supply and demand for goods determine the accumulation of capital according to this model, leaving aside the discussion of technological progress. In particular, using the finding of saving rate to be a determinant of capital flight, we will use the Solow model to analyze whether or not achieving the golden rule level of capital is desirable under capital flight conditions.

8.1 The Supply of Goods and the Production Function

$$Y = F(K,L) \tag{4}$$

That is, output Y depends on capital K and labor L. Assuming constant return to scale:

$$zY = F(zK,zL) \tag{5}$$

Dividing equation 4 by labor population in order to obtain output per worker:

$$Y/L = F(K/L,1) \tag{6}$$

We use lowercase letter to denote quantities per worker. Thus, $y=Y/L$ is output per worker and $k=K/L$ is capital per worker. We can write the production function as:

$$y = f(k) \tag{7}$$

The slope of the production function shows the extra output per worker produced from an extra unit of capital per worker. This amount is the marginal product of capital, MPK.

$$MPK = f(k + 1) – f(k) \tag{8}$$

8.2 The Demand for Goods and the Consumption Function

In the Solow model, output per worker y is divided between consumption per worker c and investment per worker i:

$$y = c + i \tag{9}$$

The model assumes that the consumption function takes the form:

$$c = (1-s)y \tag{10}$$

where s is the saving rate. Each year a fraction of (1-s) of income is consumed, and a fraction s is saved. Substituting equation 10 into equation 9:

$$y = (1-s)y + i \tag{11}$$

Rearrange the terms to obtain:

$$i = sy \tag{12}$$

This equation states that investment, like consumption, is proportional to income. Since investment equal saving the rate of saving s is also the fraction of output devoted to investment.

We can now examine how an increase in capital stock over time results in economic growth. Two forces drive change in capital stock; investment that increases capital stock, and depreciation that decreases capital stock. Given these two forces we can express the impact of investment and depreciation on the capital stock with this equation:

$$\Delta k = i - \delta k \tag{13}$$

That is, change in capital stock equal investment minus depreciation of existing capital. Because investment equal saving we can rewrite this equation as:

$$\Delta k = sf(k) - \delta k \tag{14}$$

Therefore, we can define the steady state level of capital as the level at which investment equal depreciation. So when investment exceeds depreciation, capital stock grows, and when investment is lower than depreciation, capital stock shrinks.

9. THE GOLDEN RULE LEVEL OF CAPITAL

The golden rule level of capital is defined as the steady state with highest level of consumption, and therefore the level of capital that benevolent policymakers should achieve in order to maximize the individual’s well-being.

If we rearrange the national income account (equation 9), we obtain

$$c = y - i \tag{15}$$

Since we want to find the consumption level at the steady state level, we substitute steady state values for output and investment. Steady state output per worker is f(k*), where k* is the steady state capital stock per worker. Since capital stock is not changing in the steady state, investment is equal to depreciation, δk*. Substituting f(k*) for y and δk* for i, we can rewrite steady state consumption per worker as:

