Foreign Direct Investment and its Impact in China: A Time Series Analysis

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Declaration

This thesis is submitted in accordance with the regulations for the Degree of Doctor of Philosophy of Griffith University, Australia. The work carried out within the Department of International Business and Asian Studies at the Griffith Business School of Griffith University. I declare that, to the best of my knowledge, the research work reported in this dissertation is original, except where otherwise indicated and acknowledged, and this thesis has not, either in whole or in part, been previously submitted for a degree or diploma to any other universities. I also declare that, to the best of my knowledge, the thesis contains no material previously published or written by another person except where otherwise referenced in the thesis.

Signature of Candidate           Date

ENDORSEMENT

Signature of Principal Supervisor           Date

Professor Antony Selvanathan
Abstract

Globalisation has become a significant economic phenomenon since the late nineteenth century and foreign direct investment (FDI) has been an important driving force of globalization. FDI has become an important competitive strategy for enterprises to invest all over the world to access markets, technology, resources and talent. On the other hand, host governments consider FDI as crucial to the development of their economies, exports, employment opportunities, and competitiveness. China, in this increasingly competing world economy, has absorbed enormous amounts of FDI inflows since the economic reforms introduced in 1978.

This thesis studies FDI and its impact in China during the period ranging from 1978 to 2005. The thesis makes valuable contributions to the theory of FDI as well as significant contributions to empirical analysis of the impact of FDI in China. It presents extension to various FDI theories and the impact of FDI on economic development. The thesis also empirically analyses FDI location-specific determinants and the impact of FDI on domestic investment, income distribution, consumption and tourism in China by using stationary multi-equation system of time series models together with data for the period 1978 to 2005. The results show that FDI has played an important role in the Chinese economy but does come with both benefits and costs. The findings of the thesis suggest that China should develop appropriate and effective economic development policies and regulations to ensure positive FDI externalities.
To investigate the location-specific determinants of FDI in China, we explore China’s FDI inflows in a comprehensive and meaningful way by using a Vector Auto Regression (VAR) model to analyse China’s FDI development, policies and characteristics. The results show that good infrastructure, openness, low labour costs, market demand and labour quality have been the driving forces in determining China’s FDI, while the exchange rates have no impact on China’s FDI.

We also examine the causal link between FDI, domestic investment and economic growth in China. For this purpose, a multivariate VAR system with Error Correction Model (ECM) and the innovation accounting (variance decomposition and impulse response function analysis) techniques are used. The results show that while there is a bi-directional causality between domestic investment and economic growth, there is only a single-directional causality from FDI to domestic investment and FDI to economic growth. Rather than crowding out domestic investment, FDI is found to be complementary to domestic investment. Thus, FDI has not only assisted in overcoming shortage of capital, it has also stimulated economic growth through complementing domestic investment in China.

China is the largest FDI recipient country in the developing world, which arouses concerns over the impact of FDI on rising inter-regional income inequality in China. Thus, we examine the relationship between FDI inflows and income inequality in China using data for the period 1978 to 2002. We find that FDI inflows are one of the main factors responsible for the increase in income inequality in China. In addition, empirical evidence presented in this thesis suggests that the level of economic development, education and agricultural transformation are also the crucial determinants of income inequality in China.
The most shining example of China’s economic reforms in the last thirty years has been the opening of its door to the rest of the world thus facilitating a transformation from socialism to capitalism and announcing China as a participant in world globalization. Adopting the cointegration approach, an ECM and on the basis of the life-cycle and permanent-income hypotheses, we examine international spill-over effects on Chinese household consumption behaviour. We found that international spill-over effects have substantially changed Chinese household consumption behaviour. Chinese consumers have also adopted new consumption values and patterns. Simultaneously, consumer confidence and consumption in China have continuously declined and plunged to an extremely low level. The empirical results reveal that uncertainty is responsible for the lower level of consumer confidence.

We also investigate the causal link between FDI, growth and tourism in China by employing the Granger causality test under a VAR framework. From the empirical results on FDI and tourism, only a one-directional causality is found from FDI to tourism. This explains the rapid growth in the tourism market in China during the last decade. China’s tourism industry has demonstrated robust growth and is seen as one of the cornerstones of the Chinese economy and a major source of job creation during the period 1978 to 2005. The results on the analysis of growth and tourism indicate that there exists a two-way directional causality between international tourism and economic growth, which in turn supports the widely believed tourism-led growth hypothesis.

The overall conclusion of the thesis is that FDI plays a crucial role in the Chinese economic development, mostly in a positive way. However, China should develop appropriate economic policies and regulations in order to ensure positive FDI externalities.
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Journal Articles published and Papers Presented at Conferences Based on This Thesis

1. Publications in Refereed Journals


Qiang Hua Shi, Sumei Tang and et al, 2003 “Household Saving in Developing Countries: a Case Study of Rural China” Saving and Development Quarterly Review, Vol. 4, ppXXVI.

2. Papers Submitted Under Review


3. Refereed Conference Papers and Proceedings


Chapter 1. Introduction

1.1 Background and motivation

Globalisation has become a significant economic phenomenon since the late nineteenth century and FDI has been an important driving force of globalization. FDI has become an important competitive strategy for enterprises to invest all over the world to access markets, technology, resources and talent. On the other hand, host governments consider FDI as crucial to the development of their economies, exports, employment opportunities, and competitiveness. China, in this increasingly competing world economy, has absorbed enormous amounts of FDI inflows since the economic reforms introduced in 1978.

Table 1.1 presents FDI inflows to China (row 1), total FDI inflows to Asia (row 2), and the share of China’s FDI in total FDI inflows (row 3), total FDI inflows to developing countries (row 4) and the share of China’s FDI in total FDI inflows to developing countries (row 5), respectively, in selected years. Figure 1.1 shows China’s FDI inflows during the period 1978 to 2005. As can be seen, China’s FDI inflows were low during the period 1978 to 1991 but since 1992 China’s FDI inflows surged dramatically at a growth rate of 152% and 150% in 1992 and 1993, respectively. This placed China as the largest FDI host country in the developing world in 1993 and since then, in 2002, FDI inflows to China surpassed the United States making China the largest FDI recipient country in the world.
Table 1.1 FDI inflows to China and its share in total inflows to Asia and to developing economies

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<tr>
<td>(1) China ($)</td>
<td>4.65</td>
<td>27.52</td>
<td>33.79</td>
<td>45.46</td>
<td>52.74</td>
<td>53.51</td>
<td>60.63</td>
<td>60.33</td>
</tr>
<tr>
<td>(2) Asia ($)</td>
<td>19.61</td>
<td>54.84</td>
<td>63.84</td>
<td>84.88</td>
<td>92.01</td>
<td>101.28</td>
<td>147.55</td>
<td>155.50</td>
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<tr>
<td>(3) Share A (%)</td>
<td>23.71</td>
<td>50.18</td>
<td>52.93</td>
<td>53.56</td>
<td>57.32</td>
<td>52.83</td>
<td>41.09</td>
<td>38.80</td>
</tr>
<tr>
<td>(4) Developing economies ($)</td>
<td>35.33</td>
<td>78.81</td>
<td>101.20</td>
<td>165.94</td>
<td>155.53</td>
<td>166.34</td>
<td>233.23</td>
<td>334.00</td>
</tr>
<tr>
<td>(5) Share B (%)</td>
<td>13.16</td>
<td>34.92</td>
<td>33.39</td>
<td>27.40</td>
<td>33.91</td>
<td>32.17</td>
<td>26.00</td>
<td>18.06</td>
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Figures 1.2 (a) and 1.2 (b) show the share of China’s FDI inflows in the total FDI inflows to Asian and to developing countries in 2002. As can be seen, China’s FDI share of total FDI inflows to Asia and the developing economies were 57% and 34%, respectively. During the period 1978 to 2005, FDI inflows to China have totalled $US621 billion, the annual average growth rate of FDI was about 33%, and there were about 242799 multinational enterprises (MNEs) operating in China covering almost every single sector of the economy.
The impact of FDI in China has become prominent. Table 1.2 shows the various forms of FDI contributions in the Chinese economy during the period 2000 to 2004. As can be seen, the highest share of FDI in GDP and domestic investment was 4.2% (2002) and 10.7% (2000), respectively. MNEs contributions to industrial output reached $US711 billion in 2004 accounting for 31.4% of China’s total industrial output, whereas, MNEs contributions

| Table 1.2 Various forms of FDI contributions in China |
|-----------------------------------|---|---|---|---|---|
| FDI (US billion)                  | 41 | 47 | 53 | 54 | 61 |
| FDI/GDP (%)                       | 3.8 | 4.0 | 4.2 | 3.8 | 3.7 |
| FDI/DI* (%)                       | 10.7 | 10.7 | 10.2 | 7.9 | 7.0 |
| MNEs output (US billion)          | 283 | 329 | 392 | 536 | 711 |
| MNEs output/total output (%)      | 27.4 | 28.5 | 29.3 | 31.2 | 31.4 |
| MNEs Export (US billion)          | 119 | 133 | 170 | 240 | 339 |
| MNEs Export/total export (%)      | 4.8 | 5.0 | 5.2 | 5.5 | 5.7 |
| MNEs employment (million persons) | 6.42 | 6.71 | 7.58 | 8.63 | 10.33 |
| MNEs employment/total employment (%) | 0.9 | 0.9 | 1.0 | 1.2 | 1.4 |

to exports were $US339 billion in 2004 accounting for 5.7% of China’s total exports. FDI has also generated employment opportunities in China and MNEs employed 6.42 million locals in 2000 which accounted for 0.9% of China’s total employment. In 2004, the number of locals employed by MNEs increased to 10.33 million which accounted for 1.4% of China’s total employment.

During the period 1978 to 2005, China emerged as the largest FDI host country in the developing world, and at the same time it experienced the highest economic growth in the world, an average rate of about 10%\(^1\). Meanwhile, the international tourist arrivals and receipts reached 109 million and $US26 billion, respectively, in 2004. This ranked China as 4\(^{th}\) and 6\(^{th}\) in terms of international tourist arrivals and international tourism receipts in the world. The annual average growth rates of international tourist arrivals and receipts in China over the period 1978 to 2005 were 18.9% and 20.4%, respectively, and measured the highest growth rates in the world. During the same period, while per capita income in China increased rapidly, the choices of available goods and services also expanded. With increasing income, the majority of the urban middle classes not only sought maximum consumer’s utility, but also tried to transform the western positional values into “positional consumption”. It seems that new consumption patterns have emerged and a consumption propensity shift has occurred towards international brand products and time saving items in China. As FDI increased, and more and more MNEs commenced operation in China, the number of State-Owned-Enterprises (SOEs) declined sharply from 102300 in 1989 to 23228 in 2003, resulting in millions of SOE employees being laid off. Simultaneously, an increasing income inequality has been pronounced. In urban areas, a large percentage of the

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\(^1\) All statistics in this chapter are collected or calculated from the various issues (1980-2005) of China Statistic Yearbook and the World Investment Report 1999-2005 except where otherwise referenced in the chapter.
population makes, on average, as little as $US550 to $US810 per head a year. In rural areas, many farmers make, on average, as little as $US300 per head a year\(^2\). The income arrangements can barely support a minimal standard of living. Consequently, consumer confidence and consumption in China have continuously declined and plunged to an extremely low level since China introduced economic reforms in 1978.

Many economic phenomena in China in recent decades are puzzling and can hardly be explained fully by existing economic theories. Empirical research publications in these areas are also limited. Many questions relating to the economic phenomena in China have emerged attracting attention. The questions include: How has China attracted enormous amounts of FDI since the economic reforms introduced in 1978? Does FDI crowd out domestic investment? Has FDI caused China’s income inequality? With remarkable economic performance in the last three decades, China’s per capita income has increased rapidly, how could consumer confidence and consumption in China continuously decline? Is there any causal relationship between FDI and international tourism? Does FDI cause tourism growth? Has tourism-led growth held in China? Overall, the fundamental interest lies in exploring the impact of FDI on the Chinese economy. Obviously, an economic framework is required to provide explanations for the economic phenomena in China. Correspondingly, an integrated modelling framework is also required for conducting empirical studies in the relevant areas to test and support the economic framework. In this regard, an exploration of FDI theories is urged, which may provide some solutions to the puzzles in China. In order to gain insights into FDI and how FDI affects the Chinese economy, an integrated study on the FDI characteristics and factors that determine FDI in

China are necessary. Following the studies of FDI determinants, an exploration towards a better understanding of the macro-economic effects on host country economies would be important. Given the complexity of the possible causal links between FDI and domestic investment, income inequality and tourism, a disaggregated framework and empirical analysis would be essential to provide a clear insight of FDI and its impact on the Chinese economy.

1.2 Aims and objectives of the thesis

The broad objective of the study is to develop a theoretical framework with the use of recent developments in time series analysis and econometric models, in particular, to explore and analyze FDI and its impact in China. Specifically, the principal aims of the study are to:

(1) Extend the existing theoretical FDI studies to develop a theoretical framework on the impact of FDI on the economic development of a host country;

(2) Investigate and analyze the location-specific determinants of FDI in China;

(3) Examine the causal relationships between FDI and the macroeconomic variables, domestic investment and economic growth to assess the impact of FDI on these macroeconomic variables;

(4) Explore and analyze the impact of FDI on income inequality, as well as the impact of other factors on China’s income distribution;
Examine international spill-over effects on Chinese household consumption behavior on the basis of the life-cycle and permanent-income hypotheses;

Investigate the causal relationship between FDI and tourism, and hence assess the impact of FDI on tourism;

Test tourism-led growth theory in the case of China, and accordingly, use an econometric framework to estimate the relationships between tourism, the foreign exchange rate and economic growth.

The focus of this study is, based on the developed theoretical framework, to address the issues raised above which have not been studied or with limited research previously, and are important for the Chinese economy.

1.3 Overview of the methods

This thesis mostly focuses on a time series analysis of FDI and related variables. The data used are annual as well as quarterly. The econometric models used in this study include the multiple regression models, the VAR, and the ECM. Statistical techniques such as the unit root tests for stationarity [e.g. the Augmented Dickey-Fuller (ADF), the Phillips-Perron (PP), Perron and HEGY tests], the structural break test (Perron test), cointegration methodology (e.g. the Engle-Granger and the Johansen methodologies), test for Granger causality, and the innovation accounting techniques (the impulse response function analysis and the variance decomposition method) are also frequently used in the thesis.
Using the VAR model, we investigate and analyze the location-specific determinants of FDI, and the causal relationship between FDI and tourism. The causal relationships between FDI, domestic investment and economic growth, and the impact of FDI on domestic investment and economic growth are modelled by the ECM. The ECM is also used to examine international spill-over effects on Chinese household consumption behavior, and test tourism-led growth theory in the case of China. A multiple regression model is developed to analyze the impact of FDI on income inequality, as well as the impact of other factors on China’s income inequality.

1.4 Structure of the thesis

This thesis contains ten chapters. Chapter 1 is an introductory chapter, and a literature review of previous research in FDI studies and its extensions are given in Chapters 2 and 3, respectively. Chapters 4 to 9 constitute the main analyzes of the thesis. These chapters cover the topics: location determinants of FDI (Chapter 4); FDI, domestic investment and economic growth (Chapter 5); FDI and income inequality (Chapter 6); international spill-over effects on consumption (Chapter 7); the relationship between FDI and tourism (Chapter 8); and tourism and economic growth (Chapter 9). The final chapter, Chapter 10, presents the overall conclusion of the thesis.

Chapter 1 discusses background and motivation, aims and objectives and major findings of the study, overview of the methods, structure of the thesis and significant contributions of the study. A comprehensive study on FDI theories is reviewed, and correspondingly, empirical studies on FDI are given in Chapter 2. Chapter 3 presents the development of a
theoretical framework to analyze the effects of FDI, and accordingly, empirical studies on the effects of FDI are reviewed.

Chapter 4 provides details about China’s FDI policies, the development of FDI during the period 1978 to 2005, and the characteristics of China’s FDI such as FDI source countries, geographic and sector distributions, and type of FDI. Applying China’s time series data to a VAR model, the long-run relationships between FDI, infrastructure, openness, labour costs, the exchange rates, market demand and labour quality are investigated. Further, the location-specific determinants of FDI in China are analyzed. Chapter 5 examines whether FDI has complementary or substitute effects on domestic investment in China, given the fact that China has attracted a huge amount of FDI inflows during the period 1978 to 2005. For this purpose, an ECM framework is used. Further, the relationship between FDI, domestic investment and economic growth is also analysed in this chapter.

Using time series and cross-coastal and inland regional Chinese data for the period 1978 to 2002, Chapter 6 explores the impact of FDI on rising income inequality between the coastal and the inland regions in China. This chapter also investigates the role of other factors which may have an impact on China’s income inequality. Adopting the cointegration approach and on the basis of the life-cycle and permanent-income hypotheses, Chapter 7 examines international spill-over effects on Chinese household consumption behavior. The role of other factors such as rapid income growth and accumulated wealth in Chinese consumption function are also investigated in this chapter.

Chapters 8 and 9 are about China’s tourism industry. Employing the Granger causality test under a VAR framework, Chapter 8 investigates the causal link between FDI and tourism
in China. Further, the impact of FDI on tourism is assessed. Chapter 9 tests the hypothesis of tourism-led growth in the case of China by using an ECM. In Chapter 9, the role of the foreign exchange rate in China’s economic development is also investigated.

The final chapter presents the overall conclusions by reporting the principal findings and discussing their policy implications, the limitations of the study and directions for future research.

1.5 Significant contributions and major findings of the thesis

This section briefly describes the significant contributions of the thesis to the existing knowledge in the area of FDI and presents a summary of major findings of the thesis.

**Significant contributions of the thesis**

This thesis makes significant contributions to the knowledge in the two areas, theory and applications of FDI.

First, the thesis extends the existing theoretical framework to analyze the impact of FDI on the economic development of a host country. Such a theoretical framework is a major contribution as it is the first rigorous and systematic research step towards a better understanding of the important confluence of controversies on the roles of FDI in the economic development of a host country, and provides a foundation for future research. Most existing theoretical FDI studies stem from MNEs perspectives and analyze the determinants of FDI or the motives of MNEs investing abroad, while the theoretical framework developed in this thesis stems from a macroeconomic perspective and analyzes
the impact of FDI on the economic development of a host country. It provides clear information about FDI externalities and shows how and when FDI generates good/adverse externalities on a host economy, in which, the broad effects of FDI on growth are evaluated.

Second, the thesis uses the extended theoretical framework to empirically analyze FDI and its impact on the economic development of China. The empirical study on FDI and its impact on China presented in the thesis make further significant contributions in a number of ways. These contributions include (1) explicit analysis of FDI and its impact on specific areas such as economic growth, aggregate level of domestic investment, income inequality and tourism etc. by offering insights into the extensively-disputed FDI-growth nexus; (2) the use of the cointegration technique based on a multivariate VAR system and model with time series data to analyze the determinants of FDI and its impact on China (It is well-known that the use of such a technique generates more reliable estimates in an endogenous context); and (3) the valuable policy recommendations, that are based on more reliable results derived from the study, are useful to the Chinese government and potential local and foreign investors.

**Major findings of the thesis**

The findings presented in the thesis can be grouped into two major categories. One is from the theoretical point of view and institutional discussions; and the other is based on empirical analysis. A summary of findings in both categories follows.
The findings from theoretical view and institutional discussions include (1) FDI generates both positive and adverse externalities on the economic development of a host country; (2) location-specific advantages led China to become one of the world’s highest value-added manufacturing production locations; and (3) China has entered into the more advanced development stage of FDI and should promote select types of FDI.

The empirical findings show that (1) the labour cost is a primary and significant factor attracting FDI to China; (2) FDI has played an important role in China’s economic growth and development; (3) FDI has impacted significantly on income inequality in China; (4) FDI has had spill-over effects on Chinese consumption patterns; (5) FDI significantly influences the tourism sector of China, and (6) the tourism-led growth hypothesis is supported by the Chinese economy.
Chapter 2. Theories of FDI on Multinational Firms

2.1 Introduction

FDI is not a new phenomenon, but has been a significant characteristic of globalization for the past 30 years. FDI is made outside the home country of the investing company but still controlled by the investor. FDI, unlike portfolio investment, consists of a “package” of assets and intermediate products such as capital, technology, management skills, access to markets and entrepreneurship (Dunning, 1992). In general, FDI is carried out by MNEs. MNEs are firms that engage in international production, which own or control value-added activities, such as manufacturing plants, located in at least two countries.

With increasing globalization, FDI has become an important competitive strategy for MNEs to invest all over the world. On the other hand, host governments consider FDI as crucial to the development of their economies. Theoretical and empirical research on FDI have evolved over the past 50 years (Dunning, 2000). The theory of FDI, unlike other economic theories, is formed by many different schools of thought. Most FDI theories are based on principles of microeconomics and the determinants of FDI or the motives of MNEs to invest abroad.

This chapter presents a survey of the literature on FDI including the FDI theories and some selected FDI empirical studies on China. The organization of this chapter is as follows. Section 2.2 presents a comprehensive review on the theories of FDI. Section 2.3 discusses
the controversy on the FDI theories in service industries. Section 2.4 reviews selected empirical studies on FDI and the final Section 2.5 presents conclusion.

2.2 Theories of FDI

The first theory of FDI was formulated only in 1960, and since then FDI theories have undergone several stages of development. Initially, during the period from 1960 to the mid-1970s, two FDI theories were developed, the theory of industrial organization or the classical industrial organization theory of FDI and the product cycle theory. Separate to these two main streams of FDI theories, a group of financial economists and macroeconomists also developed the currency premium theory or the cost of capital theory and the Risk diversification theory. A second stage of theoretical development occurred in the mid-1980s when theoretical studies of FDI primarily focused on extending the existing theories to a better understanding of the determinants of FDI and activities in the changed political, legal and cultural environment. The FDI theories developed in this second stage include the internationalization theory or the transaction cost theory, the dynamic comparative advantage theory, the eclectic theory, the development stage theory, and the appropriability theory. By the 1990s, FDI played an increasingly important role in global production. Correspondingly, new explanations of the FDI phenomenon were put forward and existing explanations were modified, which constitutes the third stage of development of FDI theories.

In the new millennium, the increasingly globalizing economy has presented challenges which warrant some reconstruction of the existing theories in order to provide a more
comprehensive and systematic analysis of FDI. In order to carry out further studies and research in this field, a comprehensive literature review of mainstream FDI theories is provided in this section. Such review also offers a sound theoretical foundation for the empirical studies which follow.

**The industrial organization theory**

*The industrial organization theory or imperfect competition theory* addresses the questions of why MNE firms of one nationality are better able to penetrate foreign markets than indigenous firms located in host markets, and why firms wish to engage in FDI activities abroad. Stephen Hymer in his PhD thesis in 1960 developed the industrial organization theory from existing theories of international trade and international capital movements. Based on the assumption that markets are imperfect, Hymer argued that the reasons firms wish to engage in FDI activities outside their national boundaries are the prudent use of assets to remove competition between that foreign enterprise and enterprises in the countries, or to appropriate fully the returns on certain skills and abilities. However, Hymer viewed FDI as an aggressive strategy to advance monopoly power, rather than a strategy of minimizing transaction costs. Thus, Hymer asserted that in order to maximize global profits and increase market power through FDI, a firm must possess some kind of monopolistic advantage or ownership advantages over and above those possessed by indigenous firms (competitors) located in host markets. Ownership-specific advantages or competitive advantages include scale economies, technological advantage, knowledge (e.g. management know-how), product differentiation, diversification of investment, agglomeration and credit advantages, better distribution facilities, access to lower cost
factors of production (e.g. labour and raw materials), oligoplistic market structure and behaviour etc.

*The industrial organization theory* was given prominence by Charles Kindleberger in 1967 and 1969. Since then, the theory has been taken up, refined and extended by a number of industrial organization economists including Caves (1971, 1974), Jonson (1970), Horst (1971), McManus (1972) and Hufbauer (1975). Kindleberger (1970) agreed with Hymer that firms invest abroad because of the possession of monopolistic advantages such as product differentiation, marketing skills in goods markets; proprietary knowledge, discrimination in access to capital and managerial skills in factor markets. Caves (1971, 1974) argued that FDI occurs mainly in industries characterized by certain market structures in both the home and host countries. Further, Caves pointed out that there are two types of FDI, one is horizontal investment to produce abroad the same lines of goods as they produce in the home market, and other is vertical investment to produce abroad a raw material or other input to their production process at home.

**The product cycle theory**

*The product cycle theory* can be traced back to 1961. Akamatsu (1961) introduced the idea of “The Wild Geese Flying Patterns of Foreign Trade” to describe the various stages of countries’ economic development. According to the theory, there are three stages of industrial development, and each country tries to move up to the top stage of industrialization. At the initial stage, a country imports goods. At the second stage, in order to reach the higher stage of industrialization, more FDI is attracted so that imports are substituted by technology and knowledge. Once industrialization development has spread
over the entire region or the country with strong dynamic growth, the mature stage occurs, which induces exporting abroad.

Raymond Vernon (1966) extended the neo-classical theory using the microeconomic concept of product cycle to explain MNEs activities, trade and investment relationships. Since then, the product cycle of FDI theory has been developed and merged with Akamatsu’s idea of “the Wild Geese Flying Patterns of Foreign Trade”.

The product cycle theory, one of the most influential contributions to the theories of FDI in the 1960s, differs greatly from the industrial organization theory in explaining FDI and MNE activities. The industrial organization theory views export and FDI as alternative strategies for a potential MNE. However, the product cycle theory describes export and FDI as different stages of product development which is affected by comparative input costs such as labor cost, transportation cost and industrial innovation (new products). Vernon divided the product life cycle into three stages: “new product”, “maturing product” and “standardized product”. At the initial stage, a developed country innovates a new product, which is also introduced to its home market. The demand for the new product expands rapidly and its market share increases, meanwhile the capability of supplying the product becomes stronger. The product then reaches its mature stage and is exported to foreign countries. Once the product becomes standardized, its production process becomes more independent from the home economy. Because labor becomes a more important component of costs, less developed countries become the priority destination choice for production as labor in less developed countries is cheaper than in developed countries (the home country). Moreover, as the foreign market expands further and demand becomes more price elastic, engaging in FDI activities in less developed countries becomes more attractive than in the
home country. Trade barriers such as tariffs on exports, and new competition in the markets could further accelerate the FDI process in foreign countries. Thereby, Vernon argued once overseas production by subsidiaries fits into the expected pattern, FDI could replace exports and even export back to the home country. Aliber (1970), and Buckly and Casson (1981) also expressed a similar view to Vernon but further explained that FDI would replace export once the cost of exporting exceeds the cost of FDI.

However, the product cycle theory, in general, has become outdated. Firstly, this theory was originally developed during the 1960s to explain U.S. FDI in Europe, but the United States is no longer the only dominant foreign investor. European and Japanese investors contribute an increasing share to global FDI. The product cycle theory failed to address organization issues and other motivations or determinants of FDI for MNEs engaging in FDI activities abroad. For example, many firms invest in certain industries in foreign countries simply as a means of diversifying risk, or exercising competitive or ownership and location advantages. Other firms may engage in FDI just for reasons of seeking increased efficiency or asset-augmentation. Second, MNEs are now able to develop, mature, and standardize products almost simultaneously and can differentiate their products without incurring significant time lags. Vernon (1979) himself indicated that the power of the product cycle theory to explain trade and investment is considerably weakened by several factors. To elaborate, Vernon described how MNEs have spread their network of over 500,000 subsidiaries around the world with production accounting for about 25% of global output, of which one third was produced in the host country. In many cases of the spread of new product lines by MNEs to their foreign subsidiaries, it appears that the time interval between the introduction of a new product in the home country and its initial production overseas has continuously become shorter. Nevertheless, the product cycle
theory is the first theory to dynamically illustrate the determinants of FDI and the relationship between FDI and international trade. It has been an important theory in explaining the impetus of FDI in the globalizing economy.

**The internalization theory**

*The internalization theory* is viewed as one of the general theories of FDI. The theory was first developed in the mid-1970s by a group of economists from England (e.g. Buckley and Casson, 1976; Dunning, 1977), Sweden (e.g. Swedenborg, 1979) and Canada (e.g. McManus, 1972). *The internalization theory* regards a MNE as an organization, which uses its internal market to produce and distribute products in an efficient manner in situations where a regular market fails to operate (Rugman, 1982, p11). *The internalization theory* essentially describes MNEs engaging in FDI activities abroad in response to goods and factor market imperfections which in practice prevent the efficient operation of international trade and investment. FDI allows MNEs to produce and distribute their products through internal markets which enables MNEs optimize the efficiency of production, hence increasing the total profits from ownership and use of its resources. However, it is argued such international production also creates transaction costs, in most cases higher than in the domestic market. In this regard, a MNE engages in FDI if and only if the benefits outweigh the cost.

*The internalization theory* regards information, research and knowledge as intermediate products. According to the theory, in imperfect markets there is no regular market for intermediate products to be directly sold to other nations because of the risk of loss of the knowledge advantage. However, MNEs are both vertically and horizontally integrated so
an internal market of its own is created in which the intermediate products such as information or technology know-how are permitted to transform into a valuable property specific to the firm. Therefore, the ownership or the competitive advantage of a MNE such as advanced technology and management know-how can be exploited and strengthened while the MNE still retains control over its competitive advantage.

