

EXCESSIVE FDI FLOWS UNDER
ASYMMETRIC INFORMATION

by

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Abstract

In Razin, Sadka and Yuen(1998, 1999a), we explored the policy implications of the home-bias in international portfolio investment as a result of asymmetric information problems in which domestic savers, being "close" to the domestic market, have an informational advantage over foreign portfolio investors, who are "far away" from the domestic market. However, FDI is different from foreign portfolio investment, concerning relevant information about domestic firms. Through the stationing of managers from the headquarters of multinational firms in the foreign direct establishments in the destination countries under their control, FDIors can monitor closely the operation of such establishments, thus circumventing these informational problems.

Furthermore, FDI investors not only have an informational advantage over foreign portfolio investors, but they are also more informed than domestic savers. Because FDI entails direct control on the acquired domestic firm, which the typical domestic savers with ownership position in the firm do not have. Being "insiders", the FDIors can "overcharge" the uninformed domestic savers, the "outsiders", when multinational subsidiaries shares are traded in the domestic stockmarket. Anticipating future domestic stock market trade opportunities, in advance, foreign investment becomes excessive. However, unlike the home-bias informational problem, which leads to inadequate foreign portfolio capital inflows, but may be correctable by Pigouvian taxes such as tax on non-resident income, tax on interest income and corporate tax (see Razin, Sadka and Yuen (1998, 1999a)), excessive FDI flows under the insider-outsider informational problem call for a *non-tax* corrective policy. First, because they are governed by unobservable variables (such as the productivity level which triggers default, according to the firm contract with its lender). Second, because there exist self-fulfilling expectations equilibria which cannot be efficiently corrected by taxation. The corrective policy tool that is left available is then simply quantity restrictions on FDI.

1 Introduction

An important aspect of FDI is that it has proven to be resilient during financial crises. In situations of international illiquidity, when the country's consolidated financial system has short term obligations in foreign currency in excess of foreign currency that the country has access to on short notice, FDI flows provide the only direct link between the domestic capital market in the host country and the world capital market at large. For instance, FDI flows to the East Asian countries were remarkably stable during the global financial crises of 1997-98. In sharp contrast, portfolio equity and debt flows, as well as bank loans, dried up almost completely during the same period. The resilience of FDI to financial crises was also evident in the Mexican crisis of 1994 and the Latin American debt crisis of the early 1980s. This may reflect a unique characteristic of FDI, which is determined by considerations of ownership and control by multinationals of domestic activities, which are more long-term in nature, rather than by short-term fluctuations in the value of domestic currency and the availability of credit and liquidity.¹

Could FDI persistency in the face of financial crisis, and the abundance of FDI flows into emerging economies in a period of tranquility, be a reflection of foreign overinvestment? In this paper we are trying to assess the flip side of the relatively abundant FDI flows from the viewpoint of the host country. Although the foreign direct investors are naturally able to reap their profits from the host country, their investment may at the same time exacerbate distortions in the domestic capital market. The distortions originate mainly from the lack of corporate transparency, which gives rise to the familiar problem of asymmetric information between “insiders” and “outsiders” of firms operating in the domestic economy, including

¹During a crisis, though, foreign direct investors may contribute to capital withdrawals by accelerating profit remittances or reducing the liabilities of affiliates towards their mother companies. While these are not recorded as negative FDI flows, they result from decisions made by foreign investors.

firms owned and controlled by the foreign direct investors. The domestic capital market could be trapped in a “lemons” situation described by Akerlof (1970): At the price offered by uninformed equity-buyers, which reflects the average productivity of firms whose shares are sold in the market, owners of firms (including FDI-owned firms) which have experienced a higher-than-average value, will pull out of the market. This adverse selection problem in the domestic equity market could be magnified by the introduction of FDI flows, resulting in excessive investment by the foreign direct investors. At the same time, the adverse-selection effect worsens mis-incentives for the domestic savers, caused by a wedge which is driven between the marginal productivity of capital, on the one hand, and the intertemporal marginal rate of substitution in consumption, on the other hand ².

Typically, also, the domestic investment undertaken by FDI establishments is heavily leveraged through the domestic credit market. As a result, the fraction of domestic investment actually financed by foreign savings through FDI flows may not be as big as it may seem, and the size of the traditional gains from FDI may thus be further limited by the very sizeable quantity of domestic leverage relative to the quantity of capital inflow.

International capital flows which typically fall into three major categories— portfolio flows, loans, and FDI— perform a variety of functions in the world economy. Their common traditional role lies in the blending of foreign savings with domestic savings to finance domestic investment. FDI, distinct from all other types of capital flows, performs an important additional function. FDI is not only an exchange of the ownership of domestic investment sites from domestic residents to foreign residents, but also a corporate governance mechanism in which the foreign investor exercises management and control over the host

²There is no direct evidence on the extent of under-saving resulting from these mis-incentives. A study by the World Bank (1999) shows, however, that the correlation between FDI flows and total factor productivity growth in developing countries with high saving rates is positive and significant, whereas in countries with low saving rates the correlation is negative and significant.

country firm. In so doing, the foreign direct investors gain crucial inside information about the productivity of the firm under their control—an obvious advantage over the uninformed domestic savers, who are offering to buy shares in the firm which do not entail control. Taking advantage of their superior information, the foreign direct investors will tend to retain the high-productivity firms under their ownership and control and sell the low-productivity firms to these uninformed savers. This adverse selection problem, which plagues the domestic stock market, leads to over-investment by the foreign direct investors even up to a point that, although first best capital inflows through FDI are not warranted, they nevertheless take place.

