The macroeconomic determinants of the outward foreign direct investment of China: Whither the home country?

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Abstract

The current study examines the relationships between several home country-specific macroeconomic factors and the level of the outward FDI of China using multiple time-series data from 1982 to 2006. With the use of a Vector Autoregressive model assessing the causal relationships of the endogenous variables, the empirical research proves that Chinese national characteristics associated with income per capita, openness of the economy to international trade, interest rate, human capital, technological capability, exchange rate and exchange rate volatility do not Granger cause the level of outward FDI of China. Similarly, the level of outward FDI of China does not Granger cause any of these home country-specific macroeconomic factors.

1. INTRODUCTION

With at least 18,521 parent companies, multinational companies (MNCs) based in the developing economies accounted for some 24% of all parent companies of MNCs in the whole world, and their stock of outward foreign direct investment (FDI) at around $ 1.6 trillion represented almost 13% of the worldwide stock as of 2006.[1] East and South-East Asia and Latin America have maintained their historical positions as the two most dominant home regions for FDI in the developing world, accounting for respectively 76% and 15% of the stock of outward FDI from developing economies excluding those of tax-haven economies, and around 9% and 2% of the worldwide stock of outward FDI in 2006. Despite their relatively low significance on a worldwide scale and geographical concentration, there are several remarkable features that draw attention to the high degree of transnationality of some developing economies and the importance of some of the largest MNCs based in developing economies in global competition: the substantial increase in the transnationality index of the top 50 non-financial MNCs from developing economies over the past decade; the sustained role of the four leading newly industrialized East Asian economies — Hong Kong (China), Republic of Korea, Singapore and Taiwan — as the most dynamic foreign investors in South-East Asia; the steady increase in the number of firms from developing economies in the list of the world's top 100 non-financial MNCs from five in 2004 to seven in 2005; and the operation of the top 100 non-financial MNCs from developing economies in a broad range of manufacturing and service industries of varying degrees of R & D intensity or human capital intensity (see Tolentino, 2006).

China increased the size of its outward FDI stock in absolute and relative terms since 1990. At $4,455 million, Chinese outward FDI accounted for just over 3 per

cent of the total outward FDI stock of developing economies in 1990, but it grew to 3.2 per cent share in 2000 and almost 5 cent by 2006 when the size of Chinese outward FDI reached $73,330 million (UNCTAD, 2007). The role of inward and outward internationalization in facilitating competitive catch-up by developing country MNCs, with evidence relating to Chinese MNCs has been examined by Young, Chun-Hua Huang and McDermott (1996). The growth of Chinese MNCs is doubtless contributing to the rising economic power of China. More than a few research articles have attempted to explore the emergence and development of Chinese outward FDI, including their evolving characteristics, motivations as well as future prospects (see, for example, Cai, 1999; Fung, Liu and Kao, 2007). Morck, Yeung and Zhoa (2008) assert that China's outward FDI at the infant stage concentrated on tax havens and Southeast Asian countries and were dominated by state-controlled enterprises with government sanctioned monopoly status. Wu and Yeo (2002) stated that the evolution of Chinese outward FDI from trade-related and resource-extraction activities in the early 1990s to increasingly more complex manufacturing in more recent years associated with the restructuring of the Chinese economy, increased government promotion and the emergence of more outward-looking Chinese companies. Their participation in low-technology and labour intensive manufacturing industries in neighbouring developing countries as well as resource-based industries in resource-rich countries have grown alongside their asset-seeking FDI in more advanced economies in their quest for strategic resources and capabilities (Deng, 2004).

The varying impact of country-, industry-, and firm-specific considerations on ownership and internalization characteristics of firms and location characteristics of countries has been extensively analysed in the international business literature (see

Dunning, 1982; Gray, 1982). Although internal influences associated with a firm's internal assets and competencies are central to their competitive advantage and predominately explain variations in their performance (Hawawini, Subramanian and Verdin, 2004), external or environmental factors associated with a firm's country of origin provide a critical, albeit partial, role in the development of a firm's competitive advantages by providing the context in which firm choices are made.[2] The current research article has one broad objective. It aims to examine the relationships between several home country-specific national macroeconomic factors and the level of the outward FDI of China using multiple time-series data from 1982 to 2006. Specifically, it adopts a Vector Autoregressive (VAR) model to assess the causal relationships of the endogenous variables consisting of the size of outward FDI of China and a broad range of national macroeconomic characteristics to include income per capita, openness of the Chinese economy to international trade, interest rate, human capital, technological capability, exchange rate and exchange rate volatility. Collectively, these characteristics provide a broad measure of macroeconomic soundness (income per capita), science, education & innovation (human capital, technological capability), finance (interest rate, exchange rate, exchange rate volatility) and internationalisation (openness of the economy to international trade) that are argued to comprise the home country-specific national-level determinants of the competitiveness of all MNCs based in a nation.[3] The review in Section 2 provides the context in which to situate the current study in the broader academic literature, and draws out the theoretical basis for selecting the variables to be included in the VAR model to be estimated. Section 3 contains the specification of the empirical model, data description and results of the unit root tests

on the variables, followed by the test results in Section 4. The discussion and conclusions of the research are covered in Section 5.

2. THE ACADEMIC LITERATURE REVIEW

By comparison to the richness and depth of the academic literature examining the emergence and growth of inward FDI in China, the literature remains rather sparse in the area of Chinese outward FDI and in need of further development. Some published research articles have examined the determinants of Chinese direct investments abroad, and a few have attempted to advance or reformulate existing conventional theories as well as newer emerging perspectives to explain Chinese MNCs or Chinese outward FDI. This review surveys the relevant academic literature as a way in which to reflect on the current stage of its development and to provide a proper context in which to situate the current study within that body of knowledge.

