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Multi-dimensional Complementarities and the Growth Impact of Direct Investment from China on Host Countries

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Abstract

This paper examines the growth impact of developing country outward direct investment (OFDI) on the economic growth in host developing countries using a cross country panel dataset of Chinese OFDI over the 2003-2010 period. It finds that the growth effect of Chinese OFDI is determined by the multi-dimensional complementarities between the particular FDI flow, which is host country-specific, and the host economies. Overall Chinese OFDI appears to have a positive and significant impact on their long-run economic growth in host economies despite a negative association with short-run growth as Chinese OFDI seeks a variety of objectives in addition to a high growth market. Chinese OFDI appears to have contributed positively to the economic growth not only in Africa but also in Europe and North America. However, its contribution in Asia and Latin America is insignificant. Although the illustration of Chinese OFDI being mainly resource-seeking is exaggerating and misleading, Chinese OFDI in resource-rich country cannot avoid the resource curse either.

I. Introduction

Since the introduction of the 'going global' strategy in the late 1990s, outward direct investment from China has been increasing rapidly. This fast growth has attracted considerable attention from policy makers, academics and the public. What is the impact of outward direct investment (OFDI) from China on the host countries, especially on the growth of the host developing countries? Is the growth effect of OFDI from China different from that of the conventional foreign direct investment (FDI)? In fact, outward direct investment from the developing countries is not a completely new phenomenon. The first wave of OFDI from the South started in the 1970s when direct investment from the East Asian Newly Industrialised Economies rose. There has been academic and policy debate regarding the determinants, behaviour and impact of the developing country OFDI which were inconclusive. It was argued that to host developing countries, the emergence of developing country FDI provided a new source of capital, technology and skills and was hence a welcome development (UN, 1993). South-South FDI is also regarded to have an advantage over the traditional FDI from developed countries (TFDI) because the technologies used by developing country FDI are 'more appropriate' (eg., White, 1981; Aykut and Goldstein, 2006 and Durham, 2004). Moreover, developing country FDI appear to flow more into growing sectors while FDI from north do not have such indication (Bear and Gupta, 2009).

On the other hand, some scholars argue that as far as developmental effects are concerned, developing country multinationals (DC MNEs) are not an obviously superior option to conventional MNEs (eg., Narula, 2009). It is argued that it is less clear that DC MNEs represents a new source of technology or that they engage in activities that have greater opportunities for positive externalities. There is no clear North-South difference in terms of MNE subsidiaries and their relative benefits (UNIDO, 2007) because the management and organisation structures of DC MNEs move converge to that of conventional MNEs. Moreover, DC MNEs are less experienced with how to build linkages and with integrating themselves in local communities to become embedded in society. Some also argue that Chinese OFDI in developing countries is mainly resource seeking and market seeking. They drive the African and Latin American countries to resource-based economies and crowd out local industries (Ademola et al., 2009).

This paper aims to contribute to the debate on the growth impact of emerging market market FDI through a systematic theoretical discussion focusing on the multi-dimensional complementarities between FDI and the host economy and empirical analysis based on a cross country panel dataset. It contributes to the literature in a few ways. First, it provides the first systematic and comprehensive theoretical discussion of the growth impact of Chinese OFDI with a special focus on each of the major transmission mechanisms. The existing theory on the impact of FDI, eg. the technology gap theory, is based on an important assumption of the ownership advantage of the MNEs in technological, managerial and marketing knowledge. The emergence of the infant emerging market MNEs has posed a challenge to the existing theory in explaining the benefits of these DC FDI with important policy and practical implications. Although there has been substantial recent literature on EE OFDI, most of them focuses on the determinants of these OFDI. The theoretical discussions of the growth impact emerging market OFDI has usually centred on a few specific perspectives such as appropriateness of the technology (eg. UNIDO, 1993) or the difference or convergence of the behaviour of emerging market MNE to that of the conventional MNEs (Narula, 2009). As far as we are aware, this is the first theoretical and empirical research assessing the multi-dimensional complementarities and argue that such fitness in motivation, capability and resources plays an important role in shaping the direction and significance of the impact of emerging market FDI on the host country. It argues that although many emerging market FDI do not have the same level of OLI advantages as those traditional western MNEs have at least at the current stage, they still make significant contribution to host economies depending on the characteristics of the FDI and the host economies and the overall complementarities between them.

Second, empirical evidence on the impact of Chinese OFDI on host economy is mainly based on case studies (eg. Mlachila and Takebe, 2011; Du, 2009; Kaplinsky and Morris, 2009; Renard, 2011). Evidence from large database is rare. Only some tentative inferences can be made. The only study on the differential impact of ownership on technology transfer and technology compares South African and OECD companies in Tanzania (Kabelwa, 2004). The results show that South-South FDI does indeed have a higher potential. Recently, Weisbrod and Whalley (2011) has carried out a growth accounting exercise to evaluate the contribution of Chinese FDI to Africa's pre crisis growth surge. Focusing on FDI's role in capital accumulation, their analysis of data for 13 Sub-Sahara African economies over the 1990-2009 period suggests that 0.5 percent or higher increase in GDP growth in some of these

countries are due to Chinese OFDI alone. These research though has provide valuable general assessment of the growth impact of Chinese OFDI on the host economies, the research reported in this paper is the first empirical analysis evaluating the growth impact of Chinese OFDI on all host developing countries while distinguishing the differences in effect on long and short term growth and on countries with different characteristics.

The rest of the paper is organised as follows. Section II reviews the theory and literature on FDI and economic growth in developing countries. Section III analyses the growth impact of FDI from the South and its growth impact on host countries. Section IV describes the methodology and data. Section V reports the results. Section VI concludes.

II. FDI and economic growth in developing countries: The literature and theoretical framework

Received wisdom

Theoretically there are substantial gains from inward FDI. These include 1) development financing; 2) direct and indirect job creation; 3) knowledge transfer and spillovers through demonstration effect, movement of trained labour, and knowledge transfer within supply chain; and 4) competition effect when foreign entry forces local firms to enhance efficiency so as to survive and compete with foreign invested firms (Blomstrom & Kokko, 1997; Borensztein, et al., 1998; de Mello, 1999; Narula and Dunning, 2000; Javorcik, 2008). Forming joint ventures with foreign investors and sub-contracting to foreign invested firms are also argued to be effective channels for local firms to enter into the global production chain (Pietrobelli and Saliola 2008).

Of course, FDI is not an un-annoyed blessing. There may also be negative effects of FDI on the host economy. These include the crowding out effect when the affiliates of multinational enterprises (MNEs) crowd out the domestic firms especially the small business from the local market. FDI may also create high foreign dependence in the host economy and divert the limited resources in the host economy from developing indigenous economic and technological capabilities. There are also opportunity costs of resources such as land and labour as well as costs due to damage to the environment. Moreover, foreign invested firms may remain as enclaves in the host economy and lead to polarization or sharpened dualism

within the economies of the host country (Singer, 1975; Driffield and Taylor, 2000; Lall, 2002; Fu, 2003).

Given the gains and costs of inward FDI and the mixed empirical evidence, it is argued that the benefits from FDI are subject to a list of pre-conditions. For example, the strength of the growth effect of inward FDI depends on the presence of effective linkages between foreign and domestic firms (Rodriguez-Clare, 1996; Javorcik, 2004); the absorptive capacity of the domestic firms in the host economy (Girma, 2005; Fu, 2008), and the presence of complementary institutions and infrastructure (Balasubramanyam, et al., 1996). Therefore, the strength of the growth effect of FDI depends on the characteristics of FDI and the host country (Javorcik, 2008). In other words, the type of FDI, the source of FDI, and the sector where the FDI flows to in the host country also matter. Green field FDI is argued to have greater growth and employment creation effect than FDI engaged in merge and acquisition activities. FDI from innovation active countries is regarded to have greater knowledge spillover effects than FDI from lagged behind countries (Javorcik, 2008). FDI in resource exploitation activities are found to have less local linkage and limited spillovers than FDI in knowledge intensive manufacturing and services sectors. Finally, as discussed earlier, the capabilities of host country firms, the presence of favourable institutions and policies in the host countries also matter (Narula and Dunning, 2010).

