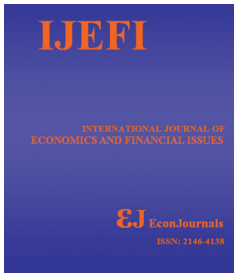

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A Gravitational Model for Estimate the Determinants of Outward Foreign Direct Investment of China

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ABSTRACT

Gravity models utilize the attractive force concept as an analogy to explain volume of trade or capital flows. This paper aims at proving that direct investment flows between China and a group of South-East Asian countries are determined by standard variables included in gravity models such as: Gross domestic products of home and host economy and distance between them. In our gravity model on foreign direct investment (FDI) we include not only gravity variables but also other variables that may explain what factors affecting Chinese outward FDI (OFDI): Political risk, cultural proximity, the degree of openness to international trade and a proxy for natural resources. This paper, after having defined the variables that are capable of influencing Chinese OFDI, will suggest a method of econometric calculation of the gravitational model based on Prais-Winsten regression; correlated panels corrected standard errors.

Keywords: Foreign Direct Investment, Gravity Model, Chinese Outward Foreign Direct Investment
JEL Classifications: F14, F15, F21

1. INTRODUCTION

Speaking of gravity models means to study that part of the international economy that studies the trade. According to Mele and Baistrocchi (2012) "this theorem has its origin in the evolution of gravitational theory where any object in the universe attracts any other body with a force directed along the line that conjoins the barycenter of the two objects. The economist Tinbergen has been proposing, since 1962, to utilize the same functional formula of the universal law of gravitation to analyze international trade flows, however, the use of this equation has lacked a real theory on which to justify this choice. Its application till now has been based on more analysis and empirical demonstrations."

Now, since some studies of international trade have found an empirical regularity in the data about trade flow is very similar to that which exists in physics about the movement - The commercial exchange between the two countries is very well explained by the distance between the two countries and the "masseconomic" of the two countries (or their gross domestic product [GDP]), we want, instead, demonstrate how it is possible use this system for estimating that direct investment flows between China and a group of South-East Asian countries are determined by standard variables included in gravity models such as: GDPs of home and host economy and distance between them (Deardoff, 1995; Deardorff, 1993).

2. LITERATURE REVIEW FOR CHINESE FOREIGN DIRECT INVESTMENT (FDI)

Within the framework of the theories which have attempted to explain the overseas development of multinational enterprises (MNEs), that eclectic of Dunning (1977) takes on particular significance. In accordance with this theory, investment decisions are determined by the combined actions of three types of advantages: Ownership, locational and internalization. In particular, Dunning (1993), Dunning (1981) and Dunning (2000) suggests four primary categories for outward FDI (OFDI): Market – seeking investment, resource – seeking investment, strategic asset – seeking investment and efficiency – seeking investment.

These typologies have been used in some of the empirical studies on host country determinants of Chinese FDI (Buckley et al., 2007;

Cheng and Ma, 2008; Amighini et al., 2011), which taking into account the first three motivations arrives at contrasting outcomes.

Part of the empirical evidence numbers among the determinants of OFDI in the OECD countries the first motivation (Kolstad and Wiig, 2012; Cheng and Ma, 2008; Cheung and Qian, 2008); other studies, taking into consideration the non-OECD countries, ascribe a preponderant role to the second motivation (Buckley et al., 2007; Pradhan, 2009; Sanfilippo, 2010; Kolstad and Wiig, 2012). Another part of the empirical evidence, performing an industry level analysis, confirms the strategic asset – seeking motivation as a determinant of Chinese OFDI both in manufacturing and service sectors (Noorbakhsh and Paloni, 2001; Amighini et al., 2011).

In regard to China, economic literature suggests that a comprehensive study on the determinants of OFDI cannot leave certain specific features of the Chinese case out of consideration. Among these are usually included the peculiarity of Chinese MNEs, which is in turn shaped by domestic institutional fabric, and a low political and economic risk adversity (Ietto-Gillies, 2005).