Among case studies on Chinese MNCs (Liu and Li, 2002; Warner *et al,* 2004) is a limited academic literature on the determinants of outward FDI in China which have attributed different importance on the role of home country-specific, host country-specific and firm-specific factors in explaining the emergence and growth of Chinese MNCs, with most studies lending emphasis on a combination of factors. Hong and Sun (2006) traced the emergence and growth of Chinese overseas investment to corporate entrepreneurship responding to the challenges and opportunities presented by globalization, favourable home government policy and the deepening reform in China. Morck, Yeung and Zhoa (2008) argue of the economic rationality of China’s outward FDI in light of national factors associated with China's savings rate, corporate ownership structures, and bank-dominated capital allocation, particularly by the most active firms able to overcome capital constraints and avail of value-creating opportunities afforded by outward FDI. The continuing spate of cross-border

M&As by Chinese firms since around 2001 is regarded to be primarily motivated by the need to develop markets, promote diversification, obtain foreign advanced technology and other resources, and create value (Boateng, Qian and Tianle, 2008). Studies that have accorded a more theoretical perspective have directed their attention to explaining either Chinese MNCs (Low and Hongbin, 2006; Li, 2007 and Rui and Yip, 2008), or Chinese outward FDI (Yang, 2005; Buckley *et al,* 2007). Low and Hongbin (2006) analysed ownership, locational and internalization advantages of Chinese construction MNCs in the context of Dunning's eclectic paradigm. On the other hand, Li (2007), on the basis of evidence gathered from three longitudinal cases from China, integrated the eclectic paradigm with a linkage–leverage–learning model of MNC formation in a content-process framework in an attempt to explain all types of MNC from both developed and developing countries. Rui and Yip (2008) view Chinese firms through the lens of a strategic intent perspective and regarded their foreign acquisitions as means to acquire strategic capabilities to offset competitive disadvantages and to leverage unique ownership advantages in the face of institutional incentives and constraints. Turning to those studies that theoretically explained Chinese FDI, Yang (2005) developed a network model through the application of network research in business organization to the economic analysis of Chinese outward FDI. On the other hand, Buckley *et al* (2007) nested three special explanations (capital market imperfections, special ownership advantages and institutional factors) within the general theory of the MNC as a means to explain the geographical destination of Chinese outward FDI.

The current study which aims to examine the relationships between several national macroeconomic factors specific to China and the level of the outward FDI of China would therefore be a useful contribution to the academic literature on the

determinants of Chinese outward FDI. These China-specific factors include income per capita, openness of the Chinese economy to international trade, interest rate, human capital, technological capability, exchange rate and exchange rate volatility. These determinants had been identified to be key determinants of outward FDI in previous studies, and therefore reference is made to these previous studies to provide a theoretical and empirical justification for selecting variables to be included in the VAR model to be estimated in this study. The literature survey will be confined to studies that analyse the relationships of these home country-specific factors to outward FDI.

a. National income/ national income per capita

A number of academic studies have established the theoretical and/or empirical causal relationships between outward FDI and national income or economic growth. The theoretical research of Bellak (1992) investigated the impact of outward FDI on a home country's balance of payments, unemployment, national income, structure, distribution, business cycle as well as dynamic competitiveness. He indicated that the effect of FDI on a home country's economy cannot be generalized but must be examined on a case-by-case basis. The empirical research of Wu, Toh and Ho (2003) showed the importance of outward FDI to Singapore's gross national income and to domestic demand through income remittances.

The concept of an investment development cycle/ path in international production advanced by Dunning (1981) — which established that there is a relationship between net outward investment (NOI) and a country's relative stage of development as measured by gross national product (GNP) per capita — provides an important theoretical rationale for a model that proposes that higher income levels of a country

are associated with higher levels of outward FDI. Although subsequently extended by Narula (1996) and Dunning and Narula (1997), Dunning suggested that the plotted data of the NOI and GNP of different countries, both variables normalised by the size of the population, show the presence of a J-shaped investment development curve with countries classified as belonging to four or five main groups corresponding to four or five stages of development.

b. Openness of the economy to international trade

The favourable influence of the liberalisation of a country's economy on the country's outward FDI is another established theme in the international business literature. Scaperlanda and Mauer (1973), Scaperlanda and Balough (1983) and Scaperlanda (1992) examined how the absence of capital controls facilitates the funding of investments abroad, while other studies have shown that the exposure to world markets associated with an open economy facilitates learning through the acquisition of information, knowledge and skills necessary for the establishment and growth of the international operations of domestic companies.

c. Interest rate

Hymer (1960, published 1976) provides a theoretical basis for the role of capital abundance of the home country in providing an incentive for the establishment and growth of large firms, including their expansion in foreign operations. Other international business scholars similarly analysed this theme, to include *inter alia* Lall (1980), Pugel (1981), Clegg (1987) and Grubaugh (1987). The theory indicates that a negative correlation between interest rate and outward FDI exists since relatively

low interest rates associated with a country's capital abundance decreases the opportunity cost of capital and enhances the profitability of investments abroad.