Multi-dimensional complementarities and impact of DC FDI on host economies

What is the growth impact of Chinese OFDI on host economies? Is it different from that of the traditional FDI? Our earlier review of the theory and literature suggests that the answer to these questions depends on the characteristics of Chinese OFDI and that of the host economies and how these differ from that of the traditional FDI. To seek various different objectives, the DC FDI has flown to both the developed and developing country markets, which have different factor endowments, different development level, different absorptive capacity, institutional framework and in different economy cycle.

The existing theories of the growth impact of inward FDI on host economies are derived in the context of traditional OFDI developed countries investing in developing host economies. The expected gains and costs of FDI is based on the assumption of ownership, location and internalisation advantages that the traditional MNEs enjoy and a considerable technological

gap between the investing and the host country. With the emergence of the 'infant' outward FDI from the developing countries which does not possess the normal OLI advantage as the traditional FDI does, it becomes unclear regarding the growth impact of these DC FDI on host economies because some of the assumptions do not hold in this circumstances. The existing theory cannot fully predict the possible gains and costs. It is hence not surprising that the debate on this issue has been ongoing and inconclusive. Is the growth impact of DC FDI inferior than that of the traditional FDI because most of the DC FDI are not as strong as the TFDI in terms of their technological and managerial capabilities and are less experienced in managing cross border production activities? What is the growth impact of DC FDI in developed economies that enjoy a higher economic and technological development level than the investing economies?

The possible growth effects, either positive or negative, take place through various channels, from financing, competition to knowledge spillover. Due to the differences in various aspects between the home and host economies, the net growth effect of DC FDI on the host economy is a result of the overall complementarity in all the growth-enhancing dimensions between each pair of FDI investing and receiving countries.

Economic growth of an economy can be driven by the growth or improvement in capital (K), labour (L), and factors affecting productivity such as knowledge, competition. Inward FDI into the host economy may affect the changes in capital, knowledge and competition depending on the complementarities of FDI with the domestic economy in the relevant dimensions.

The contribution of FDI to financial capital is normally positive. The effect is likely to be significant when there is a clear shortage of investment funding in the domestic economy.
The contribution of FDI on knowledge capital accumulation is subject to the technology gap between the investing and host economies as well as the appropriateness of the foreign technology to the local economic and technical conditions. With regard to technological gap, in the scenario of an ownership advantage of MNEs over that in the local firms, some argue a U-shaped or an inverted U-shaped relationship between the technology gap and the strength of knowledge spillovers to the local economy. In the case of DC MNE in advanced economies, although it is less likely that the technology of DC MNEs to be significantly more advanced that that used in the local firms, it is also less likely that the production technology

in DC MNEs to be less advanced than that in local firms because these DC MNEs will not be able to survive in the developed country market. DC MNEs in advanced market often enter these markets through merge and acquisition in order to acquire advanced knowledge. Therefore, in this dimension, the impact of FDI will be non-negative, although the strength of positive contribution depends on the degree of technology gap and the absorptive capacity of the local firms. In addition to the technology gap, there is also an issue of technology appropriateness which refers to the match of the mix of factor intensity, labour versus capital, unskilled versus skilled labour inputs, in the production technology. For production techniques that have similar productivity gap between foreign and local firms, their factor inputs combination may still be different. According to Acemoglu (2002), the degree of appropriateness of technology is often determined by the similarity of factor endowment in the investing and host economies.

The impact of competition on economic growth can go both positive and negative (crowding out) dimensions. This is normally determined by the complementarity of the comparative advantage of the investing and host economies and the technological gap between the local and foreign firms. DC MNEs often emerge from industries where the emerging economy has a comparative advantage. When the investing and host economies have similar comparative advantage, eg. China and other populous middle income countries, the DC MNEs are likely to compete with local firms with similar competitive advantage. Competition is likely to be fierce in such scenario, but the crowding out effect may not be significant as the two sides are of similar strength. When the investing and host economies have different comparative advantage, there are two scenarios. In one scenario, DC MNEs enter the industries in less developed countries that are not as strong as them, for example, DC MNEs go to the resource- or land-rich countries in Africa, they may crowd out local small firms while at the same time they enhance the overall production capacity in these industries which are under-invested and under-developed otherwise. In another scenario, DC MNEs enter the industries in more advanced economies to seek technological and managerial knowledge. These industries are likely to be the ones that the host economies enjoy an international competitive advantage. The DC MNEs are usually not as strong as the local firms and hence less likely to crowd them out. On the contrary, their entrance may increase the level of competition in the domestic market at a healthy degree which may force the local firms to improve to compete and hence promote economic growth.

For countries with a high overall compatibility match with that of the Chinese OFDI, the growth impact of Chinese OFDI on these economies are likely to be positive. In contrary, for countries with a low overall compatibility match, the growth impact of Chinese OFDI is likely to be insignificant or even negative.

Characteristics of Chinese OFDI and its growth impact in host countries

Therefore, in what follows, we will examine each of the dimension of the transmission mechanisms through which FDI impact on growth, and analyse how the characteristics of Chinese OFDI and the compatibility between China and the host country in each dimension of the transmission channel may shape the growth impact of Chinese OFDI on host developing countries, and how these impact may be different from that of traditional FDI from industrialised countries.

Outward direct investment from China has grown rapidly since the late 1990s. The total value of OFDI from China increased from around USD 28,000 million in 2000 to USD 300,000 in 2010 (Figure 1). These investment flows have flown to all the continents in the world although Hong Kong, Macao, Taiwan and the tax havens such as Virgin and Cayman Islands have attracted a large proportion of these OFDI flow. The rest of Asia, Europe and Africa are the top 3 destinations. Latin America excluding Virgin and Cayman Islands received the least Chinese OFDI (Figure 2). In contrary to the description that often labelled Chinese OFDI as resource seeking, mining accounted for only 14% of total OFDI stock from China in terms both total value of OFDI stock and the number of overseas firms. In fact, Chinese OFDI has gone to a wide range of industries. In terms of number of overseas firms, the manufacturing sector is the largest by the year 2010, accounting for 29% of total overseas firms numbers (Table 1).

[Insert Figure 1 here]

[Insert Figure 2 here]

[Insert Table 1 here]

Development financing In terms of development financing, in general, the development financing effect of CFDI is similar to that of TFDI. They are likely to have a significant impact in situations where there is a shortage of funding for business and investment. In the case of low income developing countries, it is argued that the opportunity cost of accepting

CFDI is very low because CFDI often goes to sectors that others normally do not go (Brautigam, 2009).

Knowledge transfer and spillover Knowledge transfer and spillover is another possible gain from FDI that may benefit the host economy in the long term. As discussed earlier, the strength of knowledge spillovers is subject to the strength of the linkages between foreign and local firms. It is often argued that Chinese invested firms often employ Chinese workers and suppliers, although there are also researchers pointed out that the situation were exaggerated in many reports (eg., Kragelund, 2009). In general, evidence on the interaction between the local and Chinese invested firms is limited.

Second, the appropriateness of the foreign technology and management style in relation to the local economic, socio-technical conditions also affects the degree to which the advanced technology embedded in the FDI are diffused and assimilated in the local economy. The theories of appropriate tech. and the directed tech change theories all suggest that new technologies will be designed to make optimal use of the factor that is abundant in the country where the technology is created. In other words, technologies created in the North may not be appropriate for the countries in the South (Acemoglu, 2002). Therefore, technologies created in China embedded in Chinese FDI may be more appropriate in unskilled or semi-skilled labour-abundant countries. For resource-rich or land-rich countries, technology used by most CFDI may not be the optimal. Third, although most of CFDI is premature when they started to invest abroad, they are more experienced in surviving and growing in adverse governance environment (Lecraw, 1993). Their managerial skills can help domestic firms to grow in adverse governance environment.