The view of FDI, no doubt only one aspect of the complex FDI phenomenon³ that we shall focus on in this paper, is that, although these flows are the most persistent among the major types of capital flows, they may actually bring social losses to the host country (to be distinguished from private gains or losses) . We model capital flows through FDI in a familiar asymmetric information framework. In the welfare assessment we attempt to disentangle the non-traditional gains/losses from FDI flows from the traditional gains that

³Evidently, there are important aspects of FDI not dealt with in this paper. It is commonly believed that foreign direct investment (FDI) is beneficial for growth in less developed countries. Among other things, direct investment by multinational corporations in developing countries is considered as a major channel for access to advanced technologies owned by the major industrial countries. In particular, technological diffusion can take place through the importation of new varieties of inputs. This is in addition to the usual role of FDI as a channel for bringing in foreign savings to augment the stock of domestic capital. Both the technology-transfer and the traditional capital-augmenting roles of FDI translate into greater income growth in the host country.

FDI can also improve efficiency by promoting competition. The advanced technology possessed by the large size of multinational enterprises often enable them to invest in industries in which barriers to entry (such as large capital requirements) limit the potential access of local competitors. See Borenzstein, De Gregorio, and Lee(1998).

are attributed to capital inflows, in general.

The rest of the paper is organized as follows. In Section 2 we start with a reminder of the traditional argument in favor of capital mobility. We then develop in Section 3 a stylized model of FDI interacting with the domestic credit and stock markets. It turns out that the model may have more than one equilibrium. Different equilibria are characterized by significantly different volumes of FDI flows, as well as savings rates and welfare levels. In Section 4 we employ numerical simulations to compute two FDI-equilibria and a financial autarky equilibrium, in order to assess the benefits of FDI. Section 5 concludes.

2 First-Best Gains from Capital Mobility

Textbook economic setups suggest that factors of production, if not constrained, move from locations where their marginal product is low, to other locations where their marginal product is high. In these setups, perfect competition with complete information prevails and there are no distortions (created by taxation, increasing returns, externalities, etc.), so that private returns to the factor owners coincide with the social returns. Accordingly, factor mobility, induced by private factor return differentials, is beneficial both for the owners of the factors that actually move from one location to another and to the source and destination economy.

The welfare impact of capital mobility can be neatly presented with the aid of the familiar scissors diagram (Figure 1) in which the marginal product capital for two countries (home and foreign) that comprise the world economy are depicted originating at opposite ends. Following MacDougall (1960), suppose that originally the world allocation of capital is at A with the home country having a higher marginal product of capital than the foreign country. If capital flows from the foreign country to the home country until the marginal

product of capital is the same in the two countries, bringing the world allocation of capital to point E , then the world output is at a maximum.

In a laissez-faire, competitive environment with complete information and no barriers to capital mobility, AE units of capital will indeed flow from the foreign country to the home country. This is because in the aforementioned classical setup the market return to capital is equal to its marginal product, so that it will pay the owners of capital in the foreign country to invest AE units of it in the home country. After such investment is made, the return to capital is equalized in the two countries. Furthermore, not only world output (namely, the sum of the home and foreign GNP) rises, but the GNP of each country rises as well: The GNP of the home country rises from $O_H MKA$ to $O_H MRQA$ ⁴ and the GNP of the foreign country rises from $O_F NSA$ to $O_F NRQA$,⁵ so that world output rises by KSR .

This textbook description, which underscores the benefits that are associated with capital mobility, serves in this paper as background to a sharply different setup that we develop here. FDI, a resilient type of capital flows, is introduced into an analytical framework in which domestic capital markets are characterized by imperfect information.

3 Interactions Between FDI flows and the Domestic Credit Market

In the remainder of this paper we examine an important feature of capital mobility which is not captured in the textbook analysis. This feature refers to imperfect information which

⁴The GNP of the home country consists of its GDP which is $O_H MRE$, less the income accruing to foreign owners of capital which is $AQRE$.

⁵The GNP of the foreign country consists of its GDP which is $O_F NRE$, plus foreign-source income which is $AQRE$.

leads to adverse selection in the capital market. This imperfection may turn around the flow of capital and thereby turn the welfare gain upside down. We assume a two-period model of a small, capital-importing country, referred to as the home country. It is assumed that capital imports are channelled solely through foreign direct investment (FDI). The economy is small enough so that, in the absence of any government intervention, it faces a perfectly elastic supply of external funds at a given risk-free world rate of interest, r^* .

We follow Gordon and Bovenberg (1996) and Razin, Sadka and Yuen (1998a, 1999) in modelling the risk in this economy. Suppose there is a very large number (N) of *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 assume that capital depreciates at the rate δ . 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 ε is a random productivity factor with zero mean and is independent across all firms. (ε is bounded from below by -1, so that output is always nonnegative). We assume that ε is purely idiosyncratic, so that there is no aggregate uncertainty. Through optimal portfolio decisions, consumer-savers will thus behave in a risk-neutral way⁶.

