Capital mobility and savings-investment correlations: panel data evidence from transition economies

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This study examines the relationship between savings and investment for 26 transition economies using a panel data set covering the 1991 to 2002 period. Estimates of the saving coefficient based on cross-sectional, fixed-effect, random-effect and mean-group estimators range from 0.263 to 0.315, which are significantly less than one.

I. Introduction

In a cross-sectional analysis of domestic savings and investment for 16 OECD countries, Feldstein and Horioka (1980) examine the extent of international capital mobility. Given their finding that the estimated coefficient of savings in the investment equation is not statistically different from one, they argue that international capital mobility is relatively low. A number of authors have questioned this conclusion attributing the observed high correlation to binding intertemporal budget constraint and long-run current account targeting (Coakley *et al.*, 1996; Jansen, 1997); labour force growth (Obstfeld, 1986); the size of a country's output (Baxter and Crucini, 1993; Ho, 2003). Others have suggested that savings-investment correlations simply measure the degree of substitutability between domestic and external savings (Sachsida and Caetano, 2000).

The majority of the studies on the savings-investment relation have focused on OECD and other industrialized economies (see Tesar, 1991 and Coakley *et al.*, 1998 for reviews of the literature). Yet a number of studies (Dooley *et al.*, 1987; Wong, 1990; Mamingi, 1997; Vamvakidis and Wacziarg, 1998; Coakley *et al.*, 1999; Sinha and Sinha, 2004) which have focused on developing economies, find that the coefficient on savings is low or insignificantly

different from zero, indicating the presence of capital mobility. There have been a number of justifications for this finding, including the presence of foreign aid (Dooley *et al.*, 1987; Isaksson, 2001), the size of the non-traded sector (Wong, 1990), and lack of financial structure (Kasuga, 2004).

However, as it appears, the savings-investment relation in transition economies has not received the proper attention it deserves. In fact, no literature on the subject has been located for these economies. Given the importance of foreign investment in the transition process, it is believed that this is a major oversight. This study is an attempt to fill this void. The next section describes the data and overview of the panel data estimation procedures and empirical results.

II. Data, Methodology, and Results

This section summarizes the empirical findings on the saving-investment relationship using an unbalanced panel data set consisting of 26 transition economies. To provide some degree of consistency across countries, the longest sample has been limited to 1991 to 2002. In fact, 22 out of 26 countries in the data set cover this sample period. The data sets for

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the remaining four countries are limited to the following periods: Bosnia (1995–2002), Kazakhstan (1992–2002), Serbia-Montenegro (1997–2002) and Turkmenistan (1997–2001). The data were obtained from the World Bank CD-ROM with the variables defines as follows:

Gross fixed capital formation per GDP i
Gross domestic savings per GDP s

Four alternative estimation methods have been employed: cross-sectional (CS), fixed effect (FE), random effect (RE) and mean-group (MG) estimators. The remainder of this section provides a brief explanation of the methods, followed by the empirical results and an interpretation of the results for capital mobility.

Consider the following simple linear regression model:

$$(i)_{jt} = \alpha_j + \beta_j(s)_{jt} + e_{jt}, \quad j = 1, \ldots, N, \quad t = 1, \ldots, T \tag{1}$$

where i_{jt} and s_{jt} are shares of domestic investment and national savings in total output for country j at time t; e_{jt} is the corresponding random error term; and α_j and β_j are country-specific intercept and slope coefficients, respectively.

The cross-sectional model is obtained by an average over-time transformation of Equation 1 for each country j:

$$(\bar{i})_j = \alpha + \beta(\bar{s})_j + \bar{e}_j, \quad j = 1, \ldots, N \tag{2}$$

where $\bar{i}_j$ and $\bar{s}_j$ are average shares of domestic investment and savings in total output for country j, and $\bar{e}_j$ is the corresponding random error term. The fixed-effect model assumes there is time-invariant heterogeneity across countries, captured by the term, α_j, as stated in Equation 3.

$$(i)_{jt} = \alpha_j + \beta(s)_{jt} + e_{jt}, \quad j = 1, \ldots, N, \quad t = 1, \ldots, T \tag{3}$$

The random-effect model assumes that the country-specific effect, u_j, is randomly distributed and $w_{jt} = u_j + e_{jt}$ given in Equation 4.

