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The contribution of outward direct investment to productivity changes within China, 1991–2007

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ABSTRACT

There has been a marked growth in recent years in outward direct investment (ODI) by developing countries, and in particular, by China. Previous studies have examined the impact on developing countries productivity of foreign direct investment (FDI) from developed countries. This paper looks at the effects of China's outward direct investment on growth in its own productivity, and at two specific reasons for this growth: technology sourcing and improvements in efficiency. These are examined using data from China's ODI in eight developed countries during the period 1991 to 2007. It appears that Chinese outward direct investment has had beneficial spill-over effects in improving total factor productivity growth over the period of the study, and that gains in efficiency have been the chief reason for this. Our vector auto regression (VAR) decomposition analysis also suggests that domestic R&D capital stocks are the most important source of productivity growth with greater contribution to technological progress. China is likely to continue to expand its ODI and it will be interesting to see whether the productivity gains continue at the same rate, and whether other developing countries also increase their ODI and reap the same benefits.

1. Introduction

The application of new growth models and empirical techniques to expanded datasets has stimulated research on how international businesses enhance technology and knowledge diffusion between countries (Aghion and Howitt, 1992; Coe and Helpman, 1995; Coe et al., 1997, 2008; Grossman and Helpman, 1991; Hejazi and Safarian, 1999; Keller, 2004). Inspired by work on trade-related technology spillovers between trading countries (Gross and Helpman, 1991; Rivera-Batiz and Romer, 1991; Romer, 1990), attention has also moved to technology diffusion associated with foreign direct investment (FDI) in the host economy (Blomstrom et al., 1999; Globerman, 1979; Gorg and Greenaway, 2002; Hanson, 2001; Haskel et al. 2002; Keller and Yeaple, 2003; Lichtenberg and Van Pottelsberghe, 2001) and the extent to which foreign presence improves productivity in recipient developing countries (Aitken and Harrison, 1999; Bromstrom, 1986; Bromstrom and Kokko, 1998; Damijan et al., 2003; Haddad and Harrison, 1993; Kokko, 1994; Kokko et al., 1996; Konings, 2001). Other recent studies have attempted to further examine the impact of FDI spillover effects on specific sources of productivity growth (Ruhul et al., 2009).

Little attempt has, however, been made to undertake quantitative analyses of FDI-related productivity effects in the developing countries that are making the investments, probably because developing countries are generally the recipients of foreign capital and few have emerged as investors in the world economy.

China is an exception; its outward direct investment (ODI) took off as a result of the government's adoption and promotion of a "go global" policy aimed at establishing the country's investors as international players (China Daily, 3 August 2009). China's ODI

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has been a remarkable phenomenon in the past two decades, with more than 8500 Chinese companies establishing nearly 12,000 overseas subsidiaries in 174 countries in 2008 (CMC, 2009). Since 2000, China's FDI outflows have grown at an annual rate of 60% and reached USD52.2 billion in 2008 (UNCTAD, 2009). Moreover, they nearly doubled in 2008, while world total FDI fell by 20% (UNCTAD, 2009). More recently, knowledge- or asset-seeking (as well as a drive for market expansion and a search for natural resources) would seem to have been substantial motives for the Chinese investors engaging in overseas investment especially in developed countries.

This paper aims to examine the effects of China's ODI on changes in its productivity between 1991 and 2007, through estimating the contribution of two key sources of productivity growth: technological progress and technical efficiency change. The distinction is important for government investment promotion policies, as the two key factors in productivity growth are associated with different sources, and hence different policy implications.

The paper is organized as follows: Section 2 elaborates the theoretical framework of technology sourcing associated with ODI and analyzes technology sourcing effect in China; Section 3 describes the econometric model and data description; Section 4 presents the empirical results; and Section 5 discusses the results with concluding remarks.