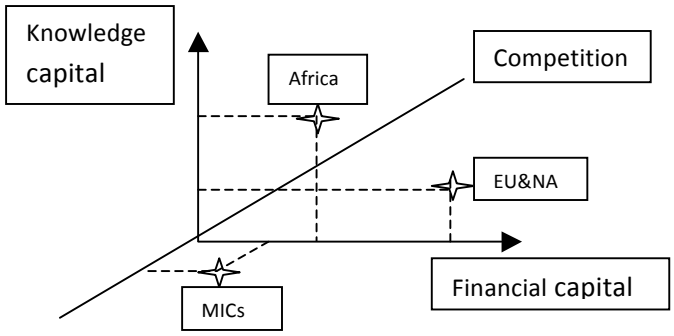
Competition and crowding out effect Inward FDI into the host economy will no doubt increase the level of competition in the product market in these economies. This competition effect is a two-edge sword to economic growth. On the one hand, competition will force the domestic firms to improve to survival. On the other hand, foreign competition may crowd local firms, especially the small and medium sized firms. The degree of the negative crowding out effect again depends on the factor endowment of the investing and host economies, the strengthen of the local firms as well as the strength and motivation of the investing firms. Different from the traditional MNEs from industrialised countries, the size and strength of most the Chinese MNEs are relative small and technologically and

managerially immature. In Africa, they go to the sectors that are lack of investment due to deindustrialisation (Brautigam, 2009). Therefore, it is unlikely for Chinese FDI to have strong crowding out effect on the local firms. And so is its positive competition effect.

Chinese OFDI has flown to both developed and developing countries in all continents. Most of the developed countries are skilled labour and capital abundant; there are also some countries which are resource abundant. However, since 2007, most of these countries have experienced serious economic crisis, spreading from the financial sector to the whole economy. Credit crunch has affected the wide economy, not only the small business sector. The developing countries can be categorised into low- and middle- income countries, which can be further characterised by their factor endowments into unskilled and semi-skilled labour and resources.

Based on the above discussions, we can summarise the multi-dimensional complementarities between Chinese OFDI and the host economies in Figure 3. These analyses hence lead to the following propositions:

Figure 3.



H1: The growth impact of CFDI on African economies is likely to be positive and significant.
H2: The growth impact of CFDI on advanced economies in Europe and North America is likely to be positive and significant.
H3: The net growth impact of CFDI on the middle income countries in Asia and Latin America is likely to be small and the direction to be unclear in general.

III. Methodology and data

Model

Our base line specification is as follows. Let y_{it} denotes the logarithm of output per worker in country i at time t, and x_{it} denotes the logarithm of the share of investment in output. Assuming the behaviour of y_{it} can be represented by the autoregressive distributed lag model (ARDL), our base line ARDL (1,1,1) dynamic panel specification is

$$y_{it} = c_{it} + \alpha_1 y_{i,t-1} + \beta_0 x_{it} + \beta_1 x_{i,t-1} + \gamma t + \eta_i + \varepsilon_{it} \quad (1)$$

where c_{it} is a non-stationary process that determines the behaviour of the growth rate of y_{it} in the long run. The time trend allows for a common rate of steady-state growth, and the country-specific intercept (or fixed effect, η_i) allows for variation across countries in initial conditions, or other unobserved factors that affect the level of the country's steady-state growth path. The residual (ε_{it}) reflects the influence of random shocks that affect the level of output per worker.

Our baseline specification further assumes that the long-run growth rate can be modelled as

$$\Delta c_{it} = \theta_0 + \theta_1 x_{it} + d + e_t + v_{it} \quad (2)$$

where the coefficient θ on the lagged level of investment test whether a higher level of the investment predicts a faster growth rate in the long run; d allows for time-invariant unobserved heterogeneity in growth rates. e_t and v_{it} have zero mean and reflect 'permanent' shocks to the (log) level of output per worker that are common to all countries (e_t) and specific country i (v_{it}).

Taking first-difference of equation (1) and substituting for c_{it} from equation (2), we have

$$\Delta y_{it} = \theta_0 + \alpha \Delta y_{i,t-1} + \beta \Delta x_{it} + \theta_1 x_{it} + d_i + e_t + \upsilon_{it} + \Delta \varepsilon_{it} \quad (3)$$

where Δy_{it} is the growth rate of output per worker between time t-1 and t; and Δx_{it} is the growth rate of investment between time t-1 and t. Country specific fixed effects in income levels (η_i) are eliminated by the firs-differencing transformation.

Control variables of the model include other important factors of economic growth of an economy. These include openness measured by total trade to GDP ratio; labour skills measured percentage of secondary school enrolment in gross population; industry structure measured by percentage of agricultural value-added in total GDP; and resources endowment of a country measured by natural resources rents as a percentage of GDP.

Definitions of variables are given in Table 2.

Data

We test the hypotheses using a cross country data for 131 countries for the 2004-2010 period compiled from various sources including MOFCOM, WDI, UNCTAD and ILO. The value of Chinese OFDI stock in 131 countries, including 97 developing countries and 34 developed countries, over the 2004-10 period was collected from the Bulletin of Chinese Outward Direct Investment published by MOFCOM. The stock of total inward FDI in each of these countries were collected from UNCTAD; and information of other variables are collected from World Development Indicator and data on wage rate is collected from the database of International Labour Organisation (ILO). A list of the countries that are included in the sample and their grouping by income level according to the UN criteria are reported in Appendix 1.

Although the official Chinese OFDI data provided valuable information for research, it has some caveats which should be taken into account in our analysis. First, the official data is likely to under-estimate the scale and scope of Chinese OFDI as many SMEs do not register. Moreover, the relative short time span of the data restricted us from using the Mean Group Estimator method which requires both the number of cross-section observations and number of time-series observations are both large (Pesaran, et al., 1997, 1999).

Chinese OFDI are not evenly distributed. In general, Hong Kong, Macao and Taiwan as well as the Virgin and Cayman Islands are the main destination of Chinese OFDI. If we exclude

these destinations, which are often used for round tripping or as tax heaven, the rest of Asia, Europe and Africa turn out to be the major destination. Latin America other than Virgin and Cayman Islands receives the least Chinese OFDI (Figure 1). Therefore, data cleaning is needed for the estimation. For this research, we focus on the cross country panel excluding Hong Kong, Macao and Taiwan, Virgin Islands, Cayman Islands and Lichtenstein. While the developing country is the main focus of the research, the growth impact of Chinese OFDI on developed country is also estimated for comparison.

Before proceeding to the estimation, we carry out unit root tests on the price variables because the estimated coefficients can be spurious if the variables are non-stationary. Given the nature of the data, i.e. N>T, we employ LLC (Levin, Lin and Chu, 2002) and IPS (Im, Pesaran and Shin, 2003) methods, with the null hypothesis that the variable contains a unit root and the alternative that the variable was generated by a stationary process. Unit root test results reported in Appendix 2 suggest that the logged variables are stationary at 1st order.

Estimation Strategy

The empirical test is carried out in three steps. First, we assess the impact of Chinese OFDI by regression equation (3) with the cross country panel data compiled. Second, we test whether the effect of Chinese OFDI is different from traditional FDI by comparing the impact of Chinese OFDI with that of US OFDI. Thirdly, we examine several characteristics of Chinese OFDI, namely the employment effect, the geographical variation of the effect, in particular, the growth effect of Chinese OFDI in Africa; and the growth effect of Chinese OFDI in resource rich countries.

For test using cross country data, one thing to take into account is the heterogeniety across countries. Pooled mean group estimator is ideal, but we are constrained by the relative short time series in the panel data. So I use dynamic fixed effects model for the estimation.