The speciality of Chinese MNEs derives from the fact that the bulk of them are state-owned enterprises (SOEs). Although private enterprises account for 57,7% of the total compared to 22,7% of the SOEs, 77% (US$ 60,17 bn) of the total OFDI stock is carried out by the SOEs (CCPIT, 2012). Capital market imperfections (Yamin, 2000) combined with an inefficient banking system (Warner et al., 2004; Child and Rodrigues, 2005; Antkiewicz and Whalley, 2006), allow the SOEs to have capital made available to them at below market rates, obtaining, in that way, an advantage over the private firms (Scott, 2002; Warner et al., 2004; Buckley et al., 2007). Furthermore, the SOEs, being able to count on a preferential policy on the part of the government, will not necessarily pursue profit – maximizing strategies, but rather political objectives. This implies that their determinants may be different from those of any other country (Morck et al., 2008; Yeung and Liu, 2008).

Another peculiar aspect is represented by a low political and economic risk adversity. The traditional theory on the determinants of foreign investment highlights a negative relation between political risk and FDI (Chekrabarti, 2001). Conversely, the literature on MNEs of emerging countries shows how they are relatively indifferent to the institutional environment of receiving countries. Since Chinese FDI have been attracted to destinations with high political and economic risks, it seems that the aforementioned result is applicable to the Chinese case (Buckley et al., 2007; Johanson and Vahalne, 1977).

3. EMPIRICAL ANALYSIS: SOME DETERMINANTS OF CHINESE FDI

Starting from the afore – mentioned contributes, this paper seeks to evaluate the determinants of Chinese OFDI in South East Asian area (Taiwan, Singapore, Malysia, Korea) considering a time period from 1999 to 2013 and a monthly dataset. The variables that have been taken into account and that, in the model, represent the regressors are market - seeking, resource - seeking (the strategic asset - seeking has been considered as subset of resource - seeking), political risk, cultural proximity (CP), interest rate, parabolic distance and, lastly, openness to FDI (MOFCOM, 2012; UNCTAD World Investment Report, 2013).

As regards the first variable, some host market characteristics, such as market size or its expected growth, are recognized as a significant determinant of FDI flows. In fact, as markets increase in size, so do opportunities for the efficient utilization of resources and the exploitation of economies of scale. We will derive the following hypothesis: Chinese OFDI is associated positively with host market size calculated using the GDP per capita with respect to the Gini Index, being this measure more representative of foreign demand (in the model it will be denoted by the variable l_LGDP). The data were taken from the World Bank Development Indicator.

With regard to the second variable (LORE), empirical studies on the determinants of Chinese FDI (Buckley, 2007; Cheung and Qian, 2008; Kolstad and Wiig, 2010) show that, especially for investments going to emerging countries, Chinese investments are motivated predominantly by the need to satisfy growing demand for primary resources and strengthen internal economic growth (Ye, 1992; Zhan, 1995). As a proxy for natural resources, in our model has been calculated the ratio between ores and metals to merchandise exports by the host country. The data represent our elaboration on data from the World Bank Development Indicator.

The regressor of political risk (LPOLI), as pointed out by the literature on MNEs of emerging countries, may be associated positively or not be significant in explaining the dependent. In order to assess how this variable influences Chinese FDI, our specification includes a dataset from the International Country and Political Risk Service of PRS Global Expertise Group, which provides a possibility of indexing political risk through a scale varying between 1 and 10.

In relation to distance (DIS), conventional theory suggests that firms are more likely to invest in FDI in more distant markets (Buckley and Casson, 1981; Navaretti and Venables, 2004). On the contrary, the gravity models assert that the relationship could be negative since the cost of investing rises with distance (Kolstad and Wiig; Pradhan, 2009). In particular, it has been established, with good approximation, that the distance represents a strong determinants for trade flows and also for FDI. Recent studies claim that physical distance between countries may be much more than a geography measure: It is history, culture, language, social relations (some of these aspects are captured by dummy variables), transport and transaction costs. For example, considering trade as dependent variable Portès and Rey (1999) conclude that greater distance between source and host country could imply higher transport costs which in turn should be associated with a reduced trade flow (because more expensive) and an increasing FDI flows, or that larger distance can be associated with higher information and search costs. In addition, others factors came into play, such as those related to moral hazard and uncertainty towards the outside environment, ascribable to cultural differences. In support of this thesis pertaining to the importance of cultural distance between country, Johanson and Wiedersheim-Paul (1975) stated that