Investment decisions are made by the firms before the state of the world (i.e., ε) is known. Since all firms face the same probability distribution of ε , they all choose the same level of investment. They then seek funds to finance the investment. At this stage, the owner-managers of the firms are better informed than the outside fund-suppliers. There are many ways to specify the degree of this asymmetry in information. In order to facilitate the analysis, however, we simply assume that the owner-managers, being “close to the action”,

⁶Free trade in capital allows the spreading and sharing of risk and affects output growth (e.g., Obstfeld(1994)). By abstracting from aggregate risk in the paper, we also abstract from the risk-sharing benefits that are potentially associated with FDI.

observe ε before they make their financing decisions, but the fund-providers, being “far away from the action”, do not.

When investment is equity-financed, the original owner-managers observe ε while the new potential shareholders of the firm do not. The market will be trapped in the lemons situation described by Akerlof (1970). At the price offered by the new (uninformed) potential equity buyers, which reflects the average productivity of all firms (i.e., the average level of ε) in the market, the owner-manager of a firm experiencing a higher-than-average value of ε will not be willing to sell its shares and will pull out of the market completely. The equity market will fail to serve its investment-financing functions efficiently.

However, a domestic credit market can do the job of channelling domestic savings into domestic investment. Even FDI can utilize this market. In fact, it is often observed that FDI is highly leveraged domestically. After gaining control of the domestic firm, a foreign direct investor usually resorts to the domestic credit market to finance new investments and possibly sell shares of the firm in the domestic equity market later on after profits from its original investment are realized.

3.1 FDI-Equilibrium

In a formal sense, foreign acquisition of shares in domestic firms is classified as FDI when the shares acquired exceed a certain fraction of ownership (say, 10-20%). From an economic point of view, we look at FDI not just as ownership of a sizable share in a company but, more importantly, as an actual exercise of control and management and acquisition of inside information (the value of ε in our model). Indeed, it is the aspect of control which distinguishes FDI from other types of capital inflows, such as portfolio capital flows.

The sequencing of firm decisions is as follows. Before ε is revealed to anyone (i.e., under symmetric information), foreign investors bid up domestic firms from their original

domestic owners, investment decisions are made, and full financing through domestic credit is secured. Then, ε is revealed to the owner-managers (who are all foreigners), but not also to domestic equity-investors. At this stage, shares are offered in the domestic equity market and the ownership in some of the firms is transferred to the domestic investors. In the initial stage (i.e., before ε is revealed to anyone), the foreign direct investors are able to outbid the domestic savers because the latter lack access to large amounts of funds necessary in order to seize control of the firms while the former, by assumption, are not liquidity-constrained.⁷

Since credit is extended *ex ante*, before ε is revealed, firms cannot sign default-free loan contracts with the lenders. We therefore consider loan contracts which allow for the possibility of default. We adopt the “costly state verification” framework *à la* Townsend (1979) in assuming that lenders make firm-specific loans, charging an interest rate of r^j to firm j ($j = 1, 2, \dots, N$).⁸ The interest and principal payment commitment will be honored when the firms encounter relatively good shocks, and defaulted when they encounter relatively bad shocks. The loan contract is characterized by a loan rate (r^j), with possible default, and a threshold value ($\bar{\varepsilon}^j$) of the productivity parameter as follows:

$$F(K^j)(1 + \bar{\varepsilon}^j) + (1 - \delta)K^j = [K^j - (1 - \delta)K_0^j] (1 + r^j). \quad (1)$$

When the realized value of ε^j is larger than $\bar{\varepsilon}^j$, the firm is solvent and will thus pay the lenders the promised amount, consisting of the principal $K^j - (1 - \delta)K_0^j$ plus the interest

⁷The existence of wealthy individuals or families in the home country may possibly limit the scope of our analysis to the extent that they can compete with the foreign direct investors on control over these greenfield investment sites. Our analysis will carry over, however, if they form joint ventures with the foreign direct investors. On the other hand, the foreign direct investors need not be excessively resourceful. Even a small technological advantage they may enjoy over and above the domestic investors will enable them to bid up all these investment sites from the domestic investors and to gain control of these industries.

⁸See also Bernanke and Gertler(1989) and Stiglitz and Weiss (1981).

$r^j [K^j = (1 - \delta)K_0^j]$ as given by the right-hand-side of (1). If, however, ε^j is smaller than $\bar{\varepsilon}^j$, the firm will default. In the case of default, the lenders can incur a cost in order to verify the true value of ε^j and to seize the residual value of the firm. This cost, interpretable as the cost of bankruptcy, is assumed to be proportional to the firm's realized gross return, $\mu [F(K^j)(1 + \varepsilon^j) + (1 - \delta)K^j]$, where $\mu \leq 1$ is the factor of proportionality. Net of this cost, the lenders will receive $(1 - \mu) [F(K^j)(1 + \varepsilon^j) + (1 - \delta)K^j]$.

