

FINANCIAL DEREGULATION IN SRI LANKA: IMPLICATIONS FOR CAPITAL MOBILITY

Arusha Cooray

Email: acooray@efs.mq.edu.au

Abstract

The purpose of this paper is to examine the degree to which financial deregulation has contributed to increased capital mobility in Sri Lanka. In fulfilling this objective the empirical validity of three tests are examined. The Feldstein-Horioka model (1980), the Sachs (1981, 1982) approach to the savings-investment relation and the Shibata-Shintani (1998) model. The Shibata-Shintani model is further investigated by relaxing the assumption of a constant real rate of return. Overall evidence points to an increase in capital mobility in the post deregulation period suggesting an enhanced role of the exchange rate in the monetary transmission process.

JEL Classification: F21, F32

Keywords: capital mobility, savings-investment correlation, current account balance, consumption-net output correlations, Feldstein-Horioka model, Shibata-Shintani model.

1. Introduction

The purpose of this paper is to investigate the degree to which financial deregulation has led to increased international capital mobility in Sri Lanka. In satisfying this objective, the empirical validity of three tests are examined. The first is the test advanced by Feldstein and Horioka (1980), which examines the correlation between domestic savings and investment. This hypothesis predicts that with greater capital mobility, the link between domestic savings and investment should weaken because the level of investment in a country need not be constrained by the level of domestic savings. The second is the approach to the savings-investment relationship advanced by Sachs (1981, 1982). According to Sachs, investment has a negative impact on the current account balance under conditions of capital mobility because higher domestic investment would lead to greater international borrowing and hence a higher current account deficit. The third is a measure of international capital mobility, suggested by Shibata and Shintani (1998), based on the correlation between a country's consumption and net output. Here consumption changes are uncorrelated with predictable changes in net output under conditions of perfect capital mobility. This model is also tested by relaxing the assumption of a constant real rate of interest.

Contrary to expectations, empirical tests on capital mobility have consistently failed to validate theoretical predictions.ⁱ Feldstein and Horioka found a high correlation between domestic savings and investment for a sample of sixteen OECD countries, which implied that there were significant imperfections in the international capital market. This subsequently gave rise to two further questions: the persistence of a strong positive correlation between savings and investment for developed countries,ⁱⁱ and a higher

savings investment correlation for developed rather than developing countries.ⁱⁱⁱ For this reason, the Sachs approach and the Shibata Shintani model are also tested for Sri Lanka.

The rest of this paper is organized as follows. Section 2 presents the Feldstein-Horioka, Sachs and Shibata-Shintani tests of capital mobility. Section 3 outlines the empirical models. Section 4 presents the data. Section 5 evaluates the empirical results relating to the tests of capital mobility. Section 6 summarizes the conclusions.

2 Tests of Capital Mobility

The Feldstein Horioka Model

Feldstein and Horioka (1980) put forward a test of capital mobility based on the correlation between a country's level of domestic savings and investment. They argue that, with greater capital mobility, the level of investment in a country need not be constrained by the level of domestic savings, as any discrepancy can be financed by foreign savings. It follows from this that the correlation between domestic savings and investment is zero with perfect capital mobility, and that savings equals investment in the case of capital immobility.

Using data from 1960–1970, Feldstein and Horioka ran a regression of the investment ratio on the savings ratio for a cross section of 16 OECD countries. The regression was also run with the sample period divided into three sub-samples. The coefficient on savings was in the range of 0.94 and 0.83 for the 4 sample periods examined, pointing to the conclusive rejection of perfect capital mobility. Contrary to theoretical predictions,

data revealed almost a one-to-one increase in the domestic savings ratio in response to an increase in the domestic investment ratio. Feldstein (1983), extending the sample period to cover the 1974–1979 period, found support for the previous findings of Feldstein and Horioka, with the coefficients on the savings ratio ranging from 0.78 to 0.99 for all the sample periods studied. Their findings were subsequently confirmed by many others—Dooley, Frankel and Mathieson (1987), Penati and Dooley (1984), Frankel (1986), Bayoumi (1990), Golub(1990), and Kim (1993).^{iv} Vredin and Warne (1991) and Krol (1996), however, found some support for the theory.

The savings investment relationship was examined from a different perspective by Sachs (1981), who defined the difference between savings(S) and investment(I) as the current account balance. According to him, investment had a negative impact on the current account balance under conditions of capital mobility because higher domestic investment would lead to greater international borrowing and hence a higher current account deficit. Regressing the current account balance (CA) on the investment ratio, Sachs found a significant negative relationship between the current account and investment ratios for a cross-section of 14 OECD countries for the 1960–1979 period. In regressions of $D(CA/GNP)$ on $D(I/GNP)$ and $D(S/GNP)$, respectively, for the period 1968–1979, the regression coefficient on the change in investment rate was -0.61 , while the estimated coefficient on the change in the savings rate was -0.34 , establishing a significant negative correlation between investment and the current account balance.^v These findings were in contrast to those of Feldstein and Horioka.