among the various difficulties that companies may face when they decide to enter a foreign market, there is one that goes beyond normal bureaucratic and legislative procedures, as well as past the geographical distance: The so-called "psychic distance." This represents the set of all the obstacles of an informative nature that are tied to cultural diversity amongst people, so as to result inversely proportional to the distance between the countries interested in economic relationship.

Considering the CP, cultural differences have the effect of hindering information's flows and communication between individuals and firms from different countries (Kogut and Sing, 1998; Mele, 2009). Consequently, studies on the determinants of FDI may not overlook the analysis and comparison of the cultures and traditions of the countries. In this respect, in our model, we made an average on the so-called cultural dimensions of Geert Hofstede (2013) that allows using the cultural concept through a numerical value of the cultural dimensions of each country concerned. It is expected that Chinese OFDI are associated positively with the CP.

The degree of openness to international trade (OPENNESS) could influence positively FDI as the more open a country is, the more attractive it is likely to be as a destination of FDI. The economic literature that deals with the indices that can best be used in empirical studies to measure the degree of openness of a country towards international trade is very extensive. Depending on how these indices are built, it is possible to divide them into: Indices that measure the volume of trade and indices based on the impact of tariff and non-tariff barriers.

The former are commonly used in empirical analyses using the ratio between the volume of trade (export + import) and the volume of wealth produced by a nation in terms of GDP. In particular, the first indices used mainly exports, as economic literature attributed little importance to imports, recognizing instead that only exports had the ability to stimulate economic growth, once that international trade had been liberalized. Conversely, the evolution of the theory of international trade has reversed this view, arguing that the benefits of trade openness are derived from imports. This statement finds its premise in the theory of comparative advantage by Ricardo, according to which, thanks to international trade exposure, a country is able to exploit their resources more efficiently, obtaining through imports the goods and services that would otherwise be produced at an increased costs (Rodrik, 1999). This radical changes in the economic literature encouraged the use of indices that consider as complementary and non-differentiated imports and exports, so as to avoid measurement problems in contemporary empirical analyses. However, these indices still present some difficulties in estimating the value of exports, imports and GDP. For example the debate on whether to evaluate the variables in terms of purchasing power parity (Alcana and Ciccone, 2004), or rely on the current prices charged on various international markets through the nominal exchange rate of the dollar (Frankel and Romer, 1999).

With regards to the latter, these can also be used to measure the degree of openness of a country to international trade. Tariff barriers usually refer to duties. These represent a tax that weighs on the value of products that are imported into a particular country. The immediate consequence is a disadvantage in the market for foreign products/companies that produce these goods, and the subsequent negative distortion to international trade. However, duties are not the only tariff barriers that are able to disrupt the normal process of internationalization of goods. Other barriers include quota restrictions, commodity agreements (agreements aimed at stabilizing the prices of certain products in the long term) and administrative barriers (state holdings, definitions of technical standards). It is clear that the transition from a situation of high tariff barriers to a situation with fewer restrictions denotes a greater degree of openness to foreign trade of a country. Nonetheless, indices of this type may present measurement errors and distortions, the most important of which is the so-called downward bias. The consequence of this phenomenon, once the ratio of revenues from customs duties and total imports is calculated, is that some goods (for internal market reasons) are subject to excess taxation so as to discourage the normal import. Although some economists (Rodriguez and Rodik, 2001) state that the effects of this distortion have not yet been fully identified, in our study we will use the index based on the volume of trade measured in current prices, as this method ensures a greater ease and precision, so as to avoid complications in the analysis (Harrison, 2004).