Rugman (1981) argued that the internalization theory is a general theory of FDI as the process of internalization explains most (and properly all) of the reasons for FDI. Moreover, Rugman added that the internalization theory is a unifying paradigm for the theory of MNEs as it does not only involve comparison of the transaction costs of two alternative contractual arrangements (the internal and external), also, the transaction cost considerations of the theory can explain alternative domestic and international business strategies, as well as the industrial structures of FDI. Ultimately, the theory can predict the situations in which firms choose to internalize foreign markets (Dunning, 1993, p75). Indeed, the internalization theory is one of principal FDI theories, which has demonstrated wide-ranging applications explaining international business behaviors and phenomena. However, the internalization theory has undergone some criticisms. It is argued that the theory is incomplete because it ignores variables other than economic variables such as social and political elements. Moreover, a firm may perform functions other than related transactions but the internalization theory has neglected them. The internalization theory has also been criticized as a static theory because it only pays attention to how a firm optimizes the use of its existing assets but loses sight of how a firm may organize its activities to create future assets. The internalization theory fails to distinguish the different forms of MNEs, and/or include equity ownership, thus, internalization is applied indiscriminately to all forms of MNEs. For example, Kindleberger (1988) pointed out that
joint ventures are difficult to fit into the internalization theory because they are inherently unstable and do not work in the long run.

The eclectic paradigm

The *eclectic paradigm*, proposed in 1977 by Dunning, seeks to offer a general theoretical framework for determining FDI activities of firms outside their national boundaries. The *eclectic paradigm* has been viewed as the main contribution to the FDI theories during the past two decades. It combines a macro-economic theory of international trade with a micro-economic theory of firms; also it attempts to combine all the existing FDI theories into a single, unified analytical framework. Dunning (2000) claimed that the *eclectic paradigm* is an envelop and a common analytical theory accommodating existing FDI and MNE theories, within which, most of the theories are complementary to each other, rather than substitutable and can be fully enriched in their application.

The principal hypothesis of the *eclectic paradigm* is that the level and structure of a firm’s FDI activities will depend on its ownership-specific (O) advantages, market internalization (I) advantages and location-specific (L) advantages. According to the theory, a firm needs a long-term management strategy consistently to engage in FDI activities for international production, given the configuration of the ownership, location and internalization (OIL) advantages. The ownership-specific (O) advantages originally emerged from the *industrial organization theory*. Dunning integrated it into his *eclectic paradigm* and identified that the ownership advantages include intangible asset advantages, the resource (asset) structure of the firm, product innovations, management know-how and transaction cost minimizing advantages etc. The internalization (I) advantages were first used by the *internalization*
theory in explaining why firms engage in FDI activities. Dunning refined it and merged it with his eclectic paradigm, in which he described that firms engage in FDI activities to avoid searching and negotiating costs, or government intervention (e.g. quotas, tariffs, tax differences and price controls, etc.), and to seek control on supplies of inputs and conditions of sale etc. The location (L) advantages originated from the theories of location and trade used to explain the factors determining the location of production. Dunning incorporated them into his theoretical framework and explained that the location-specific advantages include factors from the host nation such as resource endowments and markets, input prices, quality and productivities (e.g. labor, energy, materials, components, semi-finished goods) and cross-country ideological, language, cultural, business and political differences etc. Further, Dunning suggested that the significance of these OIL advantages will vary between MNEs and is both industry and country specific.

Compared with any other FDI theories, the eclectic paradigm is obviously the only theory encompassing a sufficiently wide range of the underlying determinants of FDI. The values of OIL variables are operationally testable. Some can best explain the initial acts of FDI, while others are more helpful in explaining subsequent acts of FDI. Moreover, some sets of key variables could come close to providing the OIL paradigm with operational substance. For example, the state of knowledge, including information and organizational technology, is a key variable influencing the capacity of firms of different nationality of ownership to produce and market particular goods and services; a group of location variables, including transaction costs, size of markets, cost of inputs and resource availability, affect the decisions made by firms regarding where to locate their activities.
Dunning’s initial studies using the *eclectic paradigm* were mainly based on American and European manufacturing and petroleum experiences, whereas FDI has grown and its patterns have changed in the last three decades corresponding to the changing economic, political and social environments. Thus, the motives for FDI are far more complex than any unitary theory of FDI could possibly comprehend. Dunning (1983) acknowledged that because of the very different motives for FDI, a single predictive theory of international production is just not possible. Kojima (1982) went even further in criticizing Dunning’s *eclectic paradigm* theory. He claimed that the *eclectic paradigm* theory was developed only for the sake of enhancing the private company’s interest and cannot properly deal with the macroeconomic effects of FDI on both the investing and host countries, especially on developing host countries.

In order to further fit the general analytical framework of the *eclectic paradigm* into the globalizing, knowledge intensive and alliance based market economy, Dunning (1993, 1995, 1998, and 2000) extended and developed the *eclectic paradigm* to be wider and more dynamic. Dunning (1993 and 2000) suggested that, in the presence or absence of the OIL advantages, the motivation for foreign market expansion includes market seeking, or demand oriented, resource seeking, or supply oriented, efficiency seeking, or rationalized and strategic asset seeking. Moreover, Dunning (2000) asserted that an add-on dynamic component to the *eclectic paradigm*, and an extension of its constituent parts to embrace both asset augmenting and alliance related cross-border ventures could do much to uphold its position as the dominant analytical framework for examining the determinants of international production. Indeed, if new FDI phenomena and MNE activities are observed constantly, relevant problems are addressed and a satisfying conceptual structure for resolution and updating are added to the *eclectic paradigm*, then the *eclectic paradigm* can
be viewed as a robust theory in explaining the determinants of FDI and MNEs activities. Such a theory will be useful for analyzing the role of FDI and its growth and development, for predicting economic impacts of FDI and for evaluating its implications for the policies of both the host and home governments.

**The dynamic comparative advantage theory**

The *dynamic comparative advantage theory* was proposed by Kojima (1978 and 1982). This theory is very different from either the *internalization theory* or the *eclectic paradigm*. It takes a macro-economic perspective of MNE activities to explain FDI. The *dynamic comparative advantage theory* has attracted widespread attention in the literature, some favorable and some very critical.

*The dynamic comparative advantage theory* is essentially an extension of the neo-classical theory of factor endowments to explain trade in international production, notably, technology and management skills (Dunning, 1993). Its basic theorem is that FDI should originate from the comparatively disadvantaged industries of the investing countries, which are potentially comparatively advantaged industries in the host country (Kojima 1973, 1978, 1982). Kojima identified two different types of FDI, trade-oriented FDI and anti-trade-oriented FDI. Kojima believes that trade-oriented FDI occurs in an industry in which the investing country has a comparative disadvantage, and the host country can develop or strengthen a comparative advantage in the same industry. Trade-oriented FDI helps reorganize the international division of labor which means it helps firms to gain competitive costs increasing production and consumption gains from trade for both countries. Trade-oriented FDI also creates, complements and increases international trade.
On the other hand, if FDI moves out from an industry in which the investing country has a comparative advantage, without prospect of developing a comparative advantage in the same industry of the host country, then FDI causes a loss or decrease of efficiency substituting for international trade.

Kojima (1973, 1978, 1982 and 1990) claimed that Japanese direct investment is primarily trade oriented and originally dominated by labor-intensive industries, where the home country had comparative disadvantage. This Japanese-type FDI transfers the intermediate products such as technology and management skills from Japan (the home country) to the host country (most are developing countries) for the purpose of producing goods in the host country at costs lower than at home and then importing back to the home country or exporting to third markets. Kojima defined that American-type direct investment is anti-trade-oriented because American FDI usually is carried out by large oligopolistic firms and distributed in monopolistic or oligopolistic industries such as natural resources development. In the context of the macroeconomic role of FDI, Kojima argued that American-type FDI, in the long run, destroys the balance of economic development in developing countries and international trade balance.

The *dynamic comparative advantage theory* integrates trade theory with the theory of FDI, which is very much like Vernon’s product cycle theory. However, Kojima’s *dynamic comparative advantage theory* has failed to satisfactorily explain MNE activities. With a somewhat narrow promise, it ignores the range of motivations of FDI, hence, lacking general applicability and attention to most forms of direct investment (Buckley, 1981). It is based less on the distribution of factor endowments and more on the need to exploit the economies of scale, product differentiation and other manifestations of market failure.
Moreover, the theory is unduly static because the wider spill-over effects of FDI in less developed countries, such as employment creation, upgrading of the labor force and increasing technological capabilities, are all already widely accepted and recognized, but ignored by Kojima’s analysis.

Other important FDI theories

Apart from the major FDI theories, four other theories are considered equally important as they offer some valuable insights into explaining MNE activities and FDI. These theories are the risk diversification theory, the currency premium theory, the appropriability theory and the development stage theory.

The risk diversification theory

The risk diversification theory is essentially an extension of the theory of portfolio selection, which was proposed by Tobin (1958) and Markowitz (1959). The theory of portfolio selection explains the real world phenomenon of diversified asset holdings as an investor maximizing the rates of return given certain risk levels. About ten years later, Grubel (1968) applied the theory of portfolio selection in an international context to explain long-term asset holdings. He argued that it was possible for individual asset holders to reduce risk by holding a sufficiently diversified portfolio of international assets. Based on Grubel’s argument, Levy and Sarnet (1970), Agmon and Lessard (1977), Lessard (1974 and 1976) and Rugman (1975, 1979, 1980) explicitly applied the theory of portfolio diversification in detail to FDI. By then, the risk diversification theory was developed which sees risk diversification as a motive for FDI. It is true that the foreign operations of
multinational firms maximize their overall level of profits with less risk than does a firm of similar size selling most of its goods in only one national market (Rugman, 1975). While considering well-being of share holders, risk diversification has been seen as an even stronger motive for FDI than wealth maximization (Lessard, 1982). In either case, when managers or shareholders are risk averse and there are impediments or significant costs to investing in international portfolio markets, then risk diversification is an even stronger motive for FDI (Rugman, 1979 and Lessart 1982).

However, many argue that the risk diversification motive is not an important determinant of FDI. Because investors do not have to engage in FDI in order to reduce investment risk. Instead, investors can obtain the same benefits by holding internationally diversified portfolios of shares if barriers to capital flows are relatively few. Moreover, investment risk may not be diversified via FDI if managers of MNEs do not act according to the assumptions of the economic model. In this regard, the risk diversification is not the sole motivation for MNEs expansion, but it can be a joint determinant of FDI (Lessard, 1982).

Nevertheless, the fact is that many risks can be minimized through diversification of operations when firms engage in multiple production both in their home and internationally, in host countries. The risk diversification theory should be best considered as a special case of a more general theory of international market failure based on the desire and ability of MNEs to minimize cross-border production and transaction costs (Rugman, 1980).
The currency premium theory

The currency premium theory was proposed by Aliber (1970). Relying on its respect of presence and characteristics of imperfections in capital and/or exchange markets, the currency premium theory is the essence of a macro-economic theory or better regarded as an extension of portfolio capital theory. According to the currency premium theory, the key factor in explaining the pattern of FDI involves capital market relationships, exchange risk and the market’s preferences for holding assets denominated in selected currencies. The pattern of FDI reflects the source country firm capitalizing the same stream of expected earnings at a higher rate than host country firms. The different capitalization rates are generated because the market attaches different currency exchange premiums. Source country firms are likely to be those in countries where the capitalization rates are high, while host country firms are those in countries where capitalization rates are low.

The currency premium theory has provided some interesting capital arbitraging ideas about the timing of FDI. That is, the world is divided into different currency areas, hence, the different currency rates allow MNEs arbitraging by purchasing or selling off assets in an undervalued or overvalued currency. Other things being equal, for any given different currency rates, FDI will tend to occur. To this extent, the currency premium theory can particularly be used to best explain mergers and acquisitions (M&A) and fluctuations of activities around a long-term trend of FDI. The currency premium theory also offers some reasons as to why countries might shift their international investment status over time (Dunning, 1993).
The currency premium theory does well in explaining foreign takeover activities but has little to offer in explanation of the pattern of FDI between weak and strong currency areas (Buckley, 1981). The currency premium theory has failed to explain the continuation of the inflow of FDI into host countries when the currency in a host country appreciated against other currencies. Moreover, the currency premium theory paid little attention to other motivations of FDI. However, the currency premium theory has clearly incorporated the imperfections in the financial exchange market into FDI trajectory. Thus, this theory can be regarded as one that is complementary to other explanations of FDI.

The appropriability theory

The appropriability theory has explored an important issue of technology transfer from developed to developing countries through FDI by MNEs. Essentially, the appropriability theory is an extension of the product cycle theory and a variation of the internalization theory.

Based on the product cycle theory and the internalization theory, Magee (1977) developed the appropriability theory. According to the theory, there are three stages of industry technology cycle, which are invention, innovation and standardization. During the invention stage, investments are made in information to create new products. During the innovation stage, the product must be developed, its production function must be created and its markets must be developed. During the standardization stage, there is little or no information created. MNEs are specialists in the production of information (technology), and FDI are important sources of current information flows. Information is less efficiently transmitted through markets than within firms.
However, the *appropriability theory* inherits some failures of the *product cycle theory* and the *internalization theory*. The *appropriability theory* pays little or no attention to other determinants of FDI and ignores other factors that firms may consider as resulting from FDI.

**The development stage theory**

The *development stage theory* is an attempt to explain the FDI position of different countries, especially developing countries, by virtue of consideration of per capita GNP. This theory can be considered as a macro-economic theory of FDI.

Dunning (1981) suggested that there is a systematic relationship between the determinants of FDI and the stage/structure of a country’s economic development. The ownership, internalization and location-specific (OIL) advantages reflect the stages of a country’s development and affect the propensity of a country to engage in FDI. The stages of a country’s development are represented by a country’s income level, per capita GNP. At stage one, poor nations have no FDI inflows because of lack of sufficient advantages. Resulting from improvements in the economy of a nation, at stage two, inward FDI rises markedly but no outward FDI takes place. At stage three, as the indigenous firms become more competitive and its location-specific advantages are strong, while foreign affiliates are lesser, outward FDI is still negative. At stage four, the net FDI becomes positive, the country is a net outward investor. Its investment flowing abroad exceeds that of foreign owned firms in its own country, which reflects the strong ownership advantages of its firms and/or an increasing propensity to exploit these advantages from a foreign rather than a
domestic location. Dunning’s development stage theory has shed some interesting light on some country’s economic development and FDI patterns of different nations in different development stages.

Stoever (1985), after spending six years teaching, studying and research in developing countries in Africa, Asia and Latin America, has proposed a series of economic growth stages with respect to the attractiveness to FDI which is most typically applicable to less developed countries. Stoever’s work, in many respects, corresponds to Dunning’s development stage theory. Stoever classifies countries into five different development stages. At Stage I, countries are too poor, too small, too distant or too underdeveloped to attract any FDI. These countries include a number of the least developed countries in tropical Africa, Central America, Guyana, Surinam and various island nations in the Pacific and Caribbean. At Stage II, in order to attract FDI in manufacturing for economic development and industrialization, many less developed countries have pursued policies such as offering subsidies, incentives, protection and guarantees to potential investors. As the domestic market of those countries grows, more FDI inflows are attracted. Labor-intensive FDI inflows are especially prevalent where skill disparities are less than wage disparities. Some less developed countries such as Ghana, Morocco, China, Turkey and a few oil-rich, low-population countries are classified as being at stage II. At Stage III, less developed countries begin to be more selective in the types of FDI they desire and typically encourage capital-intensive, higher technology, and manufacturing with an export-orientation. Also, less developed countries’ governments start to emphasize an importance on more secondary benefits for their countries, e.g. local personal training and employment, social programs and local ownership. These countries are relatively more developed including Latin America, and current emerging markets in Asia. At Stage IV, as the
economy of the country strengthens, the need for incentives, subsidies, protection to attract foreign capital and steer it into desired areas decreases. The second-tier developed markets in Europe and the newly industrialized Asian countries are good examples. At Stage V, countries are well developed and characterized by large and prosperous markets, leading-edge technology and a safe haven for nervous capital such as the US, western Europe and Japan.

The weakness of the *development stage theory* is one that derives inevitably from the macroeconomic or aggregative nature of the approach. Gray (1982) argued that the *development stage theory* ignores the very important component of intra-group FDI. A nation’s characteristics have played an important role in the determination of FDI between rich and poor countries, but not among industrial nations. Firms and industry-specific variables are important in determining FDI activities among industrial nations.

### 2.3 Controversy in theories of FDI in service industries

Most theories of FDI primarily identify and discuss the determinants of FDI from a manufacturing perspective. FDI has grown and flowed into many different industries, and its patterns have changed in the last three decades corresponding to the changing economic, political and social environments. Thus, some questions arise. Are there any distinctive characteristics of service MNEs compared with manufacturing MNEs? Are the existing FDI theories applicable to the services sector? This remaining section discusses the controversy in the theories of FDI in relation to service industries. This analysis offers a sound theoretical foundation for the empirical studies in relation to service industries which follow.
Service MNEs have their own particular features affecting OIL advantage variables and international production (Dunning, 1989). There are six particular features of service MNEs which differ from MNEs which produce goods. (1) Quality variability is the most important factor for services compared goods due to the greater human element in the provision of services. (2) Economies of scope are an “inherent” competitive advantage of some service sectors such as wholesale, insurance, and securities dealing. (3) Intangibility and perishability are two distinctive characteristics of pure services which mean they require face to face contact for an exchange. (4) Some services are strategically and/or culturally sensitive and their markets tend to be more highly regulated, such as insurance, railways and banks, so that the structure of markets and resources, and the role played by government, are crucial factors influencing the level and pattern of service output. (5) Services are much more differentiated and geared to supply particular niche markets, hence it is possible for MNEs to exist side by side with companies supplying different segments of the same market. (6) Services, more than goods, have the property of being jointly demanded and/or supplied (e.g. tourist-related services, banking and financial services).

Based on these distinct characteristics of service MNEs, Dunning (1989) upgraded his eclectic paradigm accordingly, and claimed that the eclectic paradigm does provide a framework for FDI in service industries. The eclectic paradigm varies accordingly in response to industry, country or region and firm-specific characteristics. Thus, Dunning concludes that, in the category of ownership advantage (O), factors such as economies of scope and scale are important determinants of FDI for service MNEs, as they can assist service MNEs such as retailers to use their bargaining power to obtain lower prices from a supplier. Other factors such as technology and information are core competitive advantages
in some service sectors which can enable service MNEs to acquire, produce, assemble, store, monitor, interpret and analyse information. In the category of location advantage (L), factors such as transport costs are not important, but being near to the customer and adapting the service to local customs and needs, host government and its regulations over service activities have become considerable factors in determining the destination of FDI by service MNEs (Dunning, 1989). In the category of internalization advantage (I), a firm will likely prefer to engage in FDI rather than contract through technical services or franchise agreements in order to secure the full economic rent and benefits of internalizing cross-border intermediate product markets (Dunning, 1989 and 2000).

The eclectic paradigm, notably, excludes franchising, licensing and other management contract agreements from FDI. However, global franchising, licensing, and other contractual arrangements have become a significant form of FDI in services. Their structure of control systems and mix of corporate and contractual arrangements create a complex web of relationships that are central to their FDI efforts (Bradach, 1998). They are really just different modes of ownership of MNEs (Fladmoe-Lindquist, 2000). Increasingly, franchising, licensing and other management contracts have become common forms of international production for service MNEs, such as international hotel and fast food chains (e.g. Hilton Hotels Corp, Choice Hotels & Resorts, KFC and McDonalds). In this regard, franchising, licensing and other management contracts themselves, as different entry modes, create powerful ownership-specific advantages for service MNEs engaging in FDI. Moreover, heterogeneity and quality variation are important aspects of many people-based services, and, as a consequence, service branding can be important in creating and sustaining strong brand images and customer goodwill. Brand name and image create another most influential ownership-specific advantage in determining FDI by service
MNEs. However, many FDI theories, in a similar manner as the \textit{eclectic paradigm} have failed to address the FDI modes and brand images of franchising, licensing and other management contract agreements as ownership-specific advantages. Thus, it is argued that, with some modification, the \textit{eclectic paradigm} and other FDI theories be appropriately applied to various service forms of MNEs such as licensing, franchising and other management contracts.

There is a further critical review on the existing FDI theories regarding ownership advantages of service MNEs. Technology and innovation in goods manufacturing are important determinants of ownership-specific advantages. However, technology and innovation in services offer little scope for sustained competitive advantage because in many people-embodied services, technology merely provides a support function. Once technology is freely available on the market for purchase, technology does not provide a distinct firm-specific ownership advantage (Buckley, Pass and Prescott 1990). Economies of scale and scope in service sectors may be harder to achieve than in manufacturing, as many services require customization to individual customer requirements. Thus, economies of scale and scope cannot be universally applicable across all service MNEs as an ownership-specific advantage.

The controversy remains and more theoretical studies and research on FDI in service sectors are required. What factors determine FDI by service MNEs and why certain nations attract more FDI than others are crucial questions for the researcher, for the firms, and for the nations who are seeking inward FDI.
2.4 Studies on FDI

The discussion in this section focuses on FDI empirical studies in China in terms of the various FDI theories while emphasizing the eclectic theory. The eclectic theory is sufficiently comprehensive as it incorporates most existing FDI theories. The organization of the remaining section is: first, we discuss general studies of FDI in China; second, we examine FDI source country-specific studies on the determinants of FDI in China which include FDI from Asian countries, Japan, the United States and other western countries; and finally, we review FDI studies in service industries.

General studies of FDI in China

Focusing on the distribution of FDI among 29 Chinese regions from 1985 to 1995, Cheng and Kwan (2000) analyse the location determinants of FDI by using a dynamic panel regression model. Cheng and Kwan find that the size of a region’s market, good infrastructure, the level of education, the special economic zones (SEZs) and the other key policy designations (including open coastal cities, economic and technological development zones and open coastal areas) have a positive effect on FDI; but wage cost is negatively correlated to FDI, which extends the theory that an increasing wage rate reduces FDI. Cheng and Kwan also indicate that the positive effect of the education variable is not statistically significant; and the impact of SEZs is far greater than other FDI policies. Moreover, Cheng and Kwan argue that export-oriented FDI is more responsive to preferential tax treatment, but FDI that is aimed at the local market is more responsive to
policies on market access. Finally, Cheng and Kwan claim that there is a strong self-reinforcing effect of FDI on itself.

Using Chinese time series data from 1978 to 1992, Wang and Swain (1997) investigate FDI in China by employing a regression model. Wang and Swain find that low labour cost, the Chinese market size and political stability are the predominant determinants of FDI in China. Wang and Swain also claim that the exchange rate is an important determinant of FDI in China, but trade tariffs have no impact on China’s FDI inflows. Moreover, Cheng and Swain indicate that there is little evidence supporting the impact of productivity on China’s FDI, and the cost of capital (the opportunity cost and exchange rate risk) is a relevant factor which discourages prospective foreign investors from establishing joint ventures in China. Chen (1996) investigates FDI in three different regions of China from the period 1987 to 1991, and finds that cheap labor, regional market, good local infrastructure, the abundance of mineral and energy resources, FDI policy and investment incentives are the determinants of FDI in China. In addition, Chen emphasizes that regional policies coupled with Chinese central government FDI policies play an important role in determining the regional destination of FDI in China.

Based on information of 818 international joint ventures (IJVs) in China, Zhao and Zhu (1998) divide the determinants of ownership in two categories, industry-specific factors and venture-specific factors. In other words, MNEs in China in the form of IJVs possess ownership specific advantages which include duration and scale of IJVs, skill intensity, market concentration, market potentials, and foreign business agglomerations.
The study by Schroath, Hu and Chen (1992) investigates joint ventures (JVs) in China. Prior to 1990, JVs were the dominant form of FDI in China accounting for about 92.7% of the total actual utilized FDI projects. Schroath, Hu and Chen agree that economic incentives and market size are the important location-specific determinants of FDI in China, but argue that low labor cost is not a determinant of FDI from European countries. European MNEs mainly invest in the high technology and capital intensive sectors due to ownership-specific advantages. Those ownership-specific advantages include innovation and strong capital. In contrast, cheap and abundant labor resources are the determinant of FDI from Hong Kong, while for MNEs from Japan and the United States the level of importance of cheap labor as a determinant of FDI falls somewhere between the perspectives of Hong Kong and European countries. Pan and Li (2000) have studied 1298 U.S., Japanese and European equity joint ventures (EJVs) of very large multinational firms in China for the period 1981 to 1998. Pan and Li find that those MNEs invest in China for the motives of ownership-specific advantages. Those MNEs possess strong financial capabilities to raise the resources to acquire Chinese equity joint ventures and engage in the super-large investment projects. Those MNEs also have strong bargaining power to acquire equity position in negotiations with Chinese authorities, and a wide network of cooperative partners in China.

In summary, according to the cited empirical studies, the determinants of FDI in China are:
(A) Location-specific advantages which include 1) cheap and abundant labor, and natural resources such as raw materials and energy; 2) political stability, the Chinese government FDI policies which include SEZs, open coastal cities, economic and technological development zones, tax exemptions etc.; 3) the size of the Chinese domestic market; 4) highly skilled human capital; 5) a strong self-reinforcing effect of FDI on itself; 6) good
infrastructure; 7) the exchange rate. (B) Ownership-specific advantages include 1) advanced technology and capital intensive, 2) scale of MNEs and duration of investment, 3) market concentration and potentials, 4) foreign business agglomerations, 5) strong bargaining power to acquire equity position in negotiations, 6) a wide network of cooperative partners in China.

**Asian FDI in China**

Most of China’s FDI has come from Asian countries. Among Asian countries, Hong Kong has been the major investor and its FDI accounted for 42%\(^1\) of China’s total FDI in an annual average for the period 1978 to 2005. Hong Kong’s FDI has been mainly export-oriented manufacturing industries including metal products, garment, textiles, electronics and plastic conversions (Chen and Wong, 1995). According to Chen and Wong, the dominant motivations for Hong Kong firms investing in China are cheap labor, raw materials, cheap rent and land and China’s vast untapped domestic market, whereas, the relatively cheap but highly skilled human capital in China such as in computer programming and engineering are strong motives for non-manufacturing firms to invest in China. Sun (1998) finds that the primary driving forces for Hong Kong’s investment in China are the structural transformation from labor-intensive industries to technology-intensive industries in Hong Kong, the increasing openness of China’s domestic market and China’s cheap labor. Casson and Zheng (1992) confirm the findings by Sun, Chen and Wong, but further claim that the special economic zones (SEZs) and the open coastal cities (OCCs) are important determinants of Hong Kong FDI in China. The SEZs and the OCCs

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have embraced a package of both Chinese central and regional governments’ investment incentives and other factors such as good infrastructure etc. China’s political stability, economic environment and relevant Chinese government policies are also important factors influencing Hong Kong FDI in China (Casson and Zheng, 1992; Chen and Wong, 1995). Hong Kong firms also possess ownership-specific advantages including advanced technology, high quality management skills and relatively low cost of their management personnel, geographical and cultural proximities, language skills, and local connections and experiences gained from trade and FDI activities in China (Chen 1982, Chen and Wong 1995). However, investing in China for some Hong Kong firms is a survival strategy. Hong Kong firms are mostly small, medium sized and labor-intensive. These firms need to overcome the competitive pressure arising from an oligopolistic market structure in Hong Kong and quota restrictions in the mainland market (Chen, 1981).

Taiwanese direct investment in China has played an important role as well, and its investment in China rose 20% year-on-year (Oxford Analytica Brief, 13 November, 1998 online). Taiwan’s FDI flows to China are similar to Hong Kong’s, characterized with export-oriented, labor-intensive and primarily manufacturing rather than service industries. In addition, most Taiwanese FDI is wholly-owned enterprises which accounted for 64% and 66% of total pledged Taiwanese investment in China in 1989 and 1990, respectively (Sun, 1998). In regard to the determinants of Taiwan’s FDI in China, perhaps, the drastic liberalization of capital outflow policies by the Taiwanese government in 1987 is the most important factor affecting Taiwan’s FDI to China. Some home market factors in Taiwan such as increasing wages and monetary appreciation are also important determinants of Taiwan’s FDI to China. On the other hand, Hoesel (1996) argues that there are significant disincentives for Taiwanese MNEs investing in China. Those disincentives include fear of
“possible adverse effects” and a hostage situation on investment in China by the Taiwanese government. Such fears have, to some extent, reduced FDI flows from Taiwan to China. Consequently, almost none of Taiwan’s large enterprises have been involved in FDI in China. Wang (1992) disagrees with Hoesel and suggests that such fears of reprisal did not deter potential investors investing in China, on the contrary, it spurred FDI from Taiwan to China.

Korea was the sixth largest investor in China for the period 1978 to 2005. The characteristics and the determinants of FDI from Korea are very much like those of Hong Kong and Taiwan (Sun, 1998). However, Jeon (1991) disagrees with Sun and claims that cheap labor and transport costs are no longer major determinants for attracting FDI from Korean firms because Korean manufactures are relatively capital and technology intensive. By using extensive and unique firm-level data for South Korean foreign affiliates in China, and conditional logit estimation, Kang and Lee (2006) investigate the determinants of location choice for South Korean multinational companies. Kang and Lee find that market size and government policies, quality of labor, and transport infrastructure play a positive role in determining Korean FDI to China, but labor costs, inner waterways, and distance show negative influences on Korean FDI in China. The view on some of the determinants of Korean FDI in China seems divided.

Apart from Hong Kong, Taiwan and South Korea, ASEAN countries take an important position in the development of FDI to China (e.g. Singapore was the fourth largest investor in China in 1995 (Zhang and Hock, 1996)). The investors from ASEAN countries are mainly overseas Chinese, and their investments in certain respects share common features with Hong Kong and Taiwanese investments, but also showed some distinct characteristics.
Overseas Chinese investors invest mainly in China’s primary industries and infrastructure development in their ancestral town and provinces (Sun, 1996). Moreover, ASEAN countries investment in China is relatively small and prefers close cultural and/or clan connections. China’s expanding consumer demand and long-term profit prospects are primary determinants of FDI flows from ASEAN countries, but cheap labor and abundant land are not determinants of their investments in China as their home countries have these competitive advantages already (Sun, 1996). However, Zhang and Hock (1996) argue that using Chinese unskilled, abundant and cheap labor is still one of the motives for ASEAN countries investing in China. In addition, Zhang and Hock claim that maintaining or enlarging market share to complement comparative advantage have been the major incentives for ASEAN countries investing in China. Furthermore, China’s vast domestic market and its rapid economic growth, trade protection policy, and incentives are also important determinants in bringing investors from these countries to China.

