CHAPTER 9: FOREIGN PORTFOLIO EQUITY INVESTMENT AND THE SAVING-INVESTMENT CORRELATION

Introduction

Even though financial markets today show a high degree of integration, with large amounts of capital flowing across international borders to take advantage of rates of return and risk-diversification benefits, there is still ample evidence of a home bias portfolio. For instance, French and Poterba (1991) observed that Americans held roughly 94% of their equity wealth in the U.S. stock market. They also note that the Japanese held roughly 98% of their equity wealth at home.

Similarly, Tesar and Werner (1995) found that despite the recent increase in U.S. equity investment abroad (including investment in emerging stock markets), the U.S. portfolio remains strongly biased toward domestic equity. They reported that equity-portfolio flows to Western Europe, as a fraction of the capitalized value of the U.S. equity markets, rose from only 0.3% in 1976 to about 2.2% in 1990. The share invested in Canada remained fairly constant, at less than 1%. More recently, CAPM-based portfolios are found to be much more diversified worldwide than is actually the case; see Lewis (1999) for a good survey.

Furthermore, this home bias is even noticeable among states within the U.S.: For instance, Huberman (1997) found that American investors have strong preference towards firms located in their states over out-of-state firms.

Relatedly, when one considers total capital flows (including not only equity portfolio flows, but also FDI, debt and loan flows, etc.), the Feldstein-Horioka puzzle arises; see Feldstein and Horioka (1980). They demonstrated that long-term averages of national
savings are highly correlated with the same averages of domestic investments in the OECD countries, despite the presumed capital openness of these countries. Recall that free capital mobility allows foreign funds to finance domestic investment, thereby eliminating the closed-economy tight identity (unitary correlation coefficient) between savings and investments. Thus, the high correlation between national savings and domestic investments is puzzling; see also Obstfeld (1995) and Baxter (1995).

In this chapter we provide a theoretical explanation for the two puzzles, based on informational home bias; for a recent empirical application of this idea see Portes and Rey (1999).

The Gordon-Bovenberg Model of Home-Bias Information

Suppose, for simplicity, that foreign portfolio equity investment (FPEI) is the sole channel through which foreign capital flows into the country. Officially, FPEI is defined as buying less than a certain small fraction (say, 10-20%) of shares of a firm. However, from an economic point of view, the critical feature of FPEI is the lack of control of the foreign investor over the management of the domestic firm, because of the absence of foreign managerial inputs. For our purposes, we shall simply assume that foreign investors buy shares in existing firms without exercising any form of control or applying their own managerial input.

In the next chapter we introduce foreign direct investment - FDI - where foreign control and, perhaps, also management is exercised. This lack of control and management associated with portfolio investment and the distance from where the “action” takes place give rise to a home bias in information.
We model the uncertainty in the economy à la Gordon and Bovenberg (1996) as in the preceding chapter. Suppose again that there is a continuum of \textit{ex-ante} identical domestic firms. Each firm employs capital input \((K)\) in the first period in order to produce a single composite good in the second period. We continue to assume that capital depreciates at the rate \(\delta\). Output in the second period is equal to \(F(K)(1 + \varepsilon)\), where \(F(\cdot)\) is a production function exhibiting diminishing marginal productivity of capital and \(\varepsilon\) is a random productivity factor with zero mean and is independent across all firms. \(\varepsilon\) is bounded from below by -1, so that output is always nonnegative. As before, \(\varepsilon\) is purely idiosyncratic, so that there is no aggregate uncertainty. For each \(\varepsilon\), there will be exactly \(N \Phi(\varepsilon)\) firms whose output in the second period will be less than or equal to \(F(K)(1 + \varepsilon)\), where \(\Phi(\cdot)\) is the cumulation distribution function of \(\varepsilon\) and \(N\) is the number of firms. Again, no one in the first period knows who these firms are. Thus, each firm faces a probability of \(\Phi(\varepsilon)\) of having an output less than or equal to \(F(K)(1 + \varepsilon)\) in the second period. As before, we assume that through proper portfolio diversification, consumer-savers behave in a risk-neutral way. We also normalize the number of firms to one, that is: \(N = 1\).