There is also an issue of endogeneity between the investment, FDI and openness variables and the lagged dependant variable on the one hand and economic growth on the other hand. We have tested the significance of the endogeneity between investment and growth formally using the Davidson-MacKinnon test of exogeneity. Following Bond et al., 2010, the lagged inflation rate variable is used as an instrument variable. We have also used the lagged private credit by deposit money banks to GDP ratio as another instrument variable. The data is

collected from the Financial structure dataset of World Bank. The Hansen test and Sargan test have been carried out to test for the validity and over-identification of the instrument. Reassuringly, the estimated results suggest that instruments are appropriate on all counts.

Moreover, another way to tackle the possible endogeneity between investment and growth variables is to use lagged explanatory variables. Therefore, we also use one- and two-year lagged FDI variables as alternative measures of FDI stock in the regression. The use of lagged FDI variable also allows us to account for the fact that it takes time for the impact of FDI to take effect. Finally, as a robustness check, we have carried out the test also using fixed effects model and 2-stage least squares (2SLS) methods. The results are broadly consistent with the Dynamic fixed effects estimators.

IV. Results

Dynamic fixed effects

Table 3 reports the estimated results of the dynamic fixed effects model for the full and the developing country sample. With regard to the role of overall FDI in economic growth, consistent with the findings in the literature, the net inflow of FDI as a percentage of GDP shows a significant and positive association with the long run economic growth of the host economy and is robust cross different models.

In the developing country sample, the estimated coefficient of the Chinese OFDI variable is positive and significant at the 1% significant level in long-run growth equation. This indicates a significant and positive effect of Chinese OFDI on the long-run income growth in host countries. A one percent increase in the share of Chinese FDI in total inward FDI in a developing country is associated with 0.04% increase in the country's per capita GDP growth. The result is consistent in both the base model and the full model when other important factors affecting growth are also controlled for.

However, in the short run, FDI including Chinese FDI do not appear to have a significant impact on per capital income growth in the host economies. Moreover, when other control variables are included in the regression, Chinese OFDI seems to have a negative association

with income growth in host countries, which can be explained that Chinese FDI is more likely to go to countries with low income growth.

This pattern of result of the impact of Chinese FDI are consistent in both the full sample and the developing country sample.

As expected, fixed capital formation has had a positive and significant association with both short and long term economic growth. A one percent increase in fixed capital formation to GDP ratio is associated with 0.20% increase in per capita income. This is much larger than that of the FDI variables.

Industry structure of the economy, measured by agriculture value added as % of GDP, appear to have a significant association with economic growth in the short term. Countries with a larger agricultural sector experienced a lower economic growth rate. This is consistent with the findings from the literature arguing that structural change and industrial upgrading are important for economic growth.

[Insert Table 3 here]

Robustness check: estimates of lagged FDI, in developing countries

Taking into account of the lagged effects of FDI and the possible endogeneity between investment, FDI, openness and the lagged dependent variable on the one hand and economic growth on the other, we used standard FE and 2SLS estimates for robustness check. Table 4 reports the results of robustness check using these models. One- and two-year lagged FDI variables are included as alternative measures of FDI investment. The DM test of exogeneity test suggest that in the base model and in the full model when the resource endowments of a country, measured by total natural resources rents as % of GDP, is controlled for (Columns 4 and 6). Therefore, the 2SLS estimates are preferred in these regressions.

The estimated results show that, when endogeneity is corrected using 2SLS method, the 2-year lagged Chinese FDI has a significant and positive effect on income growth in host developing countries. In the fully model when resource endowments is controlled, the one-year lagged Chinese FDI also have shown a positive and marginally significant impact on

economic growth in the host countries. All these results attest to the significant positive impact of Chinese OFDI on the economic growth in the host countries in the long run, which is in fact consistent with the findings from the fixed dynamic model reported in Table 5.

[Insert Table 4 here]

The growth effect of Chinese OFDI in different country groups

Due to the difference in economic and technical development level and factor endowments between countries located on different continents, we also whether the growth effect of Chinese OFDI varies by the multi-dimensional complementarities between China and the host countries by splitting the sample by geography continent. We use both the 2SLS method to control for the potential endogeniety. We also report the fixed effects model estimated for comparison. The estimated results are reported in Table 5. The DW test of exogeniety indicates that there is no significant endogeneity problem in the sample of Arica, Asia and Latin America. Hence the fixed effects estimates are preferred. While in the case of Europe and North America, endogeniety between income growth and investment, FDI and openness are significant at the 10% level. Therefore, the 2SLS estimates are preferred.

Interestingly, the main drivers of economic growth and the role of Chinese OFDI in the growth process indicate different growth pattern in different continents. In Africa, the two-year lagged CFDI variable show a positive and significant effect on per capital income growth, suggesting a significant positive contribution of Chinese OFDI on the income growth in Africa. Another important driver of economic growth in Africa is human capital accumulation measured by the percentage of secondary school enrolment in total population.
In Asia (not including Hong Kong, Macao and Taiwan), The estimated coefficient of the two-year-lagged CFDI variable though bear a positive sign, it is only statistically significant in the 2SLS model. This may be due to the market seeking nature of most of the Chinese OFDI in this region and relatively weaker complementarity between Chinese MNE and the hosting Asian economies over the sample period. Secondary school education bear the expected positive sign, but is also only statistically significant in the 2SLS model. The factor that has shown a significant effect on per capita income growth in Asia over the sample period is fixed capital formation which is mainly driven by domestic investment. The lack of explanatory power of openness and human capital may be due to the fact the there is not

much variation in openness in sampled Asian economies over the short sample period; and also that secondary education penetration is not an effective indicator of human capital variation over time in these Asian economies.

The effect of Chinese OFDI on the growth of the countries in Latin America are not significant in both the fixed effects and the 2SLS models. This is likely due to the relative low complementarity between Chinese MNE and the middle income countries in this region and the high concentration of CFDI in the resource sector in these countries. Similar to the case of Asia, fixed capital formation appear to be the main driver of economic growth in these countries over the sample period.

In Europe and North America, lagged Chinese OFDI variable has shown a positive and marginally significant effect on the economic growth in the countries in this group. The significance of the effect of CFDI, though marginal, is robust in different models reinforcing the positive contribution of Chinese OFDI on the growth in these advanced economies. This is likely because, first, CFDI provided financial resource that was seriously needed in these economies which are facing credit crunch, debt and economic crisis. Second, much of the CFDI in these economies are seeking to learn advanced technological and managerial knowledge. They have come to the sectors that these advanced economies have a competitive advantage in order to learn. While at the same time, most of these Chinese MNE are at their infancy stage. Their entry into the host country market has increased level of competition but not strong enough to generate crowding out effect on local firms. Therefore, they generate a net positive competition effect on the local industry and contribute to economic growth of the host economies.

[Insert Table 5 here]

[Insert Figure 4 here]

V. Conclusions and discussions

This paper attempts to contribute to the debate on the impact of emerging market MNEs on host economies by analysing the growth impact of Chinese outward direct investment on host countries using a cross country panel dataset for 151 countries over the 2004-2010 period. Findings from the research suggest that Chinese OFDI in developing countries have had a positive and significant impact on their long-run economic growth. After certain time to build

up the production capacity, with a two-year lag as found in this research, Chinese OFDI has started to show a significant contribution to host country economic growth, especially in Africa. However, its association with short-run growth in these countries is negative. Chinese OFDI is more likely to go to countries with low per capita income growth.

Our research also suggests that Chinese OFDI not only have contributed positively to the economic growth in Africa but also in the advanced economies in Europe and North America over the sample period. However, its contribution in Asia and Latin America is insignificant. Evidence from the analysis support our argument that infant MNEs from developing countries can contribute to economic growth in host countries even in industrialised economies that are more advanced than the home country. The impact of FDI, no matter from developed or developing countries, depend on the overall compatibility of the FDI and the host economy.

