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Foreign direct investment and economic growth: Exploring the transmission channels

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ABSTRACT

The impact of foreign direct investment (FDI) on growth remains a thorny question for researchers and policy makers. At the theoretical level it has been argued that FDI is growth enhancing. However, existing empirical studies have left researchers and policy makers perplexed as these studies do not appear to find a strong relationship between the two variables. This paper departs from the existing literature by exploring the transmission channels from FDI to growth. The results, based on a sample of developed and developing countries over the period 1970–2007, conclusively reveal that FDI affects growth via inputs accumulation but not the total factor productivity growth channel. In other words, our results suggest that factors other than FDI may have contributed to the increase in productivity witnessed in developing countries in recent decades.

1. Introduction

Over the last few decades foreign direct investment has become an important source of external finance worldwide, particularly for many developing countries. Indeed, many developed and developing countries have implemented various policy incentives to attract foreign firms. Worldwide, World Bank statistics show that FDI net flows have grown from 0.5 percent of GDP in 1970 to over 5 percent of GDP in 2007. This importance of FDI stems from the fact that it is commonly associated with many benefits including job creation, increased competitiveness, transfer of technology, and most importantly economic growth. This perception of FDI has also been supported by the theoretical literature, which has identified several channels, through which FDI can benefit the host country.

Notwithstanding this perception of FDI, a survey of the empirical literature appears to tell a different story. Micro-level studies (see Aitken and Harrison, 1999; Gorg and Greenaway, 2004) generally find that FDI does not spur growth and does not generate positive spill-over effects from foreign to domestically owned firms. Macro-based empirical research (see Saltz, 1992; Carcovic and Levine, 2005; Lipsey, 2002; Kose et al., 2009; Herzer, 2012; Yalta, 2013; Feeny et al., 2014; Iamsiraroj and Ulubaşoğlu, 2015) also reveal that the FDI-growth relationship remains, largely inconclusive. Some studies suggest that FDI has a positive impact on growth in developing countries, although this effect is conditional on the characteristics of the host economy (see Blomström et al., 1994; Balasubramanyam et al., 1996; De Mello, 1997; Borensztein et al., 1998; Alfaro et al., 2004). Borensztein et al. (1998), for example, show that the technology brought in by FDI translates into higher growth only when the host has a minimum threshold of human capital stock. Blomström et al. (1994) argue that FDI exerts a positive impact on growth in countries with high income per capita. Balasubramanyam et al. (1996) emphasize trade openness as a key ingredient for FDI to spur growth; while Borensztein et al. (1998) stress that for FDI to have a positive impact on growth the host country must have a highly educated workforce that allows it to exploit the spillover effects of FDI. Alfaro et al. (2004) draw attention to financial markets as they find that FDI promotes economic growth in economies with sufficiently developed financial markets. The overall picture of the empirical evidence on the FDI-growth relationship is offered by Iamsiraroj and Ulubaşoğlu (2015) who report that, of the 108 empirical studies surveyed, 43% show a positive and significant effect, 17% a negative and significant effect and 40% a statistically insignificant effect.

The core objective of this paper is to unpack the FDI-growth relationship by adopting a two step approach. In the first step, we decompose

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economic growth into its main components (input change and total factor productivity growth). This step is useful as it sheds light on the transmission channel(s) of FDI to growth. To this end, the Bayesian stochastic frontier analysis (BSFA hereafter), which allows us to formally compare different stochastic frontier models, is adopted for the decomposition. In the second step, using these various components and dynamic panel methods we investigate the channel(s) through which FDI transmits to growth.

Indeed, the literature on FDI and economic growth generally discusses two "channels" through which FDI affects economic growth and its components: (i) a direct one via accumulation of input factors (investments in capital, labour growth), and (ii) an indirect one via TFP growth (increased labour productivity, new technologies, knowhow etc.). Direct impact of FDI on growth through inputs stems from the fact that FDI contributes to higher capital stocks (via domestic capital formation; see, e.g., Azman et al., 2010; Mallick and Moore, 2008; Almfraji and Almsafir, 2014). It can also lead to an increased labour input through additional demand for it, especially for high-skilled labour. It should be noted, however, that some FDI flows may result in initial layoffs (e.g., privatization investments) or that some automation processes which come with new FDI-led technologies may not necessarily lead to higher employment (see, e.g., Azman et al., 2010). Thus the positive relation between FDI and labour may not always be as apparent as in case of capital. The direct impact of FDI on inputs, especially with respect to capital stock formation, is also outlined by Thompson (2008). Using a theoretical model he shows that foreign investment flows are due to the difference in capital to labour ratios between the host and the source country. This generates excess demand (host) and excess investments (source) which result in FDI flows. In order for the model to reach an equilibrium state (equal ratios in host and source economy) FDI flows must have a direct impact on inputs accumulation, especially capital stock. Indirect link between FDI and economic growth via TFP growth is postulated because a host country can gain access to new technologies and increase its economic efficiency due to better knowhow, managerial skills and increased human capital (see, e.g., Azman et al., 2010, Iamsiraroj and Ulubasoglu, 2015; Almfraji and Almsafir, 2014). However, it is argued that in order for FDI to affect economic growth through these channels the host country needs to meet some minimal conditions or absorptive capacities (i.e., level of human capital, trade openness, developed financial markets; see, e.g., Iamsiraroj and Ulubasoglu, 2015).

