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Does foreign direct investment facilitate technological progress? Evidence from Chinese industries

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Abstract

This paper studies the impact of foreign direct investment (FDI) on total factor productivity (TFP) for a cross sectional sample of Chinese industrial sectors. The possible determinants of TFP are sought with special focus on FDI. An endogeneity test is performed in order to avoid inconsistent results. Evidence indicates that foreign presence, the level of R&D and the firm size are the most important factors enhancing TFP in Chinese industries. The findings from this study support the argument that attracting FDI is an effective way of introducing advanced technology to host countries.

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1. Introduction

With the rapid expansion of multinationals and foreign direct investment (FDI) in the global economy, the effect of FDI on the host economy, particularly on technological progress, has been of great interest to both academics and governments, and remains a contentious issue. Empirical tests of the effect of FDI on technology transfer have generated mixed results. Some studies have found that FDI has a positive effect on productivity (Caves, 1974; Kokko, 1994; Oulton, 1998; Blomstrom and Sjöholm, 1999; Xu, 2000), while others have reported that there is an inverse relationship between FDI and industrial productivity in

host countries (Haddad, 1993; Aitken and Harrison, 1999).

The phenomenal economic growth in China has been accompanied by a rapid increase in the inflows of FDI; for example, annual inflows of FDI increased from US\$ 1.91 billion in 1983 to US\$ 41 billion in 2000, and China has become the largest recipient of FDI in the developing world (UNCTAD, 2001). Despite the fact that a large proportion of FDI has flowed into manufacturing industries, accounting for 68.8% of total FDI (MOFTEC, 2000), only a few studies, for example, Sun et al. (1999) and Liu (2000), have been conducted on the relationship between FDI and labour productivity, and have attempted to find whether there are spillover effects or technology transfer from FDI to industrial sectors in China. The results from the studies have shed light on the issue and generated policy implications. These studies, however, assume implicitly that two-way links do not exist between

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FDI and labour productivity in a sector, and that productivity has little impact on the investment decisions of multinational enterprises (MNEs). Comparatively little empirical research has been conducted on the relationship between FDI and total factor productivity (TFP) in Chinese industries. Labour productivity is a partial productivity in which only one factor, labour, is considered. It is difficult to distinguish between labour productivity being high in a sector because of a high degree of technological efficiency or because of a large stock of physical capital, given that labour productivity fails to capture all of the influences on productivity. TFP evaluates technological progress, and constitutes a measure of the efficiency with which all the factors of production are employed.

It is widely believed that technological progress is facilitated through inward FDI, thus it is important to examine the relationship between TFP and FDI in a sector. The evidence of the positive impact of FDI on TFP would provide one potential justification for the use of fiscal incentives to attract inward FDI and would generate important policy implications for development strategy in developing countries. Therefore, the aim of this research is two-fold. First, we test explicitly whether there is endogeneity between FDI and TFP in order to apply an appropriate estimation method. Second, we examine empirically whether FDI presence in a sector leads to a high level of TFP.

The paper is organised as follows. [Section 2](#) reviews briefly the relationship between FDI and productivity. In [Section 3](#), the model and data are presented. [Section 4](#) analyses the empirical results, and [Section 5](#) concludes.

2. Literature review

As far as the effect of FDI is concerned, three approaches provide theoretical explanations: industrial organisation theories, international trade theories and endogenous growth theories. The industrial organisation approach attempts to examine the indirect effect or externality of FDI on host countries. It investigates explicitly the role of FDI in technology transfer and the diffusion of knowledge, as well as the impact of FDI on market structure and competition in host countries (Hymer, 1976; Buckley and Casson, 1976; Dunning, 1993; Caves, 1996).

It is argued that firms must possess specific advantages in order to overcome the difficulties of doing business abroad. The firms investing in foreign countries therefore have distinctive characteristics which may differ from firms in host countries. The effect of MNEs' entry on a host economy is beyond that of a simple import of capital into the country. FDI is not merely a source of capital, it is also a conduit for technology transfer and human skills augmentation in host countries. There are two main reasons for this. First, when MNEs invest in host countries, they bring with them advanced technology which constitutes their specific advantage and provides them with the power to compete successfully with local firms who have superior information of local markets, consumer preferences and local business practices. Second, the entry of MNEs breaks the existing equilibrium, and eliminates the monopolistic power of local firms. These are forced to be more efficient in using existing technology and resources, or they have to introduce new technologies in order to protect and maintain their market share, or, through direct contact with MNEs, local firms observe and imitate the way foreigners operate and can therefore become more productive. As a result, the effect of competition, demonstration and learning by doing on local industry may lead to an increase in productivity (Blomstrom and Kokko, 1996).

In international trade theories, the main focus is to examine why FDI occurs and how firms choose between exporting, FDI and licensing as an entry mode (Ethier, 1986; Horstmann and Markusen, 1992; Brainard, 1993). The feature of FDI is defined as knowledge-capital which has a joint-input or 'public goods' property (Markusen, 2000). This implies that spillovers or externality of FDI can occur in host countries. However, how FDI or multinationals affect the pace and pattern of technological progress has not been discussed explicitly. One exception is that Markusen and Venables (1999) have formally shown how it is possible for FDI to act as a catalyst, leading to the development of local industry through linkage effects.

The endogenous growth model considers FDI as an important source of human capital augmentation, technology change and spillovers of ideas across countries (Grossman and Helpman, 1995) and therefore FDI is expected to have a positive effect on growth. However, the spillovers from FDI do not arise automatically.

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