In summary, according to the cited empirical studies, the determinants of Asian countries FDI in China are: (A) Location-specific advantages which include: 1) seeking cheap and abundant labor, low cost land and rent, and other natural resources such as raw materials and energy; 2) political stability, increasing openness of China’s domestic market and Chinese government FDI policies which include SEZs, OCCs, tax exemptions, low rental fees and assurances to safeguard property; 3) an expanding economy and huge Chinese domestic market and prospects of profitability; 4) tapping the relatively cheap but highly skilled human capital in China in areas such as computer programming and engineering; 5) close cultural connections; 6) good infrastructure is an additional location determinant within China. (B) Internalization incentive advantages include: 1) avoiding the competitive pressure of factors such as increasing production costs and currency appreciation; 2)
evading some restrictions from the home market; 3) increasing market share and pre-occupying future markets; 4) avoiding protection trade policies. (C) Ownership-specific advantage includes: relatively advanced technology; high quality management skills and relatively low cost management personnel; geographical and cultural proximities and language skills; and local connections and experiences gained from trade and FDI activities in China.

**Japanese FDI in China**

Since 1993 China has become a major recipient of Japanese outward FDI, with Japanese investments reaching $US53 billion and becoming the second largest source of FDI in China for the period 1978 to 2005. The majority of Japanese investments in China are joint ventures with a local partner who is most often a public organization but Greenfield investment has increased subsequent to China’s promotion of policies to attract more FDI in 1992. Moreover, Japan invests particularly in service industries, such as hotels (Chen, 1992). Urata (1996) finds that the foremost incentive for Japanese firms investing in China is China’s prospective domestic market. Japanese MNEs believe that China in the long run will constitute an attractive production base for a huge market. Consequently, it was timely to invest early to secure a foothold in what may become the world’s single largest market. Other motives for Japanese MNEs investing in China are China’s liberalization and FDI policies, rapid economic growth, a large domestic consumer products market and low unit labor cost (Urata 1996). Using an econometric model, Cassidy and Andreosso-O’Callaghan (2006) examine the spatial determinants of Japanese direct investment in China, and find some additional determinants of Japanese FDI in China, which are tertiary education, inland waterways and coastal location. On the other hand, surges of Japanese outward FDI
to China are due to a general rise in Japanese firms managerial and technological capabilities, the rapid and steep appreciation of the Yen against major international currencies, high labor cost, and the slower growth of demand in Japan, the US and Europe (Urata, 1996). Japanese FDI flows to China can also be explained by Japanese FDI outflows being positively associated with its domestic investments as higher demand for Japanese goods leads to a parallel increase in productive capacity at home and abroad (Bayoumi and Lipworths 1997). However, Japanese FDI in China is still relatively low only accounting for 8.6% of China’s total FDI for the period 1978 to 2005. Delapierre and Milelli (1998) argue that the unpredictable legal system, restrictive banking controls, and the non-convertibility of the Chinese currency discourage Japanese FDI in China. In addition, although intimate ties with Chinese authorities and business partners have spurred Japanese FDI flows to China, the requirement for local management in joint venture firms is a severe constraint for Japanese firms investing in China because this was seen as causing a surplus of personnel and low skilled local workers hence increasing production costs and leading to more product quality problems (Delapierre and Milelli, 1998). The poor organization capacities of manufacturing limits the prospects for exporting Chinese manufactured goods to sophisticated third markets, which in return discourages Japanese investment in China. The lack of intellectual property rights law in China has seriously affected the ability of the Chinese government to provide a credible and stable business environment, which further discourages FDI to China (Urata, 1996).

In summary, the determinants of Japanese FDI in China are: (A) Location-specific advantages which include: 1) prospect of Chinese huge production base market; 2) China’s robust economic growth, Chinese domestic market, especially, the large domestic consumer products market; 3) tertiary education, cheap and abundant labor; 4) inland waterways and
coastal location; 5) legal system and excess manpower, stringent regulation on banking industry and the non-convertibility of the Chinese currency, are all reserved as negative effects; 6) poor organization of manufacturing capacities is also a negative determinant of FDI from Japan. (B) Internalization incentive advantages include: 1) avoiding high labor costs and the competitive pressure caused by appreciation of the yen; 2) compensating the slow growth of demand at home and in the U.S. and European countries. (C) Ownership-specific advantages include: 1) managerial and technological capabilities; 2) increasing productive capacity; 3) existing income and wealth; 4) intimate ties with Chinese authorities and business partners; 5) relative cultural and geographical proximity.

The United States and other Western Countries FDI in China

The United States (U.S.) is the third largest investor in China and its MNEs have increased dramatically in size and number during the period 1978 to 2005. FDI from the U.S. tends to be capital and technology intensive, but import-oriented, and the average size of the U.S. FDI is larger than those from Asian nations (Sun, 1998). The surge of American FDI flows to China should primarily be attributed to the U.S. government’s liberal policy towards FDI (Pugel, 1981). The most preferred entry modes of the U.S. MNEs in China are joint ventures and contracts (Gleason, Lee and Mathur, 2002), and in recent years, the U.S. also has increased its investments in finance and service sectors in China. In general, the U.S. MNEs possess ownership advantages which include intangible asset advantages, the resource (asset) structure of the firm (Gleason, Lee and Mathur, 2002), marketing capabilities, capital cost advantages, R & D, advertising, product innovations, management know-how and advanced technologies. Also, the U.S. MNEs are primarily interested in the huge Chinese domestic market (Sun, 1998). China’s economic reforms, trade liberalization
and increasing openness of the domestic market to foreign investors are important factors attracting U.S. FDI flows, but that the SEZs and OCCs are not strong motives for the U.S. firms to invest in China (Sun, 1998). Burke (2000) argues that FDI from U.S. firms is export-oriented because U.S. MNEs have built export-oriented production bases in China to take advantage of China’s low-wage and poorly protected workforce. Burke’s analysis shows that a 10% increase in the level of U.S. direct investment in an industry in China was associated with a 7.3% increase in the volume of U.S. imports from China and a 2.1% decline in U.S. exports to China in the same industry during the period 1989 to 1998. Casson and Zhang (1992) provide a comprehensive analysis of U.S. FDI in China. According to the study, the determinants of U.S. FDI in China are 1) better access to a large Chinese market, 2) establishment of an export base, 3) use of low cost labor, 4) access to natural resources, 5) the availability of tax incentives. Among these factors, the large Chinese market was perceived as the most important factor and low cost labor was relatively important. These two factors were particularly significant in building materials, electrical, textiles and pharmaceuticals. A good export base was perceived as an important determinant for equity joint ventures in chemicals, textiles and motor vehicles. Access to natural resources was an important factor influencing oil, foods and certain other manufacturing investment in China. The quality of local infrastructure, availability of trained labor and a qualified partner were additional determinants of FDI in selecting a location. Moreover, experience in dealing with Chinese bureaucracy and a good relationship with Chinese central and local authorities were crucial factors for U.S. MNEs investing in China. However, a study by Robert (1993) has proposed a challenge to Burke (2000) and Casson & Zhang (1992) regarding the labor factor. Robert reported that direct labor is becoming a relatively minor part of total production costs in American manufacturing, in some cases it has been as low as 2-3% of total manufacturing costs.
Thus, Robert argued that the ability of countries to attract manufacturing investment on the basis of pools of cheap, unskilled labor has diminished in recent years, a trend that surely will continue. U.S. manufacturing has increasingly required high quality and new technology because of international competitive pressures, hence, highly skilled labor is required, which certainly influences plant location decisions. Robert concluded that local managerial skills and highly skilled labor with relatively low wages are more competitive in attracting U.S. FDI.

FDI of western European countries in China has showed similar trends and motivations to the United States (Sun 1998, Casson and Zhang 1992). However, the nature of investment is more capital and technology-intensive, relying on owner-specific advantages with the effect that low labor cost is not a determinant of FDI from European countries (Chen 1992). Those ownership-specific advantages include innovation and strong capital. For example, Chen and Reger (2006) describe how German FDI in China has become larger in size and of higher quality in recent years, and the motives for German FDI in China are long-term based and deeply market-oriented seeking new markets and enlarging market shares. Carlsson, Nordegren and Sjoholm (2005) conduct a survey of Scandinavian firms with subsidiaries in China to examine their economic performance, and also indicate that FDI from Scandinavian firms is capital and technology-intensive and those firms with international management skills perform well in China.

In summary, the determinants of the US and other Western countries FDI in China are: (A)

Location-specific advantages 1) China’s huge domestic market; 2) cheap, abundant but poorly protected labor; 3) establishment of an export base; 4) access to natural resources; 5) the availability of tax incentives; 6) the quality of local infrastructure, availability of trained
labor and a qualified partner are additional determinants of FDI in selecting a location. (B) Ownership-specific advantages include: 1) advanced technology and managerial capabilities, 2) international marketing skills and negotiation skills with Chinese bureaucracy or business partners; 3) good relationships with Chinese central and local authorities; 4) capital intensive and capital cost advantages; 5) R & D and advertising.

**FDI studies on service industries**

Using regression models, Kundu and Contractor (1999) have examined international country location choices for equity investment undertaken by global hotel chains. In the study, 110 hotels in 67 nations and headquartered in 18 countries were identified. Kundu and Contractor find that the tourism receipts, GDP of host countries, the general level of trade and foreign investment, and country rating variables all strongly and positively explain hotel FDI. However, the population variable was insignificant in explaining hotel FDI. Brealey and Kaplanis (1996) use a log-linear regression model with pooled time-series and cross-sectional data to estimate the determinants of foreign bank investment. In the study, almost 2000 overseas offices across 37 parent and 82 host countries were examined. Brealey and Kaplanis find that market size and market potential of both host and home countries, trade and exchange rates between home and host countries and the capital market activities of the parent country’s banks are factors in determining foreign bank investment, but it is not clear about the influences of FDI on foreign bank investment.

In conclusion, the determinants of FDI in service industries from the cited studies are tourism receipts of host countries, market size and market potential of both host and home
countries, country rating, trade and exchange rate between home and host countries, general FDI level and the capital market activities of the parent country’s banks.

2.5 Conclusion

In this chapter, we surveyed the FDI literature including a comprehensive review of the theories of FDI, discussed the controversy in theories of FDI in service industries and also provided a review of selected empirical studies on FDI. The remaining section is organised as follows: first, a concluding discussion on FDI theories and suggestions on the future development of FDI theories; second, a concluding discussion on FDI empirical studies which identifies the determinants of FDI in China and presents a critical view on the cited studies in seeking a better understanding of FDI activities in China.

FDI theories

The main stream FDI theories include the industrial organisation theory, the product cycle theory, the internalization theory, the eclectic paradigm and the dynamic comparative advantage theory. Other important FDI theories which were reviewed in the chapter include the risk diversification theory, the currency premium theory, the appropriability theory and the development stage theory. Among the FDI theories, the eclectic paradigm is considered to be a most comprehensive FDI theory which discusses ownership-specific advantages, internalization-specific advantages and location-specific advantages. The FDI theories in service industries are controversial due to distinctive characteristics of service MNEs, and the fact that most existing FDI theories were developed based on manufacturing
experiences. The controversy remains and more theoretical studies and research on FDI in service sectors are required.

Although there are many FDI theories, which from a microeconomic perspective and the perspective of MNEs analyze the determinants of FDI, they do not address the effect of FDI and how FDI impacts on economic growth of host economies. This raises a concern demanding a new theory of FDI, which, from a macroeconomic perspective and the perspective of host economies, studies the role of FDI in economic growth. FDI is widely believed to have a positive effect on economic growth. FDI diffuses technology and management know-how and helps overcome capital shortage in host countries. However, there are some speculations on the role of FDI in economic growth. It is argued that FDI crowds out domestic investment, increases income inequality, and consequently has adverse effects on growth. Towards a better understanding, further studies and research on development of FDI theories are urged.

**FDI empirical studies**

In accordance with the FDI theories, selected empirical studies were reviewed. Apart from studies on FDI in service industries, all selected empirical FDI studies focus on China. It is found that the determinants of FDI in China are in three major categories, ownership-specific advantages, internalisation-specific advantages and location-specific advantages. The determinants of FDI in China in different industries and from different countries, even between MNEs in the same industry differ from one to another.
The ownership-specific determinants of FDI in China are: (1) experience in operation in international markets through exports and FDI; (2) ability to produce a competitive or superior product; (3) achievement of technological capabilities and strong rates of innovation; (4) international management skills in managing MNEs; (5) ability to earn monopoly and economic rents; (6) existing income and wealth, possession of strong financial capabilities to raise or assemble resources; (7) having bargaining power and a wide network of cooperative partners; (8) language skills, close cultural ties and geographical proximity.

Internalization incentive determinants of FDI in China are: (1) to avoid high labor costs, tough regulation and the competitive pressure in home countries; (2) compensate the slow growth of demand at home and in the U.S. and European countries.

The important location-specific determinants of FDI in China include: (1) market size or the growth potential of the market; (2) good infrastructure; (3) government FDI policies, special economic zones and open coastal areas, investment promotions and incentives; (4) political stability; (5) trade protection policies; (6) the “right” image of the country (i.e. profit prospect); (7) exchange rate; (8) access to raw materials or other inputs; (9) the labor factor has been controversial. Cheap and abundant labour in China has attracted large FDI from Asian countries but has not been a major determinant for Japan, the U.S. and other western countries’ FDI. Rather, tertiary education and a skilled labour force are more important for attracting FDI from western countries, (10) incomplete legal system and excess manpower, stringent regulation on banking industry and the non-convertibility of the Chinese currency are all reserved as negative effect ion on FDI.
The findings of determinants of FDI in China are only based on the selected empirical studies. In the real world, the motives or determinants of FDI are far more complex, as the pattern and activities of FDI change year on year corresponding to the changing economic, social and political environment. There are also some limitations in the cited studies which may lead to biased results. For example, most of the cited empirical studies use either cross-sectional regressions or panel data framework. These practices suffer from a few major problems. Firstly, using cross-sectional or panel data is strongly criticized on the grounds of data comparability and heterogeneity (Atkinson and Brandolini 2001; Srinivasan and Bhagwati 1999). Secondly, none of these studies have tested for the direction of causality between FDI and other variables. The failure to consider the possible causality between the variables may lead to the simultaneity problem. Thirdly, a single equation model cannot deal with the simultaneity issue properly (Kholdy 1995, Shan et al., 1999 and Shan 2002). Moreover, other issues were identified in some studies. For example, the study by Cheng and Kwan (2000) only discusses the location determinants of Greenfield FDI, and ignores major ownership preferences of joint ventures in China. All the facts as discussed have presented a case for further research and study.
Chapter 3. Extensions of the Theory of FDI to Host Countries

3.1 Introduction

FDI has played an increasingly important role in world economic development, while increasingly globalization has also brought challenges to the existing FDI theories. Most existing theoretical FDI studies are based on the experiences of developed countries and from the perspective of MNEs to identify and analyze the determinants of FDI or the motives of MNEs investing abroad. In general, those FDI theories do not explicitly discuss the effects of FDI on host countries, especially on developing countries, although FDI is well known to have a significant effect on economic growth. FDI has been a controversial issue for a long time with regard to considerations of its roles in the economic development of developing countries. The controversy has existed in theoretical discussions, empirical studies and policy formulation for developing countries. Unfortunately, how FDI impacts on the economic development of a host country, especially, the developing countries, is still far more from being well understood. Towards a better understanding and for the empirical studies followed in this thesis, this chapter extends the theoretical and empirical FDI studies to develop a theoretical framework on the impact of FDI on the economic development of a host country based on a number of foreign capital theories (the orthodox economic concepts of marginal productivity theory, the modernization hypothesis / the dependency theory).

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1 See Section 2 theories of FDI of Chapter 2.
The organization of this chapter is as follows. Section 3.2 is about extensions to the existing theories on FDI. Section 3.3 is empirical studies on the impact of FDI and the last section provides concluding comments.

### 3.2 Extensions to the existing theories on FDI

In the 1950s and 1960s, the orthodox economic concepts of marginal productivity theory were developed. A group of economists (e.g. Vanek 1967, Chenery and Strout 1966) believed that foreign capital had a positive effect on economic growth in less developed countries. They argued that foreign capital could supplement domestic resources to meet target levels of saving, investment and foreign exchange in a recipient country, subsequently, additional domestic savings would be generated and local resources would become sufficient. As a result, higher economic growth rates could be achieved. In the 1970s and 1980s, the modernization (or developmental) hypothesis was developed based on the orthodox economic concepts of marginal productivity theory and the role of saving and consumption propensities. Modernization theorists argued that foreign capital contributes more to economic growth than domestic investment in the less developed countries because it directly fills the foreign exchange gap. Although neither the orthodox economic concepts of marginal productivity theory nor the modernization (or developmental) hypothesis has directly and explicitly addressed the relationship between FDI and economic growth or the impact of FDI, but the ideas of the two theories clearly apply to FDI. FDI is foreign capital, but differs from foreign portfolio investment, foreign debt and aid, still controlled by investors inside the investment company. In order to gain a better understanding of the
impact of FDI, extensions to the study of the orthodox economic concepts of marginal productivity theory and modernization theory are needed.

Although FDI is widely believed to have a positive effect on economic growth, the exact mechanism of how FDI impacts on the development process of a developing economy is not well documented. In general, developing countries are short of capital resources, FDI has certainly become a great capital flow of choice compared with foreign debt and foreign portfolio investment in the wake of the Asian and South American financial crises. FDI is not only an ideal mechanism for diffusion of capital to supplement domestic resources in meeting target levels of saving, investment and foreign exchange in a host country, FDI also has spill-over effects transferring technology and management know-how to domestic firms. This is because when FDI occurs, MNEs in a host economy create vertical inter-firm linkages with domestic firms or have sub-national or sub-regional clusters. Through formal and informal links and social contacts among the employees, MNEs diffuse technology and management know-how to indigenous firms. Consequently, economic rents are created accruing to old technologies and traditional management style. Moreover, FDI may lead to an increasing demand for exports from the host country, and as a result, more foreign exchange is earned and more investments are attracted to the export industries. Similarly, when FDI occurs in resource industries, domestic investment in related industries may be stimulated. Increasing FDI flows abroad results in many service MNEs such as banks and hotels also investing abroad in an attempt to cater for a homogeneous group of international travellers and their clients. Countries most likely to be involved in foreign hotel operations and foreign banking activities would be those generating the most FDI (Dunning and McQueen 1981, Contractor and Kundu 1995). With increasing numbers of MNEs, additional employment is created which, in turn, leads to improved income distribution.
More FDI also means more international activities, and in this regard, FDI could increase tourism and openness (Tang, Selvanathan and Selvanathan, 2007). Overall, FDI diffuses capital, transfers technology and management know-how, upgrades the labour force, increases productivity, employment, openness, tourism, exports and tax revenues, all of which are crucial for the economic development of a host country.

The ideas of the orthodox economic concepts of marginal productivity theory and the modernization theory attracted many criticisms from a group of economists (e.g. Friedman, 1958; Bruton, 1969; Griffin and Enos, 1970). The basic argument was that foreign capital could lead to a decline in domestic resources in less developed countries. First, foreign capital could induce the recipient government to relax its tax efforts, increase its consumption expenditures and liberalise its imports. Second, foreign investment prompts investment opportunities and displaces domestic investment. Moreover, as the saving rate is determined by available investment opportunities, thus, foreign investment would cause the domestic saving rate to fall. As a consequence, the economy of less developed countries would be held back and become more reliant on foreign capital. The debate about the impact of foreign capital in less developed countries intensified and led to the development of an opposing theory to the modernization hypothesis, the dependency theory. Dependency theorists (e.g. Bornschier and Chase-Dunn, 1985; Gowan, 1999) have put forward some very specific criticisms about the pernicious effect of foreign investment in less developed countries. They describe foreign investment in less developed countries as a predatory behaviour aimed at creation of a neo-colonial economy; more foreign investment in an economy means more foreign control.
The dependency theory and the criticisms of the orthodox economic concepts of marginal productivity theory may only partially apply to FDI. FDI is foreign capital but still controlled by investors which differs from aid and debt. Thus, FDI should not induce the host government to relax its tax efforts and increase its consumption expenditures. However, due to competition for FDI and in order to attract more FDI, many developing countries offer incentives such as reducing regulations, taxes, environmental protections, wages and working conditions. As a result, FDI may induce less tax revenues, cause environmental damage and worsen work conditions and income distributions. FDI may disrupt backward linkages through substitution of imports for domestic commodities. This especially is the case for MNEs in service industries and when host countries have less strict regulations and policies. For example, hotel MNEs may import almost everything to host countries for consumption. FDI is an aggressive global strategy by MNEs to advance monopoly power over and above indigenous firms of the host economy (Hymer, 1960). The ownership-specific advantages of MNEs (e.g. advanced technologies, management skills, transaction cost minimizing and other intangible advantages) (Dunning, 1981) could be transformed into monopoly power. This monopoly power can be further reinforced by the market internalization specific-advantage and the location-specific advantage of MNEs. For example, MNEs could control supplies of inputs in an industry of a host economy and gain benefits of tax subsidy provided by the host government. This may strengthen the competitive advantages of MNEs over indigenous firms. Eventually, domestic firms will be forced to exit. MNEs may grab resources from host countries and plunder many investment opportunities from local industries. MNEs may transfer pricing and repatriate profit. FDI may increase local unemployment as advanced ownership of MNEs force many local firms out of businesses, while productions by MNEs are much more capital-intensive, consequently, many workers loose their jobs. Moreover, local industries might find it
impossible to access the advanced technologies of MNEs, thus, there is no existence of technical knowledge spill-overs of FDI to domestic firms in the host country. This is because one of the optimal location and organizational strategies of MNEs is to minimize the risk of losing profits. Towards this goal, MNEs strictly prevent the leakage of technical information to potential competitors. Considering these scenarios, FDI could create adverse externalities on the economic development of a host country.

However, the fact is that the effects of FDI can sometimes barely be perceived, while other times they can be absolutely transformative. Thus, in contrast to the good externalities of FDI and the adverse externalities of FDI, the contemporary opinions are that the impact of FDI in less developed countries depends on many conditions. Well-developed and implemented policies can help maximize gains from FDI, whereas, inappropriate introduction of FDI could lead to some degree of severe damage to an economy and induce some social problems. Therefore, it is argued that the impact of FDI in less developed countries should be tested in a rigorous empirical framework and be examined on a case-by-case basis.

3.3 Empirical studies on the impact of FDI

Liu, Burridge and Sinclair (2002) investigated the causal links between FDI, trade and economic growth in China at the aggregate level for the period 1981:1 to 1997:4 by using multivariate Granger causality tests in a cointegration framework. The ECM used in their study is shown below:
\[
\begin{bmatrix}
\Delta W \\
\Delta X \\
\Delta Y \\
\Delta Z 
\end{bmatrix}_t = 
\begin{bmatrix}
\alpha_{11} & \alpha_{12} \\
\alpha_{21} & \alpha_{22} \\
\alpha_{31} & \alpha_{32} \\
\alpha_{41} & \alpha_{42}
\end{bmatrix}
\begin{bmatrix}
\beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} \\
\beta_{21} & \beta_{22} & \beta_{23} & \beta_{24} \\
\beta_{31} & \beta_{32} & \beta_{33} & \beta_{34} \\
\beta_{41} & \beta_{42} & \beta_{43} & \beta_{44}
\end{bmatrix}
\begin{bmatrix}
W \\
X \\
Y \\
Z_{t-1}
\end{bmatrix} + 
\begin{bmatrix}
\epsilon_1 \\
\epsilon_2 \\
\epsilon_3 \\
\epsilon_4
\end{bmatrix}
\]

where \(W_t, X_t, Y_t,\) and \(Z_t\) are FDI, GDP, imports and exports, respectively. \(\alpha_i\) and \(\beta_i\) are the parameters, and \(\epsilon_i\) is the white-noise disturbance term. They found that there are long-run relationships between FDI, economic growth, exports and imports. The long-run causality between FDI, economic growth and exports are bi-directional, and FDI has had a positive impact on China’s economic growth. Liu, Wang and Wei (2001) have also studied the causal relationship between FDI and trade in China by using a VAR model and a panel dataset covering 19 FDI source countries/regions over the period 1984 to 1998. They found that the growth of China’s imports causes the growth in FDI inflows to China, which, in turn, causes the growth of exports to the 19 FDI source countries. This implies that the impact of FDI on China’s economic growth is positive. Shan (2002) has analyzed the relationship between FDI, output growth and other economic variables (i.e. labour supply, labour cost, investment energy, export, income difference and exchange rate) in China for the period 1986:1 to 1998:4 by using a VAR model, variance decomposition and impulse response function techniques. Shan founds that (1) labour supply, cost and output or market size are important determinants of FDI, and exchange rate does not cause FDI; and (2) FDI has had positive impact on output growth, export and investment. Shan also indicated that FDI in China has not contributed to the regional income disparity for the study period, and the impact of FDI on the Chinese economy is significant when the share of FDI in China’s output rises.
Applying a bivariate VAR model and the time series concepts of cointegration to a set of time series and panel data, de Mello (1999) estimated the impact of FDI on capital accumulation, output and total factor productivity growth in 32 OECD and non-OECD countries for the period 1970 to 1990. de Mello claimed that FDI-led growth is evidenced in his study as FDI had complementary effects on domestic investment in his studied countries. Further, de Mello concluded that FDI-led growth can be achieved via technological upgrading and knowledge spillovers. Noorzoy (1979) developed an accelerator-flow of funds model of investment to estimate the effects of FDI inflows on domestic investment in Canada for the period 1957-1971. Noorzoy introduced FDI into the traditional neoclassical investment model as the flow of external funds. In the study, the accelerator term was measured by lagged changes in output (GNP) and the internal funds of investment by firms was given by the sum of depreciation and undistributed corporate profits. The dependent variable (investment) in the accelerator flow of funds model of investment was given by gross capital formation. Noorzoy found that FDI inflows had complementary effects on domestic investment.

Kumar and Pradhan (2002) analyzed the relationships between FDI, growth and domestic investment for a sample of 107 developing countries for the period 1980 to 1999 in a production function framework. They found that FDI affects domestic investments in a dynamic manner with the initial effect being negative and the subsequent effect being positive for most of the countries. They argued that the effect of FDI on growth could be of a dynamic nature in that the initial effect is a competition effect for domestic enterprises in the industry of the foreign entrant, hence, generally negative; and the subsequent effect

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2 Noorzoy also investigated the effects of FDI outflows on domestic investment in Canada in the study but not reported here.
could include a usually favorable externality on domestic investment because of backward linkages. The net weight of these effects could depend on the nature of FDI projects or the quality of FDI which is known to vary greatly for different types of investments. Further, they stated that in net terms the effect of FDI on domestic investments appears to be negative for the pooled estimations as well as for majority of countries. That is, in general, FDI appears to crowd-out domestic investment in net terms, but for a number of countries, FDI is seen as crowding-in domestic investment. Therefore, some countries have been able to benefit from FDI more than others. However, Kumar and Pradhan acknowledged that their findings need to be treated with caution given the causality bias and limitations of a contemporaneous estimation in capturing a possibly dynamic relationship.

Using the data from Colombia’s Manufacturing Census and a structural estimation framework, Kugler (2000) conducted an empirical investigation to assess whether inward FDI generates technological externalities. The study reveals that there are no intra-industry externalities but there are widespread inter-industry spillovers from FDI. Kugler argued that the prevalence of a positive impact among other domestic producers in general is due to the diffusion of generic technical knowledge spurred largely by linkage effects; whereas, there are no intra-industry externalities due to MNEs always minimizing market-share loss and the low absorptive capacity requirement for the adoption of generic technical knowledge. Kugler believed that both generic know-how spillovers and linkage externalities are sizable.

Using data from both developed and developing nations, Slaughter (2002) investigated how MNEs and FDI affect on both the demand and supply of skills in host-country labor markets. Slaughter found a strong positive correlation between skill upgrading and the presence of local affiliates of US MNEs. Lall (2002) studied the relationship between FDI
and employment and claimed that no general conclusions can be made about the correlation between FDI and domestic employment skills. However, when adequate absorptive capacities are present, FDI was seen to have a positive impact on domestic employment.

India, like China, is a large developing country and has recently attracted increased amounts of FDI. Chakraborty and Basu (2002) investigated the relationship between FDI, real GDP, the unit labour cost and the share of import duty in tax revenue in India by using a structural cointegration model with vector error correction mechanism (VECM). Chakraborty and Basu found that although there are long-run relationships between FDI, real GDP, the unit labour cost and the share of import duty in tax revenue in India, but there is no strong evidence supporting that economic growth is caused by FDI, instead, the causality runs more from GDP to FDI in India.