d. Human capital

Human capital is another important country-specific ownership advantage conducive to the establishment and growth of outward FDI, with R&D, production, marketing, sales, management and organization of domestic and foreign operations requiring human capital with varying degrees of competence and skills. The empirical research of Juhl (1979), Lall (1980), Pugel (1981) and Clegg (1987) justify the higher likelihood of FDI in skill-intensive sectors. The ability of firms to organise and produce human capital inputs varies across countries in accordance with such macro-economic and macro-organizational characteristics as education and training systems and government policies.

e. Technological capability

The positive role of technological capability in FDI had been the subject of extensive theoretical and empirical research in the international business literature See for example Lall (1980), Pugel (1981), Clegg (1987) and Grubaugh (1987) earlier mentioned as well as Cantwell (1981, 1987), Pearce (1989), Kogut and Chang (1991) and Dunning (1993). "The ability of firms to organise and produce technological inputs varies across countries according to characteristics such as the legal and patent systems, availability of inputs and skills necessary for the production of technology, market structure, government policies and incentives in education, scientific research, etc." (Kyrkilis and Pantelidis, 2003, p. 830)

f. Exchange rate and exchange rate volatility

A number of academic studies have established the theoretical and/or empirical relationships between the level and volatility of a home country's exchange rates on outward FDI. The evidence on such relationship is ambiguous at least in terms of inward FDI, with a heterogeneous impact of exchange rates on inward FDI observed across countries, types of investment and time (Pain and van Welsum, 2003).

At the theoretical or conceptual level, the currency area hypothesis of Aliber (1970) focused on the importance of country-specific ownership advantages that accrue to firms located in a particular currency area. Aliber argued that financial factors such as capital market relationships, exchange risks and the preferences of the market for holding assets denominated in selected currencies fundamentally explain the pattern of FDI. By lowering the capital requirements of outward FDI in domestic currency units and reducing the nominal competitiveness of exports, the appreciation of the home country currency encourages outward FDI. A more complex model based on capital market imperfections had been offered by Froot and Stein (1989). By increasing the relative wealth position of foreigners, the depreciation of the dollar lowers foreigners' capital costs for FDI, which allows for more aggressive bidding of dollar-denominated foreign assets. Baek and Kwok (2002) similarly analysed the effects of foreign exchange rate and volatility on the corporate choice of foreign entry mode and shareholder wealth. They found that a stronger home currency is related to a higher propensity to select a subsidiary and observed greater changes in shareholder wealth around subsidiary announcements in the presence of a stronger home currency for non-US parent companies. A theoretical examination of the relationship between exchange rate risks and two-way FDI had been advanced by Qin (2000). Assuming that producers wish to maximize the utility

function based on rates of return and real exchange rates, Qin argued in a one sector, two-country model that higher exchange rate volatility leads to a larger ratio of FDI to exports. The reduction of producers' exchange rate risk then becomes a driving force for two-way FDI under certain conditions. In analysing the endogeneity of the exchange rate as a determinant of FDI, Russ (2007) showed that an MNC's response to exchange rate volatility will differ depending on whether the volatility arises from shocks in the firm's home or host country.

Empirically based studies looking at the causal relationships between the level and/or volatility of a home country's exchange rates on outward FDI of several countries had been provided by Gopinath, Pick and Vasavada (1998) and Bolling, Shane and Roe (2007) for the USA, Georgopoulos (2008) for Canada, Blonigen (1997) and Guo and Trivedi (2002) for Japan, and Choi and Jeon (2007) and Kyrkilis and Pantelidis (2003) for various developed and developing countries. All these studies found a positive correlation between the home country exchange rate and/or exchange rate volatility and outward FDI.

3. THE EMPIRICAL MODEL SPECIFICATION AND DATA DESCRIPTION

The data consists of a multiple time series for the period 1982 to 2006, with the choice of time period determined by the extent to which there is available information to construct consistent measures of the selected variables over time. The data are drawn from numerous international sources, and in the case of GDP presented a problem of converting to the uniform currency of the United States dollar. All nominal data series, except those on technology, were converted to real data series by using the relevant price indices. The Data Appendix provides detailed descriptions of the variables and information on data sources.

Given the presence of multiple variables, the choice of model is between the following multiple equation models: a simultaneous, or structural, equation model or a vector autoregressive model (VAR). The use of simultaneous, or structural, equation models involve the treatment of some variables as endogenous and some as exogenous or predetermined. The exclusion or inclusion of certain predetermined variables plays a crucial role in the identification of the model prior to estimation. These decisions are often subjective and therefore lead to the problem of simultaneity. Sims (1980) argued that there should not be any *a priori* distinction between endogenous and exogenous variables in the presence of true simultaneity among a set of variables. This criticism of simultaneous, or structural, equation modelling became the fundamental basis of Sims' development of the VAR model.

A VAR model is an extension of an autoregressive model to the case in which there is more than one variable under study. A VAR has more than one dependent variable and, thus, has more than one equation. Each equation in the multiple equation model uses as its explanatory variables lags of all the variables under study (and possibly a deterministic trend). The term autoregressive is due to the inclusion of the lagged value of the dependent variable on the right-hand side of the equation, and the term vector is due to the existence of a vector of two (or more) variables.