Our research also suggest a has shown a significant job creation effect of Chinese OFDI in host developing economies.

A careful analysis of the sector distribution of the Chinese OFDI indicates that the illustration of Chinese FDI of mainly resource-seeking is exaggerated. Nevertheless, in the short-run, Chinese OFDI shows a greater growth-enhancing effect in resource rich countries. However, in the long run, Chinese OFDI going to non-resource rich countries appear to have greater growth impact.

Findings from this research has important policy implications.
First, encouragement of Chinese OFDI instead of restricting it. This is true not only for the low income countries, but also the advanced industrial economies.
Secondly, for Asian economies, how to benefit from Chinese OFDI, this is a question. Encourage CFDI from market seeking to sectors that have greater complementarity with Chinese FODI. For Latin America economies, diversification of CFDI to other sectors is important to make CFDI to contribute to its economic growth.
Finally, for Chinese MNEs, how to help the resource rich economies to sustain economic growth in the long run, through social-benefiting activities. For these country themselves, improvement in institution and in reinvesting revenues of resource rents to areas promoting long term growth such as education and infrastructure are important.

References

Aykut Dilek and Andrea Goldstein, 2007. DEVELOPING COUNTRY MULTINATIONALS: SOUTH-SOUTH INVESTMENT COMES OF AGE, OECD, working paper no 257.

White, E., "The International Projection of Firms from Latin American Countries," in Kumar, K. and McLeod, M.G. (eds), *Multinationals from Developing Countries,* Lexington, 1981.

Miguel Pérez Ludeña 2012. Is Chinese FDI pushing Latin America into natural resources? *Columbia FDI Perspectives.*

Mlachila, M. and Takebe, M. 2011. FDI from BRICs to LICs: emerging growth driver? IMF Working Paper, WP/11/178.

Ademola, T.T., A.S. Bankole and A. O. Adewuyi, 2009, China-frica Trade Relations: insights from AERC scoping studies, European journal of Development Research, v 21, no 4, 485-505.

Boradman, H., 2006. Africa's Silk Road - China and India's New Economic Frontier, Washington: The World Bank.

Dabla-Norris, Era, J. H., Lahreche, A., and Verdier, G., 2010. FDI flows to low-income countries: global drivers and growth implications, IMF Working Paper, 10/132 (Washington: IMF)

Foster, V., Butterfield, W., Chen, C. and Puchak, N., 2009. Building bridges: China's growing role as infrastructure financier for sub-Sahara Africa', Trend and Policy Options No. 5 (Washington: The world Bank).

Gu, J., 2009. China's private enterprises in Africa and the implications for African Development, European Journal of Development Research, v 21, no 4, 570-87.

Kaplinsky, R. and Morris, M., 2009. Chinese FDI in Sub-Saharan Africa: engaging with large dragons, European Journal of Development Research, v 21, no 4, 551-59.

Yao, Y. and He, Y. 2005. Chinese outward inversting firms: a study for FIAS/IFS/MIGA. Working Paper, Foreign Investment Advisory Service (Washington: The World Bank).

Weisbrod, A. and Whalley, J. 2011. The contribution of Chinese FDI to Africa's pre Crisis growth surge, NBER working paper, 17544, Cambridge, NBER. (available at www.nber.org/papers/w17544)

Renard, Mary-Francoise, 2011. China's Trade and FDI in Africa, African Development Bank Group, working paper no. 126, Tunis, Tunisia.

Ali, Shimelse and Jafrani, Nida, 2012. China's growing role in Africa: Myths and facts. International Economic Bulletin, Feb. 9, 2012.

Rajneesh Narula & John Dunning, 2000. "Industrial Development, Globalization and Multinational Enterprises: New Realities for Developing Countries,"Oxford Development Studies, Taylor and Francis Journals, vol. 28(2), pages 141-167.

de Mello, Luiz R, Jr, 1999. "Foreign Direct Investment-Led Growth: Evidence from Time Series and Panel Data,"Oxford Economic Papers, Oxford University Press, vol. 51(1), pages 133-51

Luiz de Mello, 1997. "Foreign direct investment in developing countries and growth: A selective survey,"The Journal of Development Studies, Taylor and Francis Journals, vol. 34(1), pages 1-34.

Rodriguez-Clare, Andres, 1996. "Multinationals, Linkages, and Economic Development,"American Economic Review, American Economic Association, vol. 86(4), pages 852-73, September.

Blomstrom, Magnus & Kokko, Ari, 1997. "How foreign investment affects host countries,"Policy Research Working Paper Series 1745, The World Bank.

E Borensztein, J De Gregorio, JW Lee (1998) How does foreign direct investment affect economic growth? Journal of international Economics, 45 115–135

C Pietrobelli, F Saliola 2008- Power relationships along the value chain: multinational firms, global buyers and performance of local suppliers, Cambridge Journal of Economics, 32 (6): 947-962.

Levin, A., Lin, C. F., and Chu C. (2002). Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties. *Journal of Econometrics*, 108, 1–24.

Maddala, G. S. and Wu S. (1999). A Comparative Study of Unit Root Tests with Panel Data and New Simple Test. *Oxford Bulletin of Economics and Statistics*, 61, 631-52.

Im, K. S., Pesaran, M. H., and Shin Y. (2003). Testing for Unit Roots in Heterogeneous Panels. *Journal of Econometrics*, 115, 53–74.

Arellano, M. and Bond S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *The Review of Economic Studies*, 58, 277-97.

Arellano, M. and Bover O. (1995). Another Look at the Instrumental Variable Estimation of Error-components Models. *Journal of Econometrics*, 68, 29-51.

Holtz-Eakin, D., Newey W., and Rosen H.S. (1988). Estimating Vector Autoregressions with Panel Data. *Econometrica*, 56, 1371-95.

Pesaran, M. H., Y. Shin, and R. P. Smith. 1997. Estimating long-run relationships in dynamic heterogeneous panels. DAE Working Papers Amalgamated Series 9721.

Pesaran, M. H., Y. Shin, and R. P. Smith. 1999. Pooled mean group estimation of dynamic heterogeneous panels. Journal of the American Statistical Association 94: 621{634.

Kragelund, P., 2009. Knocking on a wide-open door: Chinese investments in Africa, Review of African Political Economy, no 122, 479-497.

Fig 1.