In summary of the above cited empirical studies on the impact of FDI in host countries, the studies by Liu, Burridge and Sinclair (2002), Liu, Wang and Wei (2001), Shan (2002), de Mello (1999), Noorzoy (1979) and Slaughter (2002) support that FDI has positive externalities on the economic development of a host country. Liu, Burridge and Sinclair (2002), Liu, Wang and Wei (2001), and Shan (2000) all found that FDI has positive impact on China’s economic growth. de Mello (1999) and Noorzoy (1979) both indicated that FDI has complementary effects on domestic investment. In contrast, the studies of Kumar and Pradhan (2002), Kugler (2000) and Lall (2002) showed that whether the impact of FDI on the economic development of a host country is negative or positive, pretty much depends on conditions. Kumar and Pradhan (2002) showed that the impact of FDI on domestic investments is initially negative with the subsequent effect being positive. Kugler (2000) argued that technical knowledge spill-over effects only occur on an inter-industry basis not
on an intra-industry basis. Lall (2002) said that no general conclusions can be made about
the correlation between FDI and domestic employment skills, and only when adequate
absorptive capacities are present, FDI was seen to have a positive impact on domestic
employment. The findings by Chakraborty and Basu (2002) differ from all other studies
and indicate that FDI does not cause economic growth in India. Overall, in general, FDI
does generate positive externalities on the economic development of a host country when
FDI is introduced and promoted in an appropriate way.

3.4 Conclusion

This chapter is an extension to the existing theory of FDI aimed at providing a better
understanding of the impact of FDI on the economic development of host countries. A
number of foreign capital theories (the orthodox economic concepts of marginal
productivity theory, the opponents of the orthodox economic concepts of marginal
productivity theory, and the modernization / dependency theories) were discussed. Based
on the theories of foreign capital, a theoretical framework of the impact of FDI on the
economic development of host countries is developed. Following the theoretical analysis, a
number of selected empirical studies on the impact of FDI on the economic development of
host countries were reviewed.

In conclusion, in regard to the theoretical framework of the impact of FDI on the economic
development of host countries, the contemporary opinions are that the impact of FDI in less
developed countries depends on many conditions. Well-developed and implemented
policies can help maximize gains from FDI, whereas, inappropriate introduction of FDI
could lead to some degree of severe damage to an economy and induce social problems. The cited empirical studies in the chapter provide support to the contemporary opinions of the impact of FDI on the economic development of host countries. That is, the impact of FDI in less developed countries depends on many conditions, and should be tested in a rigorous empirical work and be examined on a case-by-case basis.
Chapter 4. Location Determinants of FDI

4.1 Introduction

Since 1993, China has been the largest recipient of FDI in the developing countries and in 2002 received the largest proportion of FDI worldwide. However, for the first time since 1999, FDI to China decreased slightly from $US60.6 billion in 2004 to $US60.3 billion in 2005. The Ministry of Commerce of the People’s Republic of China further reported that China’s FDI inflows for the first eight months of 2006 decreased 2% compared to the same period in 2005. The rates of FDI return in China are below the world average (Hsiao and Hsiao, 2004). The Chinese currency has appreciated in recent time and there are numerous predictions that the Chinese economy is going to collapse. Can China maintain the level of FDI inflows? What are location-specific determinants of FDI in China? Answers to these questions are important because FDI is crucial for China’s economic development. FDI helps China to overcome capital shortfalls and diffuses technology and management know-how to China’s indigenous firms. Understanding China’s location-specific determinants of FDI would enable China to retain competitive advantages for FDI.

This chapter explores location-specific determinants of FDI in China by applying a multivariate VAR system and the time series techniques of cointegration. In particular, we first examine the FDI development, the policies introduced in China to attract FDI and various characteristics of FDI in China over the period 1978 to 2005. Following the
examination, we use the VAR model to investigate the long-run relationships between FDI and its potential determinants.

There are a number of published research papers studying China’s FDI determinants. However, this chapter differs from those published studies in several respects. First, this chapter reveals the development of China’s FDI for the period ranging from the year economic reforms were initiated, 1978, until the very recent year 2005. Second, this chapter explores China’s FDI inflows in a comprehensive and meaningful way. That is, this chapter examines FDI policies, source countries, geographic and sector distributions, and type of FDI in China. This facilitates a better understanding of the nature of China’s FDI inflows and the factors which are the driving forces that determine China’s FDI inflows. Third, most of published studies in relation to China’s FDI determinants use cross-sectional data, whereas, this chapter utilises a set of time series data to investigate the long-run relationship between FDI and its potential determinants in China. Moreover, in order to avoid spurious regressions, tests for unit roots are used to test for stationarity of the time series. Finally, most of published Chinese FDI studies use a single regression model, while this chapter uses a cointegration technique based on a multivariate VAR system to analyse the long-run relationships between FDI and its determinants. The use of a VAR model has been proven to generate more reliable estimates in an endogenous context (Gujarati, 1995).

In section 4.2, we discuss FDI in China which includes FDI development and policies, and the characteristics of FDI. Section 4.3 reviews FDI location-specific advantage theories and empirical studies. Section 4.4 empirically examines FDI determinants hypotheses and presents data, methodology and empirical results. Section 4.5 provides concluding comments.
4.2 FDI in China

In this section, we discuss the FDI development, the policies introduced in China to attract FDI and various characteristics of FDI in China over the period 1978 to 2005.

FDI development and associated policies

During the period 1978 to 2005, FDI inflows to China are about $US621 billion in total. This remarkable achievement is partly attributable to China’s “opening up” policies and economic reforms. Preferential policies which provide tax concessions and special privileges to foreign investors have been an important “opening up” policy. Table 4.1 outlines China’s FDI development and its policies for the period 1978 to 2005. It indicates that China started its economic reforms by establishing three special economic zones (SEZ) and allowing equity joint ventures to operate in the southeast coast province, Guangdong, next to Hong Kong and Macao; and subsequently in 1980 another SEZ was established in Fujian, next to Taiwan. Meanwhile, a state investment commission was established for administering the investment process. Between 1981 and 1985, 14 SEZ and technological development zones (TDZ) were established and 14 coastal cities were opened for foreign investment in the Pearl River and the Yantze River deltas, and Liaoning, Hebei, Tianjin, Shandong, Jiangsu, Shanghai, Zhejiang, Fujian, Guangdong and Guangxi provinces and regions. During the period 1981-1984, the total amount of FDI inflows was only around $US4.8 billion. In order to attract more FDI inflows, the Chinese Government in 1986 issued the PRC law granting legal rights to wholly owned foreign enterprises in China and giving more freedom and tax incentives to FIEs. Consequently, more SEZ and TDZ were
established. The total FDI inflows doubled from 1986 to 1989 in contrast to the period 1978 to 1985. The rate of FDI moderated in 1989 as a result of the Tianman Square incident. To stimulate FDI inflows, the Chinese Government issued the Amendments to the Joint Venture Law in 1990 and enacted the Income Tax Law for Enterprises with Foreign Capital and Foreign Enterprises in 1991. The ownership laws, property rights and contract laws were developed to improve investment conditions and business environment in 1992. Further, following the famous “Southern China Tour” in 1992 by Mr. Deng Xiaoping, the economic reforms in China gained additional momentum and a new phase of FDI liberalization emerged. SEZ and TDZ were created across the whole country, and all capital cites were opened for foreign investors. As a result, FDI entered into a stage of accelerating growth during the 1990’s. Figure 4.1 illustrates FDI inflows in China from 1978 to 2005. As can be seen, FDI inflows surged to $US27.5 billion in 1993, following which time China became the recipient of the largest proportion of FDI in the developing world. In 1998, during the Asian financial crisis, the Chinese government further liberalized its FDI policy. One such liberalized policy was the abolition of FDI project approval requirement.

However, these new liberalized policies did not improve the situation as the impact of the Asian financial crisis was very strong which led to FDI inflows during the years of 1999 and 2000 falling below the previous year’s level (see Figure 4.1). In December 2001, China joined the World Trade Organization (WTO), which marked a further major development in FDI liberalization. By 2002, China had become host to the largest proportion of FDI host country in the world attracting US$52.7 billion of FDI. However, the growth rate of FDI in

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China slowed down in 2003, and had declined from $US60.6 billion in 2004 to $US60.3 billion in 2005.

Table 4.1. China’s FDI Developemnt and Policies: 1978-2005

<table>
<thead>
<tr>
<th>Year</th>
<th>Number and Type of Opened Zones or Specific Events and FDI Policies</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>Economic reforms started</td>
<td>Guangdong</td>
</tr>
<tr>
<td>1979</td>
<td>3 Special Economic Zones (The Joint Venture Law was enacted)</td>
<td>Fujian</td>
</tr>
<tr>
<td>1980</td>
<td>1 Special Economic Zone</td>
<td>Liaoning, Hebei, Tianjin, Shandong, Jiangsu, Shang hai, Zhejiang, Fujian, Guangdong and Guangxi</td>
</tr>
<tr>
<td>1984</td>
<td>14 Coastal Open Cities</td>
<td>Liaoning, Hebei, Tianjin, Shandong, Jiangsu, Zhejiang and Guangdong</td>
</tr>
<tr>
<td></td>
<td>10 Economic and Technological Development Zones</td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td>1 Economic and Technological Development Zone</td>
<td>Fujian</td>
</tr>
<tr>
<td></td>
<td>3 Coastal Open Economic Zones</td>
<td>Pearl River delta, Yantze River delta, Fujian</td>
</tr>
<tr>
<td>1986</td>
<td>2 Economic and Technological Development Zones</td>
<td>Shanghai</td>
</tr>
<tr>
<td></td>
<td>(The PRC law grants legal rights to wholly owned foreign enterprises. More freedom and tax incentive for FIEs.*)</td>
<td></td>
</tr>
<tr>
<td>1988</td>
<td>Open Coastal Belt</td>
<td>Liaoning, Shandong, Guangxi and Hebei</td>
</tr>
<tr>
<td></td>
<td>1 Special Economic Zone</td>
<td>Hainan</td>
</tr>
<tr>
<td></td>
<td>1 Economic and Technological Development Zone</td>
<td>Shanghai</td>
</tr>
<tr>
<td>1990</td>
<td>Pudong New Area (The Amendments to the Joint Venture law and the Tax Income law for FIEs were issued)</td>
<td>Shanghai</td>
</tr>
<tr>
<td>1992</td>
<td>13 Bonded Areas in Major Coastal Port Cities (Deng XiaoPing’s Southern China Tour)</td>
<td>Tianjin, Guangdong, Liaoling, Shandong, Jiangsu, Zhejiang, Fujian and Hainan</td>
</tr>
<tr>
<td></td>
<td>10 Major Cities Along the Yangtze River</td>
<td>Jiangsu, Anhui, Jiangxi, Hunan, Hubei and Sichuan</td>
</tr>
<tr>
<td></td>
<td>13 Border Economic Cooperation Zones</td>
<td>Jilin, Heilongjiang, Inner Mogolia, Xinjiang, Yunnan and Guangxi</td>
</tr>
<tr>
<td></td>
<td>All Capital Cities of Inland Provinces and Autonomous Regions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 Economic and Technological Development Zones</td>
<td>Fujian, Liaoning, Jianxi, Shandong and Zhejiang</td>
</tr>
<tr>
<td>1993</td>
<td>12 Economic and Technological Development Zones</td>
<td>Anhui, Guangdong, Hubei, Liaoning, Sichuan, Fujian, Jilin, and Zhejiang</td>
</tr>
<tr>
<td>1994</td>
<td>2 Economic and Technological Development Zones</td>
<td>Beijing and Xinjiang</td>
</tr>
<tr>
<td></td>
<td>(Foreign Exchange System Reform &amp; Decentralize FDI Policies)</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>Encourages Greater Geographical Dispersion of FDI Inflows and Promotes FDI Inflows Into Export-Oriented, High Technology, Agriculture and Infrastructure Sectors</td>
<td>Northwest and Southwest Provinces</td>
</tr>
<tr>
<td>1996</td>
<td>Encourages More FDI Flowing Into Western Area of the Inland Regions</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>Abolished the FDI projects approval requirement</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>A New Era of FDI Liberalization (China Became the 143rd Member of WTO)</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>New laws and regulations for service section, e.g. allow entries of foreign sales and insurance companies, and joint ventures of stock exchange, etc.</td>
<td></td>
</tr>
</tbody>
</table>

Source: Almanac of China’s Economy, various issues, and Demurger et al. (2002). FIEs: foreign invested enterprises.
Characteristics of FDI in China

China’s FDI inflows have unique characteristics. China’s FDI inflows have mainly come from Asian countries. Table 4.2 shows China’s FDI sources by Asia, Western countries and other regions of the world during the period 1985 to 2004. As can be seen, for the period 1985 to 2004, an annual average about 74%, 17% and 9% (last row) of China’s total FDI is from Asia, Western and other regions, respectively. Asia’s FDI share increased from 67% in 1985 to 89% in 1992 and since then gradually declined to 62% in 2004. In contrast, the share of FDI from Western countries has fallen from 27% in 1985 to the lowest level 8% in 1992, and since then has gradually increased to its highest level 23% in 1999, but declined again in recent years. The share of FDI from other regions of the world was less than 10% before 1997 and has increased significantly reaching 22% in 2004.
Table 4.2 FDI sources of China, by regions and actually utilized: 1985-2004

<table>
<thead>
<tr>
<th>Year</th>
<th>Asia</th>
<th>Western</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$US billion</td>
<td>%</td>
<td>$US billion</td>
<td>%</td>
</tr>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>1985</td>
<td>1.11</td>
<td>67</td>
<td>0.45</td>
<td>27</td>
</tr>
<tr>
<td>1986</td>
<td>1.38</td>
<td>74</td>
<td>0.43</td>
<td>23</td>
</tr>
<tr>
<td>1987</td>
<td>1.92</td>
<td>83</td>
<td>0.32</td>
<td>14</td>
</tr>
<tr>
<td>1988</td>
<td>2.62</td>
<td>82</td>
<td>0.38</td>
<td>12</td>
</tr>
<tr>
<td>1989</td>
<td>2.61</td>
<td>77</td>
<td>0.47</td>
<td>14</td>
</tr>
<tr>
<td>1990</td>
<td>2.93</td>
<td>84</td>
<td>0.56</td>
<td>16</td>
</tr>
<tr>
<td>1991</td>
<td>3.58</td>
<td>82</td>
<td>0.57</td>
<td>13</td>
</tr>
<tr>
<td>1992</td>
<td>9.80</td>
<td>89</td>
<td>0.88</td>
<td>8</td>
</tr>
<tr>
<td>1993</td>
<td>23.94</td>
<td>87</td>
<td>2.75</td>
<td>10</td>
</tr>
<tr>
<td>1994</td>
<td>28.37</td>
<td>84</td>
<td>4.39</td>
<td>13</td>
</tr>
<tr>
<td>1995</td>
<td>30.77</td>
<td>82</td>
<td>5.25</td>
<td>14</td>
</tr>
<tr>
<td>1996</td>
<td>33.38</td>
<td>80</td>
<td>6.26</td>
<td>15</td>
</tr>
<tr>
<td>1997</td>
<td>30.78</td>
<td>68</td>
<td>7.24</td>
<td>16</td>
</tr>
<tr>
<td>1998</td>
<td>31.37</td>
<td>69</td>
<td>8.18</td>
<td>18</td>
</tr>
<tr>
<td>1999</td>
<td>26.83</td>
<td>67</td>
<td>9.41</td>
<td>23</td>
</tr>
<tr>
<td>2000</td>
<td>25.48</td>
<td>63</td>
<td>9.55</td>
<td>23</td>
</tr>
<tr>
<td>2001</td>
<td>29.61</td>
<td>63</td>
<td>9.58</td>
<td>20</td>
</tr>
<tr>
<td>2002</td>
<td>32.57</td>
<td>62</td>
<td>10.54</td>
<td>20</td>
</tr>
<tr>
<td>2003</td>
<td>34.10</td>
<td>64</td>
<td>9.43</td>
<td>18</td>
</tr>
<tr>
<td>2004</td>
<td>37.62</td>
<td>62</td>
<td>9.78</td>
<td>16</td>
</tr>
<tr>
<td>Average</td>
<td>19.54</td>
<td><strong>74</strong></td>
<td>4.82</td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>


Table 4.3 presents the 15 major FDI sources for China by actually utilized FDI during the period 1978 to 2005. As can be seen, Hong Kong has been the largest source of China’s FDI in both the Asian countries and the world and has had 254,059 FDI projects in China worth $US260 billion. This accounted for 42% of China’s total FDI inflows for the period 1978 to 2005. Japan and the USA have been the second and the third largest sources of China’s FDI inflows, respectively. As can be seen from column 2, during 1978 to 2005, Japan and the USA signed 35124 and 49006 FDI projects, respectively, with China which
Table 4.3 Top 15 FDI sources for China, by actually utilized FDI, 1978-2005

<table>
<thead>
<tr>
<th>FDI sources</th>
<th>FDI projects</th>
<th>FDI actually utilized</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number (Unit)</td>
<td>Share (%)</td>
</tr>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>254059</td>
<td>43.97</td>
</tr>
<tr>
<td>Japan</td>
<td>35124</td>
<td>6.08</td>
</tr>
<tr>
<td>USA</td>
<td>49006</td>
<td>8.48</td>
</tr>
<tr>
<td>Virgin Islands</td>
<td>14011</td>
<td>2.43</td>
</tr>
<tr>
<td>Taiwan</td>
<td>68095</td>
<td>11.79</td>
</tr>
<tr>
<td>South Korea</td>
<td>38868</td>
<td>6.73</td>
</tr>
<tr>
<td>Singapore</td>
<td>14367</td>
<td>2.49</td>
</tr>
<tr>
<td>UK</td>
<td>4897</td>
<td>0.85</td>
</tr>
<tr>
<td>Germany</td>
<td>4762</td>
<td>0.82</td>
</tr>
<tr>
<td>France</td>
<td>2933</td>
<td>0.51</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1687</td>
<td>0.29</td>
</tr>
<tr>
<td>Macao</td>
<td>9829</td>
<td>1.70</td>
</tr>
<tr>
<td>Canada</td>
<td>8900</td>
<td>1.54</td>
</tr>
<tr>
<td>Australia</td>
<td>6809</td>
<td>1.18</td>
</tr>
<tr>
<td>Malaysia</td>
<td>3611</td>
<td>0.63</td>
</tr>
<tr>
<td>Others</td>
<td>60790</td>
<td>10.52</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>577748</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>


totaled $US53 billion and $US51 billion, respectively, and accounted for 9% and 8% of China’s total FDI inflows, respectively. The share of FDI from the top 15 countries accounted for 92% of China’s total FDI inflows.

Table 4.4 presents the type of actually utilized FDI in China from 1979 to 2005 by joint ventures, cooperative operation, foreign enterprises and cooperative development. At the beginning of the economic reforms during the 1980s, China’s FDI inflows mainly took the form of cooperative or equity joint ventures, which accounted for over 96%\(^2\) of China’s

\(^2\) For example, in 1984, the share of FDI in equity joint ventures (column 3, 20%), cooperative operation (column 5, 37%) and cooperative development (column 9, 42%) accounted for 99% of China’s total FDI.
Table 4.4 Type of actually utilized FDI in China: 1979-2005 ($US billion)

<table>
<thead>
<tr>
<th>Year</th>
<th>Joint Ventures</th>
<th>Cooperative</th>
<th>Foreign Enterprises</th>
<th>Cooperative Development</th>
<th>Others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$US billion</td>
<td>$US billion</td>
<td>$US billion</td>
<td>$US billion</td>
<td>$US billion</td>
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</tr>
<tr>
<td></td>
<td>Share (%)</td>
<td>Share (%)</td>
<td>Share (%)</td>
<td>Share (%)</td>
<td>Share (%)</td>
<td></td>
</tr>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
<td>(7)</td>
</tr>
<tr>
<td>1979-</td>
<td>0.17</td>
<td>0.76</td>
<td>0.08</td>
<td>0.79</td>
<td>1.80</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>42</td>
<td>5</td>
<td>44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1983</td>
<td>0.25</td>
<td>0.47</td>
<td>0.01</td>
<td>0.52</td>
<td>1.26</td>
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<tr>
<td></td>
<td>20</td>
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<td>1</td>
<td>42</td>
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<tr>
<td>1984</td>
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<td>0.59</td>
<td>0.01</td>
<td>0.48</td>
<td>1.66</td>
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<td>60</td>
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<td>60</td>
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<tr>
<td>2002</td>
<td>15.49</td>
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<td>33.49</td>
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<td>29</td>
<td>7</td>
<td>63</td>
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<tr>
<td>2003</td>
<td>16.39</td>
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<td>40.23</td>
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<td>66</td>
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</tr>
<tr>
<td>2004</td>
<td>14.61</td>
<td>1.83</td>
<td>42.97</td>
<td>0.00</td>
<td>60.33</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>24</td>
<td>3</td>
<td>71</td>
<td>0</td>
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</tbody>
</table>


total FDI inflows, and there were few wholly foreign owned enterprises operating in China.

In the 1990s, the number of wholly foreign owned enterprises started to increase at an annual average growth rate of 47% \(^3\), but joint ventures and cooperative enterprises declined. Since 2000, foreign wholly owned enterprises have become the main form of FDI in China accounting for 71% of actually utilized FDI in 2005. However, the annual average shares of joint ventures and cooperative enterprises dropped to 30% and 10% of China’s total FDI inflows, respectively, for the period 2000 to 2005.

\(^3\) The annual average growth rates for wholly owned enterprises; and the annual average shares of joint ventures and cooperative enterprises are calculated from various China Statistical Yearbook.
China’s FDI concentrated in small-sized assembling and processing for exports at the beginning of the economic reforms. A few years later, the average capital size of FDI increased with the main focus shifting to large infrastructure and manufacturing projects. Table 4.5 shows China’s FDI inflows by sector in the selected years. As indicated in column 3 of Table 4.5, the manufacturing industries were the main FDI recipient industries and their FDI share in China’s total FDI inflows reached 75.9% in 1988. Following the manufacturing industries, the real estate, public utilities and other services industries received the second highest proportion of FDI absorbing 10.2% of China’s total FDI inflows in 1988. This trend has continued with manufacturing industries and the real estate, public utilities and other services industries having retained the highest and second highest proportion of FDI in both 1996 and 2004.

The distribution of China’s FDI inflows has been very uneven. Table 4.6 presents the regional distribution of FDI inflows in China for selected years. As can be seen from column 3 of Table 4.6, most of China’s FDI has flowed into the coastal region (72%) and just a small amount of FDI has flowed to the inland region (10%). The Chinese Government has used varies strategies to promote more FDI to the inland region but its attempts have not worked. The coastal region received 88.2% (column 5) and 85.6% (column 7) of China’s total FDI in 1996 and 2003, respectively, compared with 11.8% and 13.3% for the inland region in the corresponding years.

---

4 The distribution of China’s FDI is detailed in Appendix A4, which is given in pages 97-98.
Table 4.5 China's FDI contract by sector in the selected years

<table>
<thead>
<tr>
<th>Sector</th>
<th>1988</th>
<th></th>
<th>1996</th>
<th></th>
<th>2004</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$US million</td>
<td>Share (%)</td>
<td>$US million</td>
<td>Share (%)</td>
<td>$US million</td>
<td>Share (%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>5297</td>
<td>7.0</td>
<td>73276</td>
<td>9.0</td>
<td>153479</td>
<td>9.0</td>
</tr>
<tr>
<td>Agriculture, Forestry, Animal Husbandry and Fishing</td>
<td>209</td>
<td>3.9</td>
<td>1139</td>
<td>1.6</td>
<td>3271</td>
<td>2.1</td>
</tr>
<tr>
<td>Mining</td>
<td>2</td>
<td>0.03</td>
<td>1156</td>
<td>0.8</td>
<td>1156</td>
<td>0.8</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>4021</td>
<td>75.9</td>
<td>50486</td>
<td>68.9</td>
<td>109736</td>
<td>71.5</td>
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<tr>
<td>Construction</td>
<td>119</td>
<td>2.2</td>
<td>2001</td>
<td>2.7</td>
<td>1769</td>
<td>1.2</td>
</tr>
<tr>
<td>Communication, Transport, Storage and Post</td>
<td>91</td>
<td>1.7</td>
<td>1599</td>
<td>2.2</td>
<td>4394</td>
<td>2.9</td>
</tr>
<tr>
<td>Wholesale and Retail Trade, Hotels and Restaurants</td>
<td>64</td>
<td>1.2</td>
<td>2347</td>
<td>3.2</td>
<td>4669</td>
<td>3.0</td>
</tr>
<tr>
<td>Real Estate, Public Utilities and Other Services</td>
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<td>10.2</td>
<td>12851</td>
<td>17.5</td>
<td>26145</td>
<td>17.0</td>
</tr>
<tr>
<td>Scientific Research, Technical Services and Geologic</td>
<td>7</td>
<td>0.1</td>
<td>175</td>
<td>0.2</td>
<td>1006</td>
<td>0.7</td>
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<tr>
<td>Geologic Prospecting</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Education, Culture, Sports and Entertainment</td>
<td>44</td>
<td>0.8</td>
<td>171</td>
<td>0.2</td>
<td>1186</td>
<td>0.8</td>
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<tr>
<td>Health, Social Security and Social Welfare</td>
<td>5</td>
<td>0.1</td>
<td>354</td>
<td>0.5</td>
<td>147</td>
<td>0.1</td>
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<tr>
<td>Other</td>
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<td>3.6</td>
<td>2141</td>
<td>2.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Table 4.6 Regional distribution of FDI inflows in China

<table>
<thead>
<tr>
<th>Region</th>
<th>1988</th>
<th></th>
<th>1996</th>
<th></th>
<th>2003</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$US million</td>
<td>Share %</td>
<td>$US million</td>
<td>Share %</td>
<td>$US million</td>
<td>Share %</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3193.7</td>
<td>100.0</td>
<td>41725.5</td>
<td>100.0</td>
<td>53504.7</td>
<td>100.0</td>
</tr>
</tbody>
</table>

    Coastal region  | 2298.4   | 72.0   | 36792.9  | 88.2    | 45804.8  | 85.6    |
        Metro cities  | 767.8    | 24.0   | 7646.6   | 18.3    | 9194.5   | 17.2    |
        Coastal provinces | 1530.6  | 47.9   | 29146.3  | 69.9    | 36610.3  | 68.4    |

    Inland region     | 320.0    | 10.0   | 4932.7   | 11.8    | 7135.5   | 13.3    |
        Central        | 117.4    | 3.7    | 2853.1   | 6.8     | 5319.1   | 9.9     |
        Northeast      | 46.3     | 1.4    | 1000.0   | 2.4     | 512.4    | 1.0     |
        Northwest      | 125.1    | 3.9    | 557.4    | 1.3     | 501.9    | 0.9     |
        Southwest      | 31.1     | 1.0    | 522.2    | 1.3     | 802.2    | 1.5     |

    Other              | 575.3    | 18.0   |          |          | 564.4    | 1.1     |

Source: Almanac of China’s Economy, various issues; China Statistical Yearbook, various issues.
4.3 A review of studies on FDI location-specific advantage

The eclectic paradigm (Dunning, 1977) seeks to offer a general theoretical framework to explain FDI determinants, of which, the location-specific advantage paradigm specifies the factors which determine the siting of production of multinational enterprises in host nations. The factors identified by the location-specific advantage paradigm include resource endowments, markets, input prices, quality, productivities (e.g. labour, energy, materials, components and semi-finished goods), cross-country ideological, language, cultural, business and political differences etc. These factors can determine firms’ destination of FDI activities but the significance of the location-specific advantage is both industry and country specific, and will vary between multinational enterprises. Earlier than Dunning, in the industrial organization theory, Hymer (1974) stated that firms engaged in FDI activities abroad must have monopolistic advantages or ownership advantages. One of the advantages is to be able to access lower cost factors (e.g. labour and raw materials) in host nations. Kojima (1978 and 1982) developed the dynamic comparative advantage theory, which proposes that trade-oriented FDI is for the purpose of producing goods in the host country at costs lower than at home and then importing back to the home country or exporting to third markets. The three FDI theories, the eclectic paradigm, the industrial organization theory and the dynamic comparative advantage theory, commonly believe that lower input prices are one of the important FDI location-specific determinants in host nations for attracting FDI inflows. However, in the last two to three decades, FDI has grown dramatically and its patterns have also changed significantly corresponding to the changing economic, political and social environments. Consequently, the motives of multinational enterprises engaged in FDI activities have become more complex than any unitary theory of
FDI could possibly explain. Thus, Dunning (1993 and 2000) suggested that the motivation for foreign market expansion include demand-oriented, supply-oriented, efficiency seeking and asset augmenting. Whereas, in the currency premium theory, Aliber (1970) argued that for any given different currency rates, FDI will tend to occur since the different currency rates allow multinational firms arbitraging by purchasing or selling of assets in an undervalued or overvalued currency. Source country firms are likely to be those in countries where the capitalization rates are high; host country firms are those in countries where capitalization rates are low.

Su, Tong and Yu (2002) study China’s determinants of FDI across 30 provinces by applying provincial-level panel data (1986-1998) to a regression model. Su et al. find that labour quality, infrastructure, political stability, and degree of openness to the foreign world are important determinants of FDI but the cumulative FDI relative to cumulative domestic investment has a negative impact on the new FDI. Su et al. believe that the importance of the FDI determinants moves through time. For example, Su et al. claim that wages had a positive relationship with FDI before 1991 but had a negative relationship after then. Similarly, provincial GDP held no significant relationship with GDP before 1991 but became highly positive after 1991. Li and Park (2006) examine the factors that affect the choice of location for FDI in China by applying provincial-level information and a data set from 1999 to 2002 to a regression model. Li and Park have identified three groups of factors that may affect the location choice of FDI: agglomeration economies, infrastructure, and institutional changes. Li and Park claim that agglomeration economies, the clustering of foreign firms and domestic firms, exert the strongest effect on FDI location. That is, higher FDI concentration tends to attract more foreign firms and the clustering of domestic firms exerts a negative effect on FDI locations. Li and Park also find that better
infrastructure (electricity, telecommunications, and road) and greater institutional change (open policies, privatization, and legal development) have positive effects on FDI location, but the size of the local economy does not affect the choice of location of FDI.