Since there is no aggregate risk, the expected rate of return required by domestic consumer-savers, denoted by \bar{r} , can be secured by sufficient diversification. Therefore, the “default” rate of interest, r^j , must offer a premium over and above the default-free rate, \bar{r} , according to:

$$\begin{aligned} & [1 - \Phi(\bar{\varepsilon}^j)] [K^j - (1 - \delta)K_0^j] (1 + r^j) \\ & + \Phi(\bar{\varepsilon}^j)(1 - \mu)\{F(K^j) [1 + e^-(\bar{\varepsilon}^j)] + (1 - \delta)K^j\} \\ = & [K^j - (1 - \delta)K_0^j] (1 + \bar{r}), \end{aligned} \tag{2'}$$

where $\Phi(\cdot)$ is the cumulative probability distribution of ε , i.e., $\Phi(\bar{\varepsilon}^j) = \text{prob}(\varepsilon \leq \bar{\varepsilon}^j)$, and $e^-(\bar{\varepsilon}^j)$ is the mean value of ε realized by the low-productivity firms, i.e., $e^-(\bar{\varepsilon}^j) \equiv E(\varepsilon | \varepsilon \leq \bar{\varepsilon}^j)$. For later use, we also denote by $e^+(\bar{\varepsilon}^j)$ the mean value of ε realized by the high-productivity firms, i.e., $e^+(\bar{\varepsilon}^j) \equiv E(\varepsilon | \varepsilon \geq \bar{\varepsilon}^j)$.⁹

The first term on the left-hand-side of (2') is the contracted principal and interest payment, weighted by the no-default probability. The second term measures the net residual value of the firm, weighted by the default probability. The right-hand-side is the no-default return required by the domestic lender. Observe that (1) and (2') together imply that:

⁹The weighted average of $e^-(\bar{\varepsilon}^j)$ and $e^+(\bar{\varepsilon}^j)$ must yield the average value of ε , i.e., $\Phi(\bar{\varepsilon}^j)e^-(\bar{\varepsilon}^j) + [1 - \Phi(\bar{\varepsilon}^j)]e^+(\bar{\varepsilon}^j) = E(\varepsilon) = 0$. This, in turn, implies that $e^-(\bar{\varepsilon}^j) < 0$ while $e^+(\bar{\varepsilon}^j) > 0$, i.e., the expected value of ε for the “bad” (“good”) firm is negative (positive).

$$[1 - \Phi(\bar{\varepsilon}^j)] + \frac{\Phi(\bar{\varepsilon}^j)(1 - \mu)\{F(K^j)[1 + e^{-\bar{\varepsilon}^j}] + (1 - \delta)K^j\}}{F(K^j)(1 + \bar{\varepsilon}^j) + (1 - \delta)K^j} = \frac{1 + \bar{r}}{1 + r^j}.$$

Since $\varepsilon^-(\bar{\varepsilon}^j) < \bar{\varepsilon}^j$ and $0 \leq \mu < 1$, it follows that $r^j > \bar{r}$, the difference being a risk-premium (which depends, among other things, on K^j , $\bar{\varepsilon}^j$ and μ).

The firm in this setup is competitive (i.e., a price-taker) only with respect to \bar{r} , the market default-free rate of return. This \bar{r} cannot be influenced by the firm's actions. However, r^j , K^j and $\bar{\varepsilon}^j$ are firm-specific and must satisfy equations (1) and (2'). In making its investment (i.e., choosing $K^j - (1 - \delta)K_0^j$) and its financing (loan contract) decisions, the firm takes these constraints into account. Since these decisions are made before ε is known, i.e., when all firms are (*ex ante*) identical, they all make the same decision. We henceforth drop the superscript j .

In the equity market which opens after ε is revealed to the (foreign) owner-managers, there is a cutoff level of ε , denoted by ε^o , such that all firms experiencing a value of ε above ε^o will be retained by the foreign direct investors and all other firms (with ε below ε^o) will be sold to domestic savers. This cutoff level of ε is given by:

$$\begin{aligned} & \frac{[F(K)(1 + \varepsilon^o) + (1 - \delta)K] - [K - (1 - \delta)K_o](1 + r)}{1 + r^*} = \left(\frac{\Phi(\bar{\varepsilon})}{\Phi(\varepsilon^o)} \right) \cdot 0 \quad (3') \\ & + \left(\frac{\Phi(\varepsilon^o) - \Phi(\bar{\varepsilon})}{\Phi(\varepsilon^o)} \right) \cdot \left(\frac{\{F(K)[1 + \hat{\varepsilon}(\bar{\varepsilon}, \varepsilon^o)] + (1 - \delta)K\} - [K - (1 - \delta)K_o](1 + r)}{1 + \bar{r}} \right), \end{aligned}$$

where $\hat{\varepsilon}(\bar{\varepsilon}, \varepsilon^o) \equiv E(\varepsilon \mid \bar{\varepsilon} \leq \varepsilon \leq \varepsilon^o)$ is the conditional expectation of ε given ε lies between $\bar{\varepsilon}$ and ε^o .

Notice that firms that experience a value of ε below $\bar{\varepsilon}$ default and have zero value. These firms are not retained by the foreign direct investors; hence $\varepsilon^o \geq \bar{\varepsilon}$. All other firms generate in the second period a *net* cash flow of $\{F(K)(1 + \varepsilon) + (1 - \delta)K\} - [K - (1 -$

$\delta)K_o](1+r)$. The left-hand-side of (3') represents the marginal (from the bottom of the distribution) firm retained by foreign investors. The right-hand-side of (3') is the expected value of the firms that are purchased by domestic savers. With a conditional probability of $[\Phi(\varepsilon^o) - \Phi(\bar{\varepsilon})]/\Phi(\varepsilon^o)$, they generate a net expected cash flow of $\{F(K)[1 + \hat{e}(\bar{\varepsilon}, \varepsilon^o)] + (1 - \delta)K\} - [K - (1 - \delta)K_o](1+r)$; and with a probability of $\Phi(\bar{\varepsilon})/\Phi(\varepsilon^o)$, they generate a zero net cash flow. This explains equation (3').

