Fixed Investments and Capital Flows: 
A Real Options Approach

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Abstract

This paper draws a link between international capital flows and the real options approach to investment by extending the development and cascade model applied by Grenadier (Journal of Finance 51, 1996) to real estate markets. This modified model rationalizes such phenomena as gradual investment, investment booms, and investment during recessions, and it emphasizes the role of sunk costs and uncertainty in determining the timing of investment. We also show that the correlation between capital flows and the spread between the domestic return to capital and the foreign interest rate depends importantly on the source of uncertainty; if the foreign interest rate is stochastic, the correlation is expected to be high, but would be low if the uncertainty affects the domestic rate of return.

JEL classification: F21, F32, F39

Keywords: Fixed investments, Capital flows, Real options

I. Introduction

International capital flows often appear to be subject to sudden changes in sentiment. This is most clearly the case in episodes of speculative attacks against fixed or quasi-pegged exchange rates, such as occurred in the ERM in 1992-93, Mexico in 1994-95, and in many Asian emerging markets in 1997-98. Much of the analysis of episodes of this kind identifies shifts in economic fundamentals or self-fulfilling speculative bubbles as underlying the change in sentiment generating the fluctua-

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While one cannot draw a precise link between the capital inflows and domestic investment, a significant fraction of their investment was financed by foreign capital. For example, for the developing countries in Asia, investment rose from 29 percent of GDP in 1983-90 to 33 percent of GDP in 1991-96, and from 28 percent of GDP to 32 percent of GDP over the same period for the four newly industrialized Asian economies (Table A44, I.M.F. *World Economic Outlook*, October 1997). Over this same period, there were substantial capital inflows into many of these countries.

The Asian crisis thus highlights an important role for foreign borrowing in facilitating the expansion of business fixed investment, especially real estate. Thus it would appear useful to explore the extension of theories of real estate investment to a model of capital flows in an open economy. In particular, the model of Grenadier (1996) shows how a game-theoretic approach to the exercise of options can be useful in explaining certain aspects of investment decisions. In particular, international capital movements share many features with real estate investment in that they do not always take place smoothly and continuously, but rather are often subject to sharp bursts of inflows and outflows.

The model developed here relaxes the assumption of indivisible investment in Grenadier (1996) by allowing a variable investment level and external borrowing so as to adapt the model to the situation of an open economy. Both the case of monopoly and that of Cournot competition between investors are modeled explicitly and related to the economic fundamentals of the economy where the investment takes place. Imperfect competition is a feature required to capture the strategic interaction of market players, as market share is often cited as an important consideration when investing in a foreign market. Market share would be irrelevant in a perfectly competitive environment. This modified model rationalizes such phenomena as gradual investment, investment booms, and investment during recessions, and it emphasizes the role of sunk costs and uncertainty in determining the timing of investment. It also shows that the correlation between capital flows and the spread