Since the current research involves eight variables, there will be eight equations to be estimated in an unrestricted VAR model. The eight equations below thus constitute a VAR model with eight variables. All equations depend on $p = 1$ lag of the dependent variable and on $q = 1$ lag of each of the seven other variables. Therefore the lag length is set such that $p = q$, with the exact lag length of p and q determined appropriately on the basis of the number of observations in the multiple time series. The resulting model to be estimated is known as a VAR (1) model.

$$LFDI_t = \alpha_1 + \delta_1 t + \phi_{11} LFDI_{t-1} + \beta_{11} LYPC_{t-1} + \beta_{12} LO_{t-1} + \beta_{13} LI_{t-1} + \beta_{14} LHC_{t-1} + \beta_{15} LTE_{t-1} + \beta_{16} LER_{t-1} + \beta_{17} LERV_{t-1} + e_{1t}$$

$$LYPC_t = \alpha_2 + \delta_2 t + \phi_{21} LFDI_{t-1} + \beta_{21} LYPC_{t-1} + \beta_{22} LO_{t-1} + \beta_{23} LI_{t-1} + \beta_{24} LHC_{t-1} + \beta_{25} LTE_{t-1} + \beta_{26} LER_{t-1} + \beta_{27} LERV_{t-1} + e_{2t}$$

$$LO_t = \alpha_3 + \delta_3 t + \phi_{31} LFDI_{t-1} + \beta_{31} LYPC_{t-1} + \beta_{32} LO_{t-1} + \beta_{33} LI_{t-1} + \beta_{34} LHC_{t-1} + \beta_{35} LTE_{t-1} + \beta_{36} LER_{t-1} + \beta_{37} LERV_{t-1} + e_{3t}$$

$$LI_t = \alpha_4 + \delta_4 t + \phi_{41} LFDI_{t-1} + \beta_{41} LYPC_{t-1} + \beta_{42} LO_{t-1} + \beta_{43} LI_{t-1} + \beta_{44} LHC_{t-1} + \beta_{45} LTE_{t-1} + \beta_{46} LER_{t-1} + \beta_{47} LERV_{t-1} + e_{4t}$$

$$LHC_t = \alpha_5 + \delta_5 t + \phi_{51} LFDI_{t-1} + \beta_{51} LYPC_{t-1} + \beta_{52} LO_{t-1} + \beta_{53} LI_{t-1} + \beta_{54} LHC_{t-1} + \beta_{55} LTE_{t-1} + \beta_{56} LER_{t-1} + \beta_{57} LERV_{t-1} + e_{5t}$$

$$LTE_t = \alpha_6 + \delta_6 t + \phi_{61} LFDI_{t-1} + \beta_{61} LYPC_{t-1} + \beta_{62} LO_{t-1} + \beta_{63} LI_{t-1} + \beta_{64} LHC_{t-1} + \beta_{65} LTE_{t-1} + \beta_{66} LER_{t-1} + \beta_{67} LERV_{t-1} + e_{6t}$$

$$LER_t = \alpha_7 + \delta_7 t + \phi_{71} LFDI_{t-1} + \beta_{71} LYPC_{t-1} + \beta_{72} LO_{t-1} + \beta_{73} LI_{t-1} + \beta_{74} LHC_{t-1} + \beta_{75} LTE_{t-1} + \beta_{76} LER_{t-1} + \beta_{77} LERV_{t-1} + e_{7t}$$

$$LERV_t = \alpha_8 + \delta_8 t + \phi_{81} LFDI_{t-1} + \beta_{81} LYPC_{t-1} + \beta_{82} LO_{t-1} + \beta_{83} LI_{t-1} + \beta_{84} LHC_{t-1} + \beta_{85} LTE_{t-1} + \beta_{86} LER_{t-1} + \beta_{87} LERV_{t-1} + e_{8t}$$

where:

α = constant or intercept

t = deterministic trend

LFDI = Natural logarithm of real FDI outflows from China, US $ million (2000=100), 1982 to 2006

LYPC = Natural logarithm of real GDP per capita of China, US $ million (2000=100), 1982 to 2006

LO = Openness of the Chinese economy to trade as measured by the natural logarithm of the annual sum of real exports and imports of China, US $ million (2000=100), 1982 to 2006

LI = Home country interest rate as measured by the natural logarithm of the annual real lending rate of China, 2000=100 (% per annum), 1982 to 2006

LHC = Human capital variable as proxied by the natural logarithm of the annual real GDP per person employed in China, a measure of productivity per worker, US $ million (2000=100), 1982 to 2006

LTE = Technology capability variable as proxied by the natural logarithm of the annual number of applications for registration of a trademark with a national or regional trademark office by residents of China, 1982 to 2006

LER = Home country exchange rate as measured by the natural logarithm of the annual real effective exchange rate index of China based on relative consumer prices (2000=100), 1982 to 2006

LERV = Home country exchange rate volatility as measured by the natural logarithm of the annual standard deviation of the real monthly average exchange rate of the Chinese national currency against the US $ (2000=100), 1982 to 2006

e = the stochastic error term, called impulse or innovation or shock in the VAR.

VARs provide a framework for testing for Granger causality between each set of variables. At a more fundamental level, Granger causality within the framework of a VAR can shed light on the causality between each set of variables where theory and common sense do not provide clarity on the exact direction of causality. This is because all the variables used to explain the current value of the dependent variable in a VAR occurred in the past. It therefore assumes that the past might influence the present, but it is not possible for the present to influence the past (Gujarati, 2003). Problems of interpretation that arise with the regression of FDI_t on YPC_t , O_t , I_t , HC_t, TE_t , ER_t and ERV_t do not arise in the VAR case, i.e. the VAR does not suffer from the problem of simultaneity noted by Sims (1980).

