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A knowledge-and-physical-capital model of international trade flows, foreign direct investment, and multinational enterprises

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Abstract

This paper addresses two important issues at the nexus of the literatures on international trade, foreign direct investment (FDI), foreign affiliate sales (FAS), and multinational enterprises (MNEs). First, the introduction of a third internationally-mobile factor (physical capital) to the standard $2\times2\times2$ "knowledge-capital" model of MNEs with skilled and unskilled labor allows us to resolve fairly readily the puzzle in the modern MNE literature that foreign affiliate sales among two identical economies completely displace their international trade. Intra-industry trade *and* intra-industry FDI (and FAS) can coexist for national and multinational firms (with identical productivities) in identical countries. Second, the introduction also of a third country to the model suggests a formal *N*-country theoretical rationale for estimating gravity equations of bilateral FDI flows and FAS, in a manner consistent with estimating gravity equations for bilateral trade flows.

Keywords: Foreign direct investment; International trade; Multinational firms; Gravity equation

JEL classification: F11; F12; F21; F23

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1. Introduction

> "Multinationals displace trade…." (Markusen, 1995, p. 180).

> "The cross-country pattern of FDI is quite well approximated by the 'gravity' relationship." (Barba Navaretti and Venables, 2004, p. 32).

This paper addresses two important issues at the nexus of the literatures on international trade, foreign direct investment (FDI), foreign affiliate sales (FAS), and multinational enterprises (MNEs). First, the modern $2\times2\times2$ general equilibrium theory of MNEs synthesized in Markusen (2002) implies that – in two countries with identical absolute and relative factor-endowments (other things equal) – horizontal MNEs' foreign affiliate sales displace *completely* national firms (with identical productivities) and trade between the two countries. However, the European Union and the United States, for instance, have both the largest intra-industry bilateral foreign direct investment flows (and FAS) *and* intra-industry trade flows. This is a puzzle. Second, while multi-country theoretical foundations for the trade gravity equation are now well established (cf., Anderson and van Wincoop, 2004, and Feenstra, 2004, ch. 5, for overviews), there have been virtually no formal N-country ($N>2$) theoretical frameworks provided in international economics for estimating gravity equations of aggregate bilateral FDI, despite numerous empirical studies over the past decade using the gravity equation to explain such flows.[1] Blonigen et al. (in press) note that the "gravity model is arguably the most widely used empirical specification for FDI" (p. 8). Yet the typical rationale for applying the gravity equation to bilateral FDI is by analogy to the trade gravity equation, cf., Mutti and Grubert (2004, p. 339) and Blonigen (2005, p. 21). This suggests a puzzle similar to one posed 30 years ago for trade: The gravity equation explains bilateral FDI empirically quite well… *but why*?

We suggest a simple, integrated solution to both puzzles. First, the introduction of a third factor – physical capital – to Markusen's two-factor "knowledge-capital" model with only skilled and unskilled labor, combined with the assumption that headquarters (plant) setups require human (physical) capital, implies that national exporting enterprises (NEs) can coexist with horizontal MNEs (HMNEs) in pairs of countries with identical relative *and* absolute factor-endowments (and all firms sharing identical technologies). With skilled labor not being the only factor used to setup both plants and firms, skilled labor is not completely displaced from plant setups to firm setups as two countries' GDPs converge in size. In the $2\times2\times2$ model of Markusen and Venables (2000), there is only a (highly unlikely) unique combination of trade costs, investment costs and ratio of

[1] Martin and Rey (2004) have advanced a theory of the gravity equation for bilateral *portfolio* investment flows. However, no studies have developed a theory for the gravity equation for bilateral FDI stocks/flows. Recently, a few studies have offered theoretical rationales for estimating bilateral FAS gravity equations, cf., Grazalian and Furtan (2005), Kleinert and Toubal (2005), and Lai and Zhu (2006); however, these studies assume exogenously heterogeneous productivities to generate coexistence of multinational and national firms, in the spirit of the model in Helpman et al. (2004), and only explain FAS. By contrast, we motivate the endogenous coexistence of country pairs' horizontal MNEs and national firms sharing identical productivities, even for identical economies. Moreover, by incorporating capital flows, we provide simultaneously theoretical rationales for trade, FAS, *and* FDI gravity equations, distinguishing explicitly between FDI (a measure of MNE capital flow) and FAS (a measure of MNE production). Consequently, our analysis is in the spirit of the "new trade theory" where, as noted in Helpman (2006, p. 592), within-industry heterogeneity results from product differentiation and monopolistic competition, and heterogeneous productivities among firms are unnecessary to explain large volumes of intra-industry trade. Since our theoretical model will be static, conventional to the trade and knowledge–capital MNE literatures (cf., Markusen, 2002), bilateral "flows" and "stocks" are conceptually identical. In empirical work, however, flows and stocks will be distinguished. Traditionally, gravity equations have used bilateral FDI stock data, cf., Blonigen et al. (in press).