2. Technology sourcing from outward direct investment: the theoretical framework

2.1. Technology sourcing from outward direct investment

Dunning (1988, 1994) and Cantwell (1989) suggest a close relationship between foreign direct investment and the intensity of R&D expenditures. The implicit mechanism here is that FDI can overcome geographic constraints and provide an important channel of knowledge dissemination (Aitken and Harrison, 1999; Branstetter, 2000; Caves, 1974). In line with this, multinational enterprises (MNEs) play a crucial role in raising the rate of international knowledge diffusion- they can either transfer firm-specific technology to domestic companies or source new technologies from companies in the host country (Chung, 2001). In the inward FDI technology transfer, adoption of foreign technology by domestic companies can be stimulated through competition effects, demonstrative effects and the mobility of trained labor. However, the transfer effect may be reduced by the availability of technology. This will be endogenously determined, and may even be blocked by foreign investors (Keller, 2004), and by deficient complementary skills in the domestic companies trying to adopt the technology.

Technology sourcing arises as investing companies exploit technological, capital and human resources that are scarce at home in host country markets. World research and development expenditure is highly concentrated in a number of leading MNEs in developed countries (Keller, 2004; Nolan, 2005), so locating close to them enables those with technological disadvantages to get exposure to new technology and knowledge (Fosfuri et al., 2001; Jaffe et al., 1993). Investing companies may benefit from reverse technology flows by participating in technological activities and by acquiring appropriate foreign technology or research and development (R&D) facilities in a host country. Parent companies may also contract out some peripheral R&D activities to some host country companies, enabling them to focus on core innovation activity. As a result, MNEs may benefit from speedy adoption of foreign technology and lower R&D expenditure, with sequential productivity growth at home.

There is empirical evidence that MNEs are actively sourcing foreign knowledge. For instance, early studies found that Japanese firms are motivated by US locational advantages in technology, and establish joint ventures with their American partners to close the technological gap with their competitors in the host country (Kogut and Chang, 1991; Yarmawaki, 1993). More recent evidence indicates that the technological level of Japanese companies has improved by engaging in direct investment in the U.S. (Branstetter, 2000). Empirical investigation of the relationship between productivity growth in industrialized countries and foreign presence of their MNEs tends to support the view that FDI-related R&D spillovers contribute to the productivity growth of home countries. For example, Bracornier and Ekholm (2002) found a positive association in Sweden between the size of outward and inward FDI, R&D expenditure by the host country and technological spillovers absorbed by the home country; Neven and Siotis (1993) similarly found FDI in Europe to be concentrated mainly in innovative sectors. Examining total factor productivity of the US, Japan and 11 European countries for the period 1971–1990, Lichtenberg and Van Pottelsberghe (2001) found that both imports and ODI contribute to productivity growth in these economies. Inward FDI appears to be insignificant in technology transfer; the possible explanation is that foreign investors may try to minimize technology diffusion to host country companies in order to maintain their firm-specific advantages (Blomstrom et al., 1999; Dunning, 1994). Other empirical research also finds evidence supporting the stronger technology sourcing effects associated with ODI (Globerman et al., 2000; Singh, 2004)[1].

While a number of studies have estimated ODI-related technology diffusion in developed countries, little attention has been paid to productivity changes induced by ODI in developing countries. This is probably because developing countries are, in general, recipients of foreign capital and, by and large, receive foreign technology through importing, licensing and inward FDI. Few of them have shown a strong demand for the technology and even fewer have engaged in technology sourcing. China has recently emerged as an active investor with an increasing interest in technology in leading developed countries. Despite the growing evidence in qualitative case studies (Child and Rodriguez, 2005; Liu and Tian, 2008), tracking the motives and capabilities of Chinese MNEs in technology sourcing has not been prevalent. Empirical analysis of the technology sourcing effects on productivity change in China has also not been available. This will now be offered.

[1] One of the exceptions is the work by Bitzer and Kerekes (2008). Examining ten manufacturing sectors in 17 OECD countries during the period 1973–2000, they find no evidence for positive ODI-related technology sourcing effects, but FDI-receiving countries benefit strongly from FDI-related knowledge spillovers.