There are other advantages in using a VAR. VARs do not draw heavily on existing models or theories, but the results of the VAR can bear implications for existing models or theories. Thus, VARs are often regarded as “atheoretical” (Koop, 2000) because it uses less prior information and is not tied to any one existing model or theory. The theory is limited to selecting the variables in the model, as was undertaken in the previous section of the current study. The empirical VAR model used in the current study simply states as follows: The outward FDI of China and a number of factors specific to China as a home country to include national income per capita, openness of the economy to trade, interest rates, human capital, technological capability, exchange rates and exchange rate volatility are related. This relationship is modelled as implying only that each variable depends on lags of itself and all other variables.

“Strictly speaking, in an *m*-variable VAR model, all the *m* variables should be (jointly) stationary.” (Gujarati, 2003, p. 853). Table 1 presents the results of integration tests employing the use of correlograms of each of the eight variables. The table proves the stationary properties of all variables in the multiple time series used for estimation. Since all variables in the VAR (1) are stationary, estimation and testing can be carried out in the standard way of Ordinary Least Squares Regression.

Table 1. Unit Root Test based on Correlograms of the Variables Used in the Model (Period: 1982 to 2006)

1. LFDI				
Lag	AC	PAC	Q-Stat	Prob
1	0.1527232	0.152723	0.655998	0.417976
2	-0.27402	-0.30445	2.859631	0.239353
3	-0.129629	-0.03221	3.375195	0.337313
4	0.0952385	0.048626	3.666743	0.452981
5	0.0227161	-0.05775	3.684159	0.595723
6	-0.051254	-0.01221	3.777485	0.706759
7	-0.007061	0.010061	3.779355	0.804812
8	0.0019435	-0.03133	3.779505	0.876449
9	-0.032684	-0.032	3.824573	0.922575
2. LYPC				
Lag	AC	PAC	Q-Stat	Prob
1	0.8820406	0.882041	21.88113	2.9E-06
2	0.7675283	-0.04715	39.16992	3.12E-09
3	0.6573575	-0.04499	52.42811	2.43E-11
4	0.5487027	-0.05917	62.10551	1.05E-12
5	0.4296742	-0.11681	68.33644	2.27E-13
6	0.3140349	-0.0686	71.83997	1.71E-13
7	0.2180268	0.00154	73.62256	2.73E-13
8	0.1306137	-0.0383	74.29994	6.81E-13
9	0.0194052	-0.18417	74.31582	2.16E-12
3. LO				
Lag	AC	PAC	Q-Stat	Prob
1	0.8579737	0.857974	20.70335	5.36E-06
2	0.7120864	-0.09107	35.58466	1.87E-08
3	0.5722487	-0.06193	45.63199	6.79E-10
4	0.4581139	0.009037	52.37776	1.15E-10
5	0.3594242	-0.02298	56.73778	5.73E-11
6	0.270501	-0.03728	59.33727	6.14E-11
7	0.1860805	-0.04957	60.63574	1.13E-10
8	0.1151099	-0.01563	61.16186	2.76E-10
9	0.0400473	-0.08084	61.22952	7.76E-10
4. LI				
Lag	AC	PAC	Q-Stat	Prob
1	0.9212607	0.921261	23.87029	1.03E-06
2	0.8243733	-0.16095	43.81482	3.06E-10
3	0.7145977	-0.12774	59.48248	7.58E-13
4	0.5961665	-0.10827	70.90652	1.46E-14
5	0.4668493	-0.13668	78.26228	1.94E-15
6	0.3444554	-0.02398	82.47746	1.1E-15
7	0.2155994	-0.13781	84.22057	1.89E-15
8	0.0719228	-0.21002	84.42597	6.26E-15
9	-0.058542	-0.02291	84.57055	1.99E-14
5. LHC				
Lag	AC	PAC	Q-Stat	Prob
1	0.8537001	0.8537	20.49761	5.97E-06
2	0.7082884	-0.07565	35.22061	2.25E-08
3	0.5716595	-0.05254	45.24726	8.2E-10
4	0.4455418	-0.04785	51.62786	1.65E-10
5	0.3469576	0.015682	55.69067	9.41E-11
6	0.2662591	-0.00829	58.20927	1.04E-10
7	0.1996875	-0.01195	59.70458	1.73E-10

8	0.1364738	-0.04404	60.44411	3.81E-10
9	0.0472757	-0.14893	60.5384	1.06E-09
6. LTE				
Lag	AC	PAC	Q-Stat	Prob
1	0.8489215	0.848921	20.26878	6.73E-06
2	0.689861	-0.11029	34.23565	3.68E-08
3	0.542219	-0.05212	43.25615	2.17E-09
4	0.4356817	0.051496	49.35746	4.92E-10
5	0.3414538	-0.03967	53.29239	2.93E-10
6	0.2547938	-0.04225	55.59876	3.51E-10
7	0.1796192	-0.01558	56.80862	6.52E-10
8	0.110488	-0.04166	57.29334	1.58E-09
9	0.0413725	-0.06265	57.36555	4.3E-09
7. LER				
Lag	AC	PAC	Q-Stat	Prob
1	0.8212047	0.821205	18.96686	1.33E-05
2	0.589101	-0.26189	29.15173	4.68E-07
3	0.3467248	-0.1605	32.84024	3.48E-07
4	0.1478724	-0.02962	33.54308	9.25E-07
5	0.039546	0.097799	33.59586	2.87E-06
6	-0.045377	-0.12217	33.66901	7.79E-06
7	-0.100293	-0.0411	34.04621	1.69E-05
8	-0.210303	-0.28059	35.8023	1.91E-05
9	-0.273155	0.102476	38.95005	1.18E-05
8. LERV				
Lag	AC	PAC	Q-Stat	Prob
1	0.4587076	0.458708	5.917857	0.014988
2	0.3018682	0.115827	8.592161	0.013622
3	0.0912796	-0.10819	8.847801	0.031384
4	0.1418609	0.136534	9.494661	0.049857
5	0.2308736	0.190782	11.29362	0.045859
6	-0.10261	-0.42153	11.66767	0.069807
7	0.0532184	0.28403	11.77388	0.108244
8	-0.183094	-0.27844	13.10495	0.108289
9	-0.172021	-0.23082	14.35334	0.1103