All in all, given these counteracting effects it is clear that the relationship between FDI and growth is more complex than previously thought. It is, therefore, important to scrutinise deeply into this nexus. To our knowledge, this is the first study to investigate the FDI-growth relationship from this angle. Indeed, our research has two main original features compared to the existing literature. First, we depart from the standard growth accounting method and adopt stochastic frontier analysis (SFA), in particular the BSFA, to derive our estimate of total factor productivity. This methods allows us to separate changes in TFP from random disturbances (e.g., measurement error) and to choose the best model given the data using formal Bayesian techniques (i.e., Bayesian model selection and model averaging via posterior model probabilities). In other words, the estimates of TFP obtained from this approach are more reliable than those obtained using a standard growth accounting techniques. Second, unlike most existing studies that have focused on the impact of FDI on growth or on total factor productivity, we explore its effect on all components of economic growth: total factor productivity growth and input growth. In doing so, we are able to shed more light on the transmission mechanism from FDI to growth.

To anticipate the results, the paper reveals that for the overall sample, which includes both developed and developing countries, FDI flows have a positive and robust significant effect on input growth; however, its impact on TFP growth is statistically insignificant. In the context of developing countries, where FDI remains a controversial issue, we also observe similar results. The paper progresses as follows. Section 2 presents an overview of the growth accounting and BSFA methods used in this study. Section 3 describes the empirical framework and discusses the data. In Section 4, we present the results and analysis. The section starts with a brief overview of the growth decomposition results based on BSFA. Section 5 concludes the paper.

2. Estimating the components of output growth

2.1. Growth accounting framework and the choice of estimation method

When assessing the components of output growth one should note that we can summarise the observed production of an economy as

$$Y_{it} = F(X_{it};\beta_t)EF_{it}\exp(\varepsilon_{it}) \quad (1)$$

where: Yit is the aggregated product, Xit is a vector of input factors,[1] $EFit \in (0,\ 1]$ is the technical efficiency of country i in period t given the production technology $F(.;\ \beta t)$ - also known as the production frontier - and βt is a vector of the production function parameters. The term εit is a standard symmetric disturbance, which reflects the stochastic nature of the production we observe; $E(\varepsilon it) = 0$. Given the above, we expect the production to change either due to (i) the change in the quantity of inputs or (ii) the way they are used in production. The latter term is broadly referred to as a change in productivity and we can consider it in two ways. First, when the world's production technology is progressing it augments parameters (βt) of the production function. Second, productivity may shift as a result of changes in technical efficiency ($EFit$), with which a given economy uses its resources in the aggregate production process. The described process can be summarized as (Koop et al., 1999, 2000 ab; Makieła, 2014)

$$OC_{i,t+1} = IC_{i,t+1} \times TC_{i,t+1} \times EC_{i,t+1} = IC_{i,t+1} \times \Delta TFP_{i,t+1} \quad (2)$$

where: OC is output change, IC is input change and ΔTFP is the change in total factor productivity, which can be either due to technical change (TC - changes in the "World Technology Frontier") or efficiency change (EC - changes in efficiency with which an economy utilizes its resources given the current "World Technology Frontier") in country i between period t and $t+1$. Suffice to say that increase in any of the components (i.e., input growth, TFP growth) results in economic growth.

Growth accounting frameworks often use the term Solow residual (A_{it}) when discussing TFP change. In our case it can be simply written as $A_{it} = EF_{it}\exp(\varepsilon_{it})$, which means that we formally address the problem of separating measurement uncertainty (purely random shocks reflected by ε_{it}, which are neutral to TFP change) and possible disturbances (events) which affect TFP via inefficiency change. A standard growth accounting framework usually pre-assumes a Cobb-Douglas functional form and does not make any distinction in A_{it} between technical inefficiency change, which should be included in TFP change, and random noise, which should not be part of TFP change (see, e.g., Wang and Wong, 2009). Thus if the random disturbance is substantial it can significantly bias TFP estimates. In other words, TFP estimates obtained using our approach are more reliable in the presence of measurement error (ε_{it}).

To some extent the growth accounting framework discussed in (1) and (2) determines our choice of the estimation method. First, given (1) the reader can notice that we allow for a random disturbance in the production process (ε_{it}). This is particularly important for us since we

[1] Typically these are physical capital (K_{it}) and labour (L_{it}) as in this paper. Growth accounting literature also mentions a third factor - human capital. This indicator has been left out of the BSFA production model for three reasons. First, human capital is constructed using data on years of schooling and these, with few minor exceptions, do not change significantly over time. Thus when decomposing GDP growth rates share of that component in GDP growth is negligible by construction. Second, there is no consensus as to how human capital indicator should be included in the aggregated production function, i.e., if it should be modelled (i) as a separate, stand-alone factor, (ii) as a labour input factor or (iii) both, thus influencing TFP. Third, following the FDI literature we already use human capital as one of control variables in FDI regressions.