More recently, Shibata and Shintani (1998) put forward a measure of capital mobility based on the correlation between a country's consumption and net output. They employ the permanent income model of Campbell and Mankiw (1989, 1990, 1991). The intuition underlying this model is that under conditions of perfect capital mobility, changes in consumption should be uncorrelated with predictable changes in net output. Estimating the model for a sample of 11 OECD countries, they concluded that capital mobility appeared to be greater in countries that had previously maintained capital controls than in those which had not.

3 Empirical Models

Savings-Investment Correlations

Feldstein and Horioka (1980) asserted that, with perfect capital mobility, there should be no relation between a country's domestic savings rate and domestic rate of investment.

Testing this hypothesis involves running a regression of the following form:

$$(I/Y)_t = \mathbf{a} + \mathbf{b}(S/Y)_t \quad (1)$$

where I = gross domestic investment

S = gross domestic savings

Y = gross domestic product

With perfect capital mobility, there should be no systematic relationship between domestic savings and investment. Therefore, a test of this model entails testing for a zero coefficient on the savings ratio. In the case of complete capital immobility, the value of \mathbf{b} should take on a value of unity.

Sachs (1981) defined the difference between savings and investment as the current account balance. This involves regressing the current account balance on the rate of investment and testing for a negative coefficient on the investment ratio.

$$(CA/Y)_t = a + b (I/Y)_t \quad (2)$$

Consumption-Net Output Correlations

Employing the permanent income approach of Campbell and Mankiw (1989, 1990, 1991), Shibata and Shintani put forward a test of capital mobility based on consumption–net output correlations. Their model is restated below.

Assuming a world interest rate of r , a country's budget constraint is given by,

$$\begin{aligned} A_{t+1} &= (I + r) A_t + Y_t - C_t - I_t - G_t \\ &= (I + r) A_t + X_t - C_t \end{aligned} \quad (3)$$

where Y = gross domestic product, I = investment, C = private consumption, G = government expenditure, A = foreign asset holdings and $X = Y - I - G$ = the country's net output.

From the national income accounting identity it follows that

$$CA_t = rA_t + X_t - C_t \quad (4)$$

where CA = the current account.

The two polar cases of perfect international capital mobility and financial autarky have been considered. Given a quadratic utility function and equality between the consumer

discount rate and world interest rate, optimal consumption in the case of perfect capital mobility is given by:

$$C_t^p = r \{ A_t + (1/1+r) \mathbf{S} (1/1+r)^i E_t X_{t+i} \} \quad (5)$$

Taking the first differences of equation (5) yields,

$$\mathbf{DC}_t^p = r/1+r \mathbf{S} (1/1+r)^i (E_t - E_{t-1}) X_{t+1} \quad (6)$$

where $(E_t - E_{t-1}) X_{t+i}$ denotes changes in expectations between periods $t-1$ and t . If expectations were rational,

$$\mathbf{DC}_t^p = e_t \quad (7)$$

where e_t is a rational forecast error orthogonal to information available at time $t-1$.

From equations (3), (4) and (5), the optimal current account can be expressed as,

$$CA_t = - (r/1+r) \mathbf{S} (1/1+r)^i E_t (X_{t+i} - X_t) \quad (8)$$

$$= - \mathbf{S} (1/1+r)^i E_t (\mathbf{DX}_{t+i}) \quad (9)$$

Thus, both the current account and consumption are determined by future expectations of net output.

In the case of financial autarky, a country's consumption is constrained by its current net output,

$$C_t^a = X_t \quad (10)$$

This implies that the trade balance

$$TB_t = CA_t - rA_t \quad (11)$$

is zero so that domestic saving is equal to domestic investment.

Aggregate consumption in a case of capital mobility between these two polar cases is given by,

$$C_t = (1 - I) C_t^p + I C_t^a = (1 - I) C_t^p + I X_t \quad (12)$$

where I represents a coefficient of capital mobility. It takes on a value of zero in the case of perfect capital mobility and a value of one in the case of capital immobility.

Taking the first differences of equation (12) yields,

$$DC_t = (1 - I) DC_t^p + I DC_t^a = (1 - I) e_t + I DX_t \quad (13)$$

Shibata and Shitani estimate equation (13) and test for $I = 0$.