Hsiao and Hsiao (2004) use a panel data analysis with a regression model to analyse the determinants of FDI for the five major investing countries and regions (Hong Kong, Taiwan, Japan, Korea and the United States), and they also investigate why China has attracted so much FDI in recent years while the world FDI inflows to other countries have been decreasing considerably. Their FDI panel data for Hong Kong, Japan and the United States starts from 1986 to 2002, while for Taiwan and Korea, the FDI panel data is from 1989 to 2002 and 1990 to 2002, respectively. Hsiao and Hsiao find that Hong Kong and Taiwan are predominant FDI source countries of China but their investment size is generally very small. The determinants of FDI from Hong Kong and Taiwan have been due merely to language and cultural similarity, geographic proximity, and historical ties. For the five investing countries as a whole, Hsiao and Hsiao claim that real market size, real wage differential, openness, trade and depreciation of Chinese currency have positive impacts on FDI. Zhang (2005) studies determinants of the unusually large share of FDI from Hong Kong and Taiwan in China’s total FDI from 1980 to 2001. By applying a set of time series data to a regression model, Zhang reveals that Hong Kong and Taiwan’s FDI is primarily export-oriented and motivated by China’s cheap labor and incentive policies toward FDI. Zhang concludes that China’s export-promotion FDI strategy, its large pool of cheap labor, Hong Kong and Taiwan’s specific advantages in export-oriented FDI, and their unique links with China (the Chinese connections) are the determinants of FDI from Hong Kong and Taiwan. In comparison, Zhang examines FDI from the European Union, the US, and Japan (the Triad), and finds that FDI from the Triad is market-oriented.
Cassidy and Andreosso-O’Callaghan (2004) examine the spatial determinants of Japanese FDI in China by applying Chinese provincial-level data of 1996 to a regression model. Cassidy and Andreosso-O’Callaghan find that tertiary education, inland waterways, as well as coastal location are positive and significant determinants of Japanese investment in China, but China’s low labor cost and provincial GDP are not significant determinants of Japanese FDI. However, Urata (1996), Delapierre and Milelli (1998) argue that Japanese FDI in China is due to China’s FDI policies, rapid economic growth, the large domestic market and China’s low labor cost.

In summary, these studies find that, low labor cost, labor quality, infrastructure, political stability, openness, trade, market size, and depreciation of the Chinese currency are the general location-specific determinants of China’s FDI inflows. In addition to the general determinants, language and cultural similarity, geographic proximity, and historical ties are determinants of FDI from Hong Kong and Taiwan. Most of these studies use a single regression model to carry out their analyses by employing cross-sectional data. Such an approach is subject to debate. The use of cross-sectional data implicitly assumes a common economic structure and similar production technology across different units or provinces, which is most likely untrue. For example, there are some significant differences between provinces in China such as labour skills, technology and capital capabilities, and FDI and economic development levels in the coastal provinces are much more advanced than the inland provinces. The significance of conclusions drawn from cross-sectional data regarding a long-run causal relationship is also questionable (Enders, 1995). Moreover, a

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5 The study by Zhang (2005) is an exception, in which, a set of time series data was used.
single equation model cannot properly deal with the simultaneity issue (Kholdy, 1995; Shan et. al., 1999). Consequently, the reliability of a result from a single model is doubtful.

4.4 Empirical analyses

In this section, we empirically investigate the FDI location-specific advantage theories in relation to China.

FDI determinants, methodology and data

Based on the study of China’s FDI characteristics, the theoretical and empirical review, the following hypotheses for the location-specific determinants of China’s FDI are considered: 1) good infrastructure (LH) has a positive effect on FDI [transportation infrastructure is an important location-specific determinant of FDI]; 2) degree of openness (TR) has a positive impact on FDI [an open economy should attract more foreign investors but it also could mean more competition in the open economy]; 3) labor costs (W) are negatively related to FDI [most of China’s FDI is in labor-intensive manufacturing industries due to China’s cheap labor]; 4) currency value (XR) is negatively associated with FDI [that is, depreciation of Chinese currency attracts more FDI. Firms of FDI source countries may like to invest in a host country associated with lower currency value according to the currency premium theory]; 5) market size or market demand (Y) has a positive impact on FDI [China’s huge market or demand is very attractive to many investors, especially for market-oriented FDI]; 6) labor quality (LQ) has a positive relationship with FDI [the quality of the labor force is an important determinant of FDI].
In addition to these determinants, other factors also play a crucial role in determining China’s FDI. For example, political stability is a very sensitive factor affecting foreign investors; language, cultural similarity, geographic proximity, and historical ties are important determinants of FDI from Hong Kong, Taiwan and Macao. However, this chapter is constrained to some degree by the availability of quantitative data measurements and the limitation of the VAR system.\(^6\) Thus, some variables are not included in this study. Accordingly, to empirically investigate the location-specific determinants of China’s FDI, a VAR model is developed and specified as:

$$X_t = A_0 + \sum_{j=1}^k (A_i X_{t-i}) + \epsilon_t$$

(1)

Where

- \(X_t\) = an \((n \times 1)\) vector containing each of the \(n\) variables included in the VAR. The \(n\) variables are all in natural logarithms, which are measured by
  - \(\text{FDI}_t\) = actually utilized amount of FDI;
  - \(\text{LH}_t\) = length of highway per square kilometer;
  - \(\text{TR}_t\) = total trade amount;
  - \(\text{W}_t\) = annual average real wage of workers;
  - \(\text{XR}_t\) = the exchange rates in terms of US dollars;
  - \(\text{Y}_t\) = GDP; \(\text{LQ}_t\) = the ratio of university graduates to population.
- \(A_0\) = an \((n \times 1)\) vector of intercept terms;
- \(A_i\) = \((n \times n)\) matrices of coefficients;
- \(\epsilon_t\) = an \((n \times 1)\) vector of error terms, and \(k\) is the number of lags.

\(^6\)Too many variables in a relatively small VAR model will consume too many degrees of freedom.

Testing for unit root and cointegration

We have to test the stationary property of all variables before making estimation in order to avoid spurious regressions. The ADF tests for stationarity are first performed on the level form of the variables LFDI, LLH, LTR, LW, LXR, LY and LQ using the following three models and the flowchart provided in Enders (1995), see Appendix 1 for details.

Constant and trend model

\[ \Delta y_t = \alpha_0 + \alpha_2 t + \gamma y_{t-1} + \sum_{i=1}^{q} \beta_i \Delta y_{t-i} + \varepsilon_t \]  

(2)

Constant and no trend model

\[ \Delta y_t = \alpha_0 + \gamma y_{t-1} + \sum_{i=1}^{q} \beta_i \Delta y_{t-i} + \varepsilon_t \]  

(3)

No constant and no trend model

\[ \Delta y_t = \gamma y_{t-1} + \sum_{i=1}^{q} \beta_i \Delta y_{t-i} + \varepsilon_t \]  

(4)

where \( \Delta y_t = y_t - y_{t-1} \) is the first difference of the series \( y_t \); \( \Delta y_{t-1} = (y_{t-1} - y_{t-2}) \) is the first difference of \( y_{t-1} \), etc.; \( \gamma \) and \( \beta_i \) are parameters, and \( \varepsilon_t \) is a stochastic disturbance term. Using
both the Akaike Information Criterion (AIC) and Schwarz Criterion (SC) (Akaike, 1974), the number of lagged terms is chosen to ensure that the errors are uncorrelated (q=1). The difference among the three regressions (2)-(4) lies at the inclusion or exclusion of the deterministic elements $\alpha_0$ and $\alpha_{2t}$. Equation (2) includes the drift $\alpha_0$ and time trend $\alpha_{2t}$, equation (3) includes $\alpha_0$ but no time trend and equation (4) does not include both $\alpha_0$ and $\alpha_{2t}$.

The results of the ADF tests for the original series and the first difference series are reported in Table 4.7. The ADF tests in columns 2 to 4 indicate that, in level form, FDI, XR and LQ are non-stationary, while LH, TR, W and Y are stationary. In accordance with the Granger theorem, cointegration necessitates that the variables should be integrated of the same order (Enders, 1995; Engle and Granger, 1987; and Granger, 1986). Thus, in order to ensure all variables are stationary integrated of the same order, ADF tests of the first difference series are performed. The results of the ADF tests in columns 5 to 7 show that the first difference series are all stationary integrated of order one, I (1).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Original series</th>
<th></th>
<th></th>
<th>First difference</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model (2)</td>
<td>Model (3)</td>
<td>Model (4)</td>
<td>Model (2)</td>
<td>Model (3)</td>
<td>Model (4)</td>
</tr>
<tr>
<td></td>
<td>Trend Constant</td>
<td>Constant No trend</td>
<td>No trend No constant</td>
<td>Trend Constant</td>
<td>Constant No trend</td>
<td>No trend No constant</td>
</tr>
<tr>
<td>(1) FDI</td>
<td>-1.03</td>
<td>-1.9</td>
<td>0.17</td>
<td>-3.6*</td>
<td>-2.7*</td>
<td>-1.85*</td>
</tr>
<tr>
<td>LH</td>
<td>-0.80</td>
<td>1.68</td>
<td>-2.60**</td>
<td>-3.24*</td>
<td>-2.56</td>
<td>-1.47</td>
</tr>
<tr>
<td>TR</td>
<td>-2.64</td>
<td>1.03</td>
<td>3.36***</td>
<td>-4.66***</td>
<td>-4.35***</td>
<td>-1.73*</td>
</tr>
<tr>
<td>W</td>
<td>-0.68</td>
<td>1.87</td>
<td>2.37**</td>
<td>-6.86***</td>
<td>-3.21**</td>
<td>-2.43**</td>
</tr>
<tr>
<td>XR</td>
<td>-0.47</td>
<td>1.88</td>
<td>-1.21</td>
<td>-4.57***</td>
<td>-3.38**</td>
<td>-2.33**</td>
</tr>
<tr>
<td>Y</td>
<td>-1.92</td>
<td>0.96</td>
<td>3.20***</td>
<td>-5.97***</td>
<td>-4.87***</td>
<td>-2.74***</td>
</tr>
<tr>
<td>LQ</td>
<td>-0.93</td>
<td>1.45</td>
<td>-0.88</td>
<td>-3.24*</td>
<td>-2.33</td>
<td>-1.36</td>
</tr>
</tbody>
</table>

Notes: ***, **, and * denotes significance at the 1%, 5% and 10% levels, respectively.
It is also necessary to investigate whether all series in the model are cointegrated having a long-run equilibrium relationship. Thus, the Johansen methodology is used to perform the cointegration test. A model which contains a lag is chosen to test cointegration among all variables. The result of the Johansen cointegration rank test is summarized in Table 4.8. The Max-eigenvalue test indicates that there is at least a presence of 4 and 3 cointegration vectors at 5% and 1% levels of significance for the model respectively. Whereas, the trace test indicates that there is at least a presence of 6 and 4 cointegration vectors at 5% and 1% levels of significance for the model respectively. In other words, all variables in the model are cointegrated and there exists a long-run equilibrium relationship between all variables in China.

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Alternative Hypothesis</th>
<th>$\lambda_{\text{max}}$ tests</th>
<th>95% CV</th>
<th>$\lambda_{\text{trace}}$ tests</th>
<th>95% CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rank $\leq 0$</td>
<td>$r \geq 1$</td>
<td>114.34**</td>
<td>49.42</td>
<td>345.41**</td>
<td>146.76</td>
</tr>
<tr>
<td>Rank $\leq 1$</td>
<td>$r \geq 2$</td>
<td>93.20**</td>
<td>43.97</td>
<td>231.07**</td>
<td>114.90</td>
</tr>
<tr>
<td>Rank $\leq 2$</td>
<td>$r \geq 3$</td>
<td>57.92**</td>
<td>37.52</td>
<td>137.87**</td>
<td>87.31</td>
</tr>
<tr>
<td>Rank $\leq 3$</td>
<td>$r \geq 4$</td>
<td>31.63*</td>
<td>31.46</td>
<td>79.95*</td>
<td>62.99</td>
</tr>
<tr>
<td>Rank $\leq 4$</td>
<td>$r \geq 5$</td>
<td>22.75</td>
<td>25.54</td>
<td>48.32*</td>
<td>42.44</td>
</tr>
<tr>
<td>Rank $\leq 5$</td>
<td>$r \geq 6$</td>
<td>16.77</td>
<td>18.96</td>
<td>25.57*</td>
<td>25.32</td>
</tr>
<tr>
<td>Rank $\leq 6$</td>
<td>$r \geq 7$</td>
<td>8.80</td>
<td>12.25</td>
<td>8.80</td>
<td>12.25</td>
</tr>
</tbody>
</table>

Note: * and ** denote rejection of the null hypothesis at the 5% and 1% significance levels, respectively.

Testing the FDI location-specific advantage theories

To test the hypotheses of the location-specific determinants of China’s FDI, we investigate the long run relationship between the variables H, TR, W, XR, Y and LQ by using the procedure developed by Zapata and Rambaldi (1997) based on the VAR model. That is, first to estimate the VAR model, and then perform the Wald test to test Granger causality. Using the Schwarz (1978) Criterion (SC) and the Akaike (1974) Information Criterion.
(AIC), an optimal model with zero leg length for FDI, one leg length for the variables of H, TR, W, XR, Y and LQ was chosen to estimate the VAR model and to test whether each of the variables, H_{t-1}, TR_{t-1}, W_{t-1}, XR_{t-1}, Y_{t-1} and LQ_{t-1} Granger cause FDI_{t}. That is, to test the following null hypotheses (H_0): a) infrastructure does not cause FDI (H_{t-1} \not\Rightarrow FDI_{t}); b) openness does not cause FDI (TR_{t-1} \not\Rightarrow FDI_{t}); c) low labor costs do not cause FDI (W_{t-1} \not\Rightarrow FDI_{t}); d) the exchange rates do not cause FDI (XR_{t-1} \not\Rightarrow FDI_{t}); e) market demand or size does not cause FDI (Y_{t-1} \not\Rightarrow FDI_{t}); and f) labor quality does not cause FDI (LQ_{t-1} \not\Rightarrow FDI_{t}).

Table 4.9 presents the results of the Granger causality test based on the VAR model\(^7\). As can be seen, in the Granger sense and at the 5% significant level, the null hypotheses of a) infrastructure does not cause FDI (LH_{t-1} \not\Rightarrow FDI_{t}); b) openness does not cause FDI (TR_{t-1} \not\Rightarrow FDI_{t}); c) low labor costs do not cause FDI (W_{t-1} \not\Rightarrow FDI_{t}); e) market demand or size does not cause FDI (Y_{t-1} \not\Rightarrow FDI_{t}); and f) labor quality does not cause FDI (LQ_{t-1} \not\Rightarrow FDI_{t}) are all rejected, but the hypothesis of d) the exchange rates do not cause FDI (XR_{t-1} \not\Rightarrow FDI_{t}) is not rejected. That is, the empirical results demonstrate that the location-specific determinants of China’s FDI are good infrastructure, openness, low labor costs, market demand and labor quality, while the exchange rates do not influence China’s FDI inflows.

\(^7\) This chapter only focuses on the analysis of FDI determinants, thus, the other results of the Granger causality test are not reported.
The findings are robust and consistent with the results summarized in Section 4.3 except the exchange rates.

### 4.5 Conclusion

This chapter has reviewed China’s FDI policies and the development of FDI for the period 1978 to 2005. The characteristics of China’s FDI including FDI source countries, geographic and sector distributions, and type of FDI were also closely examined. Further, applying China’s annual time series data to a VAR model, this chapter has analysed the long-run relationship between FDI, infrastructure, openness, labour costs, the exchange rates, market demand and labour quality. It has found that there is a long-run relationship between FDI, infrastructure, openness, labour costs, the exchange rates, market demand and labour quality. Good infrastructure, openness, low labour costs, market demand and labour quality have been driving forces in determining China’s FDI inflows, while the exchange rates have no impact on China’s FDI.

The evidence presented in this chapter suggests that one of the dominant motives for foreign investors to invest in China is low labour costs to produce manufactured goods. Thus, it is recommended that the Chinese government should continuously promote its low

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**Table 4.9 Granger causality test**

<table>
<thead>
<tr>
<th>Null hypothesis (H)&lt;sub&gt;0&lt;/sub&gt;</th>
<th>Wald test statistics</th>
<th>Critical Value</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>H&lt;sub&gt;t-1&lt;/sub&gt; &gt; FDI&lt;sub&gt;t&lt;/sub&gt;</td>
<td>6.99*</td>
<td>3.84</td>
<td>Reject H&lt;sub&gt;0&lt;/sub&gt;</td>
</tr>
<tr>
<td>TR&lt;sub&gt;t-1&lt;/sub&gt; &gt; FDI&lt;sub&gt;t&lt;/sub&gt;</td>
<td>5.16*</td>
<td>3.84</td>
<td>Reject H&lt;sub&gt;0&lt;/sub&gt;</td>
</tr>
<tr>
<td>W&lt;sub&gt;t-1&lt;/sub&gt; &gt; FDI&lt;sub&gt;t&lt;/sub&gt;</td>
<td>5.27*</td>
<td>3.84</td>
<td>Reject H&lt;sub&gt;0&lt;/sub&gt;</td>
</tr>
<tr>
<td>XR&lt;sub&gt;t-1&lt;/sub&gt; &gt; FDI&lt;sub&gt;t&lt;/sub&gt;</td>
<td>0.90</td>
<td>3.84</td>
<td>Do not reject H&lt;sub&gt;0&lt;/sub&gt;</td>
</tr>
<tr>
<td>Y&lt;sub&gt;t-1&lt;/sub&gt; &gt; FDI&lt;sub&gt;t&lt;/sub&gt;</td>
<td>9.48*</td>
<td>3.84</td>
<td>Reject H&lt;sub&gt;0&lt;/sub&gt;</td>
</tr>
<tr>
<td>LQ&lt;sub&gt;t-1&lt;/sub&gt; &gt; FDI&lt;sub&gt;t&lt;/sub&gt;</td>
<td>9.33*</td>
<td>3.84</td>
<td>Reject H&lt;sub&gt;0&lt;/sub&gt;</td>
</tr>
</tbody>
</table>

Note: *denotes rejection of the null hypothesis at the 5% significance level.
cost labor advantage to maintain and attract foreign investors. With raising competition in
the international market, labour quality has also increasingly become one of the important
factors in attracting FDI. Skilled labour is more likely producing better quality of products.
This, especially, is very important for China as it has been long known that the quality of
most of China’s products is very poor. To change the images of China’s products and to be
competitive in the international market, the Chinese government should propose some
effective policies and regulations focusing on labour training as well quality control.
Cheaper labour is coupled with good quality could boost FDI inflows, which also implies a
further promotion ensuring that China as one of the world’s highest value-added
manufacturing production centers. The result of this chapter also indicates that most of
those investors are from Asian regions and over 70% of FDI have been in manufacturing
industries. This means that there are great opportunities for China to promote FDI inflows
into industries other than manufacturing industries such as agriculture, communication,
banking and finance, scientific research and technology services, and from Japan, the
European Union and the US, facing a potential decline in FDI inflows. Japan, the European
Union and the US supply 90% of global FDI, but their FDI in China is relatively very
small. To achieve the goal to maintain and/or increase FDI inflows, and hence economic
development, a better understanding of investors of Japan, European Union and the US is
required, and to remain labour market competitive, China should also further liberalise the
FDI market and develop new laws and regulations to improve the investment environment.
The result of this chapter suggests that there are causalities between FDI, infrastructure,
openness and market demand, and infrastructure, openness and market demand have played
a great role in promoting FDI. Given FDI has been distributed unevenly and the Western
regions only received small amount of FDI, it is recommended that China should improve
infrastructure in the Western regions and develop specific strategies and FDI policies to
encourage investors to invest in the Western regions. Moreover, FDI should be selective, that is, export-oriented, capital-intensive and higher technology FDI should be encouraged. The limitations of this chapter are acknowledged in the conclusion chapter, Chapter 10.

Appendix A4

The distribution of China’s FDI inflows has been very uneven. Most of China’s FDI has flowed into the coastal regions and just a small amount of FDI has been invested in the inland regions. The coastal regions include China’s three metro cities and nine coastal provinces. The inland regions include central, northeast, northwest and southwest regions and provinces which cover about eighteen provinces and regions. The coastal regions are much more developed than the inland regions. Among the coastal regions, Shanghai, Jiangsu, Fujian and Guangdong have hosted significant amounts of FDI inflows in the period 1978 to 2005. Guangdong has consistently been the leading FDI recipient province from 1978 until the early 2000s but in the most recent years, Jiangsu has become the largest FDI recipient province surpassing Guangdong. The details are given in Table A4.1. Table A4.1 presents the regional distribution of FDI inflows in China in the selected years.
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal region</td>
<td>2575.6</td>
<td>2298.4</td>
<td>9802.4</td>
<td>36792.9</td>
<td>35411.2</td>
<td>45804.8</td>
</tr>
<tr>
<td>Metro cities</td>
<td>655.2</td>
<td>767.8</td>
<td>938.2</td>
<td>7646.6</td>
<td>6099.8</td>
<td>9194.5</td>
</tr>
<tr>
<td>Beijing</td>
<td>118.7</td>
<td>502.8</td>
<td>349.9</td>
<td>1552.7</td>
<td>1166.0</td>
<td>2191.3</td>
</tr>
<tr>
<td>Tianjin</td>
<td>105.7</td>
<td>31.9</td>
<td>107.2</td>
<td>2152.7</td>
<td>1166.0</td>
<td>1534.7</td>
</tr>
<tr>
<td>Shanghai</td>
<td>430.8</td>
<td>233.2</td>
<td>481.1</td>
<td>3904.9</td>
<td>3160.1</td>
<td>5468.5</td>
</tr>
<tr>
<td>Coastal provinces</td>
<td>1920.4</td>
<td>1530.6</td>
<td>8864.2</td>
<td>29146.3</td>
<td>29401.3</td>
<td>36610.3</td>
</tr>
<tr>
<td>Hebei</td>
<td>11.2</td>
<td>16.7</td>
<td>112.0</td>
<td>825.9</td>
<td>679.2</td>
<td>964.1</td>
</tr>
<tr>
<td>Liaoning</td>
<td>44.1</td>
<td>115.3</td>
<td>489.6</td>
<td>1737.7</td>
<td>2044.5</td>
<td>2824.1</td>
</tr>
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<td>Jiangsu</td>
<td>56.5</td>
<td>103.0</td>
<td>1460.0</td>
<td>5210.1</td>
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<td>Zhejiang</td>
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<td>1473.4</td>
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<td>8453.8</td>
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<tr>
<td>Fujian</td>
<td>236.2</td>
<td>130.2</td>
<td>1416.3</td>
<td>2044.5</td>
<td>2824.1</td>
<td>4084.5</td>
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<td>Shandong</td>
<td>104.9</td>
<td>43.1</td>
<td>937.4</td>
<td>2971.2</td>
<td>3160.1</td>
<td>5468.5</td>
</tr>
<tr>
<td>Guangdong</td>
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<td>957.9</td>
<td>3551.5</td>
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<td>7822.9</td>
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<td>656.2</td>
<td>524.7</td>
<td>418.6</td>
</tr>
<tr>
<td>Inland region</td>
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<td>920.7</td>
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<td>4921.7</td>
<td>7135.5</td>
</tr>
<tr>
<td>Central</td>
<td>62.1</td>
<td>117.4</td>
<td>584.2</td>
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<td>2956.5</td>
<td>5319.1</td>
</tr>
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<td>300.7</td>
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<td>128.5</td>
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<td>637.9</td>
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<td>70.5</td>
<td>548.4</td>
<td>300.9</td>
<td>321.8</td>
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<td>557.4</td>
<td>493.0</td>
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</tr>
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<td>Mongolia</td>
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<td>5.2</td>
<td>71.9</td>
<td>224.7</td>
<td>213.6</td>
</tr>
<tr>
<td>Shaanxi</td>
<td>1.6</td>
<td>111.7</td>
<td>45.5</td>
<td>325.1</td>
<td>284.8</td>
<td>331.9</td>
</tr>
<tr>
<td>Gansu</td>
<td>0.3</td>
<td>2.0</td>
<td>0.4</td>
<td>90.0</td>
<td>62.4</td>
<td>23.0</td>
</tr>
<tr>
<td>Qinghai</td>
<td>23.5</td>
<td>2.7</td>
<td>0.7</td>
<td>1.0</td>
<td>0.0</td>
<td>25.0</td>
</tr>
<tr>
<td>Ningxia</td>
<td>3.0</td>
<td>0.3</td>
<td>3.5</td>
<td>5.6</td>
<td>17.4</td>
<td>17.4</td>
</tr>
<tr>
<td>Xinjiang</td>
<td>3.3</td>
<td>5.0</td>
<td>6.3</td>
<td>9.1</td>
<td>19.1</td>
<td>15.3</td>
</tr>
<tr>
<td>Southwest</td>
<td>33.3</td>
<td>31.1</td>
<td>144.8</td>
<td>522.2</td>
<td>834.4</td>
<td>802.2</td>
</tr>
<tr>
<td>Sichuan</td>
<td>28.9</td>
<td>23.6</td>
<td>101.9</td>
<td>425.4</td>
<td>681.3</td>
<td>673.1</td>
</tr>
<tr>
<td>Yunnan</td>
<td>1.5</td>
<td>3.1</td>
<td>23.1</td>
<td>65.4</td>
<td>128.1</td>
<td>83.8</td>
</tr>
<tr>
<td>Guizhou</td>
<td>2.9</td>
<td>4.4</td>
<td>19.8</td>
<td>31.4</td>
<td>25.0</td>
<td>45.2</td>
</tr>
<tr>
<td>Tibet</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Other</td>
<td>575.3</td>
<td>284.4</td>
<td>381.9</td>
<td>564.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2712.4</td>
<td>3193.7</td>
<td>41725.5</td>
<td>53504.7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Almanac of China’s Economy, various issues; China Statistical Yearbook, various issues.

The amounts of FDI inflows for 1984 are contracted values, and the amounts for other years are actually utilized values.
Chapter 5. FDI, Domestic Investment and Economic Growth

5.1 Introduction

As one of the world’s fastest growing economies, China has attracted a large amount of FDI over the last two decades and, since 1993, has been the largest FDI recipient amongst the developing countries. The amount of FDI inflows into China totalled $US488 billions\(^1\) during the period 1988-2003, with approximately 271,963 MNEs operating in China. Does this enormous amount of FDI in China crowd out domestic investment or complement it? Answering this question is important because a complementing relationship means a beneficial effect of FDI on growth irrespective of time horizons. Otherwise, FDI may be detrimental to economic growth in the long-run if not in the short-run.

Despite a large amount of literature on the subject, the role of FDI in economic growth remains highly controversial. The proponents of FDI argue that FDI helps promote economic growth through technology diffusion and human capital development (Broensztein et al. 1998; de Mello 1999; Kim and Seo 2003; Liu et al. 2002; Shan 2002 and Van Loo 1977). This is particularly the case when MNEs in a host economy have vertical inter-firm linkages with domestic firms or have sub-national or sub-regional clusters of inter-related activities. Through formal and informal links and social contacts among the employees, MNEs diffuse technology and management know-how to indigenous firms.

\(^1\) All statistics in this section are calculated from China Statistical Yearbook, 1980-2004, except the total amount of FDI of the developing countries, which is obtained from World Investment Report, 2003.
Consequently, economic rents are created accruing to old technologies and traditional management style. Also, FDI helps overcome capital shortage in host countries and complements domestic investment when FDI flows to high risk areas or new industries where domestic investment is limited (Noorzoy, 1979). When FDI occurs in resource industries, domestic investment in related industries may be stimulated. Moreover, FDI may result in an increased demand for exports from the host country, helping attract investment in the export industries. Empirical studies supporting these arguments include Sun (1998) and Shan (2002). Using the conventional regression model and panel data, Sun (1998) finds a high and significantly positive correlation between FDI and domestic investment in China. Shan (2002) uses a VAR model to examine the inter-relationships between FDI, industrial output growth and other variables in China. He concludes that FDI has a significantly beneficial impact on the Chinese economy when the ratio of FDI to industrial output rises.

On the contrary, opponents of FDI argue that FDI crowds out domestic investment, and has an adverse effect on growth (e.g. Huang 1998 and 2003; Braunstein and Epstein 2002). In particular, the industrial organisation theory stipulates that FDI is an aggressive global strategy by MNEs to advance monopoly power over and above indigenous firms of the host economy (Hymer 1960 and Caves 1971). The ownership-specific advantages of MNEs (e.g. advanced technologies, management know-how skills, transaction cost minimizing and other intangible advantages) could be transformed into monopoly power. This monopoly power can be further reinforced by the other two advantages of MNEs: the market internalization specific-advantage and the location-specific advantage (Dunning, 1981). For example, MNEs could control supplies of inputs in an industry of the host economy and gain the benefits of tax subsidy provided by the host government. This may strengthen the
competitive advantages of MNEs over indigenous firms. Eventually, domestic firms will be forced to exit. Based on this, FDI may substitute for domestic investment in the long run. The substitution effects can also occur when MNEs compete for limited investment opportunities in the host economy. In addition, FDI may disrupt backward linkages through substitution of imports for domestic commodities (Noorzoy, 1979). Empirical evidence backing up the views of FDI opponents can be found in Braunstein and Epstein (2002) and Huang (2003). Braunstein and Epstein (2002) fit a regression model to the 1986-1999 province-level panel data and find that FDI crowds out domestic investment in China. They point out that the social benefits of FDI are dissipated at least at the provincial level due to intense competition for FDI among the regions in China, which forces regions to reduce taxes, relax regulations on environmental protection, wages and working conditions. Huang (1998, 2003) holds that the Chinese investment policies are more “friendly” to foreign-invested enterprises (FIEs) than to domestic private firms. As a result, Chinese partners are eager to form FIEs with foreign investors. This type of investment, in which Chinese partners are major investors, occurs just for the FIE status. As a consequence, these FIEs exploit the preferential policies and even possess privileges in competing for local scarce resources. It is from this perspective that FDI crowds out domestic investment.