$$(i)_{jt} = \alpha + \beta(s)_{jt} + w_{jt}, \quad j = 1, \ldots, N, \quad t = 1, \ldots, T \tag{4}$$

Finally, the mean group estimator (see Coakley *et al.*, 2004; Pesaran and Smith, 1995) is an unbiased and consistent estimator in non-stationary regressions with persistent $I(1)$ disturbances. The mean group estimator is simply the average of the country-specific coefficients, as shown in Equation 5a. The corresponding standard error is calculated using Equation 5b.

$$\hat{\beta}^{MG} = N^{-1} \sum_{j=1}^{N} \left[\frac{\sum_{t=1}^{T} \tilde{x}_{jt} \tilde{y}_{jt}}{\sum_{t=1}^{T} \tilde{x}_{jt}^2} \right] = N^{-1} \hat{\beta}_j \tag{5a}$$

$$se(\hat{\beta}^{MG}) = \frac{\sigma(\hat{\beta}_j)}{\sqrt{N}} = \sqrt{\frac{(\hat{\beta}_j - \hat{\beta}^{MG})/N - 1}{N}} \tag{5b}$$

Table 1 presents the CS, FE, RE, and MG estimates of the saving-investment relationship along with their standard errors for the 26 transition economies. The table also reports the results of two alternative tests of hypotheses about the parameter β. One tests the null hypothesis that β is not significantly different from one. That is, there is a one-to-one relation between domestic saving and investment, and capital may be considered perfectly immobile as defined by Feldstein–Horioka. The other is the test of the null hypothesis that β is not significantly different from zero. That is, given the interpretation of Feldstein–Horioka, there is no relation between domestic saving and investment, and capital may be considered perfectly mobile.

The value of the estimated parameter ranges between 0.263 in the CS model and 0.315 in the FE model. The null hypothesis that β is not significantly different from one is rejected overwhelmingly irrespective of the choice of estimation method, thus rejecting the case of perfect capital immobility.

Table 1 Saving-investment relation in transition economies

	CS	Panel (FE)	Panel (RE)	MG
$\hat{\beta}$	0.263	0.315	0.312	0.297
$se(\hat{\beta})$	0.085	0.031	0.029	0.081
t-ratio ($\beta = 1$)	−8.659	−22.096	−23.724	−8.729
t-ratio ($\beta = 0$)	3.094	10.252	10.920	3.691

Notes: CS = cross-sectional estimates; FE = fixed-effect estimates; RE = random-effect estimates: and MG = mean-group estimates. The panel data set consists of annual observations on 26 transition economies over 1991–2002. Exceptions are Bosnia (1995–2002), Kazakhstan (1992–2002), Serbia-Montenegro (1997–2002) and Turkmenistan (1997–2001).

Similarly, the null hypothesis that β is not significantly different from zero is rejected in all the specifications, thus rejecting the case of the perfect capital mobility hypothesis. The empirical work has also been extended on the fixed and random effect models in two directions: (1) in order to account for the possibility of endogeneity in the saving rate, the saving rate was lagged by one period. The estimated parameter values 0.318 and 0.305 are very similar to the results in Table 1. (2) to take into account the possibility of non-stationarity in the levels, the models were estimated with first-differenced data. The resulting estimated parameters of 0.263 and 0.250 are slightly below their estimates with level data. Thus, the results can be considered robust to these specification issues.

While the Feldstein–Horioka savings-investment relationship has been examined in a number of studies for OECD and developing countries, there have been no published studies on the subject with respect to transition countries. The results are similar to those for developing economies, the coefficient on savings is low relative to developed, industrialized economies. Kasuga (2004) attributes the disparity in estimates of the savings coefficients between industrialized and developing countries by the country's financial structure. Countries with developed primary equity markets tend to have larger estimates on the savings coefficient. One can reasonably argue that the primary equity markets are not that well developed in the case of transition economies.

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Appendix

Albania	Lithuania
Azerbaijan	Macedonia
Belarus	Moldova
Bosnia-Herzegovina	Poland
Bulgaria	Romania
Croatia	Russian Federation
Czech Republic	Serbia-Montenegro
Estonia	Slovak Republic
Georgia	Slovenia
Hungary	Tajikistan
Kazakhstan	Turkmenistan
Kyrgyz Republic	Ukraine
Lativa	Uzbekistan