Shibata and Shintani assume that the real rate of interest is constant. Michener (1984), however, points out that consumption could appear sensitive to income due to variation in real interest rates through time, despite the inter-temporal optimization by agents in the absence of borrowing constraints. The study, therefore, also investigates the model permitting for changes in the real rate of interest. Relaxing the assumption of a constant real interest rate the model can now be written as:^{vi}

$$DC_t = (1 - I) [e_t + dr_t] + I DX_t \quad (14)$$

The existence of a statistically significant real interest rate could imply that the ex ante real interest rate is associated with the growth rate of consumption.

4 Data

All data are taken from the Central Bank Reports of Sri Lanka. The sample period runs from 1959–1998. The sample is divided into two sub-periods, with the 1959–1976 period representing the era of fixed exchange rates, and 1978–1998 the period of

floating exchange rates. It should be noted that while Feldstein and Horioka (1980) use cross sectional data, this study uses time series data.^{vii} However, the data is tested for unit roots and regressions are also carried out on the first differences of the series to make the data stationary, see Bayoumi (1990).

All the time series employed are tested for unit roots. The trend term is omitted from the first differences of the series as it is shown to be insignificant on the basis of a F test. The test results are reported in Tables 1 and 2.

Table 1
Dickey-Fuller Test for Unit Roots for the Levels of the Series

Variable	No Trend		Trend	
	ADF	LM	ADF	LM
<i>I/Y</i>	-1.43	3.74	-2.29	5.99
<i>S/Y</i>	-1.86	6.98	-3.62**	4.48
<i>CA/Y</i>	-3.16**	4.60	-3.30*	5.16
<i>C</i>	-1.60	10.56	-1.16	9.54
<i>X</i>	-0.84	2.13	-2.39	3.92

Note: The lag length for the ADF regressions has been selected to ensure white noise residuals. A sixth order autoregressive model is used. The χ^2 statistic for 6th order serial correlation in the residuals with 6 degrees of freedom is 12.59.

Significance levels with trend: 1%, -4.07 : 5%, -3.46 : 10% -3.16; without trend: 1%, -3.51 : 5%, -2.90, 10% -2.58 (Davidson and MacKinnon).

*, **, *** significant at the 10%, 5% and 1% levels respectively.

While the savings and investment ratios appear to be non-stationary in levels in the absence of a trend term, the current account ratio is stationary in levels. Therefore, ADF tests are carried out on the first differences of the data series that display a unit root.

Table 2 reports the results.

Table 2**Dickey-Fuller Test for Unit Roots for First Differences of the Series**

Variable	ADF	LM
<i>I/Y</i>	-6.08***	4.74
<i>S/Y</i>	-6.87***	10.46
<i>CA/Y</i>	-3.57***	11.20
<i>C</i>	-3.26**	10.89
<i>X</i>	-5.17***	5.69

Note: The lag length for the ADF regressions has been selected to ensure white noise residuals. A sixth order autoregressive model is used. The χ^2 statistic for 6th order serial correlation in the residuals with 6 degrees of freedom is 12.59.

Significance levels without trend : 1%, -3.51 ; 5%, -2.90, 10% -2.58 (Davidson and MacKinnon).

*, **, *** significant at the 10%, 5% and 1% levels respectively.

All data appear to be stationary in first differences. As the savings and investment ratios display an unit root, in addition to the conventional inference procedures cointegration tests are carried out on the Feldstein-Horioka model. As *DX*, *DC* and *CA/Y* are stationary, the Sachs and Shibata-Shintani models are estimated on the basis of the assumption that both the current account and the change in net output and change in consumption are stationary.

5 Empirical Results

Savings-Investment Correlations

The cointegration tests for the full sample, the pre and post-deregulation periods are reported in Table 3.

Table 3**Cointegration Results for the Feldstein-Horioka Model**

Sample Period	Regression Equation	ADF
1959-1998	$(I/Y)_t = \mathbf{a} + \mathbf{b}(S/Y)_t + \mathbf{e}_t$	-2.75
1959-1976	$(I/Y)_t = \mathbf{a} + \mathbf{b}(S/Y)_t + \mathbf{e}_t$	-3.10
1977-1998	$(I/Y)_t = \mathbf{a} + \mathbf{b}(S/Y)_t + \mathbf{e}_t$	-2.31

Significance Levels: 1% -4.29; 5% -3.74; 10% -3.45 (Davidson and MacKinnon)

The results point to the rejection of a long-run relationship between the savings and investment ratios for Sri Lanka. The test statistic for the full sample, the pre and post-deregulation periods are all below the 10% critical value. The rejection of the cointegration tests do not necessarily imply foreign exchange market efficiency as the failure of the tests could stem from unsatisfied assumptions. Therefore hypothesis tests employing the conventional inference procedures are carried out to verify the evidence implied by the cointegration tests.