Investment decisions are made by the firms before the state of the world (that is, \(\varepsilon\)) is known. Since all firms face the same probability distribution of \(\varepsilon\), they all choose the same level of investment. Denote the gross investment of the firm by \(I\). Therefore, if its initial stock of capital in the first period, carried over from the preceding period, is \(K_0(1 - \delta)\), then the stock of capital the firm employs in the first period is \(K = (1 - \delta)K_0 + I\).

All firms are originally owned by domestic investors who equity-finance their capital investment \(I\). After this capital investment is made, the value of \(\varepsilon\) is revealed to domestic saver-investors, but not to foreign portfolio investors. The latter buy shares in the existing
firms. The rationale for this informational asymmetry - the informational home bias - is the very reference to the foreigners as portfolio investors who are “far from the action”, and therefore informationally handicapped.

Being unable to observe $\varepsilon$, foreign investors will offer the same price for all firms, reflecting the average productivity of the firms they purchase. On the other hand, domestic investors who do observe $\varepsilon$ will not be willing to sell at that price the firms that have experienced higher than average values of $\varepsilon$. (Equivalently, domestic investors will outbid foreign investors for these firms.) Therefore, there will be a cutoff level of $\varepsilon$, say $\varepsilon_0$, such that all firms that experience a value of $\varepsilon$ lower than the cutoff level will be purchased by foreigners. All other firms will be retained by domestic savers-investors. The cutoff level of $\varepsilon$ is then defined by:

$$
\frac{F(K)[1 + e^{-\varepsilon_0}] + (1 - \delta)K}{1 + r^*} = \frac{F(K)(1 + \varepsilon_0) + (1 - \delta)K}{1 + \bar{r}},
$$

(9.1)

where

$$
e^{-\varepsilon_0} = E(\varepsilon / \varepsilon 5 \varepsilon_0);
$$

(9.2a)

and for later use we also define:
\[ e^+(\varepsilon_0) = E(\varepsilon / \varepsilon = \varepsilon_0); \]  

(9.2b)

and, as in the preceding chapter:

\[ \Phi(\varepsilon_0)e^-(\varepsilon_0) + [1 - \Phi(\varepsilon_0)]e^+(\varepsilon_0) = E(\varepsilon) = 0. \]  

(9.3)

The value of a typical domestic firm in the second period is equal to its expected output, plus its residual stock of capital, that is, \( F(K)[1 + e^-(\varepsilon_0)] + (1 - \delta)K \). Because foreign portfolio investors will buy only those firms with \( \varepsilon \leq \varepsilon_0 \), the expected second-period value of a firm they buy is \( F(K)[1 + e^-(\varepsilon_0)] + (1 - \delta)K \), which they then discount by the factor \( 1 + r^* \) to determine the price they are willing to pay for it in the first period, where \( r^* \) is the world rate of interest. At equilibrium, this price is equal to the price that a domestic investor is willing to pay for the firm that experiences a productivity value of \( \varepsilon_0 \). The cutoff price is equal to the output of the firm plus its residual capital, discounted at the domestic rate of interest \( \bar{r} \). This explains the equilibrium condition (9.1).

As \( e^-(\varepsilon_0) < \varepsilon_0 \), an interior equilibrium with both foreigners and residents having nonzero holdings in domestic firms requires that the foreigners’ rate of return \( (r^*) \) be lower than the residents’ rate of return \( (\bar{r}) \). In some sense, this means that foreign investors are overcharged for their purchases of domestic firms. They outbid domestic investors who are willing to pay on average only a price of \( \{F(K)[1 + e^-(\varepsilon_0)] + (1 - \delta)K\}/(1 + \bar{r}) \) for the
low-productivity firms.