4. RESULTS

We applied the gravitational model to Chinese OFDI, making it our dependent variable in the multiple regression. This allowed us to grasp the relation between Chinese FDI outflows and those of a group of countries (Taiwan, Singapore, Korea and Malaysia).

The multivariate-regression results reported below where obtained through the use of the statistical-econometric software STATA S.E. v.11, utilizing longitudinal data that varies both in time and space (cross-section time-series). The analysis of our panel, a dataset containing 900 observations, is carried out utilizing the estimation method with fixed effects (on a hyperplane, with N different intercepts that can be represented by a group of binary variables able to capture the influences of each variable while remaining constant in time) so as to appease both econometric logic and economic theory. From a technical standpoint, the Hausman test rejects the alternative method, for instance, the generalized least square random effects method results insignificant 0.0000 level, thus providing a clear justification for the use of a fixed effect model. On a purely theoretical level, international trade between countries have complex relationships that, in the long run, may be influenced by various factors. Although these have been included in our model in the form of regressors, nothing excludes the presence of other likely exogenous causes to the model. Consequently, this can lead, according to the Ramsey test, to distortions caused by omitted variables.

Therefore, we have followed the theoretical indications of Hsiao (2003), which expresses the possibility of using a fixed effects model because, in certain cases, the effects of possible distortions by exogenous factors can conveniently be considered stable.

Model 1: PCSEs, using 900 observations

Dependent variable: l_FDI			
Weights based on per-unit error variances			
l_FDI	Coefficient	Standard error	P value
l_LGDPPHM	0.785265	0.000354	0.000
l_LGDPHS	0.123574	0.000038	0.000
l_LORE	0.135468	0.000164	0.000
l_LPOLI	1.003265	0.000568	0.000
l_CP	1.812548	0.001364	0.000
l_DIST	−0.02389	0.001659	0.000
l_OPEN	1.258976	0.000259	0.000

FDI: Foreign direct investment, PCSE: Panels corrected standard errors, CP: Cultural proximity, GDP: Gross domestic product

Finally, to estimate the invariant variables, excluded from the fixed-effects model - As can be inferred from the results of later variables of distance and language – we regressed these variables onto the previously estimated Fixed effect model, through a "Prais-Winsten regression, correlated panels corrected standard errors."

As can be seen, the results comply with the principle of gravitational models: Chinese OFDI flows toward the considered countries are directly influenced by their respective GDP (l_LGDPHM and l_LGDPHS) but inversely proportional to the distance among them. However, with regard to the regressor of distance, although negative, its value is minimal highlighting how the analysis has considered a group of countries characterized by CP and that could account for an area of regionalism.

In addition, all the variables are significant at P value level, showing an of R^2 of 80% and similar information criteria.

The variable l_LORE is positive highlighting how, especially for investment going to emerging countries, Chinese investments are motivated predominantly by the need to satisfy growing demand for primary resources. Political risks influence positively Chinese OFDI. A possible explanation of this outcomes lies in the fact that if higher risk host countries offer higher returns, then FDI will still flow to them, and an increasing relationship between risk and FDI will be observed (Buckley et al., 2007). Coherently with our hypothesis, Chinese OFDI are positively associated with CP. So, the variable CP allows these countries to expand both political and economic relations. Lastly, it is interesting to note that OFDI are influenced positively by the degree of openness confirming that the characteristic of these countries to be export – led has proportionally affected also FDI flows in addition to those of goods.

5. CONCLUSION

The gravity equation can be applied to explain FDI between pairs of countries. However, it is noteworthy that the equation' application to FDI differs, both in terms of the model and econometric treatment, from that relating to trade. *In primis,* although gravity equations have a similar structure, the estimation process varies: the gravity equations both for trade and FDI might seem similar, but the peculiarities of FDI call for specific theoretical and econometric treatment. Secondly, gravity equation presents a mathematical critique (Mele, 2012; Grossman,1998): from Tinbergen's contribution onwards, the economic literature pertaining to gravitational models has failed to provide an explanation to the adaptation of the gravitational constant in a regression, considering the logarithmic transformation of that variable, such as the simple intercept of a straight line. However, the transformation of Newton's original equation – on a mathematical level – should take into consideration the theoretical value of the gravitational constant itself.

