Foreign direct investment and its determinants: A regional panel causality analysis

M.W. Luke Chan[a,b], Keqiang Hou[b], Xing Li[c], Dean C. Mountain[a,*]

[a] DeGroote School of Business, McMaster University, Canada
[b] School of Finance, Shanghai University of Finance and Economics, China
[c] School of International Economics and Business, Nanjing University of Finance and Economics, China

ARTICLE INFO

ABSTRACT

Moving beyond traditional one- or possibly two-way causality involving foreign direct investment (FDI), a systematic approach is implemented for delineating both short- and long-run flows of causality involving FDI and a comprehensive set of FDI's possible determinants. Granger causality procedures incorporating error correction terms are implemented, using provincial panel data from China. In both the short and long run, growth in GDP directly influences FDI, while growth in local infrastructure and local investment provide indirect but not direct influence.

© 2013 The Board of Trustees of the University of Illinois. Published by Elsevier B.V. All rights reserved.

1. Introduction

Foreign direct investment (FDI) and its relationship with economic growth have led to numerous empirical studies (see DeMello, 1997, 1999). Traditionally, in the literature, one or possibly two-way causality involving FDI and one factor such as GDP, local investment and infrastructure or quality of labor have been examined. Our intention is to widen the discussion by providing a systematic approach for considering all possible flows of causality involving FDI and the other variables of influence. We outline and implement a sequential econometric methodology that firstly determines whether the relevant variables of potential interest are stationary or integrated, that secondly identifies the exogeneity and endogeneity of these variables, that thirdly determines whether relationship among variables are long or short run in nature, and that finally establishes the relevant causality relationships. We do this in the context of regional panel data from China over the period, 1995–2010. China has the highest FDI among developing countries, but within China a great deal of diversity exists across regions. While not limited to the coastal provinces of China, traditionally most of the FDI inflows have been in the coastal region. Furthermore, with a limited length of reliable annual data in China, a regional panel approach provides statistical efficiency benefits.

While originally the focus in the literature had been on the one-way causal link from FDI to growth, following criticisms such as Kholdy (1995) and others, newer studies emerged allowing for the possibility of two-way causality among FDI and growth. That is, FDI can Granger cause GDP growth and GDP growth could also affect the inflow of FDI. Nevertheless, it soon becomes apparent that possible linkages inevitably involve other determinants. For example, the contribution of FDI to growth is influenced by such factors as domestic investment, technology and skills of the labor force (e.g., Apergis, Katrakilidis, & Tabakis, 2006; Gholami, Lee, & Heshmati, 2006; Kartircioglu and Naraliyeva, 2006; Sun, Tong, & Yu, 2002).

Indeed, how these other determinants influence FDI and the growth in GDP undoubtedly can shape the prescriptive policies that lead to targeted growth and investment. In searching for the relevant interaction and causality among FDI, growth in GDP and other determining factors, this study proposes a comprehensive search strategy for uncovering the most suitable dynamic specification. While section 2 of this paper will provide a number of plausible explanations of the relationship between growth in FDI and possible determinants, ultimately we have to go to the data to statistically identify the appropriate endogenous variables, control variables and specification that best describes these relationships. Section 3 documents the definitions of the data variables and the data sources. Section 4 provides a preliminary exploration of what

* Corresponding author. Tel.: +1 905 525 9140x23988; fax: +1 905 521 8995.
E-mail addresses: chanmwl@mcmaster.ca (M.W.L. Chan),
hou.keqiang@mail.shufe.edu.cn (K. Hou), lixing@njue.edu.cn (X. Li),
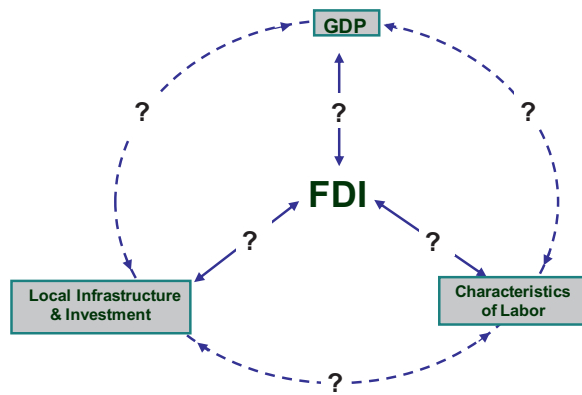mountain@mcmaster.ca (D.C. Mountain).

Fig. 1. Possible causality involving FDI.

variables are exogenous and what are endogenous, the nature of the stationarity of the variables, and whether the variables are cointegrated. Taking into account the findings of Section 4, Section 5 presents the causality exploration strategy and Section 6 presents the empirical results of the Granger causality tests and policy implications.