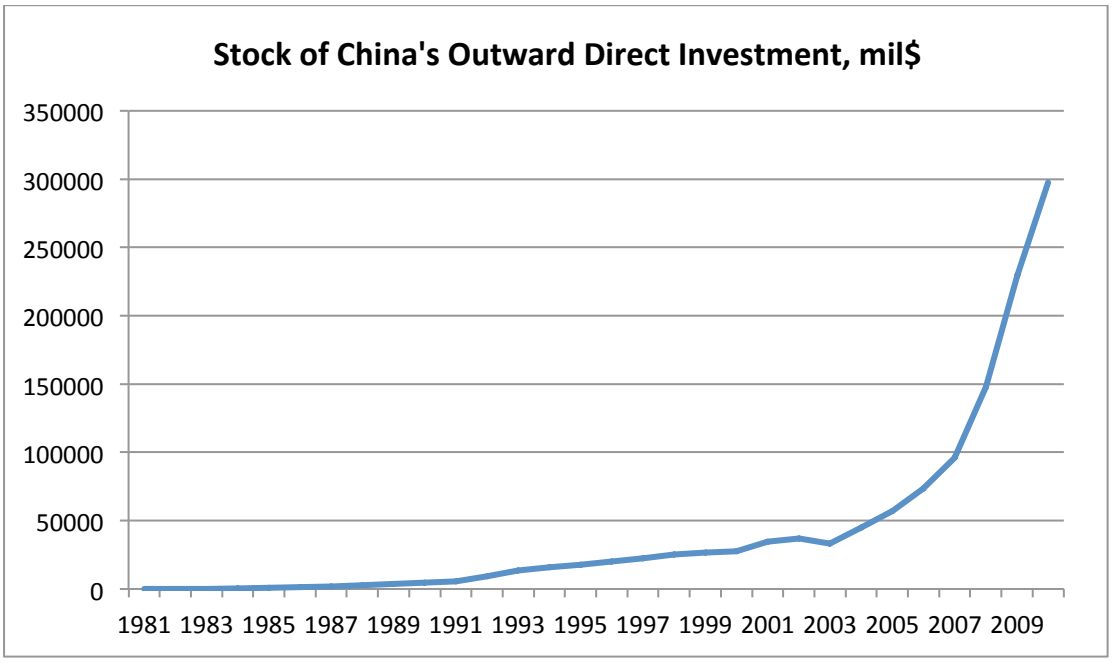


Fig 2. Geographical distribution of OFDI from China, million USD

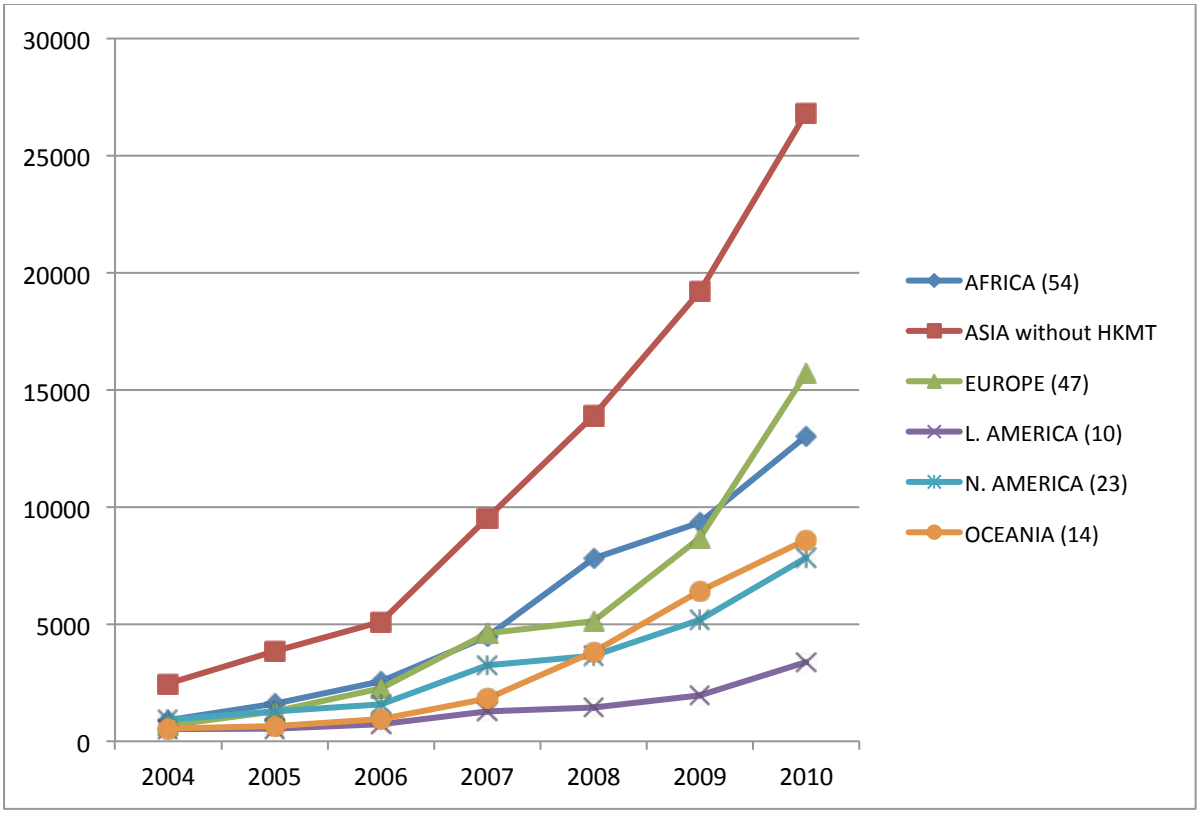


Figure 4.

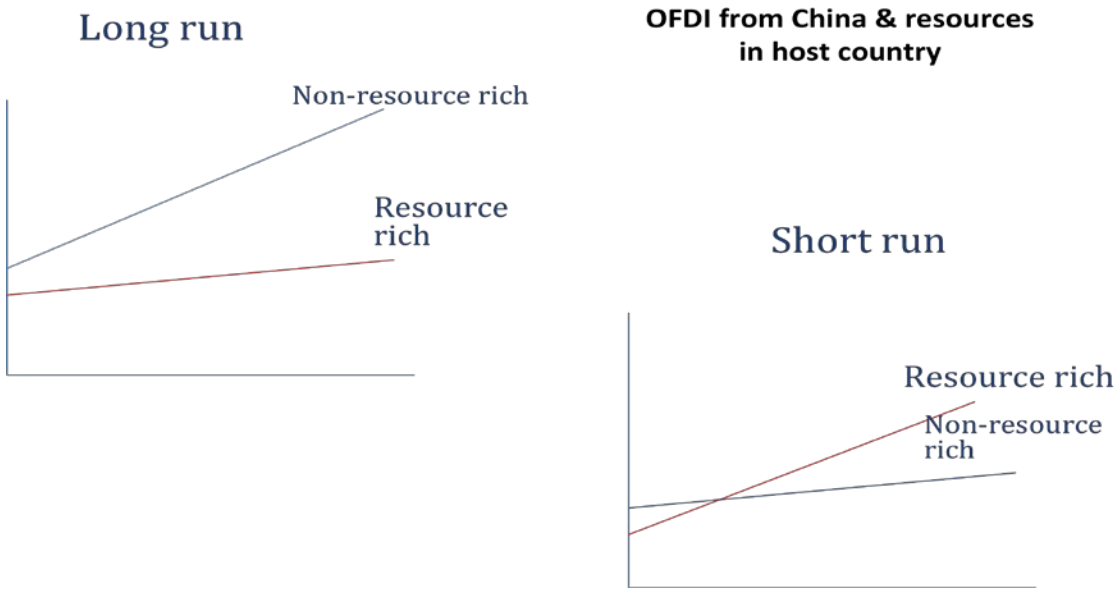

Long run
Non-resource rich
Resource rich
OFDI from China & resources in host country
Short run
Resource rich
Non-resource rich

Table 1. Industry distribution of China's outward FDI: by FDI stock and number of firms, 2010

Industry	OFDI Stock, % of total	**Industry**	Number of overseas firms, % of total
Leasing and Business Service	31%	Manufacturing	29%
Banking	17%	Wholesale and Retail Trade	23%
Mining	14%	Leasing and Business Service	13%
Wholesale and Retail Trade	13%	Construction	7%
Transport, Storage and Post	7%	Mining	6%
Manufacturing	6%	Agriculture	5%
Computer Services	3%	Scientific Research	4%
Real Estate	2%	Transport, Storage and Post	4%
Construction	2%	Services to Households	3%
Scientific Research	1%	Computer Services	2%
Public utility	1%	Real Estate	1%
Services to Households	1%	Lodging & Catering	1%
Agriculture	1%	Banking	1%
Environment Management	0.4%	Culture & Entertainment	1%
Lodging & Catering	0.1%	Public utility	1%
Culture & Entertainment	0.1%	Others	0.5%
Public services	0.02%		
Total	317210.59	**Total**	16107