We can substitute equation (1) into (2') and (3') in order to eliminate r and then rearrange terms to obtain:

$$\begin{aligned} & [1 - \Phi(\bar{\varepsilon})]F(K)(1 + \bar{\varepsilon}) + \Phi(\bar{\varepsilon})(1 - \mu)F(K) [1 + e^-(\bar{\varepsilon})] + [1 - \Phi(\bar{\varepsilon})\mu](1 - \delta)K \quad (2) \\ = & [K - (1 - \delta)K_o](1 + \bar{r}), \end{aligned}$$

and

$$\frac{\varepsilon^o - \bar{\varepsilon}}{1 + r^*} = \left(\frac{\Phi(\varepsilon^o) - \Phi(\bar{\varepsilon})}{\Phi(\varepsilon^o)} \right) \cdot \left(\frac{\hat{e}(\bar{\varepsilon}, \varepsilon^o) - \bar{\varepsilon}}{1 + \bar{r}} \right). \quad (3)$$

Consider now the capital investment decision of the firm that is made before ε becomes known, while it is still owned by foreign direct investors. With a probability of $\Phi(\varepsilon^o) - \Phi(\bar{\varepsilon})$, it will be sold to domestic savers who pay a positive price equalling:

$$\begin{aligned} & \{F(K)[1 + \hat{e}(\bar{\varepsilon}, \varepsilon^o)] + (1 - \delta)K - [K - (1 - \delta)K_o](1 + r)\}/(1 + \bar{r}) \\ = & F(K)[\hat{e}(\bar{\varepsilon}, \varepsilon^o) - \bar{\varepsilon}]/(1 + \bar{r}), \end{aligned}$$

by using (1). With a probability of $1 - \Phi(\varepsilon^o)$, it will be retained by the foreign investors for whom it is worth:

$$\begin{aligned}
& \{F(K)[1 + e^+(\varepsilon^o)] + (1 - \delta)K - [K - (1 - \delta)K_o](1 + r)\}/(1 + r^*) \\
= & F(K)[e^+(\varepsilon^o) - \bar{\varepsilon}]/(1 + r^*),
\end{aligned}$$

by using (1). Hence, the firm seeks to maximize:

$$\begin{aligned}
V = & [1 - \Phi(\varepsilon^o)] \cdot \left(\frac{F(K)[e^+(\varepsilon^o) - \bar{\varepsilon}]}{1 + r^*} \right) \\
& + \Phi(\bar{\varepsilon}) \cdot 0 + [\Phi(\varepsilon^o) - \Phi(\bar{\varepsilon})] \cdot \left(\frac{F(K)[\hat{e}(\bar{\varepsilon}, \varepsilon^o) - \bar{\varepsilon}]}{1 + \bar{r}} \right)
\end{aligned} \tag{4}$$

subject to constraint (2), by choice of K and $\bar{\varepsilon}$, given ε^o .¹⁰ The first-order conditions are spelled out in appendix 1.

The (maximized) value of V in equation (4) is the price paid by the foreign direct investors at the greenfield stage of investment. Since the value of ε is not known at this point, the same price is paid for all firms. The low ε - *firms* are then (after ε is revealed to the foreign direct investors) resold to domestic savers, all at the same price, because ε is not observed by these savers. Net capital inflows through FDI are given by:

$$FDI = N[1 - \Phi(\varepsilon^o)]F(K)[e^+(\varepsilon^o) - \bar{\varepsilon}]/(1 + r^*) \tag{5}$$

(see equation (4)). Unlike the case with no domestic credit (in which the foreign direct investors have to bring in their own capital to finance the domestic investment projects), all capital outlays are financed domestically and FDI consists only of the price paid for the ownership and control of the high ε firms.

¹⁰The ε^o condition, as given by equation (3), is determined by equilibrium in the equity market. As such, it will not be taken into account by the price-taking firms when choosing their investment levels.

The remainder of the equilibrium conditions is standard. The first-period resource constraint is given by:

$$FDI = N[K - (1 - \delta)K_o] - [NF(K_o) - c_1]. \quad (6)$$

The second-period resource constraint is:

$$c_2 = N[F(K) + (1 - \delta)K] - FDI(1 + r^*) - N\mu\Phi(\bar{\varepsilon})\{F(K)[1 + e^{-\bar{\varepsilon}}] + (1 - \delta)K\}. \quad (7)$$

Note that the last term on the left-hand-side of (7) reflects the existence of real default costs. Finally, the consumer-savers do not have access to the world capital market and can only borrow/lend from the domestic market. As a result, in maximizing utility, they will equate their intertemporal marginal rate of substitution to the domestic risk-free rate of return:

$$\frac{u_1(c_1, c_2)}{u_2(c_1, c_2)} = 1 + \bar{r}. \quad (8)$$

In this model, the eight equations (i.e., (2), (3), (5)-(8) together with the two first-order conditions associated with the choice of K and $\bar{\varepsilon}$) determine the eight endogenous variables, i.e., K , \bar{r} , $\bar{\varepsilon}$, ε^o , c_1 , c_2 , FDI and the Lagrange multiplier λ associated with the constraint (2).