Table 4 presents OLS estimation results for the Feldstein-Horioka model.

Table 4

The Feldstein-Horioka Model: OLS Estimates

Sample	Regression Equation	R²	DW
Period			
1959-1998	$(I/Y) = 0.07 + 0.90 (S/Y)$ (2.51) (4.65)	0.36	0.68
1959-1976	$(I/Y) = 0.12 + 0.32 (S/Y)$ (5.53) (1.85)	0.18	1.3
1977-1998	$(I/Y) = 0.25 - 0.04 (S/Y)$ (5.03) (-0.14)	0.00	0.65
1959-1998	$D(I/Y) = 0.002 - 0.05 D(S/Y)$ (0.51) (-0.29)	0.002	2.0
1960-1976	$D(I/Y) = -0.00 + 0.17 \Delta (S/Y)$ (-0.15) (0.97)	0.06	2.3
1977-1998	$D(I/Y) = 0.00 - 0.19 D(S/Y)$ (0.75) (-0.80)	0.03	1.9
With a Structural Break			
1959-1998	$I/Y = 0.15 + 0.07 (S/Y) + 0.09 D$ (6.17) (0.39) (6.19)	0.69	1.0

t statistics are reported in the parenthesis below the coefficients

The null hypothesis that the savings retention coefficient (the coefficient on S/Y) is zero is rejected for the full sample covering the 1959–1998 period, with the estimated coefficient taking on a value of 0.90. The results for the full sample appear to suggest that 90% of the increase in the domestic investment ratio is financed by domestic savings. While the null hypothesis that the coefficient on S/Y is zero is rejected at the 10% level for the pre-deregulation period, it is not rejected for the post-deregulation period. The coefficient drops from 0.32 during the period 1959–1976 to -0.04 for the period 1978–1998. Although negative, the coefficient is insignificantly indifferent from zero suggesting a significant increase in capital mobility between the two periods. This is further confirmed by the sharp fall in the R^2 of the regressions. The levels of the series display some evidence of serial correlation in the residuals on the basis of the DW statistics.^{viii} The savings retention coefficient (S/Y) on the first differenced data is marginally higher and negative in the post-deregulation period in comparison the coefficient for the pre-deregulation period.

In order to investigate if the financial deregulation has led to a weakening of the link between savings and investment, the regression of I/Y on S/Y is carried out with the inclusion of a dummy variable (see Table 4). This variable takes on a value of zero until 1977 and one thereafter. While the coefficient on the dummy variable is statistically significant, confirming a structural break, the restriction that the coefficient on the savings ratio is zero is not rejected, consistent with the evidence obtained for the levels regressions. Overall evidence therefore points to an increase in capital mobility.

A test of capital mobility put forward by Sachs (1981), based on a regression of the current account ratio to investment ratio, is also used to confirm the above results. Sachs hypothesized that if capital was internationally mobile, investment should have a negative impact on the current account. The results are reported in Table 5.

Table 5

The Sachs Model: OLS Estimates

$$CA/Y = a + b(I/Y)$$

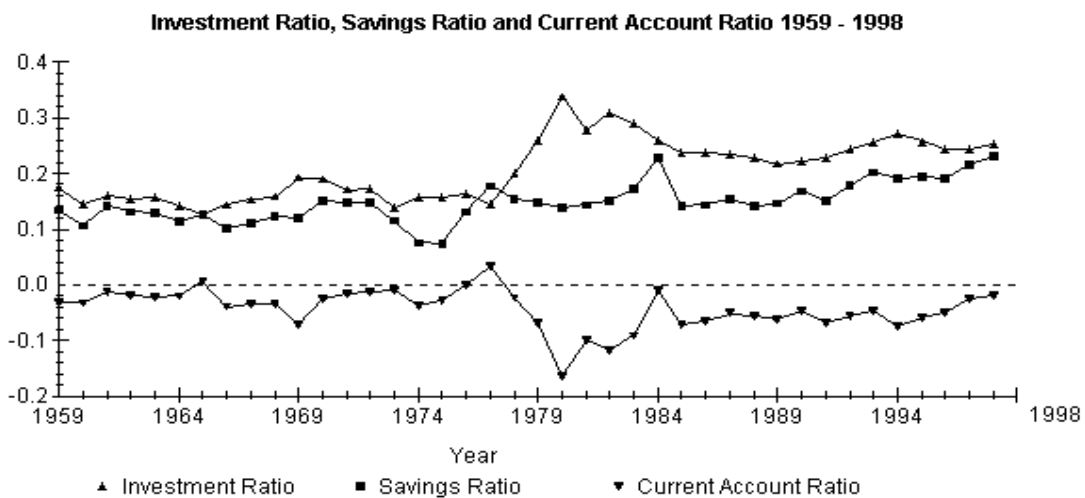
Sample	Regression Equation	R²	DW
Period			
1959–1998	$(CA/Y) = 0.06 - 0.52(I/Y)$ (4.43) (-7.70)	0.60	1.3
1959–1976	$(CA/Y) = 0.05 - 0.47(I/Y)$ (1.44) (-2.16)	0.23	1.7
1977–1998	$(CA/Y) = 0.15 - 0.86(I/Y)$ (4.77) (-6.65)	0.69	1.30
1959–1998	$D(CA/Y) = 0.002 - 0.93 D(I/Y)$ (0.59) (-6.30)	0.52	2.5
1960–1976	$D(CA/Y) = 0.001 - 0.59 D(I/Y)$ (0.28) (-2.05)	0.22	2.4
1977–1998	$D(CA/Y) = 0.003 - 1.02 D(I/Y)$ (0.62) (-5.62)	0.61	2.6

