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## Capital mobility in saving and investment: A time-varying coefficients approach

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This paper uses a model with time-varying coefficients in order to track changes in Feldstein–Horioka saving–retention coefficients over time. To the extent that such coefficients measure international capital mobility, the main empirical findings are as follows. First, the stability of the saving–retention coefficient is strongly rejected. Second, capital has long been perfectly mobile in Canada. Third, capital mobility has never been high in the United States. Fourth, capital was more mobile in Japan and the United Kingdom at the turn of the 20th century than it has been during the postwar period. Capital mobility has risen in Argentina, Italy and Sweden since around 1970. Finally, capital mobility for most of the countries considered has not monotonically increased during the postwar period.

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### 1. Introduction

A large empirical literature has investigated how mobile capital is between countries. Several methods have been proposed to measure the degree of capital mobility. One such way – suggested by Feldstein and Horioka (1980) (hereafter, FH) – is to estimate how strongly saving and investment are related either across countries at a given time or over time in a given country.

According to FH, if capital is perfectly mobile, investors care only about the rate of return on their investments and not about which country they invest in. This means that domestic saving need not be

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related to domestic investment under perfect international capital mobility. Indeed, each country's domestic saving responds to and seeks out opportunities for investment everywhere in the world while its domestic investment is financed by the worldwide pool of capital. By contrast, if incremental saving does tend to be invested in the country of origin, FH argued that domestic savers must not be able to readily avail themselves of all investment opportunities in the rest of the world; i.e., capital must be imperfectly mobile internationally. Moreover, the greater is this tendency of domestic saving to flow only into domestic investment, the less mobile capital is likely to be.

On the basis of this rationale, FH regressed domestic investment on domestic saving for cross-sectional samples of OECD countries in order to assess how mobile capital was among them. They found that the estimated regression coefficients, which they termed "saving-retention coefficients," were all close to one. This finding, that most of incremental saving tended to remain in the country of origin, was surprising since it suggested that capital was closer to being completely immobile than perfectly mobile internationally. FH's seminal study stimulated a large literature confirming high saving-retention coefficients; see Coakley et al. (1998) for a review of this literature.

This paper reexamines the relationship between domestic investment and domestic saving by investigating how it has evolved over time and by paying special attention to the time-series properties of the data. If they are nonstationary as one would expect, FH's conventional approach could yield misleading estimates because of the spurious-regression problem. We formulate an appropriate way to perform statistical inference on saving-retention coefficients when the data are nonstationary. In order to test the stability of the coefficients, we apply two tests: Hansen's (1992) LM-type tests and Park's (1990) variable-addition approach. We estimate the Time-Varying Coefficients Cointegration Model (hereafter, TVC) with polynomial and trigonometric functions. This recently developed estimation method can provide an especially fruitful way to measure the variation in international capital mobility over time.

Our main empirical findings are as follows. First, domestic saving and investment rates are well approximated as difference stationary. Second, the stability of savings-retention coefficients is strongly rejected. Third, capital appears to have long been perfectly mobile in Canada. Fourth, capital was more mobile before the World War I than it has been in recent years. Fifth, the degree of capital mobility does not show a monotonically increasing trend during the postwar period.

Section 2 briefly surveys the FH literature, focusing on cointegration approaches. Section 3 introduces statistical inference methods for time-varying coefficient models with  $I(1)$  variables, and Section 4 reports the findings of our empirical analysis. It also compares our findings with those reported in the literature.

## 2. Results and interpretation in the existing literature

A large literature has established that investment is closely correlated with saving; e.g., Feldstein and Horioka (1980), Feldstein (1983), Frankel (1991), Dooley et al. (1987), Feldstein and Bacchetta (1992), and Coiteux and Oliver (2000). Basically, FH and those who followed have estimated the following regression equation:

$$(I/Y)_j = \alpha_0 + \alpha_1(S/Y)_j + \varepsilon_j, \quad (1)$$

where  $I$ ,  $S$ , and  $Y$  are domestic investment, saving and output.<sup>1</sup> The subscript  $j$  indicates an individual country but could be replaced by the time subscript  $t$  to indicate a time period.

Using cross-sectional data, FH found that estimates of the coefficient  $\alpha_1$  (the so-called saving-retention coefficient) are close to one, indicating that most incremental saving tends to remain in the country of origin. This finding surprised many researchers because they believed capital had become highly mobile across the OECD. For this reason, FH's finding has been termed the Feldstein–Horioka puzzle.

<sup>1</sup> Although our exposition in the text is often in terms of *investment* and *saving*, we follow the literature in adopting a specification that relates investment *rates* to saving *rates*. The division of the variables by  $Y$  serves to eliminate scale effects in cross-sectional regressions and to reduce nonstationarity in time-series regressions.

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