Notes:
AC = autocorrelation, PAC = partial autocorrelation, Q-Stat = Q statistic, Prob - Probability

4. THE EMPIRICAL RESULTS

The results of the unrestricted VAR (1) model with 8 variables are presented in Table 2. Six of the eight equations that constitute the unrestricted VAR model are statistically significant on the basis of the standard *F* test. Moreover, the results for the six significant equations demonstrate some interesting patterns of Granger causality.

The observed F-statistic in the first equation, with LFDI as the dependent variable, is much too low to be statistically significant. The null hypothesis that all of the regression coefficients are simultaneously equal to zero is therefore accepted at the 95 per cent confidence level. This implies that none of the lagged explanatory variables are statistically significant in Granger causing the level of outward FDI flows of China, and this result is confirmed by the hypotheses tests for all individual regression coefficients other than LO(-1). Except for the statistically peculiar result on the coefficient of LO(-1), none of the other estimated partial coefficients of the regression equation are significantly different from zero at the 95 per cent confidence level.

The observed F-statistic in the second equation, with LYPC as the dependent variable, is highly statistically significant at the 99 per cent confidence level. The null hypothesis that all of the regression coefficients are simultaneously equal to zero is therefore rejected, which implies that the lagged explanatory variables are collectively significant in determining the Granger causality of the national income per capita of China. The hypotheses tests for individual regression coefficients shows statistically significant coefficients for LYPC(-1), LO(-1), LI(-1), LER(-1), LERV(-1) and TIME at the 95 per cent confidence level at least. This means that LYPC, LO, LI, LER and LERV Granger cause LYPC.

Table 2. The VAR (1) Model using LFDI, LYPC, LO, LI, LHC, LTE, LER, LERV as dependent variables

	Dependent variable LFDI		Dependent variable LYPC		Dependent variable LO		Dependent variable LI		Dependent variable LHC		Dependent variable LTE		Dependent variable LER		Dependent variable LERV	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
LFDI(-1)	.037957	.878	.0096159	.348	-.011301	.430	-.0017529	.914	.0022642	.746	-.017951	.437	-.0044315	.741	.024482	.792
LYPC(-1)	-2.9372	.514	.42667	.031	-.42360	.113	-.60159	.056	-.16748	.197	-.69785	.106	.71271	.009	-3.8719	.034
LO(-1)	13.6382	.038	.50073	.057	.35925	.308	.73616	.080	.070552	.680	-.16815	.763	.28570	.388	.77785	.732
LI (-1)	-.28725	.948	-.73397	.001	.26692	.298	.59959	.053	-.18365	.154	.81953	.059	-.33916	.168	.85567	.606
LHC(-1)	-7.9819	.324	.51828	.125	.46649	.313	.074051	.887	.61408	.014	-.51706	.484	-.14447	.737	1.7683	.555
LTE(-1)	-4.2112	.218	.022507	.868	.061993	.745	-.28870	.200	.18873	.059	.51824	.107	.080568	.655	-1.6371	.516
LER(-1)	.19174	.947	-.49556	.001	.20705	.219	.14655	.441	.078140	.341	.83818	.006	.47655	.007	.70306	.516
LERV(-1)	.31593	.672	-.10644	.003	.0065585	.878	.058255	.246	-.011012	.602	.078290	.264	-.049721	.228	.28551	.315
Intercept	-18.3314	.584	-1.7563	.208	2.6187	.183	-2.0823	.349	1.7921	.072	7.0929	.034	-2.3451	.206	5.2546	.675
Time	-.34877	.743	-.12054	.013	.11815	.067	-.026231	.708	-.011689	.697	.28257	.011	-.14457	.022	.45784	.261
R-Squared	.38510		.99537		.99462		.98751		.99342		.98926		.95874		.55941	
R-Bar-Squared	-.010197		.99239		.99117		.97948		.98919		.98236		.93222		.27618	
S.E. of Regression	1.4500		058937		.082831		.095239		.040854		.13345		.078225		.54310	
F (9,14)	.97421[.499]		334.2975[.000]		287.7293[.000]		122.9701[.000]		234.7678[.000]		143.3358[.000]		36.1496[.000]		1.9751[.122]	
Akaike Info. Criterion	-46.5039		30.3645		22.1964		18.8463		39.1596		10.7499		23.5693		-22.9353	
Schwarz Bayesian Criterion	-52.3942		24.4742		16.3061		12.9561		33.2693		4.8596		17.6791		-28.8256	
DW-statistic	2.2714		1.9021		2.0722		1.9929		1.7353		1.9192		2.5292		2.3842	
System Log-likelihood	223.9638		223.9638		223.9638		223.9638		223.9638		223.9638		223.9638		223.9638	

The observed F-statistic in the third equation, with LO as the dependent variable, is highly statistically significant at the 99 per cent confidence level. The null hypothesis that all of the regression coefficients are simultaneously equal to zero is therefore rejected, which implies that the lagged explanatory variables are collectively significant in determining the Granger causality of the openness of the Chinese economy to international trade. However, none of the variables are significantly different from zero at the 90 per cent confidence level, other than Time. This result flags the possible problem of multicollinearity between the lagged variables in this equation.