t statistics are reported in parenthesis

As pointed out by Penati and Dooley (1984), the inverse correlation between the current account balance and I/Y should increase over time with increasing capital mobility. The results appear to suggest increasing capital mobility, with the estimated slope coefficients rising from -0.47 to -0.86 for the levels, and from -0.59 to -1.02 for the first differences of the series between the pre- and post-deregulation periods. The results confirm increased capital mobility between the pre- and post-deregulation periods.

Figure 1 illustrates the behaviour of the average rates of investment, savings and current account for the period under study. The graph clearly indicates a significant rise in the investment ratio over the 1977–1980 period, leading to a widening gap between the savings and investment ratios. A question arises, therefore, as to whether the absence of a correlation between savings and investment for this period was due to these few outlying observations. Hence, the regression for the post-deregulation period is re-estimated by omitting these observations.

Figure 1



Source: Central Bank of Sri Lanka Annual Reports

Table 6**Estimates for the Feldstein-Horioka and Sachs Current Account-Investment****Models Eliminating Observations from 1977–1980**

Sample Period	Regression Equation	R²	DW
1981-1998	$(I/Y) = 0.23 + 0.13 (S/Y)$ (6.69) (0.68)	0.03	0.41 ^{ix}
1981-1998	$(CA/Y) = 0.09 - 0.60 (I/Y)$ (1.51) (-2.51)	0.28	1.4

t statistics are reported in parenthesis

The elimination of observations does not lead to a significant change in the estimated coefficients in the regressions of S/Y on I/Y or CA/Y on I/Y . It is possible to conclude, therefore, that financial deregulation has led to an increase in capital mobility.

However, it should be kept in mind that a number of factors could bias the results in favour of the Feldstein-Horioka model. Studies by Dooley, Frankel and Mathieson (1987) and Frankel and MacArthur (1988) find a strong association between domestic savings and investment for economies with relatively open capital accounts and a weak correlation between savings and investment for developing economies that rely heavily on foreign aid to finance their current accounts. Fry (1993) shows that a rise in the debt ratio in developing countries leads to a widening of the current account ratio increasing the gap between the savings ratio and investment ratio monotonically. The results obtained above while could be attributed to increased capital mobility, it is also possible that the increase in foreign debt and widening current account imbalance in the post-

deregulation period have biased the results in favour of increased capital mobility. Hence the Shiabta-Shintani model of international capital mobility is used to verify the above obtained results.

Consumption-Income Correlations

The consumption function given by equation (13) is estimated by using OLS and IV techniques. The results are reported in Table 7. The second and third rows report the adjusted R^2 for the OLS regressions of DC and DX on the instruments. As pointed out by Campbell and Mankiw (1990), e_t in equation (13) is an innovation and is hence orthogonal to any variable that is in the agents' information set at time $t-1$. Therefore, IV estimation is also employed to eliminate the potential inconsistencies of the OLS estimates.

The results appear to be robust to the measures of estimation. While the coefficient on DX records a decline from 1.09, capital immobility, in the period 1959–1976 to approximately 0.49 in the post-deregulation period under OLS, the IV estimates record a similar trend. There is significant evidence of an increase in capital mobility between the two periods consistent with the results obtained in respect of the savings-investment correlations. The fact that consumption appears sensitive to income given a constant real interest rate, violates Michener's (1984) proposition of a fluctuating real interest rate as the factor giving rise to the close association between the two variables. Therefore Table 8 presents results relaxing the assumption of a constant real interest rate.