3.2 Gains from FDI

To flash out in a simplified manner the kind of gains or losses brought about by FDI, we compare the laissez-faire allocation in the presence of FDI with the closed economy laissez-

faire allocation. The latter economy is referred to as autarky.

In the autarky case, the “lemons” problem will drive the equity market out of existence. Firms will have to rely solely on the provision of domestic credit in financing its investment projects. The firm-specific debt contract for any firm j continues to be characterized by a default-risky interest rate (r^j) and a threshold productivity level ($\bar{\varepsilon}^j$) that satisfy the cutoff condition (1). The default-free interest rate (\bar{r}) is still defined implicitly by (2'). Again, since all firms are *ex ante* identical, we can drop the superscript j . The firm's investment decision is to choose K , r and $\bar{\varepsilon}$ to solve the following problem:

$$\begin{aligned} \underset{\{K,r,\bar{\varepsilon}\}}{Max} & F(K) - \Phi(\bar{\varepsilon})\{F(K)[1 + e^{-}(\bar{\varepsilon})] + (1 - \delta)K\} & (4') \\ & - [1 - \Phi(\bar{\varepsilon})][K - (1 - \delta)K_o](1 + r) \end{aligned}$$

subject to (1) and (2'). We can use (1) to substitute out the risky interest rate (r) in (2') as well as in the objective function above. The first-order conditions with respect to K and $\bar{\varepsilon}$ for this reduced problem are laid out in appendix 1. Utility maximization by the consumer-savers continues to yield the same intertemporal condition (8). In the absence of capital flows, $FDI \equiv 0$ in the two resource constraints (6) and (7). The five equations (2), (6), (7) and the two first-order conditions for K and $\bar{\varepsilon}$ (laid out in appendix 1) determine the five endogenous variables K^A , \bar{r}^A , $\bar{\varepsilon}^A$, c_1^A and c_2^A .

In the open economy case with domestic credit, FDI has conflicting effects on welfare. Its first role (discussed in detail in Razin, Sadka and Yuen (1999b)) is to facilitate the channelling of domestic saving into domestic investment by getting around a “lemons” problem and sustaining a domestic equity market. This, by itself, is welfare-enhancing. But, as we have already indicated, FDI is driven also by distorted incentives; in their presence the channelling of foreign savings into domestic investment may generate an excessive stock of domestic capital (either when capital inflows are not needed at all or, when they are needed

to start with, too many of them take place). This foreign over-investment (coupled with the possibility of domestic under-saving) tends to reduce welfare.

We use numerical examples to illustrate the effect of FDI on welfare. In these examples, we employ a logarithmic utility function ($u(c_1, c_2) = \ln(c_1) + \gamma \ln(c_2)$), with a subjective discount factor γ , a Cobb-Douglas production function ($F(K) = AK^\alpha$), and a uniform distribution of ε defined over the interval $[-\alpha, \alpha]$. The welfare gain (loss) is measured by the uniform percentage change (in c_1 and c_2) which is needed in order to lift the autarkic utility level to the FDI utility level. We set the parameter values as follows: $\gamma = 0.28$, $\alpha = 0.33$, $\delta = 0.56$, $N = 1$, $A = 0.9$, $K_o = 0.03$, $\alpha = 0.84$ and $\mu = 0.05$. Since we think of each period as constituting half of the lifetime of a generation (i.e., about 25 years), the values of γ and δ are chosen in such a way as to reflect an annual time preference rate of about 3% and an annual depreciation rate of about 3%.

Unlike the case of no domestic credit market, where the domestic stock market fail to finance investment because of the “lemons” problem, an autarkic economy in this case can utilize domestic savings to debt-finance domestic investment. The beneficial role of FDI as a vehicle for sustaining a domestic stock market through which domestic savings are channelled into domestic investment is thus substantially diminished. Consequently, the negative effect of FDI associated with the distorted incentives emanating from the domestic equity market dominates, and altogether there may exist a net welfare loss from intertemporal trade.

We now focus our attention on the second effect of FDI. Figure 2 compares the utility of the representative consumer generated by free flows of FDI for different world rates of interest (r^*) with the utility entailed under autarky. Naturally, the autarky utility level does not depend on the world rate of interest (r^*): the horizontal line describes the utility level under autarky. We measure the utility level by an index, where the level under autarky is set equal to 100. The utility index in the presence of FDI is measured against this base

index by calculating the percentage change in life time consumption under autarky which will lift autarkic utility to the corresponding utility level in the presence of FDI.

It turns out that there are *two* FDI equilibria¹¹. The first equilibrium, represented by the curve with squares in Figure 2, is characterized by a relatively high rate of default on credit (high $\bar{\varepsilon}$), while the second, indicated by diamonds, is characterized by a low default rate (low $\bar{\varepsilon}$). Evidently, a sudden shift from the bad equilibria to the good equilibria, triggered by a switch in expectations, can have significant effect on the economy. For example, as shown in Figures 2 and 3, at the world interest rate 5.5, a shift from the good equilibrium to the bad equilibrium leads to a rise in the FDI from a medium fraction of GDP (about 8 percent) to a large fraction (about 13 percents) of GDP¹².