The present chapter contributes to the existing literature by applying a multivariate VAR system with the ECM and time series techniques of cointegration and innovation accounting to explore the possible links between FDI, domestic investment and economic growth in China. Specifically, we use the impulse response function and variance decomposition plus the Grange causality testing procedures to investigate whether: (1) FDI has complementary/substitution effect on domestic investment in China; (2) there exists any causal relationship between FDI, domestic investment and economic growth; (3) FDI
has played an important role in China’s economic growth; and (4) FDI contributes to
growth more than domestic investment. This chapter differs from earlier studies in a
number of respects. First, it represents the first attempt to directly identify or test the
relationship between FDI and domestic investment in China, offering insights into the
extensively-disputed FDI-growth nexus. Second, we use pure time-series data while
previous studies use either cross-sectional or panel data (e.g. Sun 1998; and Braunstein and
Epstein 2002), which are likely to suffer from problems of data comparability and
heterogeneity (Atkinson and Brandolini 2001; Srinivasan and Bhagwati 1999). Third,
earlier studies do not test for causality between FDI, domestic investment and economic
growth. The failure to consider the possible two-way causality between the variables may lead
to the simultaneity problem. Finally, our VAR model incorporates long-run dynamics or
ECM while others have not. Neglecting these dynamics in the VAR may produce various
estimation biases, giving rise to misleading analytical results.

The organization of the chapter is as follows. Section 5.2 offers an overview on FDI
inflows, domestic investment and economic growth in China. This is followed by
econometric analysis in Section 5.3. The final section of the chapter presents the conclusion
and some policy implications.

5.2 An overview of the FDI inflows, domestic investment and economic

Attracting FDI has been a key pillar of China’s “opening up” policies and economic
reforms. In the early 1980s, special economic zones were formed with preferential policies
including tax concessions and special privileges for foreign investors. During the reform period, the Chinese government also has developed various new legislations to improve investment conditions and the business environment in order to attract FDI.

Figures 5.1(a) and 5.1(b) show FDI inflows, domestic investment (DI) and GDP in China from 1978 to 2003. At the initial “opening up” period, FDI inflows were quite low, varying from 0.05 billion Chinese Yuan in 1983 to 1.3 billion Chinese Yuan in 1984. From 1984 until the early 1990s, FDI increased at an average rate of over 30% per annum. The total amount of FDI was still small and remained as low as 40 billion Chinese Yuan until 1992. In 1992, the famous “Southern Tour” by the Chinese leader, Deng Xiaoping, led to a new phase of FDI liberalization. During the Asian financial crisis period, the Chinese government further liberalized FDI policy. One such change was the abolition of the FDI project approval requirement. In December 2001, China joined the World Trade Organization (WTO), which marked a new era of FDI liberalization. China’s FDI inflows increased dramatically from 337 billion Chinese Yuan in 2000 to 388 billion Chinese Yuan in 2001 and by 2002 China had become the largest FDI host country in the world, attracting 437 billion Chinese Yuan of FDI.

As can be seen from Figure 5.1(b), a similar trend to that of FDI appears in the movement of domestic investment and GDP. China’s economic growth has also shown remarkable strength, increasing at an average annual rate of 9% since the economic reforms began in 1978. China has become one of the fastest growing economies in the world, in relation to which, many argue FDI has played an important role. For example, the growth rate of total exports averaged 12.6% between 1978 and 2002, notably the share of exports by foreign-

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2 Calculated from the various issues of China Statistical Yearbook.
invested enterprises (FIEs) was almost 50% in 2001. In line with the rapid growth in GDP and FDI, domestic investment\(^3\) in China demonstrated a significant increase with an average rate of 20% per annum from 1978 to 2003.

![Figure 5.1(a) Trend of FDI in China](image1)

![Figure 5.1(b) Trends of DI and GDP in China](image2)

Figure 5.2 shows the growth rates of FDI, DI and GDP in China during 1978-2003. Clearly, FDI growth reached multiple peaks of 168%, 132% and 161% in 1980, 1983 and 1991-1992, respectively, while domestic investment growth peaked in the same or subsequent years but well below the FDI growth rate until 1994. GDP also showed a similar growth trend to FDI and domestic investment, reaching its peaks in 1984, 1987 and 1993. Overall, Figures 5.1 and 5.2 demonstrate that both FDI and domestic investment display an upward trend, matching the economic growth trend of GDP during the period 1978 to 2003.

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\(^3\) The domestic investment in this chapter is the aggregate investment which excludes all types of foreign investments.
Table 5.1 presents the ratios of FDI to GDP, DI to GDP and FDI to DI from 1978 to 2003. As can be seen, the proportions of FDI to GDP (column 2) were quite low and less than 1% during 1978 to 1990. It increased to a peak value of 6.2% in 1994 and then steadily decreased to 3.8% in 2003. The proportion of DI to GDP was 18.5% in 1978 and increased steadily to 47.6% in 2003. The proportion of FDI to DI has increased dramatically from 0.1% in 1978 to 1.7% in 1984, and by 1994 it has reached an all time high of 18.1%. After then, it gradually decreased to 8.0% in 2003.

Figures 5.3(a)-5.3(c) plot DI against FDI, GDP against FDI, and GDP against DI, respectively. They clearly depict positive relationships between FDI and DI, FDI and GDP, and GDP and DI. It appears that FDI inflows to China have had complementary effects on domestic investment hence spurring economic development and growth. However, such a scatter plot is far from being conclusive in drawing any causal relationship. Thus, a formal econometric analysis is required which is performed in the next section.
Table 5.1 The Ratios of FDI to GDP, DI to GDP and FDI to DI (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>FDI/GDP</th>
<th>DI/GDP</th>
<th>FDI/DI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>0.01</td>
<td>18.45</td>
<td>0.07</td>
</tr>
<tr>
<td>1979</td>
<td>0.06</td>
<td>17.32</td>
<td>0.36</td>
</tr>
<tr>
<td>1980</td>
<td>0.06</td>
<td>20.16</td>
<td>0.28</td>
</tr>
<tr>
<td>1981</td>
<td>0.14</td>
<td>19.02</td>
<td>0.74</td>
</tr>
<tr>
<td>1982</td>
<td>0.15</td>
<td>22.10</td>
<td>0.70</td>
</tr>
<tr>
<td>1983</td>
<td>0.21</td>
<td>22.98</td>
<td>0.93</td>
</tr>
<tr>
<td>1984</td>
<td>0.41</td>
<td>24.57</td>
<td>1.66</td>
</tr>
<tr>
<td>1985</td>
<td>0.54</td>
<td>27.35</td>
<td>1.99</td>
</tr>
<tr>
<td>1986</td>
<td>0.63</td>
<td>29.24</td>
<td>2.16</td>
</tr>
<tr>
<td>1987</td>
<td>0.72</td>
<td>30.18</td>
<td>2.38</td>
</tr>
<tr>
<td>1988</td>
<td>0.80</td>
<td>29.33</td>
<td>2.71</td>
</tr>
<tr>
<td>1989</td>
<td>0.75</td>
<td>24.36</td>
<td>3.10</td>
</tr>
<tr>
<td>1990</td>
<td>0.90</td>
<td>22.82</td>
<td>3.94</td>
</tr>
<tr>
<td>1991</td>
<td>1.08</td>
<td>24.40</td>
<td>4.41</td>
</tr>
<tr>
<td>1992</td>
<td>2.28</td>
<td>28.57</td>
<td>7.98</td>
</tr>
<tr>
<td>1993</td>
<td>4.58</td>
<td>34.99</td>
<td>13.09</td>
</tr>
<tr>
<td>1994</td>
<td>6.22</td>
<td>34.34</td>
<td>18.12</td>
</tr>
<tr>
<td>1995</td>
<td>5.36</td>
<td>31.17</td>
<td>17.19</td>
</tr>
<tr>
<td>1996</td>
<td>5.11</td>
<td>30.36</td>
<td>16.83</td>
</tr>
<tr>
<td>1997</td>
<td>5.04</td>
<td>30.32</td>
<td>16.62</td>
</tr>
<tr>
<td>1998</td>
<td>4.80</td>
<td>33.31</td>
<td>14.42</td>
</tr>
<tr>
<td>1999</td>
<td>4.07</td>
<td>33.81</td>
<td>12.03</td>
</tr>
<tr>
<td>2000</td>
<td>3.77</td>
<td>35.12</td>
<td>10.73</td>
</tr>
<tr>
<td>2001</td>
<td>4.04</td>
<td>37.79</td>
<td>10.70</td>
</tr>
<tr>
<td>2002</td>
<td>4.17</td>
<td>41.00</td>
<td>10.16</td>
</tr>
<tr>
<td>2003</td>
<td>3.82</td>
<td>47.56</td>
<td>8.04</td>
</tr>
</tbody>
</table>

Sources: China Statistical Yearbook various issues.
Figure 5.3(a) DI vs FDI

Figure 5.3(b) GDP vs FDI
5.3 Empirical analysis

Data and unit root test

Quarterly time series data (1988:1 to 2003:4) for FDI, DI and GDP are available and all in current prices of the Chinese currency (CYN). They are compiled from China Monthly Statistics (1987:1-2004:3), Comprehensive Statistical Data and Materials for 50 years of New China and the various issues of China Statistical Yearbook, all published by the National Bureau of Statistics (NBS) of China. GDP quarterly time series is constructed on the basis of the monthly gross industrial output (GIO) and the yearly GDP statistics due to lack of quarterly and monthly GDP statistics. It is found that the annual growth pattern of GDP is similar to that of GIO, and following Liu, Song and Romilly (1997) and Liu, Burridge and Sinclair (2002), quarterly GDP is estimated by using the relationship:

\[ GDP_{t,q} = g_t \times GIO_{t,q} \quad q = 1, \ldots, 4 \quad t = 1988, 1989, \ldots, 2003 \]

where \( g_t \) is the annual GDP/GIO ratio and \( GIO_{t,q} \) is the quarterly value of GIO.

Due to China’s centrally planned economic regime, many time-series from China display a regular pattern of large seasonal fluctuations (Rawski, 2002). This is indeed the case for the FDI, DI and GDP (see Figures 5.4). To permit seasonality when conducting cointegration analysis and model estimation, a variable of centered (orthogonalized) seasonal dummies is incorporated. The standard 0-1 seasonal dummy variables will affect both the mean and the
trend of the level series in a VAR system but the centered seasonal dummy variable only shifts the mean without contributing to the trend (Johansen, 1995).

Figure 5.4(a) The original series of FDI 1988:1-2003:4

Figure 5.4(b) The original series of DI 1988:1-2003:4

Figure 5.4(c) The original series of GDP 1988:1-2003:4
In this chapter, we employ the augmented Dickey-Fuller (ADF) test to test the stationarity of the three time series FDI, DI and GDP. As can be seen from Figures 5.4(a) to 5.4(c), the three series appear to be non-stationary in level form. Therefore, we investigate the stationarity of the first difference of the three series by testing for unit roots. The ADF tests are as same as the one discussed in Chapter 4 and we do not repeat the procedure in this chapter again.

The results of the ADF test are reported in Table 5.2. The results indicate that all three first differenced series are stationary. Therefore, we conclude that the three time series are all integrated of order one, I(1).

Table 5.2 ADF test for a unit root on the first difference series

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model (1)</th>
<th>Model (2)</th>
<th>Model (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No constant &amp; no trend</td>
<td>Constant &amp; No trend</td>
<td>Constant &amp; trend</td>
</tr>
<tr>
<td>FDI</td>
<td>-7.26***</td>
<td>-7.46***</td>
<td>-7.44***</td>
</tr>
<tr>
<td>DI</td>
<td>-8.40***</td>
<td>-8.49***</td>
<td>-8.53***</td>
</tr>
<tr>
<td>GDP</td>
<td>-4.71***</td>
<td>-5.60***</td>
<td>-6.12***</td>
</tr>
</tbody>
</table>

Notes: *** denotes significance at the 1% levels.
Cointegration test

Now, the cointegration test is performed to investigate any long-run equilibrium relationships among the three variables of FDI, DI and GDP. After a careful search and trial, a model with 6 lags, constant and centered seasonal dummy variable was chosen. The result of the Johansen cointegration rank test is summarized in Table 5.3, which indicates presence of two cointegrating vectors at 1% and 5% levels of significance, respectively (i.e., the null hypotheses of no cointegration is rejected for rank of zero and less than or equal to 2). This means that there exists a long-run relationship among the three variables.

### Table 5.3 Johansen co-integration tests

<table>
<thead>
<tr>
<th>Null (H0)</th>
<th>Alternative (H1)</th>
<th>$\lambda_{max}$</th>
<th>95% CV</th>
<th>$\lambda_{trace}$</th>
<th>95% CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rank = 0</td>
<td>r $\geq$ 1</td>
<td>30.02**</td>
<td>23.78</td>
<td>46.01**</td>
<td>34.55</td>
</tr>
<tr>
<td>Rank $\leq$ 1</td>
<td>r $\geq$ 2</td>
<td>10.06</td>
<td>16.87</td>
<td>15.99</td>
<td>18.17</td>
</tr>
<tr>
<td>Rank $\leq$ 2</td>
<td>r $\geq$ 3</td>
<td>5.94*</td>
<td>3.74</td>
<td>5.94*</td>
<td>3.74</td>
</tr>
</tbody>
</table>

Note: * and ** denote rejection of the null hypothesis at the 5% and 1% significance levels, respectively.

The error correction model

To analyze the causal relationship between the three variables FDI, DI and GDP, we use an ECM of the following VAR system:

$$
\Delta FDI_t = a_1 + a_{di} \hat{c}_{t-1} + \sum_{i=1}^{\xi} a_{11} (i) \Delta FDI_{t-i} + \sum_{i=1}^{\xi} a_{12} (i) \Delta DI_{t-i}
$$
\[
\Delta D_I_t = \alpha_2 + \alpha_{di} \hat{e}_{t-1} + \sum_{i=1}^{k} \alpha_{21}(i) \Delta FDI_{t-i} + \sum_{i=1}^{k} \alpha_{22}(i) \Delta D_I_{t-i} + \sum_{i=1}^{k} \alpha_{23}(i) \Delta GDP_{t-i} + \beta_2 D_t + \varepsilon_{dit} \tag{2}
\]

\[
\Delta GDP_t = \alpha_3 + \alpha_{gdp} \hat{e}_{t-1} + \sum_{i=1}^{k} \alpha_{31}(i) \Delta FDI_{t-i} + \sum_{i=1}^{k} \alpha_{32}(i) \Delta D_I_{t-i} + \sum_{i=1}^{k} \alpha_{33}(i) \Delta GDP_{t-i} + \beta_3 D_t + \varepsilon_{gdpt} \tag{3}
\]

where

\[FDI_t = \text{FDI inflows in China during period } t;\]

\[D_I_t = \text{gross capital formation represents domestic investment but}\]
\[\text{excludes any forms of foreign investment during period } t;\]

\[GDP_t = \text{gross domestic product represents economic growth during period } t;\]

\[\hat{e}_{t-1} = \text{the error-correction term};\]

\[D_t = \text{the centered seasonal dummy variable};\]

\[\alpha_i, \alpha_{ij}(i) \text{ and } \beta_i = \text{the parameters};\]

\[\varepsilon_{dit}, \varepsilon_{dit} \text{ and } \varepsilon_{gdpt} = \text{white-noise disturbance terms that may be correlated with each other}.\]

When fitted to the Chinese data, the VAR system performs quite well. As reported in Table 5.4. None of the diagnostic statistics are significant at the 95% critical value and, therefore, there is nothing to suggest that the system model is misspecified. The R² - values are 76%, 83% and 96% for equations (1), (2) and (3), respectively. Based on the Schwartz (1978) and Akaike (1974) information criteria, the number of lags is choosen as six.
Table 5.4 VAR Model diagnostics

<table>
<thead>
<tr>
<th></th>
<th>∆FDI_t</th>
<th>∆DI_t</th>
<th>∆GDP_t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adj-R²</td>
<td>0.76</td>
<td>0.83</td>
<td>0.96</td>
</tr>
</tbody>
</table>

Autocorrelation test for the model
LM (1), CHISQ (9) = 15.061, P-value = 0.09; LM (8), CHISQ (9) = 11.47, P-value = 0.24

Normality test for the model
CHISQ (3) = 5.55, P-value = 0.06

Innovation accounting and Granger causality test

The innovation accounting (variance decomposition and impulse response function) technique can be utilised to examine the relationships among economic variables (e.g. Jin and Yu 1996; Borensztein, De Gregorio and Lee 1998; Kilian 1998; Shan 2002; Shan 2002b; Zhang, Bessler and Leatham 2006). Relying on this technique, Kim and Seo explore the complementary or substitution relationship between FDI and domestic investment, and analyse the impact of FDI on economic growth. On the other hand, the forecast error variance decomposition allows us to make inference over the proportion of movements in a time series due to its own shocks versus shocks to other variables in the system (Enders 1995, p311). For example, if \( \varepsilon_{gdpt} \) shocks explain none of the forecast error variance of \( \Delta FDI_t \) at all forecast horizons, we can say that the \( \Delta FDI_t \) sequence is exogenous. In such a circumstance, the \( \Delta FDI_t \) sequence would evolve independently of the \( \varepsilon_{gdpt} \) shocks and the \( \Delta GDP_t \) sequence. The impulse response function analysis is a practical way to visualize the behaviour of a time series in response to various shocks in the system (Enders 1995, p306). For example, plotting the impulse response function can trace out the effects of shocks to \( \varepsilon_{fdit} \) or \( \varepsilon_{gdpt} \) on the time paths of the \( \Delta GDP_t \) or \( \Delta FDI_t \) sequences.
Within a ten-year forecasting horizon, the variance decomposition results are reported in Table 5.5. In the case of China, the innovations in FDI are explained largely by its own past values (90.8%), only 2.4% due to past domestic investment, and 1.9% to past GDP. The innovations in DI are mainly explained by its own past values (80.0%), followed by GDP (40.8%) and FDI (3.5%). The innovations in GDP also are mainly explained by its own past values (57.3%), followed by DI (17.6%) and FDI (5.7%).

<table>
<thead>
<tr>
<th>Percent of forecast error variance in</th>
<th>Typical shock in</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FDI</td>
</tr>
<tr>
<td>FDI</td>
<td>90.8</td>
</tr>
<tr>
<td>DI</td>
<td>2.4</td>
</tr>
<tr>
<td>GDP</td>
<td>1.9</td>
</tr>
</tbody>
</table>

These results suggest the strength of the relationships between FDI, domestic investment and economic growth are different. FDI plays an important role in China’s economic growth but its influences are less than that of domestic investment (5.7% vs 17.6%). GDP shows stronger influences on China’s domestic investment than FDI does (40.8% vs 3.5%). The influences of DI and GDP on FDI are relatively low (2.4% and 1.9%, respectively). But the relationship between GDP and DI is strong, with 40.8% influence from GDP to DI and 17.6% in reverse. It is noted that each of the three variables explains the preponderance of its own past values (forecast error variances). This means that the current/past FDI, DI and GDP have strong influences on their own future/current trends.
Table 5.6 presents the Granger causality test results for the three variables. The results show that: i) the effects of DI and GDP on FDI are not statistically significant; ii) the effects of FDI and GDP on DI are statistically significant; iii) the effects of FDI and DI on GDP are statistically significant. Thus, FDI affects DI and GDP but not the reverse, whereas, the causal links between GDP and DI are bi-directional. These findings confirm the results of the variance decomposition analysis.

Table 5.6 Results of Granger causality test among FDI, DI and GDP

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>∆FDIt</th>
<th>∆DIt</th>
<th>∆GDPt</th>
</tr>
</thead>
<tbody>
<tr>
<td>∆FDIt</td>
<td></td>
<td>3.98</td>
<td>4.38</td>
</tr>
<tr>
<td>∆DIt</td>
<td>24.63**</td>
<td></td>
<td>26.06**</td>
</tr>
<tr>
<td>∆GDPt</td>
<td>20.15**</td>
<td>16.20*</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion

FDI ⇒ DI
FDI ⇒ GDP
DI ⇒ GDP
GDP ⇒ DI

Note: * and ** reject null hypothesis at 5% and 1%, respectively.

We now use the impulse response function to reveal the dynamic causal relationships between FDI, domestic investment and economic growth. Figure 5.5 presents impulse responses to a shock in FDI. Clearly, the impact of the shock on FDI itself is strong. FDI has reverted to its mean level after an immediate sharp decline. This confirms that FDI level in China depends very much on its past values. The effect on DI is to cause a moderate immediate decrease, then some rises, even outweighing the initial decrease. It is interesting to note that the peaks and troughs of FDI are almost always at the opposite positions of DI. Overall, the shock causes an upward and slight shift in the mean of DI. This confirms that FDI does not crowd out domestic investment in China. It also implies that metaphorically, a shortage of domestic investment in China did call for FDI, and the
larger FDI the more domestic investment. The upward movement of GDP due to a shock to FDI indicates that FDI has a positive impact on China’s economic growth.

Figure 5.5 Impulse responses to a shock in FDI

Figure 5.6 presents the impulse responses of a shock in DI. The impact of DI on itself is strong. It has reverted to its mean level after an immediate drop. The shock in DI has a more moderate impact on GDP. GDP has reverted above its original level after an initial decrease but its mean level has remained unchanged. The impact of the shock on FDI is minimal. These findings are consistent with the variance decomposition analysis and the Granger causality test that DI is determined very much by its own past values, domestic investment plays a crucial role in China’s economic growth, and there is not much effect of domestic investment on FDI.

Figure 5.6 Impulse responses to a shock in DI
Figure 5.7 shows the impulse responses of a shock in GDP. A shock in GDP results in a strong impulse response from GDP itself. GDP has reverted to its original level after an initial decline, but afterwards resuming its fluctuation pattern. The shock in GDP has a more moderate impact on domestic investment. DI declines continuously, and then reverts back to its original level.

It is useful to point out that the fluctuations of DI almost coincide with those of the GDP - the higher level of DI, the greater GDP. The impact of GDP on FDI is small - FDI reverts to its mean level after some fluctuations. These results suggest that GDP is strongly influenced by its own past values, the causal link between GDP and domestic investment is strong, but the impact of GDP on FDI is minimal.

5.4 Summary and policy implications

Using a VAR system with ECM, we have found that (a) FDI plays an important role in complementing domestic investment in China, the larger FDI the greater the domestic investment. Further, FDI has a significant effect on China’s economic growth; (b) China’s domestic investment and economic growth are positively correlated; great economic growth
spurs large domestic investment, and vice versa; (c) China’s domestic investment and GDP do not have much impact on FDI inflows in the long-run. The causal link between GDP and DI is bi-directional, but there is only a one-way directional causality from FDI to DI and FDI to GDP; (d) China’s domestic investment has a greater impact on growth than FDI does. This lends some support to the theoretical view that FDI has complementary effects on domestic investment, and that long-run economic growth is positively associated with FDI. This also confirms the findings of Sun (1998) and Shan (2002).

These findings do have some important implications for policy makers in China and elsewhere. Since FDI complements domestic investment, less developed countries ought to encourage and promote FDI inflows, for which appropriate FDI policies and regulations are required. For example, the host governments not only should encourage FDI inflows, they should also impose regulations on MNEs to urge them to undertake export obligations or encourage direct foreign investors to invest in high risk areas or in resource industries where domestic investment is limited. In the case of China, particularly, quality FDI should be encouraged to invest in the primary and secondary industries, and in less developed western regions. Moreover, since an important channel of technology diffusion and spill-over of management know-how by MNEs is vertical inter-firm linkages with domestic firms, host governments could impose regulations on MNEs to intensify generation of local linkages. Finally, any host government should not blindly reduce taxes, environmental protections, wages, working conditions and change regulations in exchange for FDI. Such a practice may create adverse FDI externalities on growth. Given that China’s domestic investment exerts much greater contributions to growth than FDI, encouraging and promoting domestic savings should take precedence over attracting FDI in designing and executing investment strategies and investment policies in China.
Chapter 6. The Relationship between FDI and Tourism

6.1 Introduction

Tourism is one of the most important industries in many countries around the world and is one of the main export services in a domestic economy. FDI plays an increasingly important role in the global economy and has an enormous impact on a domestic economy, and its tourism industry, in particular. Internationalisation is a common character linking FDI and tourism but very few empirical studies have analysed whether and how they are linked. For example, the studies by Sanford and Dong (2000) and Tisdell and Wen (1991) discussed only the relationship between FDI and tourism without any econometric analysis. Studies by Dunning and McQueen (1981), Contractor and Kundo (1995) and Kundo and Contractor (1999) considered the impact of international hotels FDI on tourism using a standard regression model. Further, regarding statistical techniques used in previous FDI and tourism studies, it is argued that they are insufficient and poor (e.g. see Tisdel and Wen, 1991; and Sanford and Dong, 2000).

The current study focuses on the empirical analysis of the relationship between FDI and tourism in China. China has been the largest FDI host country in the world in 2002. At the time China opened its economy to the outside world, FDI inflows increased dramatically from a very low level of US$0.16 billion in 1979 to the level of US$52.743 billion in 2002\(^1\). FDI in China’s hotel industry increased from US$5 billion at the end of

\(^1\) China Statistical Yearbook 2003.
1980s to U$20 billion at the end of 1996. To reflect this increase in FDI, correspondingly, the international hotels in China increased from 14 units in 1980 to 833 by the end of 2000. China plays a leading role in absorbing FDI among emerging economies and developing countries. China has had enormous growth in GDP at an average annual rate of 10% over the last two decades. FDI has played a key role in China’s dramatic economic growth. The inward FDI stocks reached 23.5% of China’s GDP in 1997. Coupled with the influx of FDI in China, a surge in inbound international travel to China has correspondingly emerged in the last two decades. China is the largest tourist recipient country in the world and its international tourist arrivals totalled 83.5 million in 2000 compared to the 1.8 million international visitors in 1978. China was ranked fifth amongst the world’s top tourism destinations in 2000. Moreover, China’s tourism receipts in 2000 were U$16.2 billion which placed it as seventh in the world. This FDI accounted for 4.88% of China’s GDP, 52% of China’s total service trade and 6.86% of China’s total export. World Tourism Organisation (WTO) predicted that, by 2020, China would become the world’s leader in international tourist arrivals receiving 145 million international visitors and its total tourism earnings will be U$75 billion (approximately 8% of China’s GDP). China’s GDP, FDI and tourism, have each maintained an impressive rapid growth rate during 1979 – 2000 at an annual average of 10%, 37% and 16%, respectively.

2 Tourism investment directory in China.
4 Calculated from various issues of China Statistical Yearbook.
5 Calculated from World Bank Data on line, various issues of World Investment Report and China Statistical Yearbook.
7 World Tourism Organisation Source on line, April 2002, “Asia and Pacific Report.”
8 China Tourism Development: 15 Years Plan and Outlook of 2015 and 2020.
9 World Tourism Organisation Source on line, April 2002, “Interview with H.E. Mr. Guangwei He, Chairman of the China National Tourism Administration (CNTA).”
10 Calculated from the various issues of China Statistical Yearbook and Yearbook of China Tourism Statistics.
The organisation of the remaining parts of the chapter is as follows. Section 6.2 provides an overview of previous research on FDI and tourism, and empirical evidence from China that demonstrates the relationship between FDI and tourism. In Section 6.3, we present the data and the econometric methodology for testing the stationary properties of the time series (including co-integration) and in Section 6.4 we investigate the direction of causality. Finally, in Section 6.5, we present the conclusion.

6.2 An overview

In terms of FDI, there are many FDI theories and most of them try to reveal determinants of FDI or why firms wish to engage in FDI activities abroad. Among all these theories, the eclectic theory (also known as OIL theory) has been viewed as the main contributor of the FDI theories. It combines a macro-economic theory of international trade with a micro-economic theory of the firm and attempts to combine all the existing FDI theories into a single, unified analytical framework. The principal hypothesis of the eclectic theory is that the level and structure of a firm’s FDI activities will depend on its ownership (O), market internalisation (I) and location (L) specific advantages. However, tourism has not been explicitly addressed as a specific advantage to determine FDI activities by the eclectic theory or any other FDI theories.

In fact, it is argued, that tourism should be an important location specific determinant of FDI. More tourists would generate greater demand for hotels and as a result more investment would be required. Along with internationalisation, the international hotel industry has been becoming more global. The international hotel giants (chains) spread hotel brands into all competitive corners around the world, hence influencing FDI, to meet
the growing tourism demand, especially for international tourism. Moreover, international tourism allows potential investors to experience first-hand the environment of the country being visited and obtain information about the available investment opportunities. By experiencing the country’s goods and services, opportunities for investment may be identified (Sanford and Dong, 2000). Investment in the tourism industry would lead to improved tourist infrastructure such as excellent hotels and transport facilities and new tourist attractions such as theme parks etc which could result in increase in tourism activities.