Table 7**Consumption-Income Correlations**

$$DC = u + I DX$$

Sample Period		OLS estimates	IV estimates		
			1	2	3
1960-1998	<i>I</i>	0.81	0.43	0.67	0.58
		(2.3)	(1.12)	(1.36)	(1.95)
R ² for ΔC			-0.03	-0.03	-0.09
R ² for ΔX			0.04	-0.02	-0.04
1960-1976	<i>I</i>	1.09	1.20	0.83	1.03
		(8.82)	(3.02)	(1.51)	(5.29)
R ² for ΔC			-0.03	-0.16	0.07
R ² for ΔX			-0.11	-0.20	0.23
1977-1998	<i>I</i>	0.49	0.29	0.04	0.57
		(3.13)	(0.77)	(-0.02)	(1.99)
R ² for ΔC			0.004	-0.12	0.06
R ² for ΔX			0.05	-0.15	-0.05

Instruments used are 1: Constant, $\Delta C_{t-2}, \dots, \Delta C_{t-4}$

2: Constant, $\Delta X_{t-2}, \dots, \Delta X_{t-4}$

3: Constant, $\Delta C_{t-2}, \dots, \Delta C_{t-4}, \Delta X_{t-2}, \dots, \Delta X_{t-4}, CA_{t-2}$

Scaling has been carried out by dividing ΔC , ΔX and CA by X_{t-1}^x

The R² values are the adjusted R² from OLS regression of ΔC and ΔX on the instruments. t statistics are reported in parenthesis.

The results suggest that the coefficients on the real rate of interest are statistically significant and of the correct sign for most of the regressions. Despite the fluctuations in the real interest rate, the results are not significantly different from those of Table 7, confirming increased capital mobility between the pre- and post-deregulation periods.

Table 8

Consumption–Income Correlations Relaxing the Assumption of a Constant Real Rate of Interest

$$DC = u + dr + l DX$$

Sample Period		OLS estimates		IV estimates			
				1	2	3	4
1960-1998	<i>l</i>	0.70 (6.57)	-0.004 (-0.003)	0.22 (0.20)	0.59 (1.95)	0.37 (0.74)	
	<i>d</i>	-0.006 (-2.86)	0.01 (0.50)	0.01 (0.66)	-0.00 (-0.09)	0.004 (0.40)	
	R ² for <i>DC</i>		-0.03	-0.03	-0.07	-0.07	
	R ² for <i>DX</i>		0.04	-0.02	-0.04	-0.06	
1960-1976	<i>l</i>	0.78 (5.72)	0.43 (1.01)	0.63 (1.87)	0.68 (4.04)	0.66 (3.98)	
	<i>d</i>	-0.01 (-3.17)	-0.02 (-2.42)	-0.02 (-3.12)	-0.12 (-3.33)	-0.02 (-3.32)	
	R ² for <i>DC</i>		-0.03	-0.16	-0.12	-0.15	
	R ² for <i>DX</i>		-0.11	-0.20	-0.18	-0.06	
1977-1998	<i>l</i>	0.29 (2.42)	-0.10 (-0.23)	-2.81 (-0.23)	0.31 (1.32)	0.02 (0.93)	
	<i>d</i>	-0.008 (-4.46)	-0.02 (-1.72)	-0.02 (-0.24)	-0.010 (-2.44)	-0.008 (-1.95)	
	R ² for <i>DC</i>		0.004	-0.12	-0.18	-0.12	
	R ² for <i>DX</i>		0.05	-0.15	-0.18	-0.21	

Table 8 (cont) - notes

Instruments used are

- 1: Constant, $\Delta C_{t-2} \dots \Delta C_{t-4}$
- 2: Constant, $\Delta X_{t-2} \dots \Delta X_{t-4}$
- 3: Constant, $\Delta C_{t-2} \dots \Delta C_{t-4}, \Delta X_{t-2} \dots \Delta X_{t-4}, CA_{t-2}$
- 4: Constant, $\Delta C_{t-2} \dots \Delta C_{t-4}, \Delta X_{t-2} \dots \Delta X_{t-4}, r_{t-2}$

Scaling has been carried out by dividing ΔC , ΔX and CA by X_{t-1}

The R^2 values are the adjusted R^2 from OLS regression of ΔC and ΔX on the instruments. t statistics are reported in parenthesis.

6 Conclusion

The Feldstein-Horioka (1980), Sachs (1981, 1983) and Shibata-Shintani (1998) models appear to suggest an increase in capital mobility in Sri Lanka between the pre- and post-deregulation periods. However, as pointed out by Tesar (1991) and Shibata and Shintani (1998) among others, the observed correlation between savings and investment, and consumption and income need not necessarily arise from an increase/decrease in capital mobility. Changes in a number of other factors including technological progress, population growth and government policy could contribute to increased correlation between savings and investment.