$$c^* = f(k^*) - \delta k^* \tag{16}$$

Figure 1 Diagrammatic representation of the golden rule level of capital

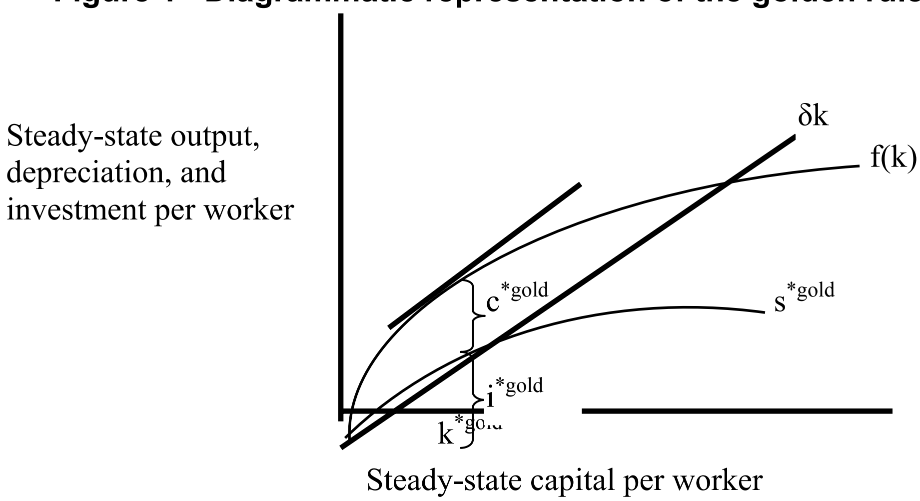


Figure 1 shows that there is only one level of saving that can generate the golden rule level of capital, maximizing consumption at the steady state.

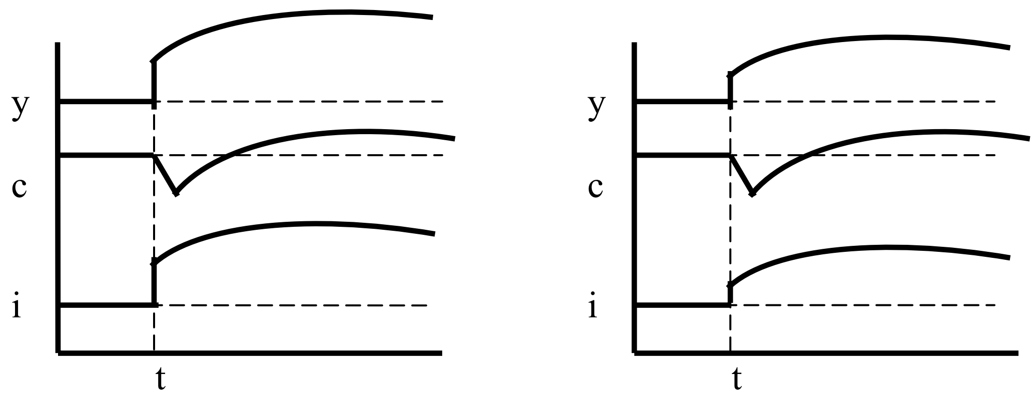
10. CAPITAL FLIGHT, SAVING RATE AND THE GOLDEN RULE LEVEL OF CAPITAL

If the saving rate is not at the optimal point (s^{*gold}), then policymakers can face either of two scenarios: the initial capital is less than the golden rule level or the economy has more initial capital than the golden rule level. Therefore, the neo-classical framework suggests that policymakers should stimulate saving in the first scenario and discourage saving rate in the second scenario. However, because the regression analysis in section 4 empirically support that an increase in saving rate also generates capital flight, investment will not increase in the same proportion as consumption decreases under capital flight conditions.

We can compare the effect of an increase and decrease of saving rate under neutral flows and capital flight conditions in figure 2.

Figure 2 **Increase in saving rate**

a) Neutral capital flow b) Capital flight

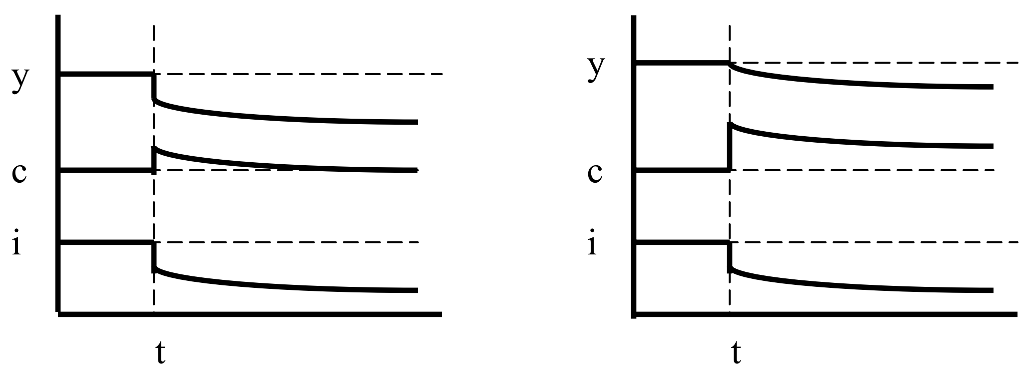


In panel 'a', an increase in the saving rate leads to a jump in investment and equal reduction in consumption. Hence output, consumption and investment increase together over the time, eventually increasing consumption over the initial level.