Table 2. Descriptive stats

Variable	Definition	Obs	Mean	Std. Dev.	Min	Max
D.ypc	Ln (GDP per capita constant 2000 US$) -first difference	941	0.025	0.044	-0.193	0.285
L.ypc	Ln (GDP per capita constant 2000 US$) -lagged value	956	7.828	1.620	4.480	11.195
fcs	Ln(Chinese OFDI stock as % of total FDI stock of country i)	1063	-0.532	1.661	-2.303	4.606
L.fcs	One-year lagged fcs variable	912	-0.609	1.643	-2.303	4.606
L2.fcs	Two-year lagged fcs variable	760	-0.680	1.627	-2.303	4.606
f2	ln(FDI, net inflows as % of GDP)	1038	1.153	1.219	-4.605	3.952
L.f2	One-year lagged f2 variable	904	1.166	1.232	-4.605	3.952
L2.f2	Two-year lagged f2 variable	753	1.197	1.243	-4.605	3.952
k	ln(Gross fixed capital formation as % of GDP)	970	3.073	0.319	0.723	4.097
op2	ln(exports+imports as % of GDP)	1024	4.400	0.455	3.105	6.100
hc2	ln(secondary School enrollment, as % gross population)	862	4.228	0.556	2.191	5.010
s2	ln(Agriculture, value added as% of GDP)	955	2.012	1.198	-3.219	4.222
n	ln(Total natural resources rents as % of GDP)	879	1.096	2.184	-4.605	5.330

Notes: D=first difference; L=one year lagged value; L2=two year lagged value.

Table 3. The growth impact of Chinese OFDI on host countries: Dynamic fixed effects

	LDC				Full sample			
	5	6	7	8	1	2	3	4
	Long-run	Short-run	Long-run	Short-run	Long-run	Short-run	Long-run	Short-run
k	0.202***		0.260***		0.178***		0.261***	
	-0.060		-0.061		-0.054		-0.054	
fcs	0.033***		0.040***		0.033***		0.042***	
	-0.012		-0.013		-0.012		-0.012	
f2	0.030*		0.033**		0.038***		0.032**	
	-0.017		-0.016		-0.014		-0.013	
op2			0.035				0.076	
			-0.083				-0.073	
hc2			0.063				0.065	
			-0.088				-0.082	
s2			-0.031				0.022	
			-0.083				-0.067	
D.k		0.041***		0.034*		0.047***		0.034**
		-0.013		-0.019		-0.012		-0.017
D.fcs		-0.003		-0.006**		-0.003		-0.007***
		-0.002		-0.003		-0.002		-0.003
D.f2		0.002		0.000		0.000		-0.002
		-0.003		-0.004		-0.002		-0.003
D.op2				0.013				0.027
				-0.022				-0.019
D.hc2				0.029				0.036
				-0.049				-0.044
D.s2				-0.045**				-0.041**
				-0.022				-0.017
Convergence coef		-0.217***		-0.294***		-0.219***		-0.288***
		-0.020		-0.036		-0.018		-0.030
Constant		1.437***		1.786***		1.623***		1.871***
		-0.142		-0.287		-0.145		-0.255
N								

Notes: Dep var: D.ypc

Table 4. Robustness check by taking lags of FDI, using fixed effects and 2SLS estimation

	LDC					
	FE			2SLS		
VARIABLES	1	2	3	4	5	6
	D.ypc	D.ypc	D.ypc	D.ypc	D.ypc	D.ypc
L.ypc	-0.359***	-0.410***	-0.385***	-0.308***	-0.344***	-0.245***
	(0.037)	(0.078)	(0.106)	(0.048)	(0.072)	(0.082)
L.fcs	0.003	0.004	0.0110**	0.003	0.002	0.00733*
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)
L2.fcs	0.001	0.005	0.007	0.008***	0.013***	0.015***
	(0.003)	(0.004)	(0.006)	(0.003)	(0.003)	(0.004)
L.f2	0.003	0.001	-0.009*	-0.002	-0.004	-0.004
	(0.004)	(0.005)	(0.0050	(0.004)	(0.005)	(0.007)
L2.f2	0.001	0.000	0.002	0.001	0.001	0.002
	(0.002)	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)
k	0.082***	0.129***	0.134***	0.045*	0.080**	0.137***
	(0.018)	(0.025)	(0.033)	(0.026)	(0.034)	(0.043)
op2		-0.024	0.007		0.068	0.144***
		(0.038)	(0.038)		(0.046)	(0.054)
hc2		0.028	0.051		0.046	0.030
		(0.032)	(0.035)		(0.037)	(0.041)
s2		0.014	0.024		0.044*	0.048*
		(0.028)	(0.028)		(0.024)	(0.027)
n			-0.011			0.001
			(0.013)			(0.010)
L.fcsn			-0.007**			-0.004
			(0.003)			(0.002)
L2.fcsn			-0.002			-0.001
			(0.003)			(0.003)
L.f2n			0.006*			-0.001
			(0.004)			(0.004)
L2.f2n			-0.002			0.001
			(0.002)			(0.002)
Constant	2.338***	2.530***	2.077**			
	(0.274)	(0.665)	(0.840)			
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Observations	422	295	258	304	211	184
R-squared	0.529	0.623	0.645	0.522	0.646	0.673
Number of country2	97	81	76	68	54	51
jp				0.083	0.178	0.498
sarganp				0.083	0.178	0.498
idp				0.000	0.000	0.000
r2c				0.522	0.646	0.673
Davidson-MacKinnon test of exogeneity				0.062	0.256	0.058

Table 5. The growth impact of Chinese OFDI in different country groups (dependent var: D.ypc)

	Africa				Asia				LatA				EU&NA			
	FE		2SLS		FE		2SLS		FE		2SLS		FE		2SLS	
	-1	-2	-4	-5	-1	-2	-4	-5	-1	-2	-4	-5	-1	-2	-4	-5
L.ypc	-0.39***	-0.28***	-0.34***	-0.34***	-0.091	-0.24	-0.28***	-0.42***	-0.26***	-0.24***	-0.107	0.08	-0.36***	-0.59***	-0.40***	-0.49***
	-0.069	-0.088	-0.068	-0.096	-0.061	-0.150	-0.082	-0.126	-0.062	-0.056	-0.102	-0.229	-0.048	-0.083	-0.069	-0.112
L.fcs	0.000	0.004	0.000	0.000	0.001	-0.008	-0.009	-0.012	0.012**	0.011	0.001	-0.012	0.008	0.011*	0.006	0.002
	-0.003	-0.003	-0.002	-0.003	-0.009	-0.013	-0.010	-0.011	-0.004	-0.008	-0.009	-0.022	-0.006	-0.006	-0.008	-0.010
L2.fcs	0.003	0.006**	0.007***	0.009***	0.002	0.011	0.018**	0.026***	-0.004	-0.002	-0.001	-0.002	0.003	0.015	0.025***	0.025*
	-0.003	-0.003	-0.002	-0.003	-0.008	-0.011	-0.007	-0.009	-0.004	-0.005	-0.006	-0.010	-0.014	-0.013	-0.007	-0.013
L.f2	0.002	0.005	-0.004	-0.003	-0.001	-0.001	-0.006	-0.005	0.011*	0.006	0.006	0.019	0.000	-0.003	0.003	-0.001
	-0.006	-0.007	-0.004	-0.004	-0.005	-0.005	-0.005	-0.007	-0.006	-0.011	-0.011	-0.016	-0.003	-0.005	-0.004	-0.006
L2.f2	-0.001	-0.007	-0.002	-0.006	-0.003	0.004	-0.003	-0.007	-0.002	-0.007	-0.003	-0.013	0.000	0.000	0.003	0.002
	-0.003	-0.005	-0.003	-0.004	-0.006	-0.008	-0.005	-0.009	-0.006	-0.005	-0.009	-0.021	-0.003	-0.005	-0.004	-0.007
k	0.004	0.030	-0.024	-0.047	0.017	0.096*	0.089*	0.123	0.139***	0.154***	0.008	-0.069	0.103***	0.088*	0.053	0.092
	-0.018	-0.030	-0.046	-0.055	-0.023	-0.052	-0.048	-0.079	-0.020	-0.014	-0.082	-0.135	-0.034	-0.050	-0.040	-0.058
op2		-0.023		-0.062		0.039		0.004		-0.092		-0.268		-0.098		0.255
		-0.027		-0.040		-0.052		-0.084		-0.069		-0.370		-0.087		-0.220
hc2		0.088**		0.0529*		0.115		0.291***		-0.084		0.031		0.005		0.186
		-0.034		-0.031		-0.115		-0.110		-0.115		-0.126		-0.184		-0.165
s2		-0.068		0.002		0.050		0.022		-0.006		-0.058		-0.039		-0.051
		-0.064		-0.036		-0.045		-0.052		-0.077		-0.074		-0.032		-0.034
Constant	2.60***	1.75***			0.703	0.69			1.76***	2.35***			2.99***	5.44***		
	-0.44	-0.512			-0.455	-1.221			-0.51	-0.662			-0.42	-1.272		
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	170	104	125	78	148	93	97	62	83	65	71	53	177	137	135	105
R-squared	0.324	0.532	0.435	0.519	0.364	0.448	0.546	0.683	0.798	0.876	0.654	0.601	0.782	0.807	0.795	0.792
No country2	42	30	29	21	33	25	24	17	19	18	15	13	38	37	30	28
r2_w																
jp			0.283	0.149			0.146	0.445			0.417	0.418			0.532	0.168
sarganp			0.283	0.149			0.146	0.445			0.417	0.418			0.532	0.168
idp			0.001	0.023			0.000	0.018			0.012	0.560			0.000	0.013
r2c			0.435	0.519			0.546	0.683			0.654	0.601			0.795	0.792
DW-test of ex.			0.349	0.404			0.631	0.207			0.242	0.445			0.036	0.096

