



Foreign direct investment, human capital and non-linearities in economic growth

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ABSTRACT

This paper makes a contribution to the existing literature on the foreign direct investment (FDI) and economic growth nexus by contrasting past empirical evidence and conventional wisdom and arriving at some interesting new results. By applying non-parametric methods, and thus taking into account non-linear effects of initial income and human capital on economic growth, we explore the FDI effect on growth in much greater detail than previous studies. Our findings not only confirm the non-linear effect of human capital in the presence of FDI inflows but also suggest that FDI inflows are growth enhancing in the middle-income countries while there is a 'two-regime' FDI effect for high-income countries. This new finding appears to be independent of OECD country membership.

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1. Introduction

The role of foreign direct investment (FDI) in the growth process has been (and still is) the subject of long and intense debate.¹ Although this debate has provided many potential insights into the relationship between FDI and growth, it is true that most of the existing theory provides contradicting predictions about their relationship.² FDI is considered a vehicle through which new ideas, advanced techniques, technology and skills are transferred across borders and provide substantial spillover effects. Within the framework of new growth theories, that stress the effect of technological progress on long-run growth rates, FDI should be considered an important factor boosting growth. There is a body of literature that analyses the effect of FDI on growth and another concentrating on knowledge spillovers to domestic firms³. The existing empirical evidence also seems to be contradictory: firm-level studies of particular countries often conclude that FDI is not beneficial to growth and also fail to obtain positive spillover effects to domestic enterprises. On the other hand, country-wide studies examining the effect of FDI inflows in the growth process of countries usually provide positive results, especially in specific environments.

All the above are of immediate practical interest for developing and least developed countries (LDC), which often lack the necessary background in terms of education, infrastructure, economic and political stability in order to be able to innovate and generate new discoveries and designs. In this vein, FDI and its agents, Multinationals Corporations (MNCs) may conceivably help technological advancement domestically. On the other hand, developing countries and LDCs lack the necessary

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¹ This debate will be presented analytically later in the literature review.

² For theoretical models please refer to Findlay (1978), Walz (1997), Markusen and Venables (1999), Baldwin et al. (2005), Dinopoulos and Segerstrom (2005).

³ For surveys please refer to de Mello (1997), Kumar and Siddharthan (1997) and Saggi (2000).

environment, hence they are not able to reap the benefits associated with FDI and as a consequence they are only used as platforms for MNCs to promote their own benefit by establishing rent-seeking activities. Moreover, the presence of MNCs may adversely affect domestic firms, given the market power of their proprietary assets such as technology, superior brand names and aggressive marketing techniques and as a result, FDI may crowd-out domestic investment.

Our findings contradict the bulk of existing parametric evidence which suggests that a beneficial effect of FDI to economic growth exists only for countries with a minimum threshold of absorptive capacity, i.e. countries at higher levels of income. In contrast to this we find that FDI inflows have a non-linear effect on growth. These new findings appear to be independent of OECD country membership.

Although there are a number of studies that bring up the issue of non-linear effects of FDI on growth, they are imposing specific restrictions as to the non-linearity on the grounds of human capital, level of development, financial development and degree of openness to trade, by simply incorporating interaction terms in a linear regression framework, or splitting the sample of countries into groups according to the above. Instead, in our study we impose no such prior restrictions on the potential non-linearity of FDI on economic growth and we resort to non-parametric techniques, thus surpassing the existing criticism on parametric econometric specifications.

Apart from this methodological contribution, this paper makes another two contributions to the relevant literature; first, we confirm that the recently established non-linear effects of human capital on growth still hold in the presence of FDI inflows; second, we allow for possibly non-linear human capital effects along with non-linear FDI effects on growth. Hence, we “test” for the joint effect and interaction of FDI and human capital on economic growth. In our analysis we use a wide range of countries, both developed and developing in order to be able to distinguish potential differential effects between the two groups.