There are only a few published empirical studies analysing the link between inward FDI and tourism in a host country, even though it is well known that FDI and tourism simultaneously play an important role in the economic development of a country. Dunning and McQueen (1981), Contractor and Kundu (1995), Kundu and Contractor (1999), and Dunning and Kundu (1995) have researched the link between FDI and tourism and found that the rate of growth of tourism, particularly business tourism, are important determinants of international hotel FDI. These four studies focused their analysis only on the international hotel industry but did not discuss the relationship between overall FDI and tourism. Tisdell and Wen (1991) studied mainly the investment in the Chinese tourism industry during the period 1979–1988, in which FDI inflows in tourism industry has been discussed mainly from the aspect of policy issues. Tisdell and Wen also showed that the fast growth rate of tourism in China is one of the driving forces of foreign investment in China’s tourism industry. This is a qualitative study and does not explain the causality relationship between tourism and the aggregate FDI inflows in China. In a recent study for the US, Sanford and Dong (2000) found that tourism and change in tourism significantly affect subsequent new FDI. They also added that the relationship between tourism and new
FDI varies by industry, with firms in the service sector more responsive to tourism flows. Sanford and Dong also acknowledge the limitations of their study, for instance, the methodology may not be adequate lacking causality analysis. Further, the review of the above FDI and tourism studies also reveals that most of these studies are qualitative and/or used a single equation approach. Moreover, these studies mentioned above did not attempt to investigate the direction of the causality relationship between FDI and tourism. In terms of econometrics methodology, it is argued that the reliability of the results from such studies is doubtful and that a high priority should be given to developing complete simultaneous equation models (Lim, 1997; Song et al., 1997; Witt and Witt, 1995; Shan and Wilson, 2001; and Gupta, 1983). In general, the causality between FDI and tourism is not only running from tourism to FDI, but it can also be from FDI to tourism. FDI is made outside the home country of the investing firm but the control of using the resources still remains with the investor. Challenges faced by the foreign investors include grappling with different cultures and learning new economic and political structures. In order to assure profitability, MNEs need much more detailed and complex first-hand information and resources than those normally available through government or industry publications on which to base their FDI decisions regarding entry mode, location siting in host countries, issues of material supplies, transportation, production, management etc. This naturally creates a surge of international business travel. Subsequently, family members of staff and some other employees may travel to get first-hand information by themselves. Moreover, with particular reference to the tourism industry, FDI generates the development of new tourist venues (hotels) and facilities which in turn attracting more tourists. As an offshoot of FDI, export-oriented FDI leads to greater trade, while on the other hand, an increase in trade is likely due to a growing awareness of the products, materials, services and industries
operating in each country. This is in turn generating the cyclical effect of investigative business and holiday travel resulting in greater tourism.

International studies on tourism demand, applying either pure time series or regression models, have dominated the tourism literature in the recent past. Lim (1997) comprehensively surveyed about 100 published tourism studies and found that the major determinants influencing tourism demand are consumer’s income, relative prices, transportation cost and exchange rates. In addition, business travel (Kulendran and Wilson, 2000; Lim, 1997), trade (Shan and Wilson, 2001) and political risk (Poirier, 1997) are also found to be important components forming tourism demand. In relation to China’s tourism, published research seems to focus mainly on the tourism sector alone (Tisdell and Wen, 1991; Wen and Tisdell, 1996; Tisdell, 1996; Lew and Yu, 1995; and Xu, 1999), except the recent study which explored the causal link between tourism and trade in China (Shan and Wilson, 2001). However, there is an apparent lack of research that explores the impact of FDI as a determinant of tourism demand.

Table 6.1 presents the number of tourist arrivals and the FDI from selected countries into China. As can be seen, in general, the countries from which China has the largest number of tourist arrivals had also contributed more to the FDI in China. This study uses the FDI at aggregate level as individual country specific long-term time series data for FDI are not available.
Table 6.1 Tourism, trade and FDI by selected country or territory in China

<table>
<thead>
<tr>
<th></th>
<th>Tourists arrivals (10000 persons)</th>
<th>FDI (USD 100million)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1999</td>
<td>2000</td>
</tr>
<tr>
<td>Hong Kong &amp; Macao</td>
<td>6167</td>
<td>7010</td>
</tr>
<tr>
<td>Taiwan</td>
<td>259</td>
<td>311</td>
</tr>
<tr>
<td>Japan</td>
<td>186</td>
<td>220</td>
</tr>
<tr>
<td>Korea</td>
<td>99</td>
<td>135</td>
</tr>
<tr>
<td>USA</td>
<td>74</td>
<td>90</td>
</tr>
<tr>
<td>UK</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>Germany</td>
<td>22</td>
<td>24</td>
</tr>
</tbody>
</table>

Source: China Statistical Yearbook, varies issues.

6.3 Data, methodology and empirical analysis

In order to empirically investigate the causality between FDI and tourism (TOUR), we specify the following bivariate vector autoregressive VAR system of order p for the pair of the two variables FDI and TOUR. Such a VAR system has been recommended as it provides more robust estimates (e.g. Zapata and Rambaldi, 1997; Gujarati, 1995).

\[
\text{FDI}_t = \mu_1 + \sum_{i=1}^{p} \alpha_{i1} \text{FDI}_{t-i} + \sum_{i=1}^{p} \beta_{i1} \text{TOUR}_{t-i} + e_{1t} \quad (1)
\]

\[
\text{TOUR}_t = \mu_2 + \sum_{i=1}^{p} \alpha_{i2} \text{FDI}_{t-i} + \sum_{i=1}^{p} \beta_{i2} \text{TOUR}_{t-i} + e_{2t} \quad (2)
\]

The null hypothesis of "TOUR doesn't Granger cause FDI (TOUR \( \not\rightarrow \) FDI)" can be tested by using a standard F-test or Wald test of the joint hypothesis

\[H_0: \beta_{11} = \beta_{21} = \ldots = \beta_{p1} = 0.\]
TOUR is said to cause FDI in the Granger sense if the above null hypothesis is rejected. (That is, at least one of the $\beta_i$'s for $i=1,\ldots, p$ is statistically significant.) Similarly, the null hypothesis of "FDI doesn't Granger causes TOUR (FDI $\not=>$ TOUR)" can be tested by defining the null hypothesis

$$H_0: \alpha_{12} = \alpha_{22} = \ldots = \alpha_{p2} = 0.$$ 

FDI is said to cause TOUR in the Granger sense if the null hypothesis is rejected. For the above hypotheses testing it is assumed that the time series FDI and TOUR involved in equations (1) and (2) are stationary. If the time series are nonstationary, then we could use the stationary differenced form of the time series. Sims (1980) and others such as Doan (1992), recommended against differencing even if the time series are nonstationary. They argued that the goal of the VAR analysis is to determine the interrelationships among the variables, not the parameter estimates (p301, Enders, 1995). However, if the two time series FDI and TOUR are non-stationary (or contain a unit root), it is important to test whether they are co-integrated, as this affects the causality test results (Toda and Phillips, 1993; Mosconi and Giannini, 1992; Sims et al, 1990; Granger, 1986). Therefore as a starting point, we investigate whether the two time series are stationary or not.

The data used in this chapter are quarterly time series FDI$_t$ (inward foreign direct investment to China) and TOUR$_t$ (total international tourist arrivals in China) in logarithms and for the period 1985:1 to 2001:3, which are collected from the data sources of China Monthly Statistics (1987:1–2001:3) published by China Statistics and Information Consultancy Service Centre, State Bureau of Statistics, China; The Yearbook of China Tourism Statistics (1985-2001) published by National Tourism Administration of the
Figures 6.1 and 6.2 show the plots of the original time series of the two variables FDI and tourism (TOUR) in logarithmic forms. As can be seen, there is a clear upward trend in both series indicating that the means are changing over time and hence both series in levels may not be stationary. Such a view is also supported by the plots of the autocorrelations of the two series (not presented in the chapter), which die down slowly. Figures 3 and 4 are the plots of the first-differenced series of tourism and FDI. These two plots suggest no evidence of changing means indicating that the tourism and FDI series may be integrated of order one, that is, both time series are I(1). This conclusion is also further supported by the correlograms of the two first-differenced series, which die out rapidly (not presented in the chapter). To statistically validate these findings, we

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Figure 6.1 The original series of tourism (TOUR), (in natural logs), China 1985:1-2001:3

---

11 The quarterly data of FDI over period from 1985 to 1996 was sought from China Statistics and Information Consultancy Service Centre, State Bureau of Statistics, China.
Figure 6. 2 The original series of FDI (in natural logs), China 1985:1-2001:3

Figure 6. 3 The first differenced series of tourism (TOUR) (in natural logs), China 1985:1-2001:3

Figure 6. 4 The first differenced series of FDI, (in natural logs), China 1985:1-2001:3
formally test the stationarity of these two series using the Augmented Dickey-Fuller (ADF) unit-root test.

The ADF test was carried out on the time series of FDI and TOUR by estimating the following three regression models (3)-(5) for the presence of unit roots as discussed in Chapter 4.

The number of lagged terms is chosen to ensure that the errors are uncorrelated. To reinforce our analysis, the Phillips-Perron (PP) test was also employed as recent Monte Carlo studies have found that the Phillips-Perron test has greater power to reject a false null hypothesis of a unit root (Enders, 1995, p242). The sample size used in the estimation is 67. Estimation was carried out using the econometric software SHAZAM and the test used for the presence of unit roots is the systematic procedure described in Enders (1995). The results of the ADF test for stationarity on the original series are presented in Table 6.2. As can be seen, both series in level form are non-stationary. The PP test also showed similar results.

From Figures 6.1 and 6.2, we also notice a possibility of structural change has taken place for both series (for tourism around 1989(3) and for FDI around 1993(2)). It is well known that the ADF test is biased towards accepting the null of unit root when there are structural breaks. Perron (1989) developed a testing procedure to test for unit roots in the presence of a structural break at a particular point in time. Table 3 presents the value of the test statistics of the Perron (1989) test at various lag lengths. The critical values for these tests are obtained from Perron (1989). As can be seen, we are still unable to reject the null hypothesis of a unit root.
### Table 6.2 Augmented Dickey-Fuller test results for a unit root on the level form of the two series

<table>
<thead>
<tr>
<th>Model</th>
<th>Null hypothesis</th>
<th>Critical value</th>
<th>Tourism Results</th>
<th>FDI Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Data-based value of the test statistic</td>
<td>Data-based value of the test statistic</td>
</tr>
<tr>
<td>Constant and trend</td>
<td>$H_0: \gamma = 0$</td>
<td>-3.13</td>
<td>Do not reject $H_0$</td>
<td>-2.95</td>
</tr>
<tr>
<td>Constant and trend</td>
<td>$H_0: \alpha_0 = \gamma = 0$</td>
<td>5.34</td>
<td>Do not reject $H_0$</td>
<td>2.889</td>
</tr>
<tr>
<td>Constant and no trend</td>
<td>$H_0: \alpha_0 = \gamma = 0$</td>
<td>-2.57</td>
<td>Do not reject $H_0$</td>
<td>-1.285</td>
</tr>
<tr>
<td>Constant and no trend</td>
<td>$H_0: \alpha_0 = \gamma = 0$</td>
<td>3.78</td>
<td>Reject $H_0$</td>
<td>1.395</td>
</tr>
<tr>
<td>Constant and no trend</td>
<td>$H_0: \gamma = 0$</td>
<td>-1.62</td>
<td>Do not reject $H_0$</td>
<td>-0.285</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>${\text{TOUR}}$ has a unit root and the series is non-stationary</td>
<td>${\text{FDI}}$ has a unit root and the series is non-stationary</td>
</tr>
</tbody>
</table>

* Significant level at the 5 percent level.

### Table 6.3 Perron Test statistics for a unit root in the presence of structural change

<table>
<thead>
<tr>
<th>Variable/Lags</th>
<th>TOUR</th>
<th>FDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-2.43</td>
<td>-2.31</td>
</tr>
<tr>
<td>1</td>
<td>-2.00</td>
<td>-2.30</td>
</tr>
<tr>
<td>3</td>
<td>-0.12</td>
<td>-0.85</td>
</tr>
<tr>
<td>5</td>
<td>-2.20</td>
<td>-3.27</td>
</tr>
</tbody>
</table>

Value of $\lambda$ = 23/67 = 0.3

Critical values: -3.76 - 3.76
Another issue which needs to be considered is the seasonal unit roots of the time series.

Figure 6.1 shows very little seasonal pattern on the tourism series while Figure 6.2 shows a quarterly seasonal pattern. In order to investigate the possibility of seasonal unit roots in the series, we apply the commonly used HEGY (Hylleberg et al, 1990) test. This test is based on the following auxiliary regression model:

\[
y_{4t} = \pi_1 y_{1t-1} + \pi_2 y_{2t-1} + \pi_3 y_{3t-2} + \pi_4 y_{3t-1} + \epsilon_t
\]

(3)

where

\[
y_{4t} = y_t - y_{t-4}; \quad y_{1t-1} = y_{t-1} + y_{t-2} + y_{t-3} + y_{t-4};
\]

\[
y_{2t-1} = -y_{t-1} + y_{t-2} + y_{t-3} + y_{t-4}; \quad y_{3t-2} = -y_{t-2} + y_{t-4};
\]

\[
y_{3t-1} = -y_{t-1} + y_{t-3};
\]

and \( \epsilon_t \) is a normally and independently distributed error term with zero mean and constant variance. For estimation we use least squares method and include an intercept, three seasonal dummies and a time trend to equation (3). The HEGY test involves testing the following three hypotheses:

1. \( H_0: \pi_1 = 0 \) vs \( H_1: \pi_1 < 0 \);
2. \( H_0: \pi_2 = 0 \) vs \( H_1: \pi_2 < 0 \);
3. \( H_0: \pi_3 = \pi_4 = 0 \) vs \( H_1: \) at least one \( \pi_i \neq 0 \) \( i=3,4 \)

First two hypotheses (1) and (2) involve the use of the t-test and the third involves the use of F-test. If null hypothesis (1) is not rejected, it means that there is a unit root at the zero frequency (i.e. a non seasonal unit root in the series). If null hypothesis (2) is not rejected, it
means that there is a seasonal unit root at the semi-annual frequency. If null hypothesis (3) is not rejected, it means that there is a seasonal unit root at the annual frequency. Table 6.4 presents the values of the test statistic and the corresponding critical values at the 5% level for the two time series, TOUR and FDI. The results show that null hypothesis in (1) is not rejected for the two time series, indicating that both series have a non-seasonal unit root. This confirms our previous finding of the ADF and PP test. The null hypotheses (2) and (3) were rejected for the TOUR time series indicating that TOUR time series has no seasonal unit roots. For the FDI series, the null hypothesis (2) is rejected but not the null hypothesis (3) indicating that the FDI series has a seasonal unit root at the annual frequency but not at the semi-annual frequency.

<table>
<thead>
<tr>
<th>Set of Hypotheses</th>
<th>Data-based value of the test statistic</th>
<th>Critical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOUR</td>
<td>FDI</td>
<td></td>
</tr>
<tr>
<td>(1)</td>
<td>0.16</td>
<td>-1.03</td>
</tr>
<tr>
<td>(2)</td>
<td>-3.09</td>
<td>-3.14</td>
</tr>
<tr>
<td>(3)</td>
<td>7.04</td>
<td>2.52</td>
</tr>
</tbody>
</table>

The results so far confirms that both time series have at least one unit root and hence are non-stationary in level form. We now test the first difference of both series for stationarity by applying the ADF test on the first difference series. The results are presented in Table 6.5. As can be seen, the results show that both series are stationary in their first difference form. This means both series are I(1).
Even if the two variables FDI and TOUR individually are I(1), it may be possible that a liner combination of the two variables may be stationary. If we are modelling a linear relationship between FDI and TOUR, even if each of them individually are non-stationary (i.e. I(1)), as long as they are cointegrated, the regression involving the two series may not be spurious. Thus, we now investigate whether the two series are cointegrated and having a long run equilibrium relationship. An informal way of identifying the cointegration of two variables is the use of $R^2$ and co-integration regression Durbin-Watson (CRDW) statistic from their regression of the two variables. High $R^2$ value together with non-zero CRDW is an indication that the two variables may be cointegrated.

<table>
<thead>
<tr>
<th>Model</th>
<th>Null hypothesis Characteristics</th>
<th>Critical value</th>
<th>Tourism</th>
<th>FDI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Data-based value of the test statistic</td>
<td>Results</td>
</tr>
<tr>
<td>Constant and trend</td>
<td>$H_0: \gamma = 0$</td>
<td>-3.13</td>
<td>-3.357</td>
<td>-2.603</td>
</tr>
<tr>
<td>Constant and trend</td>
<td>$H_0: \alpha_0 = \gamma = 0$</td>
<td>5.34</td>
<td>Do not reject $H_0$</td>
<td>3.441</td>
</tr>
<tr>
<td>Constant and no trend</td>
<td>$H_0: \gamma = 0$</td>
<td>-2.57</td>
<td>Do not reject $H_0$</td>
<td>-2.359</td>
</tr>
<tr>
<td>Constant and no trend</td>
<td>$H_0: \alpha_0 = \gamma = 0$</td>
<td>3.78</td>
<td>Do not reject $H_0$</td>
<td>2.795</td>
</tr>
<tr>
<td>No constant and no trend</td>
<td>$H_0: \gamma = 0$</td>
<td>-1.62</td>
<td>Reject $H_0$</td>
<td>-1.670</td>
</tr>
</tbody>
</table>

**Conclusion**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th>Tourism</th>
<th>FDI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>${\Delta \text{TOUR} }$ has no unit root and the series is stationary</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

|                      |                                  |                |         |              |
|                      | $\{\Delta \text{FDI} \}$ has no unit root and the series is stationary |                |         |              |

* Significant level at the 5 percent level.
Table 6.6 presents the estimated regression results and the values for $R^2$ and CRDW values. As can be seen, the $R^2$-values are reasonably high and the CRDW values are not close to zero. This points in the direction that FDI and TOUR series may be cointegrated.

Table 6.6 Augmented Dickey-Fuller unit root test for co-integration on the residual series*

<table>
<thead>
<tr>
<th>Estimated Equation</th>
<th>$R^2$</th>
<th>CRDW</th>
<th>ADF-test on the residual series</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOUR$_t$ = 2.007 + 0.295 FDI$_t$</td>
<td>0.80</td>
<td>0.50</td>
<td>Critical value at the 5% level Value of the test statistic</td>
<td>Reject $H_0$ {FDI} and {TOUR} are cointegrated</td>
</tr>
<tr>
<td></td>
<td>(0.032)    (0.018)</td>
<td></td>
<td>-1.62 -1.704</td>
<td></td>
</tr>
<tr>
<td>FDI$_t$ = -5.240 + 2.714 TOUR$_t$</td>
<td>0.80</td>
<td>0.60</td>
<td>-1.62 -2.086</td>
<td>Reject $H_0$ {FDI} and {TOUR} are cointegrated</td>
</tr>
<tr>
<td></td>
<td>(0.397)    (0.169)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Standard errors are given in parentheses.

We now formally test cointegration of FDI and tourism variables by employing the Engle and Granger (1987) procedure, which is based on testing for a unit root in the residual series of the estimated equilibrium relationship by employing the Dickey-Fuller test. Therefore, the null and alternative hypotheses are:

$H_0$: The residual series has a unit root (or FDI and TOUR are not cointegrated)

$H_A$: The residual series has no unit root (or FDI and TOUR are cointegrated)

Rejection of the null hypothesis in both cases would mean that the two series FDI and TOUR are cointegrated.
The results presented in Table 6.6, clearly show that both the least square residual series are stationary and hence the series FDI\(_t\) and TOUR\(_t\) are cointegrated indicating that there is a long-run equilibrium relationship between FDI and tourism in China. So far we found that the two series are I(1) and are co-integrated. In this kind of situation, instead of the usual ECM, Zapata and Rambaldi (1997) propose an alternative testing procedure for moderate to large samples situation to test causality. We outline their procedure in the next section.

### 6.4 Zapata and Rambaldi testing procedure for causality

Now, we investigate the causality between FDI and tourism (TOUR) using the recently developed procedure by Zapata and Rambaldi (1997) based on the VAR system. Following Zapata and Rambaldi (1997), we perform the Wald test to test Granger causality. The computation of the Wald test consists of the following 3 steps:

**Step 1:** Estimate a VAR\((p+d_{\text{max}})\) process by multivariate least squares, where \(d_{\text{max}}\) is the maximum degree of integration in the system and \(p\) is pre-tested optimal lag length, and obtain the least squares estimate \(\hat{A}\) of \(A\) (which are defined below).

**Step 2:** Estimate \(\hat{\Sigma}_A\), the variance-covariance matrix of \(\hat{A}\).

**Step 3:** Let \(R\) be the matrix which select the appropriate ‘non-causality’ parameters.

Then the Wald-test statistic:

\[
\lambda_w = T (R\hat{A})' (R\hat{\Sigma}_A R')^{-1} (R\hat{A})
\]
can be used to test for non-causality, \( H_0: \mathbf{R} \hat{\mathbf{A}} = 0 \). The vector \( \mathbf{A} \) is the linearised version of matrix \( \mathbf{A} \) and \( \lambda_w \) has an asymptotic \( \chi^2_p \) distribution.

We determine the optimal lag length for the VAR system by using the Schwarz (1978) Criterion (SC) and the Akaike (1974) Information Criterion (AIC). We found that the optimal lag lengths for both FDI and tourism (TOUR) series to be 4 lags. In our case, we have \( p = 4 \) and \( d_{\text{max}} = 1 \), therefore the system to be estimated is a VAR(5) and test whether \( \text{TOUR}_{t-1}, \text{TOUR}_{t-2}, \text{TOUR}_{t-3} \) and \( \text{TOUR}_{t-4} \) do not appear in the \( \text{FDI}_t \) equation (i.e., to test \( H_0: \text{TOUR} \neq \text{FDI} \)). We write the VAR(5) system in the following form

\[
\begin{pmatrix}
\text{FDI}_t \\
\text{TOUR}_t
\end{pmatrix}
= \begin{pmatrix}
a_{01} \\
a_{02}
\end{pmatrix}
+ \begin{pmatrix}
\alpha_{11} & \beta_{11} \\
\alpha_{12} & \beta_{22}
\end{pmatrix}
\begin{pmatrix}
\text{FDI}_{t-1} \\
\text{TOUR}_{t-1}
\end{pmatrix}
+ \ldots +
\begin{pmatrix}
\alpha_{51} & \beta_{51} \\
\alpha_{52} & \beta_{52}
\end{pmatrix}
\begin{pmatrix}
\text{FDI}_{t-4} \\
\text{TOUR}_{t-4}
\end{pmatrix}
+ \begin{pmatrix}
e_t
\end{pmatrix}, \quad (4)
\]

That is,

\[
y_t = \mathbf{A}_0 + \mathbf{A}_1 y_{t-1} + \ldots + \mathbf{A}_5 y_{t-5} + e_t, \quad (5)
\]

where

\[
y_t = \begin{pmatrix}
\text{FDI}_t \\
\text{TOUR}_t
\end{pmatrix}
\quad \text{and} \quad
\mathbf{A}_i = \begin{pmatrix}
\alpha_{i1} & \beta_{i1} \\
\alpha_{i2} & \beta_{i2}
\end{pmatrix}
\]

By defining \( \mathbf{A} = [\mathbf{A}_0 \ \mathbf{A}_1 \ldots \mathbf{A}_5] \), equation (8) can be written as

\[
y_t = \mathbf{A} y_t^* + e_t, \quad (6)
\]
where \( y_t^* = [1 \ y_{t-1}^* \ y_{t-2}^* \ ... \ y_{t-5}^*]' \) and 1 is a unit vector made up of ones. The matrix \( A \) above is the one defined in step 1. Therefore, the linearised form of \( A \), which is \( A_v \), is given by

\[
A_v = \begin{bmatrix}
\alpha_{01} & \alpha_{02} & \alpha_{11} & \alpha_{12} & \beta_{11} & \beta_{12} & \ldots & \alpha_{51} & \alpha_{52} & \beta_{51} & \beta_{52}
\end{bmatrix}'.
\]

Hence the null hypothesis to test ‘non-causality’ that ‘TOUR does not cause FDI’ is that

\[
H_0: \beta_{11} = \beta_{21} = \beta_{31} = \beta_{41} = 0.
\]

In matrix form,

\[
H_0: RA_v = 0,
\]

where

\[
R = \begin{bmatrix}
0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0
\end{bmatrix}.
\]

Rejection of the null hypothesis \( H_0 \) means that TOUR causes FDI in the Granger sense. A similar procedure can be followed to test the null hypothesis that ‘FDI does not cause TOUR’. That is, \( H_0: \alpha_{12} = \alpha_{22} = \alpha_{32} = \alpha_{42} = 0. \)

We perform the above estimation in SHAZAM and Table 6.7 presents the results. As can be seen from row 1 of Table 6.7, for testing TOUR\( \not\Rightarrow \)FDI, the value of the test statistic is 3.62 which is smaller than the critical value of 9.49. Hence we are unable to reject the null hypothesis that ‘TOUR does not cause FDI’ in the Granger sense. Looking at row 2 of the Table, the value of the test statistic for testing \( H_0: \) FDI\( \not\Rightarrow \)TOUR is 18.77 which is larger than the critical value of 9.49. Therefore, we reject the null hypothesis \( H_0: \) ‘FDI does not cause TOUR’ in favour of the alternative \( H_A: \) ‘FDI causes TOUR’.
Table 6.7 Results of Granger Causality Test between FDI and Tourism in China, 1985-2001

<table>
<thead>
<tr>
<th>Null hypothesis</th>
<th>Value of the test statistic</th>
<th>Critical value ( \chi^2_{0.05,4} )</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) H( <em>0 ): TOUR ( \not\Rightarrow ) FDI ( (\beta</em>{11} = \beta_{21} = \beta_{31} = \beta_{41} = 0) )</td>
<td>3.62</td>
<td>9.49</td>
<td>Do not reject H( _0 ): TOUR ( \not\Rightarrow ) FDI</td>
</tr>
<tr>
<td>(2) H( <em>0 ): FDI ( \not\Rightarrow ) TOUR ( (\alpha</em>{12} = \alpha_{22} = \alpha_{32} = \alpha_{42} = 0) )</td>
<td>18.77</td>
<td>9.49</td>
<td>Reject H( _0 ): FDI ( \not\Rightarrow ) TOUR</td>
</tr>
</tbody>
</table>

6.5 Conclusion

In this chapter we have investigated the causal relationship between foreign direct investment (FDI) and tourism (TOUR) in China using the quarterly data for the period 1987:1 to 2001:3. For this investigation we employed various time series econometric techniques such as unit root test, cointegration and causality. As we found that the two time series FDI and TOUR are both I(1) and are co-integrated, we use the recent methodology proposed in Zapata and Rambaldi (1997) to investigate the causality between FDI and TOUR. The results show that there is a one way causal relationship between FDI and tourism in the direction of FDI \( \rightarrow \) TOUR (tourism). There is no econometric evidence to support the causal relationship between FDI and tourism in the direction of TOUR \( \rightarrow \) FDI.

As the result shows that FDI plays a significant role in expanding the tourism sector in China. This shows that appropriate policy to explore tourism resources and plans to develop new tourist venues and facilities may need to be considered in order to meet the increasing demand of tourism. As the regional economic development and the regional distribution of FDI inflows in China are very unbalanced, including geographical element in the tourism development policy would be beneficial. Some poor regions, for instance,
Southwest provinces of Yunnan, Guizhou and Sichuan, are rich of tourism resources, thus, a policy encourages more FDI flow into those poor regions and meanwhile to promote tourism could generate a cyclical effect of investigative business and holiday travel resulting in greater tourism hence greater economic development in those regions.

There are a number of other points worth mentioning about the current study. Firstly, we recognise the importance of the investigation of the link between tourist arrivals and FDI from specific origins such as Hong Kong, Taiwan, USA etc. Due to limitation of disaggregated data, we were unable to perform this investigation in this study. Secondly, using Ganger Causality we found that FDI plays a positive significant role in determining the tourist arrival, while recognising that the 'causality' we considered here is not the causality in the usual sense of the word.
Chapter 7. Tourism and Economic Growth

7.1 Introduction

In 2005, China was ranked, worldwide, 4th in terms of the number of international tourist arrivals (120 million) and 6th when comparing international tourism receipts ($US29 billion) according to the statistics published by the World Tourism Organization (WTO). Meanwhile, China experienced the highest economic growth (8%) in the world in 2005. During the period 1978 to 2005, the annual average growth rates of international tourist arrivals and receipts were 19% and 20%, respectively. Tourism plays an important role in the Chinese economy. The direct contribution of tourism accounts for 1.3% of GDP in 2005, while the impact of tourism on the whole economy is much greater. In 2004, tourism generated $US184 billion worth of economic benefits (11% of GDP) and employment up to 13.6 million people (2% of total employment). Recently, the WTO predicted that China will become the most favoured international tourism destination in the future. It is expected that in 2020, the number of international tourist arrivals would increase to 145 million and the corresponding tourism receipts would be $US75 billion representing approximately 8% of China’s estimated GDP. China’s tourism industry has demonstrated robust growth and is seen as one of the cornerstones of the Chinese economy and a major source of job creation during the period 1978 to 2005. Has the hypothesis of tourism-led growth been held in China? Providing evidence to support the hypothesis of tourism-led growth is important to China because, as a country scarce in resources facing an increasingly competitive
world economy, tourism presents a rich natural resource which could provide China with a comparative advantage in achieving foreign exchange earnings and economic growth. On the other hand, if there is no evidence to support the hypothesis of tourism-led growth, then tourism promotion may not only be an ineffective strategy for fostering economic development, it may generate adverse externalities on the Chinese economy damaging the natural environment.