Panel 'b' shows a different behavior under capital flight conditions. An increase in saving reduces consumption in the same proportion, but because capital flight takes place, the initial increases in investment and output are proportionately lower than the drop in consumption. Hence output, consumption and investment increase together over time.

Figure 3 **Reduction in saving rate**

a) Neutral capital flow b) Capital flight



In figure 3, panel 'a', a reduction in saving rate leads to an equal increase in consumption and equal reduction in investment. Over time, output, consumption and investment fall together.

In panel ‘b’, under capital flight conditions, a decrease in saving rate leads to the same decrease in investment but a proportionally higher increase in consumption, as a reduction in saving also reduces capital flight, leaving more capital in the economy.

The analysis above allows us to reach the conclusion that achieving the golden rule level of capital under capital flight conditions is always desirable when the level of capital is above the golden rule level. On the other hand, the desirability to reach the golden rule level of capital when the level of capital is below the golden rule level depends exclusively on the relationship between capital flight and saving rate.

11. POLICY RECOMMENDATIONS

Historically, the government revenue in Latin American economies has been characterized by the high level of taxes on goods and services and for the low revenue from taxes on income, profit and capital gains. This is reflected in appendix B, which shows that the average taxes on goods and services as a percentage of total revenue for the six Latin American countries studied in this paper is around 35 percent. Meanwhile, the same average for developed countries such as Australia, the US, Japan and UK is 17.4 percent. appendix B shows that the average taxes on income, profit and capital gain for those Latin-American countries only represent 26.1 percent of total revenue but represent 53 percent (in average) for Australia, the US, Japan and UK.

The economic literature supports direct taxes as a major source of government revenue in contrast to taxes on consumption; the principal argument is that taxes on income, with progressive scales, allow the government to tax the wealthiest members of society at a greater proportion and provide relief to the less wealthy members of society. Even though the focus of this paper is not to discuss the issue of indirect and direct taxation, it is important to note the finding of saving rate as a determinant of capital flight reinforces the argument supporting direct taxation rather than indirect taxation, as taxes on goods and services reduce consumption and taxes on income reduce savings.

Maintaining a high interest rate without currency depreciation has been an effective way to prevent capital flight. Previous studies in the 1970s and 1980s outlined this[11] and the present study of the 1990s have empirically support it. Inflation, however, has shown a relationship with capital flight during the 1970s and 1980s (Pastor 1990), but not during the 1990s. Intuitively, the 1990s has had substantially lower levels of inflation, while the 1970s and 1980s were decades with the highest inflation for those countries. Therefore, inflation appears to generate capital flight only when there is a period of high inflation.

12. CONCLUSION

The results from the present study show some of the determinants of capital flight in Latin America from previous decades are also important in explaining capital flight throughout the 1990s. The finding of saving rate as a new determinant of capital flight provides another perspective as to whether or not achieving the golden rule level of capital is always desirable. In particular, the present study suggests that achieving the

[11] E.g. Cuddington, J. T.(1986 and 1987) and Pastor, M. (1990) have found a positive relationship between capital flight and FINC.

golden rule level of capital under capital flight conditions when the economy has less capital than the golden rule level, may not be an appropriate policy, and it would depend exclusively on the impact of saving rate on capital flight.

On the contrary, when the economy has more capital than the golden rule level, achieving the golden rule level of capital is highly desirable; this is because a reduction in saving rate also reduces capital flight, leading to consumption increasing by a greater proportion than the reduction in investment.

This new determinant also gives a new reason to choose direct taxation over indirect taxation in Latin American countries, confirming the view of many economists that the taxation system in Latin America is one of the reasons of inequality in those countries. Moreover, while indirect taxation generate inequality in itself, it also creates inequality in Latin American countries because taxes on goods discourage consumption and encourage saving. The saving rate increases capital flight, which is a further source of inequality.

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