Despite the progress made since 1977 in liberalizing capital account transactions, restrictions continue to apply over capital movements in Sri Lanka. Controls are more pervasive with respect to capital outflows rather than inflows, reflecting the authorities' concern at risk of capital flight. Restrictions relate in particular to transactions in government securities and debt instruments. Foreign investment in government Treasury bills, bonds and securities is prohibited, while foreign participation is not permitted in the government debt market. Private foreign capital has access only to certain specified types of investment.^{xi}

There also remain restrictions on access to foreign funds by Sri Lankan nationals. Local enterprises other than those in free trade zones do not have unlimited access to foreign capital. Similarly, Sri Lankan commercial banks do not have unlimited access to international capital and money markets. From 1995, however, they were permitted to obtain foreign loans of up to 5% of their capital and reserves. This was increased to 15% in 1997 with the approval to grant foreign currency loans to non-BOI exporters.^{xii} Commercial banks are also permitted to grant foreign currency loans from their foreign currency banking units to non-BOI exporters for importation of inputs required for export. Controls also remain on long-term capital movement in Sri Lanka, particularly with respect to foreign ownership of real estate.

The authorities have adopted a gradual approach to dismantling restrictions with respect to capital account transactions for fear of undermining macroeconomic stability. Needless to say, capital controls are frequently cited as causing deviations from interest parity. Nonetheless, as the elimination of capital controls continues, the impact of these developments on the degree of efficiency of the foreign exchange market has become an important consideration. Hence the evidence of an increase in capital mobility has important policy implications for Sri Lanka in that it suggests an enhanced role of the market mechanism in the monetary transmission process. It is possible to conclude, therefore, that Sri Lanka is on its way to achieving greater efficiency in respect of the foreign exchange market.

References

- Bayoumi T. Saving-Investment Correlations. *IMF Staff Papers* **37**: (1990) 360–387
- Campbell JY. and Deaton AS. Why is Consumption So Smooth. *Review of Economic Studies* **56**: (1989) 357–374
- Campbell JY. and Mankiw NG. Permanent Income, Current Income and Consumption. *Journal of Business and Economic Statistics* **8**: (1990) 265–279
- Campbell JY. and Mankiw NG. The Response of Consumption to Income: A Cross Country Investigation. *European Economic Review* **35**: (1991) 723–767
- Campbell JY. and Mankiw NG. Consumption, Income, and Interest Rates: Reinterpreting the Time Series Evidence. in Blanchard O. and Fischer S. (Eds.) *NBER Macroeconomics Annual 1989* MIT Press: MA
- Central Bank of Sri Lanka *Annual Report: Various Issues*. Central Bank of Sri Lanka: Colombo
- Central Bank of Sri Lanka 1998 *Economic Progress of Independent Sri Lanka*. Central Bank of Sri Lanka: Colombo
- Davidson R. and MacKinnon JG. 1993 *Estimation and Inference in Econometrics*. Oxford University Press: Oxford
- Dickey DA. and Fuller WA. Autoregressive Time Series With a Unit Root. *Journal of the American Statistical Association* **74**: (1979) 427–431
- Dooley MP. Frankel J. and Mathieson D. International Capital Mobility: What Do Saving-Investment Correlations Tell Us? *IMF Staff Papers* **34**: (1987) 503–530
- Dooley MP. A Survey of Literature on Controls over International Capital Transactions. *IMF Staff Papers* **43**: (1996) 639–687

- Dooley MP. and Isard P. Capital Controls, Political Risk, and Deviations from Interest Parity. *Journal of Political Economy* **88**: (1980) 370–384
- Dooley MP. and Mathieson DJ. Exchange Rate Policy, International Capital Mobility, and Monetary Policy Instruments. in Glick R. and Hutchison MM. (Eds.) *Exchange Rate Policy and Interdependence: Perspectives from the Pacific Basin* 1994: Cambridge University Press: Cambridge
- Feldstein M. and Horioka C. Domestic Saving and International Capital Flows. *Economic Journal* **90**: (1980) 314–329
- Feldstein M. Domestic Saving and International Capital Movements in the Long Run and the Short Run. *European Economic Review* **21**: (1983) 129–151
- Fieleke N. National Saving and International Investment in Saving and Government Policy *Conference Series* No.25 1982: Boston Federal Reserve Bank: Boston
- Frankel JA. International Capital Mobility and Crowding Out in the U S Economy: Imperfect Integration of Financial Markets or of Goods Markets? NBER Working Paper No.1773 in Hafer R. (Eds.) *How Open is the U S Economy?* Lexington: MA (1986)
- Frankel JA. and MacArthur AT. Political vs. Currency Premia in International Real Interest Differentials: A Study of Forward Rates for 24 Countries. *European Economic Review* **32**: (1988) 1083–1121
- Fry MJ. Direct Investment in Southeast Asia: Differential Impacts. ASEAN Economic Research Unit: Institute of Southeast Asian Studies 1993
- Golub S. International Capital Mobility: Net Versus Gross Stocks and Flows. *Journal of International Money and Finance* **9**: (1990) 424–439