The observed F-statistic in the fourth equation, with LI as the dependent variable, is highly statistically significant at the 99 per cent confidence level. The null hypothesis that all of the regression coefficients are simultaneously equal to zero is therefore rejected, which implies that the lagged explanatory variables are collectively significant in determining the Granger causality of the national interest rate of China. The hypotheses tests for individual regression coefficients shows statistically significant coefficients for LYPC(-1), LO(-1) and LI(-1) at the 90 per cent confidence level at least. This means that LYPC, LO, and LI Granger cause LI.

The observed F-statistic in the fifth equation, with LHC as the dependent variable, is highly statistically significant at the 99 per cent confidence level. The null hypothesis that all of the regression coefficients are simultaneously equal to zero is therefore rejected, which implies that the lagged explanatory variables are collectively significant in determining the Granger causality of the national human capital of China. The hypotheses tests for individual regression coefficients shows statistically significant coefficients for LHC(-1), LTE(-1) and the Intercept at the 90 per cent confidence level at least. This means that LHC and LTE Granger cause LI.

The observed F-statistic in the sixth equation, with LTE as the dependent variable, is highly statistically significant at the 99 per cent confidence level. The null hypothesis that all of the regression coefficients are simultaneously equal to zero is therefore rejected, which implies that the lagged explanatory variables are collectively significant in determining the Granger causality of the national technological capability of China. The hypotheses tests for individual regression coefficients shows statistically significant coefficients for LI(-1), LER(-1), Intercept and Time at the 90 per cent confidence level at least. This means that LI and LER Granger cause LTE.

The observed F-statistic in the seventh equation, with LER as the dependent variable, is highly statistically significant at the 99 per cent confidence level. The null hypothesis that all of the regression coefficients are simultaneously equal to zero is therefore rejected, which implies that the lagged explanatory variables are collectively significant in determining the Granger causality of the national level of the exchange rate of China. The hypotheses tests for individual regression coefficients shows statistically significant coefficients for LYPC(-1), LER(-1) and Time at the 95 per cent confidence level at least. This means that LYPC and LER Granger cause LER.

The observed F-statistic in the eighth equation, with LERV as the dependent variable, is much too low to be statistically significant. The null hypothesis that all of the regression coefficients are simultaneously equal to zero is therefore accepted at the 95 per cent confidence level. This implies that none of the lagged explanatory variables are statistically significant in Granger causing the national exchange rate volatility of China, and this result is confirmed by the hypotheses tests for all individual regression coefficients other than LYPC(-1). Except for the statistically

peculiar result on the coefficient of LYPC(-1), none of the other estimated partial coefficients of the regression equation are significantly different from zero at the 95 per cent confidence level.

5. DISCUSSION AND CONCLUSIONS

An 8-equation unrestricted VAR model was used in the current study to test the relationship between the level of outward FDI flows of China and a number of factors specific to China as a home country to include national income per capita, openness of the economy to international trade, interest rate, human capital, technological capability, exchange rate and exchange rate volatility. The most remarkable finding of the study is that the past values of all these home country-specific variables, either individually or collectively, do not explain current levels of outward FDI flows of China.[4] Similarly, past values of the outward FDI flows of China do not explain current levels of national income per capita, the openness of China to international trade, the national interest rate, the national human capability, the national technological capability, the national exchange rate and the national exchange rate volatility. The results obtained on the basis of the data available to hand thus suggest that the home country-specific macroeconomic factors do not determine the level of outward FDI of China, and neither does the level of outward FDI of China determine these home country-specific macroeconomic factors. This is an interesting finding that could well be peculiar to China alone, and a finding that could well change over time with a longer time series that could allow the estimation and testing of a probable more properly specified VAR model with longer lags. Until such time comes the study concludes on the basis of currently available evidence that macroeconomic factors of China do not bear significance in determining the level of

outward FDI flows of China. Similarly, there is currently no evidence to show the importance of the level of outward FDI flows of China in determining or affecting a whole range of macroeconomic factors of China.

The case of China is evident – at least currently — of the weakness of the macroeconomic theories of international production. A more nuanced perception may be required that extends beyond the currently accepted view that the increase in complexity of ownership advantages of MNCs and the growth in complexity of the determinants of these ownership advantages over time with increasing global integration diminish eventually the role of home country-specific national factors and the explanatory power of macroeconomic theories of international production. The current research has established that home country-specific national-level macroeconomic determinants may well be irrelevant in explaining the extent of internationalisation of firms based in some countries as measured by the variability in the levels of their annual outward FDI flows. There are clear limits to the ability of macroeconomic theories, particularly those that assign sole importance to national-level factors, to contribute to a general understanding of the level and pattern of international production. The current study only serves to provide further proof of the dangers of pushing these theories — as well as policies based on these theories — beyond their limit.

The results of the current study imply strongly that there are other explanatory factors than home country-specific national macroeconomic factors that moderate the strength of the relationship. The estimated VAR model may be under-specified at two levels. On the one hand, the model is under-specified to the extent that it fails to determine comprehensively the full contribution of the home country in explaining variations in the level of the annual outward FDI flows of a country. A more

comprehensive model would assess the role of home country-specific national-level determinants as well as home country-specific industry-level determinants and home country-specific firm-level determinants that define the competitiveness of all firms based in a country. This study, along with other recent conceptual and empirical studies, clearly point to the importance of analysing the role of the home country environment more broadly.