2. Potential determinants of FDI

The purpose of this section is to set the stage for exploring the possible factors having a significant influence on the growth in FDI. Traditionally in the literature, theoretical and empirical arguments have been provided to explore one- or possibly two-way causality involving FDI and GDP, FDI and local infrastructure and investment, or FDI and characteristics of labor. In Fig. 1, this causality, represented by the solid bidirectional arrows, appears as the spokes of a wheel with FDI as the hub. As we will more fully elaborate on, a number of the papers to date have explored some of these causality spokes. The intention of this paper is to consider all the factors simultaneously and to augment the discussion to consider possible three or four-way causality involving FDI, GDP, domestic investment and infrastructure, and quality of the labor force. Furthermore, while a particular variable may influence FDI, the causality may not be direct or short run in nature. The influence of a variable on FDI may be through another variable. For example, while the extent of local infrastructure may not have a direct impact on FDI, the influence may come indirectly through GDP.

While we are advocating a more comprehensive causality approach for exploring the causality relationships involving FDI, we begin by providing a brief summary of the arguments and empirical evidence to-date supporting the traditional one- or two-way linkages involving FDI and another factor such as GDP, local investment and infrastructure or quality of labor.

2.1. GDP and FDI

Originally it was hypothesized that FDI had a significant effect on GDP (e.g., Kholdy, 1995). Knowledge transfers and adoption of new technologies are sometimes portrayed as the primary growth-enhancing channels of FDI. The conditions for supporting the causality are varied. Blomström, Lipsey, and Zegan (1994) maintain that for FDI to have a significant impact on growth in GDP, there must be a sufficiently large per capita income. Borensztein, De Gregario, and Lee (1998) find that FDI raises growth only in countries where the labor force has achieved a certain level of education. Alfaro, Chanda, Kalemli-Ozcan, and Sayek (2004) argue that FDI provides growth only where there are

sufficiently developed financial markets. Nevertheless, even when such variables are taken into account, Carkovic and Levine (2002) find no impact on long-run growth.

Nevertheless, the traditionally held view is that the larger the market size (often represented by GDP) means less entry costs for foreign investors and potential economies of scale. Head and Mayer (2004), Blomström and Lipsey (1991) and Blonigen, Davis, Waddell, and Naughton (2004) have documented this impact on FDI.

A number of papers have tested for Granger causality between the two variables. Zhang (2001) using an error correction model found a strong Granger–causal relationship between FDI and GDP growth. But where there was no cointegration relationship between FDI and GDP growth, no cointegration relationship exists between the log of FDI and growth. Chowdhury and Mavrotas (2006) find that FDI does not Granger-cause GDP in Chile, but there is a bi-directional causality between GDP and FDI in Malaysia and Thailand. For non-OECD countries, DeMello (1999) finds either no causality from FDI to growth or negative short-run impact, depending on the econometric methodology. On the other hand, Nair-Reichert and Weinhold (2001) and Hansen and Rand (2006), with cross-country panels found that FDI on average had a significant impact on growth. Thus, the empirical evidence is mixed with respect to the causality regarding FDI and growth in GDP.

2.2. Local investment and infrastructure and FDI

There are two sources of an economy's investment, local investment and foreign investment. A central concern is whether FDI complements local investment or crowds out domestic investment. Both theory and empirical studies provide mixed signals with respect to the influence of FDI on local investment. On the one hand, through FDI the introduction of new managerial skills and technology will have a positive impact on local investment (Blomström, 1989). The generation of positive externalities leads to productivity growth of all sectors including those associated with local investment. But FDI could have negative impacts. With increased competition, particularly imperfect competition, the market share of domestic firms is reduced by FDI, particularly where there is a large technological gap between foreign and domestic firms. FDI may increase wages and prices of locally supplied inputs, leading to displacement of domestic firms and associated investments. FDI may crowd out domestic investment, because of better access to credit.

On the other hand, domestic investment may influence FDI. One channel of influence is through more investment in local infrastructure, FDI becomes more profitable. Also local investors may have a better feel for the local business possibilities. Consequently, their actions provide a valuable signal to foreign investors when full information is not readily available to foreigners.

Another way that local investment may influence FDI is through market size or expected GDP growth. Domestic investment is a significant determinant of GDP growth and in times of GDP growth or the growth in size of the local market there will be in turn positive impacts on FDI (e.g., Harrison and Revenga, 1995). (A good discussion of other possible interactions between local investment and FDI can be found in Apergis et al. (2006)). Nevertheless, while theory provides guidance on a number of possibilities regarding possible interactions between domestic investment and FDI, the extent to which some of these influences may even offset each other, deserves analyzing.

The infrastructure of the host economy can also make FDI more attractive due to lower entry and setup costs. Cheng and Kwan (2000a), Coughlin, Terza, and Arromdee (1991) and Porter (1990) provide evidence showing local infrastructure as an important