Table 6. The impact of Chinese OFDI in resource rich countries: Dynamic fixed effects model estimates

	Include interaction with resources			
	Full sample		LDC	
	1	2	3	4
	Long-run	Short-run	Long-run	Short-run
EC convergence coef.		-0.293***		-0.300***
		(0.032)		(0.038)
D.k		0.0422**		0.0379*
		(0.019)		(0.021)
D.fcs		-0.009***		-0.010***
		(0.003)		(0.003)
D.f2		-0.002		0.000
		(0.003)		(0.004)
D.op2		0.007		-0.013
		(0.022)		(0.026)
D.hc2		0.016		0.018
		(0.048)		(0.053)
D.s2		-0.023		-0.031
		(0.019)		(0.025)
k	0.259***		0.224***	
	(0.060)		(0.066)	
fcs	0.052***		0.052***	
	(0.014)		(0.015)	
f2	0.035**		0.039**	
	(0.015)		(0.018)	
op2	0.096		0.118	
	(0.080)		(0.091)	
hc2	0.042		0.024	
	(0.086)		(0.092)	
s2	0.000		-0.028	
	(0.071)		(0.086)	
n	0.078**		0.068**	
	(0.032)		(0.034)	
fcsn	-0.0164**		-0.0162**	
	(0.007)		(0.007)	
D.fcsn		0.003**		0.0039**
		(0.001)		(0.002)
D.n		-0.007		-0.015
		(0.009)		(0.011)
Constant		1.879***		1.750***
		(0.270)		(0.309)
Observations				

Appendix 1

List of countries included in the research by income level

LIC	LM	UM	H_NO	H_O
country	country	country	country	country (high income OECD country)
BDI	AGO	ALB	ARE	AUS
BEN	ARM	ARG	BHR	AUT
BGD	BOL	ATG	BHS	BEL
CAF	CIV	AZE	BMU	CAN
COM	CMR	BGR	BRB	CHE
ERI	COG	BIH	BRN	CZE
ETH	CPV	BLR	CYP	DEU
GIN	DJI	BRA	GNQ	DNK
GMB	EGY	BWA	HRV	ESP
KEN	FJI	CHL	KWT	EST
KGZ	FSM	COL	MLT	FIN
KHM	GEO	CUB	OMN	FRA
LBR	GHA	DMA	QAT	GBR
MDG	GUY	DZA	SAU	GRC
MLI	IDN	ECU	SGP	HUN
MOZ	IND	GAB	TTO	IRL
MWI	IRQ	GRD		ISL
NER	LAO	IRN		ISR
NPL	LKA	JAM		ITA
RWA	LSO	JOR		JPN
SLE	MAR	KAZ		KOR
TCD	MDA	LBN		NLD
TGO	MHL	LBY		NOR
TJK	MNG	LTU		NZL
TZA	MRT	LVA		POL
UGA	NGA	MEX		PRT
ZAR	PAK	MKD		SVK
ZWE	PHL	MUS		SVN
	PNG	MYS		SWE
	SDN	NAM		USA
	SYR	PAN		
	TKM	PER		
	TON	PLW		
	UKR	ROM		
	UZB	RUS		
	VNM	SUR		
	VUT	SYC		
	WSM	THA		
	YEM	TUN		
	ZMB	TUR		
		URY		
		VEN		
		ZAF		

Appendix 2. Unit Root Test Results (p-values)

	Level			First difference	
	Levin, Lin & Chu	Im, Pesaran & Shin		Levin, Lin & Chu	Im, Pesaran & Shin
y	0.1332	0.6986	**dy**	0.0000	0.0001
ypc	0.0000	0.0000	**dypc**	0.0000	0.0000
f1	0.0000	0.0000	**df1**	0.0000	0.0000
f2	0.0000	0.0000	**df2**	0.0000	0.0000
fc1	0.0000	0.0000	**dfc1**	0.0000	0.0000
fc2	0.0000	0.0000	**dfc2**	0.0000	0.0000
fo1	0.0000	0.0000	**dfo1**	0.0000	0.0000
fo2	0.0000	0.0000	**dfo2**	0.0000	0.0000
op2	0.0000	0.0006	**dop2**	0.0000	0.0000
hc2	0.0000	0.0000	**dhc2**	0.0000	0.0000
l	0.0000	0.0000	**dl**	0.0000	0.0000
em1	0.0008	0.9896	**dem1**	0.0000	0.0000
em2	0.0000	0.6352	**dem2**	0.0000	0.0000
te1	0.0000	0.0000	**dte1**	0.0000	0.0001
s2	0.0000	0.0000	**ds2**	0.0000	0.0000
Null: Unit root (assumes common unit root process)					
Prob.**					

Note: First order serial correlation is allowed in the errors.

Appendix 3. Pairwise corre

	D.ypc	L.ypc	fcs	L.fcs	L2.fcs	f2	L.f2	L2.f2	k	op2	hc2	s2	n
D.ypc	1												
L.ypc	-0.1902	1											
fcs	0.028	-0.5641	1										
L.fcs	0.0223	-0.527	0.8985	1									
L2.fcs	0.0285	-0.5137	0.8346	0.8821	1								
f2	0.129	0.0596	-0.1568	-0.139	-0.121	1							
L.f2	0.0416	0.0626	-0.1897	-0.1734	-0.1534	0.7399	1						
L2.f2	-0.0127	0.0955	-0.2445	-0.2175	-0.1989	0.6411	0.7423	1					
k	0.2073	0.0999	-0.0875	-0.0676	-0.0388	0.3531	0.3497	0.2866	1				
op2	0.0104	0.1849	-0.1146	-0.1146	-0.1079	0.4175	0.3964	0.3794	0.2061	1			
hc2	-0.076	0.7585	-0.4354	-0.4274	-0.4167	0.1276	0.1528	0.1576	0.2222	0.2551	1		
s2	0.1826	-0.8825	0.441	0.4385	0.4278	-0.0965	-0.1099	-0.1303	-0.1056	-0.3005	-0.6362	1	
n	0.1244	-0.2996	0.1772	0.1623	0.1502	-0.0233	-0.049	-0.044	-0.0818	-0.0392	-0.2683	0.2575	1