Consider now the capital investment decision of the firm that is made before \( \varepsilon \) becomes known. The firm seeks to maximize its market value, net of the original investment \([K - (1 - \delta)K_0]\). There is a probability \( \Phi(\varepsilon_0) \) that it will be sold to foreign portfolio investors, who will pay \( \{F(K)[1 + e^{-}(\varepsilon_0)] + (1 - \delta)K\}/(1 + r^*) \). There is a probability \([1 - \Phi(\varepsilon_0)]\) that it will be sold to domestic investors, who will pay, on average, \( \{F(K)[1 + e^{+}(\varepsilon_0)] + (1 - \delta)K\}/(1 + \bar{r}) \).

Hence, the firm’s expected market value, net of the original capital investment is:

\[
- [K - (1 - \delta)K_0] + \frac{\Phi(\varepsilon_0)\{F(K)[1 + e^{-}(\varepsilon_0)] + (1 - \delta)K\}}{1 + r^*} + \frac{[1 - \Phi(\varepsilon_0)]\{F(K)[1 + e^{+}(\varepsilon_0)] + (1 - \delta)K\}}{1 + \bar{r}}.
\]

Maximizing this expression with respect to \( K \) yields the following first-order condition:

\[
-1 + \frac{\Phi(\varepsilon_0)\{F'(K)[1 + e^{-}(\varepsilon_0)] + (1 - \delta)\}}{1 + r^*} + \frac{[1 - \Phi(\varepsilon_0)]\{F'(K)[1 + e^{+}(\varepsilon_0)] + (1 - \delta)\}}{1 + \bar{r}} = 0.
\]

Because the firm knows, when making its capital investment decision, that it will be sold to foreign portfolio investors at a “premium” if faced with low-productivity events, it tends to overinvest relative to the domestic rate of return \((\bar{r})\) and underinvest relative to the world rate of return \((r^*)\):
\[ r^* < F'(K) - \delta < \bar{r}. \quad (9.6) \]

(A formal proof of these inequalities is provided in the appendix.)

The Home-Bias Portfolio and the Saving-Investment Correlation

Note that (9.6) implies that the net return to domestic capital (namely, \( F'(K) - \delta \)) exceeds the world rate of interest. This means that the country in question does not attract enough foreign portfolio equity investment. Put differently, foreign portfolio investors are biased away from this country’s equity towards their own countries’ equity - the so-called “home bias portfolio.”

Relatedly, foreign sources do not provide adequate financing for domestic investment. That is, national saving must play a larger role of financing domestic investment. Recall that in the full-information, frictionless capital mobility benchmark case there is a separation between savings and investments decisions: domestic capital accumulates up to that level where its net marginal is equated to the world interest rate, no matter whether national saving falls short or exceeds the investment needed to let domestic capital reach this level. The difference between national saving and this investment is absorbed by current account imbalances. In the informational asymmetry case described in this chapter, foreign sources play a more limited role in financing domestic investment, thereby strengthening the correlation between national saving and domestic investment. This model helps provide a theoretical explanation for the Feldstein-Horioka (1980) puzzle about the strong correlation...
between national saving and domestic investment in the OECD countries which are fairly open to capital flows.

Note that the home-bias portfolio and the related correlation between national saving and domestic investment in this chapter stem from the asymmetry in information between foreign portfolio investors and domestic saver-investors. Specifically, the latter are better informed than the former about the productivity \((\varepsilon)\) of domestic firms. For this asymmetry to persist, it must be that the foreign portfolio investors cannot infer the productivity factor \((\varepsilon)\) from the price of the firms retained by the domestic saver-investors. This may happen when, for instance, the high \(\varepsilon\) firms are retained by their original domestic owners, so that they are not traded and thus not priced. Were foreign portfolio investors able to infer the true productivity of the high \(\varepsilon\) firms from their market price, then, as long as \(r^* < \bar{r}\), they will be able to bid up domestic saver-investors for all domestic firms; or, alternatively, \(\bar{r}\) converges to \(r^*\). In both cases, the net marginal product of capital will be driven down to \(r^*\), in which case the home-bias portfolio disappears and the correlation between national saving and domestic investment is weakened. Nevertheless, markets with such fully revealing prices seldom exist.