Nevertheless, even in the presence of the above considerations, the result of our work has shown that the Chinese economic miracle, that began with the process of reforms of Deng Xiaoping in the late Seventies, has recorded in recent years a new phase of development: As a consequence of the considerable external surplus, China has accumulated a great deal of reserve assets which have allowed to fuel outward flows of FDI. This phenomenon fits into the broader context of structural changes affecting the Chinese economy and which may better define the transition of this country towards a later and more mature stage of its development.

REFERENCES

Alcalá, F., Ciccone, A. (2004), Trade and productivity. Quarterly Journal of Economics, 119(2), 613-646.

Amighini, A., Rabellotti, R., Sanfilippo, M. (2011), An industry-level analysis of host country determinants, IFO Institute, Center for Economic Studies Working Paper, 3688.

Antkiewicz, A., Whalley, J. (2006), Recent Chinese Buyout Activity and the Implications for Global Architecture, NBER Working Paper, No. 12072. Cambridge, MA: NBER.

Buckley, P.J., Clegg, L.J., Cross, A.R., Liu, X., Voss, H., Zheng, P. (2007), The determinants of Chinese outward foreign direct investment. Journal of International Business Studies, 38(4), 499-518.

Buckley, P., Casson, M. (1981), The optimal timing of a foreign direct investment. The Economic Journal, 91(361), 75-87.

Cheng, L.K., Ma, Z. (2008), China's Outward Foreign Direct Investment, Paper Presented at the Indian Statistical Institute, 12 December 2008.

Cheung, Y.W., Qian, X.W. (2008), The Empirics of China's Outward Direct Investment, Presented at Cesifo Conference on Macro. Money and International Finance, 14-15 March, 2008, Munich.

China Council for the Promotion of International Trade. (2012), Survey on Chinese Enterprises' Outbound Investment and Operation.

Child, J., Rodriguez, S.B. (2005), The internationalization of Chinese firms: A case for theoretical extension? Management and Organization Review, 1(3), 381-410.

Chakrabarti, A. (2001), The determinants of foreign direct investment: Sensitivity analyses of cross-country regressions. Kyklos, 54(1), 89-114.

Deardoff, A. (1995), Determinants of Bilateral Trade: Does Gravity Work in a Neo-Classical World? NBER Working Paper.

Deardorff, A. (1993), Testing trade theories and predicting trade flows. In: Jones, R.W., Kenen, P., editors. Handbook of International Economics. Vol. 1. North Holland: Elsevier.

Dunning, J.H. (1977), Trade, location of economic activity and the nine: A search for an eclectic approach. In: Olhin, B., Hesselborn, P.O., Wijkman, P.M., editors. The International Allocation of Economic Activity. London: MacMillan.

Dunning, J.H. (1981), International Production and the Multinational Enterprise. London: Allen and Unwin.

Dunning, J.H. (1993), Multinational Enterprises and the Global Economy. Wokingham: Addison Wesley Publishing Company.