A critical value of the rate of interest, which implies that the inflows of capital are neither welfare improving nor welfare reducing, is denoted by r^c . If the world rate of

¹¹Notice that there is a strong element of *circularity* involved in two credit-market relationships, equations (1) and (2'). To see this note that, on the one hand, a rise in the firm-specific rate of interest (including risk premium), r , implies that the cut-off productivity level (which determines the number of solvent firms and the number of insolvent firms in equilibrium), $\bar{\varepsilon}$, must rise. This is because, more firms are expected to default with the rise in the rate of interest (see equation (1)). On the other hand, when the cut-off productivity level, $\bar{\varepsilon}$, rises, the return on risky credit must rise, and therefore r should rise as well. The increase in r is needed in order to restore the balance between the risky return and the alternative return on the risk-free credit, governed by the risk-free rate of interest, \bar{r} (see equation (2')). Interacting with the adverse-selection effect of FDI, the circularity property leads, under some parameter configurations, to a multiplicity of equilibria.

¹²At the same time, the capital stock rises from 0.05 to 0.75; the risk free rate of interest falls from about 2.25 to 1; first-period consumption rises from 0.255 to 0.275, while second period consumption declines from 0.24 to 0.125; the solvency/insolvency cut-off productivity level, $\bar{\varepsilon}$, rises from -0.84 to -0.75; and the productivity cut-off level, ε^o , which determines the number of low-productivity firms that the FDIors sell in the domestic stock market, declines from 0.65 to -0.65.

interest is equal to this rate, the beneficial effect of FDI, being the flow of foreign saving that complements domestic saving in the financing of domestic investment (when the world rate of interest is still below the autarkic domestic rate of interest) is offset by the adverse-selection effect of FDI on the domestic stock market. The rate r^c is shown in Figure 2 by the intersection between the flat line, representing autarky equilibrium, and the two curves representing the FDI equilibria (overlapping, at this point).

Consider first the case where the world rate of interest (r^*) is above the critical rate of interest; that is, $r^* > r^c (< \bar{r}^A$, the autarkic rate of interest)¹³. In this case, FDI is clearly welfare reducing. Among the two FDI-equilibria depicted in Figure 2, the equilibrium associated with the high FDI delivers low utility (the curve with diamonds) while the equilibrium associated with the low FDI generates relatively high level of utility (the curve with squares). However, the utility levels that are associated with low- and high-FDI equilibria, both fall short of the level of utility under financial autarky, in the absence of FDI. Therefore, the adverse-selection effect of FDI leads to *excessive* FDI flows under both low- and high-default rate equilibria.

The policy implication is straightforward: A quantity ceiling on FDI flows. Indeed, a total ban on FDI is desirable whenever the world rate of interest exceeds the critical rate of interest.

Consider, next, the case where the world rate of interest (r^*) is below the critical rate

¹³Recall that in a distortion-free, perfectly competitive set-up, the autarkic rate of interest is the benchmark rate for predicting the direction of capital movements. If the world rate of interest falls short of the benchmark rate, capital flows in; if the world rate of interest exceeds the benchmark rate, capital flows out. The larger the (absolute) difference between the rates, the larger the gains from capital mobility. See, however, Helpman and Razin(1983) for a different setup, with increasing returns to scale and imperfect competition, in which capital inflows are taking place even though they are not warranted under the first principle which compares the autarkic marginal productivity of capital to the world rate of interest.

of interest, r^c , (which, in turn, is smaller than autarky rate of interest (\bar{r}^A)). In this case we expect the positive (traditional) traditional welfare effect of FDI, which allows foreign-saving financing of domestic investment in addition to the domestic saving finance, to dominate the adverse-selection, negative, effect of FDI on the domestic stock market. In this case we again have multiplicity of equilibria. At least one of these equilibria delivers utility level above the autarkic level of utility (the curve with squares), in accordance with the traditional gains-from-trade theorem. It turns out that in this case also, the good equilibrium is associated with relatively low FDI flows (but it is now the high rate of default equilibrium, indicated by squares; see Figure 3). In order to sustain this low-FDI equilibrium (and thus avoid the trap of falling into a high -FDI equilibrium), policy makers may resort again to a ceiling on FDI. But, since FDI flows are now evidently warranted, in contrast to the first case in which $r^* \geq r^c$, the quantity ceiling does not at all mean a total ban on FDI inflows. The quantity ceiling's role, in the case case $r^* \leq r^c$, is to eliminate one of the two equilibria - the one with relatively large FDI inflows.

4 Conclusion

Elsewhere, in Razin, Sadka and Yuen(1998, 1999a), we explored the policy implications of the home-bias in international portfolio investment as a result of asymmetric information problems in which domestic savers, being “close” to the domestic market, have an informational advantage over foreign portfolio investors, who are “far away” from the domestic market. However, FDI is different from foreign portfolio investment, concerning relevant information about domestic firms. Through the stationing of managers from the headquarters of multinational firms in the foreign direct establishments in the destination countries, under their control, FDIors can monitor closely the operation of such establishments, thus circumventing these informational problems.