The model suffers from under-specification at a more general level, which the analysis of the home country-specific national determinants of the annual outward FDI flows of China brings into sharp relief. In terms of providing directions for future research, there could presumably be several possible sources of variation in the level of annual outward FDI flows of a country to include: general home country factors, industry-specific effects (which capture the influence of structural characteristics of industries), firm-specific effects (which take account of the heterogeneity among firms in tangible and intangible assets), a year factor (which measures factors of broader economic significance, including the impact of a global factor) and various interactive factors such as home country-year factor (which captures the impact of business cycles on the country), industry-year factor (which captures the impact of economic cycles on the industry) and also the home country-industry (comparative advantage) factor – see, for example, Porter (1990), Kojima (1973) and Tolentino (2000). The key focus of future research may be in specifying and testing a comprehensive empirical model which takes into account all these possible structural and cyclical factors in explaining the variance in the level of outward FDI flows of a country. Such an approach may have more mileage in explaining the so-called process of “accelerated internationalization” (Bonaglia, Goldstein and Mathews, 2007) of some MNCs based in developing countries and the

evolution of the more entrepreneurial companies from Brazil, Russia, India, Mexico and China as well as some smaller countries into global leaders in a variety of industries (van Agtmael, 2007), notwithstanding volatility and frequent crises as well as institutional constraints in their macroeconomic home environment (Khanna and Palepu, 2006). “Inter-firm and inter-industry variability in R and D quality, in entrepreneurs’ animal spirits, in synergistic relationships and the ability to exploit economies of agglomeration can all affect the identity of the efficient firms apparently without reference to national characteristics.” (Gray, 1982, p. 192) The current study certainly serves to fuel the conceptual debate concerning the extent to which country- and industry-specific factors embodied in the ‘location-bound’ approach predominate over firm-specific factors embodied in the ‘universalist’ approach in elucidating the distinctive nature of MNCs based in developing economies (see Tolentino, 2008).

The VAR model estimated in the current study bears far wider implications for the analysis of the relationships of macroeconomic variables and economic theory which fall outside the scope of the paper.

DATA APPENDIX

Measurement and Data Sources

Variables	*Measurement*	*Data Sources*
FDI	Real FDI outflows from China, US $ million (2000=100)	Calculated
	Nominal FDI outflows from China	IMF, Balance of Payments Statistics
	Chinese GDP deflator (2000=100)	IMF, International Financial Statistics
GDP	Real GDP per capita of China, US $ million (2000=100)	Calculated

	Nominal GDP of China	IMF, International Financial Statistics
	Chinese GDP deflator (2000=100)	IMF, International Financial Statistics
	Population of China	IMF, International Financial Statistics
O	Sum of real exports and imports of China, US $ million (2000=100)	Calculated
	Nominal sum of exports and imports of China	IMF, Direction of Trade Statistics
	USA GDP deflator (2000=100)	IMF, International Financial Statistics
I	Real lending rate of China, 2000=100 (% per annum)	Calculated
	Nominal lending rate of China	IMF, International Financial Statistics
	Inflation (CPI: 2000=100) of China	IMF, International Financial Statistics
HC	Real GDP per person employed, a measure of productivity per worker, US $ million (2000=100)	Calculated
	Real GDP per person employed (1990=100)	ILO, Key Indicators of the Labour Market
	Deflator GDP per person employed (1980=100)	ILO, Key Indicators of the Labour Market
TE	Number of applications for registration of a trademark with a national or regional trademark office by residents of China	World Bank, World Development Indicators
ER	Real Effective Exchange Rate index based on relative consumer prices (2000=100)	IMF, International Financial Statistics
ERV	The standard deviation of the real monthly average exchange rate of the Chinese national currency against the US $	Calculated
	Nominal monthly average exchange rate of the Chinese national currency against the US $	IMF, International Financial Statistics
	Consumer price index of China (2000=100)	IMF, International Financial Statistics

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NOTES

[1] Excluding the Caribbean which is the home region of many tax-haven economies, the stock of outward FDI by developing economies stands at $ 1.4 trillion as of 2006. Data in this section is based on UNCTAD (2007). The current research adopts the classification used by UNCTAD for developing economies, which does not include South-East Europe and the Confederation of Independent States. The data on the stock of outward FDI from developing economies must be interpreted with caution. On the one hand, the data are over-stated for some economies on account of round tripping (in the case of Hong Kong, China); investment by foreign affiliates of mainly developed-country MNCs operating in developing economies (investment that is particularly large in economies such as Cyprus, Hong Kong (China), Mauritius, Singapore, Malaysia and a number of tax havens); and capital flight. On the other hand, other factors may lead to under-reporting of outward FDI. For example, firms from some developing economies have raised capital for outward FDI in host country markets or in international markets owing to the prohibitions on the transfer of funds from their home countries; in that case, the full extent of their international production activities is not reflected in FDI statistics.

[2] For an empirical analysis of the role of home country characteristics in the development of competitive advantages of companies, see Nachum and Rolle (1999) and Nachum (2001).

[3] Shenkar and Luo (2004) similarly consider economic soundness, science, technology & innovation, finance, and internationalisation as the four elements comprising the country-level determinants of the competitiveness of a nation.

[4] Except of course for LO(-1) whose coefficient is individually statistically significant within a regression model that is not statistically significant.