- Kim SB. Do Capital Controls Affect the Response of Investment to Saving? Evidence from the Pacific Basin. *Economic Review Federal Reserve Bank of San Francisco*: (1993) 23–39
- Krol R. International Capital Mobility: Evidence from Panel Data. *Journal of International Money and Finance* **15**: (1996) 467–474
- Michener R. Permanent Income in General Equilibrium. *Journal of Monetary Economics* **13**: (1984) 297–306
- Monadjemi M. Testing the Degree of International Capital Mobility. *Australian Economic Papers* **29**: (1990) 30-39
- Murphy RG. Productivity Shocks, Non Traded Goods and Optimal Capital Accumulation. *European Economic Review* **30**: (1986) 1081–1095
- Obstfeld M. Capital Mobility in the World Economy: Theory and Measurement. *Carnegie Rochester Conference Series on Public Policy* **24**: (1986) 55–104
- Penati A. and Dooley M. Current Account Imbalances and Capital Formation in Industrial Countries 1949–81. *IMF Staff Papers* **31**: (1984) 1–24
- Pesaran MH. and Pesaran B. 1997 *Working with Microfit 4.0: Interactive Econometric Analysis*. Oxford University Press: Oxford
- Sachs J. The Current Account and Macroeconomic Adjustment in the 1970s. *Brookings Papers on Economic Activity* **1**: (1981) 201–268
- Sachs JD. The Current Account in the Macroeconomic Adjustment Process. *Scandinavian Journal of Economics* **84**: (1982) 147 - 159
- Shibata A. and Shintani M. Capital Mobility in the World Economy: An Alternative Test. *Journal of International Money and Finance* **17**: (1988) 741–756

Notes

ⁱ Feldstein and Horioka (1980), Feldstein (1983), Dooley, Frankel and Mathieson (1987), Bayoumi(1990), Golub(1990) among others, found a significant positive correlation between savings and investment.

ⁱⁱ See Feldstein (1983) and Penati and Dooley (1984).

ⁱⁱⁱ See Fieleke (1982), Dooley, Frankel and Mathieson (1987), Wong (1990).

^{iv} This puzzle has been explained by way of institutional and legal restrictions (Feldstein and Horioka 1980), population growth, income growth, terms of trade shocks (Obstfeld 1986, Summers 1988); non-traded consumption goods, immobile factors of production (Frankel 1986, Murphy 1986, Wong 1990); government policy (Summers 1988, Bayoumi 1990).

^v See Sachs (1981, Table 14, p.250).

^{vi} See Campbell and Mankiw (1990, 1991).

^{vii} The use of time series data can be found in Frankel (1986), Bayoumi (1990) and Monadjemi (1990).

^{viii} Correction for serial correlation does not lead to a significant change in the savings retention coefficient.

$$1959-1998 \quad (I/Y) = 0.07 + 0.95 (S/Y) - 0.37 \Delta(S/Y)_{t-1} + 0.47 \Delta(I/Y)_{t-1}$$

$$(2.11) \quad (4.66)^{***} \quad (-1.24) \quad (1.83) \quad DW=1.2$$

$$1959-1976 \quad (I/Y) = 0.12 + 0.28 (S/Y) - 0.03 \Delta(S/Y)_{t-1} + 0.24 \Delta(I/Y)_{t-1}$$

$$(4.42) \quad (1.26) \quad (-0.11) \quad (0.96) \quad DW = 1.6$$

$$1977-1998 \quad (I/Y) = 0.23 + 0.10 (S/Y) - 0.35 \Delta(S/Y)_{t-1} + 0.33 \Delta(I/Y)_{t-1}$$

$$(4.61) \quad (0.33) \quad (-1.25) \quad (1.20) \quad DW = 1.2$$

^{ix} With correction for serial correlation:

$$1981-1998 \quad (I/Y) = 0.23 + 0.12 (S/Y) + 0.11 \Delta(I/Y)_{t-1} + 0.06 \Delta(S/Y)_{t-1}$$

$$(6.23) \quad (0.56) \quad (0.50) \quad (0.28)$$

$$R^2 = 0.05 \quad DW = 0.56$$

^x See Campbell and Deaton (1989). This method is employed by Campbell and Mankiw(1990), Shibata and Shintani (1998).

^{xi} These include banking, finance and plantations. Foreign investment is not permitted in sectors such as money-lending, pawn-broking and fishing.

^{xii} See Central Bank of Sri Lanka (1998), "Economic Progress of Independent Sri Lanka".