Our results have potentially interesting policy implications. The non-linearity appearing in the relationship indicates a differential impact of FDI on growth which does not necessarily hold on the basis of the countries’ human capital absorptive capacity. Rather, this study suggests that the relationship is much more complex than that since the human capital itself exerts also a non-linear effect on economic growth. This may signal the need for a more specialized analysis and policy design within each country since (i) FDI may take place in very different sectors/industries among countries on the one hand and on the other hand even if it is in the same sectors/industries it might exhibit different productivities (ii) the evidence is also consistent with [Durlauf and Johnson \(1995\)](#) pointing to a model in which countries pass through distinct phases of development towards a unique steady state. That is, at a given time interval, countries display differences in their growth characteristics in their transition to a high growth position ([Galor, 2005](#)) and this is reflected in the observed non-linearities in the data.

The rest of the paper is organized as follows: Section 2 discusses related literature; Section 3 presents the benchmark model and data, Section 4 analyses the non-linear models and estimation. Section 5 then presents empirical results and finally Section 6 concludes.

2. Literature review

As mentioned above, firm-level studies usually fail to reach positive growth or positive spillover effects into the host nation. Among those we find the influential study of [Aitken and Harrison \(1999\)](#) for Venezuela, [Haddad and Harrison \(1993\)](#) for a number of developing countries, [Kokko \(1994\)](#) for Mexico regarding industries where foreign affiliates exhibit higher productivity and a larger market share than the domestic firms. In other industries though, she finds positive effects between foreign presence and local productivity. [Kokko et al. \(1996\)](#) for Uruguay and [Kathuria \(2001\)](#) for India find similar results. An affirmative positive affect is suggested in [Blomström \(1986\)](#) for Mexico.

The literature is much richer in the macroeconomic context. Positive effects of FDI on growth or productivity spillovers are attributed to [De Gregorio \(1992\)](#) for 12 Latin-American countries, [Blomström et al. \(1992\)](#) for 78 developing countries, [Blomström et al. \(1994\)](#) for a sample of both developed and developing countries,⁴ [Bende-Nabende and Ford \(1998\)](#) for Taiwan, [Zhang \(2001\)](#) for the majority of East-Asian economies and Latin America and [Baldwin et al. \(2005\)](#) for nine OECD countries.

Another line of research points to a differential impact between developed and developing countries, for example, [De Mello \(1999\)](#) for 15 OECD and 17 non-OECD countries for the period 1970–1990 and [Xu \(2000\)](#) for US FDI in 40 countries for the period 1966–1994.

Finally, there is an array of works that stress the positive role of FDI conditioned on adequate local factors,⁵ especially human capital. [Borenztein et al. \(1998\)](#) in their study of 69 developing economies for 1970–1989 concluded that the effect of FDI is dependent on the human capital stock. [Bengoa and Sanchez-Robles \(2003\)](#) reached the same conclusion for Latin America based on economic stability and liberalized financial markets.

All relevant studies discussed above regarding the growth enhancing role of FDI based on local “absorptive capacity”, impose restrictions as to the type of non-linearity and are confined to parametric techniques by simply incorporating interaction terms in their regressions or by splitting the sample of countries into groups to test such a hypothesis.

Recently, two studies emerged to contradict the majority of macroeconomic evidence of a beneficial effect. [Carkovic and Levine \(2005\)](#) criticized existing empirical studies as not fully controlling for simultaneity bias, country-specific effects and

⁴ However, when they split their sample of developing countries into two groups based on their level of income per capita they found that FDI was not statistically significant for lower income developing countries although it remained positive.

⁵ [Balasubramanyam et al. \(1996\)](#) examined a number of developing countries for 1970–1985 and concluded that FDI is enhancing for those that follow an export oriented trade policy regime, [Alfaro et al. \(2003\)](#) found growth enhancing effects of FDI in economies with sufficiently developed financial markets.

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