Furthermore, FDI investors not only have an informational advantage over foreign portfolio investors, but they are also more informed than domestic savers. Because FDI entails direct control on the acquired domestic firm, which the typical domestic savers with ownership position in the firm do not have. Being “insiders”, the FDIors can “overcharge” the uninformed domestic savers, the “outsiders”, when multinational subsidiaries shares are traded in the domestic stockmarket. Anticipating future domestic stock market trade opportunities, in advance, foreign investment becomes excessive. However, unlike the home-bias informational problem, which leads to inadequate foreign portfolio capital inflows, but may be correctable by Pigouvian taxes such as tax on non-resident income, tax on interest income and corporate tax (see Razin, Sadka and Yuen (1998, 1999a)), excessive FDI flows under the insider-outsider informational problem call for *non-tax* corrective policy. First, because they are governed by unobservable variables (such as the productivity level which triggers default, according to the firm contract with its lender). Second, because there exist self-fulfilling expectations equilibria which cannot be efficiently corrected by taxation. The

corrective policy tool that is left available is then simply quantity restrictions on FDI.

APPENDIX 1: DERIVATION OF FIRST-ORDER CONDITIONS FOR THE FIRM'S INVESTMENT PROBLEM

In the presence of FDI, the maximization of the firm value V , as specified in equation (4), with respect to K and $\bar{\varepsilon}$ yields the following first-order conditions:

$$\begin{aligned}
 0 = & \left\{ \frac{[1 - \Phi(\varepsilon^o)][e^+(\varepsilon^o) - \bar{\varepsilon}]}{1 + r^*} + \frac{[\Phi(\varepsilon^o) - \Phi(\bar{\varepsilon})][\hat{e}(\bar{\varepsilon}, \varepsilon^o) - \bar{\varepsilon}]}{1 + \bar{r}} \right\} F'(K) & (\text{A1.1}) \\
 & + \lambda \{ [1 - \Phi(\bar{\varepsilon})](1 + \bar{\varepsilon}) + \Phi(\bar{\varepsilon})(1 - \mu)[1 + e^-(\bar{\varepsilon})] \} F'(K) \\
 & - \lambda(\bar{r} + \delta) - \lambda\Phi(\bar{\varepsilon})\mu(1 - \delta),
 \end{aligned}$$

and

$$\begin{aligned}
 0 = & -\frac{1 - \Phi(\varepsilon^o)}{1 + r^*} - \frac{\Phi'(\bar{\varepsilon})[\hat{e}(\bar{\varepsilon}, \varepsilon^o) - \bar{\varepsilon}]}{1 + \bar{r}} & (\text{A1.2}) \\
 & + \frac{[\Phi(\varepsilon^o) - \Phi(\bar{\varepsilon})][\frac{\partial \hat{e}}{\partial \bar{\varepsilon}}(\bar{\varepsilon}, \varepsilon^o) - 1]}{1 + \bar{r}} - \lambda\Phi'(\bar{\varepsilon})(1 + \bar{\varepsilon}) \\
 & + \lambda[1 - \Phi(\bar{\varepsilon})] + \lambda\Phi'(\bar{\varepsilon})(1 - \mu)[1 + e^-(\bar{\varepsilon})] \\
 & + \lambda\Phi(\bar{\varepsilon})(1 - \mu)\frac{de^-(\bar{\varepsilon})}{d\bar{\varepsilon}}F(K) - \lambda\mu\Phi'(\bar{\varepsilon})(1 - \delta)K,
 \end{aligned}$$

where λ is a Lagrange multiplier. Our numerical simulations suggest that there will be domestic under-saving and foreign over-investment, i.e., $\bar{r} < F'(K) - \delta < r^*$.

In the absence of FDI, the first-order conditions for the maximization problem as stated in (4') with respect to K and $\bar{\varepsilon}$ are:

$$\begin{aligned}
0 &= F'(K) - \Phi(\bar{\varepsilon})\{F'(K)[1 + e^-(\bar{\varepsilon})] + (1 - \delta)\} & (\text{A1.1}') \\
&\quad - [1 - \Phi(\bar{\varepsilon})][F'(K)(1 + \bar{\varepsilon}) + (1 - \delta)] \\
&\quad + \lambda[1 - \Phi(\bar{\varepsilon})][F'(K)(1 + \bar{\varepsilon}) + (1 - \delta)] \\
&\quad + \lambda\Phi(\bar{\varepsilon})(1 - \mu)\{F'(K)[1 + e^-(\bar{\varepsilon})] + (1 - \delta)\} \\
&\quad - \lambda(1 + \bar{r}),
\end{aligned}$$

and

$$\begin{aligned}
0 &= -\Phi'(\bar{\varepsilon})\{F(K)[1 + e^-(\bar{\varepsilon})] + (1 - \delta)K\} & (\text{A1.2}') \\
&\quad - \Phi(\bar{\varepsilon})F(K)[de^-(\bar{\varepsilon})/d\bar{\varepsilon}] - [1 - \Phi(\bar{\varepsilon})]F(K) \\
&\quad + \Phi'(\bar{\varepsilon})[F(K)(1 + \bar{\varepsilon}) + (1 - \delta)K] + \lambda[1 - \Phi(\bar{\varepsilon})]F(K) \\
&\quad - \lambda\Phi'(\bar{\varepsilon})[F(K)(1 + \bar{\varepsilon}) + (1 - \delta)K] \\
&\quad + \lambda\Phi'(\bar{\varepsilon})(1 - \mu)\{F(K)[1 + e^-(\bar{\varepsilon})] + (1 - \delta)K\} \\
&\quad + \lambda\Phi(\bar{\varepsilon})(1 - \mu)\{F(K)[de^-(\bar{\varepsilon})/d\bar{\varepsilon}]\}.
\end{aligned}$$

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