Conclusion

We employed a model of informational home-bias to explain two related puzzles: The home-bias portfolio and the high correlation between national saving and domestic investment. The informational asymmetry gave rise to a market failure that is expressed in two types of inefficiency. First, there is foreign underinvestment: The net marginal product
of domestic capital exceeds the world rate of interest. Second, there is domestic oversaving: The domestic rate of return to domestic savers exceeds the net marginal product of domestic capital. These two inefficiencies may be mitigated by a corrective (Pigouvian) tax policy; see Gordon and Bovenberg (1996) and Razin, Sadka and Yuen (1998).
Appendix 9.1: A Proof of (9.6)

From equation (9.1) we conclude that:

\[
1 + r^* = \frac{F(K)[1 + e^{-}(\varepsilon_0)] + (1 - \delta)K}{F(K)(1 + \varepsilon_0) + (1 - \delta)K} \cdot (1 + \bar{r}), \tag{9.1a}
\]

or that:

\[
1 + \bar{r} = \frac{F(K)(1 + \varepsilon_0) + (1 - \delta)K}{F(K)[1 + e^{-}(\varepsilon_0)] + (1 - \delta)K} \cdot (1 + r^*). \tag{9.2b}
\]

Now, substituting (9.1a) into the first-order condition (9.5) yields:

\[
1 + \bar{r} = \frac{\Phi(\varepsilon_0)\{F'(K)[1 + e^{-}(\varepsilon_0)] + (1 - \delta)\}\{F(K)(1 + \varepsilon_0) + (1 - \delta)K\}}{F(K)[1 + e^{-}(\varepsilon_0)] + (1 - \delta)K} + \tag{9.3a}
\]

\[
[1 - \Phi(\varepsilon_0)]\{F'(K)[1 + e^{+}(\varepsilon_0)] + (1 - \delta)\}.
\]

Since \(e^{-}(\varepsilon_0) < \varepsilon_0\), it follows that:

\[
\frac{F(K)(1 + \varepsilon_0) + (1 - \delta)K}{F(K)[1 + e^{-}(\varepsilon_0)] + (1 - \delta)K} > 1,
\]

and, hence, by (9.3a):
\[ 1 + \bar{r} > \Phi(\varepsilon_0)\{F'(K)[1 + e^-(\varepsilon_0)] + (1 - \delta)\} + \]
\[ [1 - \Phi(\varepsilon_0)]\{F'(K)[1 + e^+(\varepsilon_0)] + (1 - \delta)\} \]
\[ = F'(K) + (1 - \delta), \]

where use is made of (9.3). This proves that:

\[ F'(K) - \delta < \bar{r}. \]

Similarly, substitute (9.2a) into the first-order condition (9.5) to get:

\[ 1 + \tilde{r} = \Phi(\varepsilon_0)\{F'(K)[1 + e^-(\varepsilon_0)] + (1 - \delta)\} + \]
\[ \frac{[1 - \Phi(\varepsilon_0)]\{F'(K)[1 + e^+(\varepsilon_0)] + (1 - \delta)\}\{F(K)[1 + e^-(\varepsilon_0)] + (1 - \delta)K\}}{F(K)(1 + \varepsilon_0) + (1 - \delta)K}. \]

Since \( e^-(\varepsilon_0) < \varepsilon_0 \), it follows that:

\[ \frac{F(K)[1 + e^-(\varepsilon_0)] + (1 - \delta)K}{F(K)(1 + \varepsilon_0) + (1 - \delta)K} < 1, \]

and, hence, by (9.4a):
\[ 1 + r^* < \Phi(\varepsilon_0) \{ F'(K)[1 + e^{-\varepsilon_0}] + (1 - \delta) \} \]
\[ + [1 - \Phi(\varepsilon_0)] \{ F'(K)[1 + e^+\varepsilon_0] + (1 - \delta) \} \]
\[ = F'(K) + (1 - \delta), \]

where use is made again of (9.3). This proves that \( r^* < F'(K) - \delta \).