Dunning, J.H. (2000), The eclectic paradigm as an envelope for economic and business theories of MNE activity. International Business Review, 9, 163-190.
Frankel, J.A., Romer, D. (1999), Does trade cause growth? American Economic Review, 89(3), 379-399.
Grossman, G. (1998), Comment on `determinants of bilateral trade: Does gravity Work in a neoclassical World?. In: Frankel, J., editor. The Regionalization of the World Economy. Chicago: University of Chicago Press.
Harrison, G. (2004), Field experiments. Journal of Economic Literature, 42(4), 1009-1055.
Hofstede, G. (2013), Culture Dimension. Available from: https://www.geert-hofstede.com/cultural-dimensions.html.
Hsiao, C. (2003), Analysis of panel data. Econometric Society Monographs. 2nd ed., Vol. 34. Cambridge: Cambridge University Press.
Ietto-Gillies, G. (2005), Imprese Transnazionali. Concetti, Teorie, Effetti. Carocci, Roma.
Johanson, J., Vahalne, J.E. (1977), The internationalization process of the firm: A model of knowledge development and increasing foreign market commitments. Journal of International Business Studies, 8(1), 23-32.
Johanson, J., Wiedersheim-Paul, F. (1975), The internationalization of the firm - Four Swedish cases. Journal of Management Studies, 12(3), 305-322.
Kolstad, I., Wiig, A. (2012), What determines Chinese outward FDI?. Business Journal of World Business, 47(1), 26-34.
Kolstad, I., Wiig, A. (2010), Is transparency the key to reducing corruption in resource rich countries? World Development, 37(3), 521-532.
Kogut, B., Singh, H. (1988), The effect of national culture on the choice of entry mode. Journal of International Business Studies, 19(3), 411-432.
Mele, M., Baistrocchi, A. (2012), A critique of the gravitational model in estimating the determinants of trade flows. International Journal of Business and Commerce, 2, 13-23.
Mele, M. (2009), L'impatto della cultura sul commercio internazionale nel Sud-Est asiatico Mercati, Valori: Regole; 2009.
Mele, M. (2012), A critique of the gravitational model in estimating the determinants of trade flows. International Journal of Business and Commerce, 2(5), 44-58.
MOFCOM. (2012), Statistical Bulletin of China's Outward Foreign Direct Investment. Beijing: Ministry of Commerce.
Morck, R., Yeung, B., Zhao, M. (2008), Perspectives on China's outward foreign direct investment. Journal of International Business Studies, 39(3), 337-350.
Navaretti, G., Venables, J. (2004), Multinational Firms in the World Economy. Princeton, NJ: Princeton University Press.
Noorbakhsh, F., Paloni, A. (2001), Human capital and FDI inflows to developing countries: New empirical evidence. World Development, 29(9), 1593-1610.
Pradhan, J.P. (2009), Emerging multinations from India and China: Origin, impetus and growth, MPRA Paper No. 18120.
Portes, R., Rey, H. (1999), The Determinants of Cross-Border Equity Flows, Working Paper 7336, NBER September 1999. Available from: http://www.nber.org/paper/w7336.
Rodrik, D. (1999), The New Global Economy and the Developing Countries: Making Openness Work. Washington, DC: Overseas Development Council.
Rodríguez, F., Rodrik, D. (2001), In: Bernanke, B., Rogoff, K., editors. Trade Policy and Economic Growth: A Skeptic's Guide to the Cross-National Evidence. NBER Macroeconomics Annual 2000. Cambridge, MA: National Bureau of Economic Research; 2000.
Sanfilippo, M. (2010), Chinese FDI to Africa: What is the nexus with foreign economic cooperation? African Development Review, 22(1), 599-614.
Scott, W.R. (2002), The changing world of Chinese enterprises: An institutional perspective. In Tsui, A.S., Lau, C.M., editors. Management of Enterprises in the People's Republic of China. Boston: Kluwer Academic Press. p59-78.
Tinbergen, J. (1962), The World Economy. Suggestions for an International Economic Policy. New York, NY: Twentieth Century Fund.
UNCTAD World Investment Report. (2013), Global Value Chains: Investment and Trade for Development. New York, Geneva: United Nations Publication.
Warner, M., Hong, N.S., Xu, X. (2004), Late development experience and the evolution of transnational firms in the People's Republic of China. Asia Pacific Business Review, 10(3/4), 324-345.
Yamin, M. (2000), A critical re-evaluation of Hymer's contribution to the theory of the transnational corporation. In: Pitelis, C.N., Sugden, R., editors. Nature of the Transnational Firm. London: Routledge.
Ye, G. (1992), Chinese transnational corporations. Transnational Corporations, 1(2), 125-133.
Yeung, H.W., Liu, W. (2008), Globalizing China: The rise of mainland firms in the global economy. Eurasian Geography and Economics, 49(1), 57-86.
Zhan, J.X. (1995), Transnationalization of outward investment: The case of Chinese firms. Transnational Corporations, 4(3), 61-93.