Table 7.1 details China’s international tourist arrivals, international tourism receipts, the annual average growth rates of arrivals and receipts, and the percentage share of international tourism receipts in export, economic growth and trade balance deficit over the period 1978 to 2005. The international tourism industry in China has been one of the fastest growing sectors of the economy. International tourist arrivals (column 2) and international tourism receipts (column 4) are plotted in Figures 7.1(a) and 7.1(b). As can be seen, international tourist arrivals and tourism receipts in China have increased significantly during the period 1978 to 2005. International tourist arrivals have increased from 1.8 million in 1978 to 120 million in 2005, while the receipts from international tourists arrivals have also increased from $US0.3 billion to $US29 billion during the same period. During the period 1978 to 2005, the average annual growth rates of international tourist arrivals and tourism receipts are 18.9% (last row of column 3) and 20.4% (last row of column 5). Columns 6-8 of the table also show that international tourism receipts have made an important contribution to China’s economy. As can be seen from column 6, tourism receipts as a proportion of export fluctuated between 2.7% (1978) to 7.2% (1999) with an average rate of 4.9% over the period 1978 to 2005. The ratio of tourism receipts to GDP (column 7) has been on the increase from 0.1% in 1978 to 1.6% in 2002 and fell to 1.3% in 2005 with an annual average rate of
0.9% over the sample period. The last column presents the percentage share of international tourism receipts in terms of trade balance which clearly suggests that

<table>
<thead>
<tr>
<th>Year</th>
<th>Tourist arrivals million persons</th>
<th>Growth in arrivals %</th>
<th>Tourism receipts US $b</th>
<th>Growth in receipts %</th>
<th>% Share of tourism receipts in export</th>
<th>% Share of tourism receipts in GDP</th>
<th>% Share of tourism receipts in trade balance deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>1.8</td>
<td>0.3</td>
<td>2.7</td>
<td>0.1</td>
<td>-23.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1979</td>
<td>4.2</td>
<td>132.3</td>
<td>0.4</td>
<td>70.8</td>
<td>3.3</td>
<td>0.2</td>
<td>-22.4</td>
</tr>
<tr>
<td>1980</td>
<td>5.7</td>
<td>35.7</td>
<td>0.6</td>
<td>37.3</td>
<td>3.4</td>
<td>0.2</td>
<td>-32.5</td>
</tr>
<tr>
<td>1981</td>
<td>7.8</td>
<td>36.2</td>
<td>0.8</td>
<td>27.3</td>
<td>3.6</td>
<td>0.3</td>
<td>15.8</td>
</tr>
<tr>
<td>1982</td>
<td>7.9</td>
<td>2.0</td>
<td>0.8</td>
<td>7.4</td>
<td>3.8</td>
<td>0.3</td>
<td>27.8</td>
</tr>
<tr>
<td>1983</td>
<td>9.5</td>
<td>19.6</td>
<td>0.9</td>
<td>11.6</td>
<td>4.2</td>
<td>0.3</td>
<td>112.0</td>
</tr>
<tr>
<td>1984</td>
<td>12.9</td>
<td>35.6</td>
<td>1.1</td>
<td>20.2</td>
<td>4.3</td>
<td>0.4</td>
<td>-89.1</td>
</tr>
<tr>
<td>1985</td>
<td>17.8</td>
<td>38.8</td>
<td>1.3</td>
<td>10.5</td>
<td>4.6</td>
<td>0.4</td>
<td>-8.4</td>
</tr>
<tr>
<td>1986</td>
<td>22.8</td>
<td>28.0</td>
<td>1.5</td>
<td>22.5</td>
<td>4.9</td>
<td>0.5</td>
<td>-12.8</td>
</tr>
<tr>
<td>1987</td>
<td>26.9</td>
<td>17.9</td>
<td>1.9</td>
<td>21.6</td>
<td>4.7</td>
<td>0.6</td>
<td>-49.4</td>
</tr>
<tr>
<td>1988</td>
<td>31.7</td>
<td>17.8</td>
<td>2.2</td>
<td>20.7</td>
<td>4.7</td>
<td>0.6</td>
<td>-29.0</td>
</tr>
<tr>
<td>1989¹</td>
<td>24.5</td>
<td>-22.7</td>
<td>1.9</td>
<td>-17.2</td>
<td>3.5</td>
<td>0.4</td>
<td>-28.2</td>
</tr>
<tr>
<td>1990</td>
<td>27.5</td>
<td>12.1</td>
<td>2.2</td>
<td>19.2</td>
<td>3.6</td>
<td>0.6</td>
<td>25.4</td>
</tr>
<tr>
<td>1991</td>
<td>33.4</td>
<td>21.4</td>
<td>2.8</td>
<td>28.3</td>
<td>4.0</td>
<td>0.7</td>
<td>35.3</td>
</tr>
<tr>
<td>1992</td>
<td>38.1</td>
<td>14.3</td>
<td>3.9</td>
<td>38.7</td>
<td>4.6</td>
<td>0.8</td>
<td>90.7</td>
</tr>
<tr>
<td>1993</td>
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<td>18.7</td>
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<td>0.8</td>
<td>-38.3</td>
</tr>
<tr>
<td>1994</td>
<td>43.7</td>
<td>5.2</td>
<td>7.3</td>
<td>56.4</td>
<td>6.1</td>
<td>1.3</td>
<td>135.6</td>
</tr>
<tr>
<td>1995</td>
<td>46.4</td>
<td>6.2</td>
<td>8.7</td>
<td>19.3</td>
<td>5.9</td>
<td>1.2</td>
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</tr>
<tr>
<td>1996</td>
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<td>10.2</td>
<td>10.2</td>
<td>16.8</td>
<td>6.8</td>
<td>1.2</td>
<td>83.5</td>
</tr>
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<td>12.1</td>
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<td>1.3</td>
<td>29.9</td>
</tr>
<tr>
<td>1998</td>
<td>63.5</td>
<td>10.2</td>
<td>12.6</td>
<td>4.4</td>
<td>6.9</td>
<td>1.3</td>
<td>28.9</td>
</tr>
<tr>
<td>1999</td>
<td>72.8</td>
<td>14.7</td>
<td>14.1</td>
<td>11.9</td>
<td>7.2</td>
<td>1.4</td>
<td>48.2</td>
</tr>
<tr>
<td>2000</td>
<td>83.4</td>
<td>14.6</td>
<td>16.2</td>
<td>15.1</td>
<td>6.5</td>
<td>1.5</td>
<td>67.3</td>
</tr>
<tr>
<td>2001</td>
<td>89.0</td>
<td>6.7</td>
<td>17.8</td>
<td>9.7</td>
<td>6.7</td>
<td>1.5</td>
<td>78.9</td>
</tr>
<tr>
<td>2002</td>
<td>97.9</td>
<td>10.0</td>
<td>20.4</td>
<td>14.6</td>
<td>6.3</td>
<td>1.6</td>
<td>67.0</td>
</tr>
<tr>
<td>2003²</td>
<td>91.7</td>
<td>-6.4</td>
<td>17.4</td>
<td>-14.6</td>
<td>4.0</td>
<td>1.2</td>
<td>68.3</td>
</tr>
<tr>
<td>2004</td>
<td>109.0</td>
<td>19.0</td>
<td>25.7</td>
<td>47.9</td>
<td>4.3</td>
<td>1.6</td>
<td>80.5</td>
</tr>
<tr>
<td>2005</td>
<td>120.3</td>
<td>10.3</td>
<td>29.3</td>
<td>13.8</td>
<td>3.8</td>
<td>1.3</td>
<td>28.8</td>
</tr>
<tr>
<td>Mean</td>
<td>44.3</td>
<td>18.9</td>
<td>7.8</td>
<td>20.4</td>
<td>4.9</td>
<td>0.9</td>
<td>26.5</td>
</tr>
</tbody>
</table>

Source: China Statistical Yearbook various issues and the online data of the National Bureau of Statistics of China

Notes: ¹ and ². The negative growth in arrivals (column 3) and receipts (column 5) were due to the effects of the Tianmen Square incident and the SARS epidemic in 1989 and 2003, respectively.

tourism plays an even greater role than China’s exports in terms of net foreign exchange earnings, as the annual average share of tourism receipts in trade balance reached 26.5% during the period 1978 to 2005.
The remainder of this chapter is organised as follows. Section 7.2 presents a review of previous studies. Section 7.3 is an econometric analysis. Finally, Section 7.4 provides conclusions and policy implications.

![Tourist arrivals, China, 1978-2005](image1)

![Tourism receipts, China, 1978-2005](image2)

### 7.2 Review of previous studies

Despite the significant contributions of international tourism to China’s economic development over the period 1978 to 2005, very little research has been carried out to investigate this relationship empirically. Consequently, the role of tourism in economic growth remains controversial.

The proponents of tourism-led growth argue that the tourism-led growth hypothesis has been held for many economies (Balaguer and Cantavella-Jorda, 2002; Dritsakis, 2004; Durbarry, 2004; Jackson, 2006; and Wen and Tisdell 1996). Tourism brings foreign exchanges and contributes to government revenues. Tourism spurs local governments to improve infrastructure such as better water and sewerage systems, roads, electricity, telephone and public transport networks. Consequently, it can improve the quality of
life for local residents as well as facilitating tourism. Moreover, tourism promotes regional economic development by creating local tourism cluster industries. For example, tour and travel agencies, retailers, accommodation, transportation, telecommunication, banking, education and research institutions etc. Subsequently, these cluster industries contribute to local employment and improve income distribution. Tourism also promotes greater awareness amongst other countries of the country being visited, stimulates international and domestic trade, and generates FDI and domestic investment in tourism industries. In addition, tourism enhances the efficiency of resource allocation and facilitates the exploration of economies of scale in local firms to remain competitive. It is from this perspective that the tourism-led growth hypothesis is promoted. Empirical studies supporting these arguments include Balaguer and Cantavella-Jorda (2002), Dritsakis (2004), Jackson (2006), and Wen and Tisdell (1996).

Balaguer and Cantavella-Jorda (2002) apply the recent econometric methodologies and test for Granger causality to investigate the role of inbound tourism in the Spanish long-run economic development over the period 1975 to 1997. They find that economic growth in Spain has been sensible to persistent expansion of international tourism, and that the tourism-led growth hypothesis is supported in the case of Spain. Dritsakis (2004) uses an ECM to examine the impact of tourism on the long-run economic growth in Greece over the period 1960 to 2000. He shows that international tourism earnings cause economic growth with a strong Granger causal relationship in Greece.

In the context of China, Jackson (2006) regards tourism as a regional natural advantage having potential for activating business links in the socialist market economy of China.
It means that tourism could form the basis for regional competitive advantage to foster regional economic development and to reduce regional income inequalities. Jackson’s study is a qualitative research focusing on the importance of tourism activity to regional economic development. Using cross sectional data and a single-equation regression, Wen and Tisdell (1996) analyse China’s spatial distribution of tourism and find that there is a link between tourism and regional economic development. Besides Jackson, and Wen and Tisdell, there are a few published studies on China which indirectly study the relationship between international tourism and economic development. For example, Shan and Wilson (2001) in their empirical analysis find a strong reciprocal relationship between international tourism and trade. Also, Tang, Selvanathan and Selvanathan (2007) in their study find there is a causal relationship between international tourism and foreign direct investment.

The opponents of tourism led-growth (e.g. Brandon, 1996; Hazari and Ng, 1993; Oh, 2005 and Batta, 2003) argue that tourism may contribute little to the local economy when there are no backward and forward linkages of tourism with the local sectors (Batta, 2003), and there is absence of effective policies and regulations in the tourism host country. This could be true when the tourism host countries are less developed, where tourism is predominantly nature-based, tourism is the major sector of the economy, and major accommodations and businesses are owned and operated by foreign investors. Those foreign investors have backward linkages with their home countries and they import almost everything to the tourism host countries for consumption. When tourism occurs, a significant proportion of tourism expenditures (transport, hotels and food) are spent on prepaid tours, and the expenses made by the tourists in the tourism host countries are little. The economic benefits for the tourism
host countries include employment opportunities and tax revenues. However, if local people lack the requisite skills, people external to the local area will take advantage of the employment opportunities arising from tourism development (Batta, 2003). Moreover, tourism is demand driven and its prices are determined by monopoly power (Hazari and Ng, 1993). In addition, tourism may lead to deforestation and degradation of forests, and depletion of water resources. In this regard, tourism not only contributes little to the less developed economy, it also generates adverse externalities on less developed economies such as reducing welfare (Hazari and Ng, 1993) and damaging the natural environment. Empirical evidence supporting the views of tourism led-growth opponents can be found in Hazari and Ng (1993), Oh (2005) and Batta (2003).

Hazari and Ng (1993) in their study show that in a monopoly power framework, tourism may be welfare reducing. Batta (2003) investigates tourism in Fiji and claims that tourism is demand driven, has high environmental impacts, contributes little to the local economy, makes no contribution to conservation and does not elicit local community participation. Oh (2005) uses a VAR model to investigate the causal relationship between tourism growth and economic growth in Korea. Oh claims that the hypothesis of tourism-led economic growth was not held in the case of the Korean economy as the comparable role of tourism in the Korean economy is significantly less than some countries such as Spain.

Our current study contributes to the existing literature by applying an ECM and time series techniques of cointegration to investigate the role of tourism in the Chinese economy. A real exchange rate variable is included in the system because the role of the real exchange rate in foreign trade (tourism and export/import) and economic growth is
well recognised theoretically and empirically. Specifically, we test the hypothesis of tourism-led growth in China’s long-run economic development. In addition, we also investigate the role of the real exchange rate in the Chinese economy, and whether there exists any causal relationship between tourism, economic growth and the real exchange rate. This study differs from earlier studies in a number of aspects. First, it represents the first attempt to directly identify or test the relationship between tourism, the real exchange rate and economic growth in China, offering insights into the disputed tourism-led growth nexus, and exploring the role of the exchange rate in the Chinese economy. Second, relevant quantitative studies in a multivariate framework regarding causal links between tourism and China’s economic growth in the long-run are scarce. Thus, this study attempts to fill that vacuum by using the ECM model. Using a single equation model (e.g. Wen and Tisdell, 1996) may produce various estimation biases, giving rise to misleading analytical results. Third, we use pure time-series data while previous studies on Chinese tourism and growth use either cross-sectional or panel data, which are likely to suffer from problems of data comparability and heterogeneity (Atkinson and Brandolini 2001; Srinivasan and Bhagwati 1999).

7.3 An econometric analysis

The three variables used in this study are international tourism receipts (TR), economic growth (GDP) and the real foreign exchange rate (XR). The data of the three variables used for the analysis are all quarterly time series for the period 1988:1 to 2005:4. The data for the period 1988 to 2004 are compiled from China Monthly Statistics (1987:1-2005:4), Comprehensive Statistical Data and Materials for 50 years of New China and the various issues of China Statistical Yearbook, all published by the National Bureau of
Statistics (NBS) of China. The data for the latest year 2005 are obtained from the website of the National Bureau of Statistics (NBS) of China and China National Tourist Office. GDP quarterly time series for the period 1988 to 2000 is constructed on the basis of the monthly gross industrial output (GIO) and the yearly GDP statistics because of the lack of availability of quarterly or monthly GDP statistics\(^9\).

Figure 7.2 plots the three original time series in log form, LTR, LGDP and LXR. It is noticeable that there are a few irregular effects appearing in the series of LTR (Figure 7.2(a)) around 1989:3, 1994:1, 1998:1 and 2003:1. These irregular effects are the 1989 Tianmen Square Massacre, the depreciation of the Chinese currency in terms of US dollars in 1994, the 1998 Asian Financial Crisis and the 2003 SARS epidemic. In Figure 7.2(c), a sudden large upward shock is visible in LXR series around quarter one of 1994. At the beginning of 1994 the Chinese government depreciated almost 50% of its currency value in terms of US dollars. During this time, China carried out reform of its foreign exchange system and adopted a unified, central government managed exchange rate regime based on market supply and demand of foreign exchange. Overall, as can be seen, there is a clear upward trend in the three time series indicating that the means are changing over time, and hence the three series in level form may not be stationary.
Figure 7. 2(b) The original series of GDP in natural logs, China 1988:1-2005:4

Figure 7. 2(c) The original series of exchange rates (XR) in natural logs, China 1988:1-2005:4

Figure 7.3 are the plots of the first difference series of the three logarithmic time series. They suggest no evidence of changing means indicating that the three series, LTR, LGDP and LXR may be integrated of order one, I(1). To statistically validate these preliminary findings, the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and HEGY tests are used to test the stationarity of the three time series in this study.
Testing for unit root

The ADF test for unit roots are first performed on the level form of the three series LTR, LGDP and LXR. We follow the testing procedure discussed in Enders (1995) discussed in Chapter 4.

The sample size used for the estimation of the three models is 70. The ADF test is applied to the series LTR, LGDP and LXR separately. Estimation is carried out using the econometric software SHAZAM. The results of the ADF test for stationarity on the original series are not reported here indicate that all three series LTR, LXR and LGDP are non- stationary as expected from the plots 7.2(a), 7.2(b) and 7.2(c). To reinforce the
analysis, the Phillips-Perron (PP) test is also used as Monte Carlo studies have found that the Phillips-Perron test has greater power to reject a false null hypothesis of a unit root (Enders, 1995, p242). Table 7.2 presents the ADF and PP test results for the first differenced series.

Table 7.2 ADF and PP tests for a unit root on the 1st differenced three series

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model (1)</th>
<th>Model (2)</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trend &amp; Constant</td>
<td>Constant &amp; No trend</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ADF</td>
<td>PP</td>
<td>ADF</td>
</tr>
<tr>
<td>LTR</td>
<td>-3.46*</td>
<td>-8.27*</td>
<td></td>
</tr>
<tr>
<td>LGDP</td>
<td>-2.68</td>
<td>-24.74*</td>
<td>-2.75*</td>
</tr>
<tr>
<td>LXR</td>
<td>-4.43*</td>
<td>-8.30*</td>
<td></td>
</tr>
</tbody>
</table>

Notes: *denotes significance at the 1% level.

As can be seen in Figure 7.2(c), structural changes may have occurred to the exchange rate series LXR around 1994:1. The depreciation of the Chinese currency in terms of US dollars by 50% at the beginning of 1994 induced a one-time rise in the mean of LXR, was an exogenous shock but appears likely to have a permanent effect on the LXR. When there are structural breaks, the Dickey-Fuller and Phillips-Perron test statistics are biased towards the non-rejection of a unit root (Enders, 1995). Thus, it is necessary to use the procedure developed by Perron (1989) to test for a unit root in the presence of a structural change. Towards the purpose, the following regression equation was considered for the exchange rate variable LXR:

\[
y_t = \alpha_0 + \mu_1 DU_t + \mu_2 DT_t + \alpha_1 y_{t-1} + \alpha_2 t + \sum_{i=1}^{k} \beta_i \Delta y_{t-i} + \varepsilon_t \tag{1}
\]

where, \( y_t \) represents LXR in time t;
DUₜ = \begin{cases} 
1, & \text{if } t \geq \tau + 1 \\
0, & \text{otherwise} 
\end{cases} \\
DTₜ = \begin{cases} 
t - \tau, & \text{if } t \geq \tau + 1 \\
0, & \text{otherwise} 
\end{cases}

where \( \tau = 24 \) is the structural break in exchange rate which took place in 1994:1. DUₜ is a level dummy variable and DTₜ is a slope dummy variable.

\[ \alpha_0 \] a vector of intercept term;
\[ t \] a deterministic trend;
\( \alpha_i, \mu_i \) and \( \beta_i \) the parameters;
\[ k \] the lag length; and
\[ \epsilon_t \] the disturbance terms.

The model is generalised to allow a one-time change in the structure occurring at a time. It permits an exogenous change in the level of the series and in the rate of growth. The value of the test statistics of the Perron (1989) test at various lag lengths of time series LXR are reported in Table 7.3. The Perron test indicates that the null hypothesis of a unit root is not rejected by the series of LXR in the presence of a structural break at all lag lengths. This confirms the previous finding of the ADF test that the series of LXR in level form is non-stationary.

| Table 7.3 Perron test for a unit root in the presence of structural change |
|--------------------|-------|-------|-------|-------|-------|-------|
|                   | T     | \( \lambda \) | K=0   | K=1   | K=2   | K=3   | K=4   | K=5   | Critical value at 1% |
| LXR               | 70    | 0.36   | -3.67 | -3.50 | -3.39 | -3.49 | -4.13 | -4.80 | -4.81          |

Notes: \( T \) = number of observations, \( \lambda \) = proportion of observations occurring before the structural change, \( K \) = lag length. All estimated values of \( \alpha_i \) are significantly different from unity at the 1% level.

The overall results so far confirm that the LTR, LGDP and LXR time series have at least one unit root and hence are non-stationary in level form. Thus, we need to difference these series once to achieve stationarity. Moreover, in accordance with the Granger theorem, cointegration necessitates that the variables should be integrated of
the same order (Enders, 1995; Engle and Granger, 1987; and Granger, 1986). Thus, in
order to ensure LTR, LGDP and LXR are integrated of same order, the ADF and PP
tests for a unit root on the first differenced three series are performed. The results of
ADF and PP tests in the three models are presented in Table 7.2 which confirms that the
first difference of the three series LTR, LGDP and LXR are all stationary, and thus
integrated of order one, I (1).

In general, tourism activities fluctuate strongly with seasons. Besides the natural
seasonal fluctuations, China’s centrally planned economic regime has also generated a
regular pattern of large seasonal fluctuations (Rawski, 2002) in its economy. In Figure
7.2(a) and 7.2(b), the seasonality of the both original series of LTR and LGDP seems
discernible. In order to investigate the possibility of seasonal unit roots in the series, the
commonly used HEGY (Hylleberg et al, 1990) test is applied to the two series. This
test is based on the following auxiliary regression model:

\[ y_{4t} = \pi_1 y_{1t-1} + \pi_2 y_{2t-1} + \pi_3 y_{3t-2} + \pi_4 y_{3t-1} + \epsilon_t \]  

(2)

where

\[ y_{4t} = y_t - y_{t-4} ; \quad y_{1t-1} = y_{t-1} + y_{t-2} + y_{t-3} + y_{t-4} ; \]

\[ y_{2t-1} = -y_{t-1} + y_{t-2} - y_{t-3} + y_{t-4} ; \quad y_{3t-2} = -y_{t-2} + y_{t-4} ; \]

\[ y_{3t-1} = -y_{t-1} + y_{t-3} ; \]

and \( \epsilon_t \) is a normally and independently distributed error term with zero mean and
constant variance. For estimation, we apply the least squares method and include an
intercept, three seasonal dummies and a time trend in model (2). The HEGY test
involves testing the following three hypotheses:

(i) \( H_0: \pi_1 = 0 \) vs \( H_1: \pi_1 < 0 \);

(ii) \( H_0: \pi_2 = 0 \) vs \( H_1: \pi_2 < 0 \);
(iii) \( H_0: \pi_3 = \pi_4 = 0 \) vs \( H_1: \) at least one \( \pi_i \neq 0 \) \( i=3,4 \).

The first two hypotheses, (i) and (ii), involve the use of the t-test and the third involves the use of F-test. If null hypothesis (i) is not rejected, it means that there is a unit root at the zero frequency (i.e. a non-seasonal unit root in the series). If null hypothesis (ii) is not rejected, it means that there is a seasonal unit root at the semi-annual frequency only. If null hypothesis (iii) is not rejected, it means that there is a seasonal unit root at the annual frequency only.

Table 7.4 presents the values of the test statistics and the corresponding critical values at the 5\% level for the two time series, LGDP and LTR. The results show that null hypothesis (i) and (ii) are not rejected for the two time series indicating that both series have a non-seasonal unit root but have seasonal unit roots at the semi-annual frequencies, respectively. The null hypothesis (iii) is not rejected for the time series LGDP but rejected for the time series LTR which indicate there are seasonal unit roots at the annual frequencies for LGDP and there are no unit roots at the annual frequencies for LTR.

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>The test statistics</th>
<th>Critical values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LGDP</td>
<td>LTR</td>
</tr>
<tr>
<td>(i)</td>
<td>-0.50</td>
<td>-2.09</td>
</tr>
<tr>
<td>(ii)</td>
<td>-2.15</td>
<td>-2.35</td>
</tr>
<tr>
<td>(iii)</td>
<td>6.40</td>
<td>7.86*</td>
</tr>
</tbody>
</table>

Notes: * denotes significance at the 5\% level.

Testing for cointegration
Even though the three individual series LTR, LGDP and LXR are non-stationary and of order I (1), it is possible that a linear combination of the three variables may be stationary. Modelling a linear relationship between the three variables, even if each of the variables is non-stationary (that is I (1)), as long as they are cointegrated, the regression involving the three series may not be spurious. Thus, it is necessary to investigate whether the three series LTR, LGDP and LXR are cointegrated having long-run equilibrium relationships. The Johansen methodology is used to perform the cointegration test among the three variables.

To minimize the effect of seasonal fluctuations, a centered seasonal dummy variable is applied when conducting the cointegration test. The reason for using the centered seasonal dummy variable is that a standard 0-1 seasonal dummy variable will affect both the mean and the trend of the level series in a model system, but the centered seasonal dummy variable can shift the mean without contributing to the trend (Johansen, 1995). In addition to the centered seasonal dummy variable, an event dummy variable is also introduced into the cointegration test to capture the combined irregular effects in the cointegration analysis. These irregular effects are reflected in the series and are particularly visible in the series of LTR (Figure 7.2 (a)) around 1989:3, 1994:1, 1998:1 and 2003:1, which are the effects of the Tianmen Square Massacre, the depreciation of the Chinese currency in terms of US dollars, the Asian Financial Crisis and the SARS epidemic, respectively.

A model, which contains 2 lags, a drift and two exogenous dummy variables, is chosen to test cointegration among the three variables after a careful search and test. The result of the Johansen cointegration rank test is summarized in Table 7.5. It indicates that at
least there is a presence of two cointegration vectors at 1% level of significance. In other words, at 1% level of significance, the null hypothesis of no cointegration is rejected for rank of zero in favour of the alternative hypothesis of one or more cointegration vectors. Moreover, at 1% level of significance, the null hypothesis of rank less than or equal to 1 is also rejected in favour of the alternative hypothesis of two or more cointegration vectors. Thus, we conclude that the three variables of LTR, LGDP and LXR are cointegrated and there exists long-run equilibrium relationships between the three variables, LTR, LGDP and LXR in China.

Table 7.5 Johansen cointegration tests

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Alternative Hypothesis</th>
<th>$\lambda_{\text{max}}$ Tests</th>
<th>95% CV</th>
<th>99% CV</th>
<th>$\lambda_{\text{trace}}$ Tests</th>
<th>95% CV</th>
<th>99% CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rank = 0</td>
<td>$r \geq 1$</td>
<td>29.21**</td>
<td>23.78</td>
<td>28.83</td>
<td>52.99**</td>
<td>34.55</td>
<td>40.49</td>
</tr>
<tr>
<td>Rank $\leq 1$</td>
<td>$r \geq 2$</td>
<td>21.76**</td>
<td>16.87</td>
<td>21.47</td>
<td>23.78**</td>
<td>18.17</td>
<td>23.46</td>
</tr>
<tr>
<td>Rank $\leq 2$</td>
<td>$r \geq 3$</td>
<td>2.02</td>
<td>3.74</td>
<td>6.40</td>
<td>2.02</td>
<td>3.74</td>
<td>6.40</td>
</tr>
</tbody>
</table>

Note: ** denotes rejection of the null hypothesis at the 1% significance level.

**Testing for Granger causality**

To test the tourism-led growth hypothesis and the sensitivities of the exchange rate in the Chinese economy, an ECM system is developed. The model includes three equations:

$$\Delta \text{LGDP}_t = \alpha_1 + \alpha_{\text{lgdp}} \hat{\epsilon}_{t-1} + \sum_{i=1}^{k} \alpha_{11} (i) \Delta \text{LGDP}_{t-i} + \sum_{i=1}^{k} \alpha_{12} (i) \Delta \text{LTR}_{t-i} + \beta_1 \text{Det} + \rho_1 \text{Dst} + \epsilon_{\text{lgdpt}}$$  \hspace{1cm} (3)

$$\Delta \text{LTR}_t = \alpha_2 + \alpha_{\text{ltr}} \hat{\epsilon}_{t-1} + \sum_{i=1}^{k} \alpha_{21} (i) \Delta \text{LGDP}_{t-i} + \sum_{i=1}^{k} \alpha_{22} (i) \Delta \text{LTR}_{t-i}$$
\[ \Delta \text{LXR}_t = \alpha_3 + \alpha_{3t} \hat{e}_{t-1} + \sum_{i=1}^{k} \alpha_{31} (i) \Delta \text{LGDP}_{t-i} + \sum_{i=1}^{k} \alpha_{32} (i) \Delta \text{LTR}_{t-i} + \sum_{i=1}^{k} \alpha_{33} (i) \Delta \text{LXR}_{t-i} + \beta_3 D_e + \rho_3 D_s + \epsilon_{\text{lxrt}} \]  

\[ + \sum_{i=1}^{k} \alpha_{23} (i) \Delta \text{LXR}_{t-i} + \beta_2 \text{Det} + \rho_2 \text{Dst} + \epsilon_{\text{ltrt}} \]  

(4)  

\[ \Delta \text{LXR}_t = \alpha_3 + \alpha_{3t} \hat{e}_{t-1} + \sum_{i=1}^{k} \alpha_{31} (i) \Delta \text{LGDP}_{t-i} + \sum_{i=1}^{k} \alpha_{32} (i) \Delta \text{LTR}_{t-i} \]

A number of lags for each of the three variables have been included to capture the short-run dynamic relationships in the ECM system. In particular, the model includes changes in \( \Delta \text{LGDP}_t \), \( \Delta \text{LTR}_t \), \( \Delta \text{LXR}_t \), and lagged \( \Delta \text{LGDP}_t \), \( \Delta \text{LTR}_t \) and \( \Delta \text{LXR}_t \); \( D_e \) is the event dummy variable for capturing the possible combined effects of the 1989 Tianmen Square Massacre, the 1998 Asian Financial Crisis and the 2003 SARS epidemic and the depreciation of the Chinese currency in terms of US dollars; \( D_s \) is the centered seasonal dummy variable for minimizing the effect of seasonal fluctuations. \( \hat{e}_{t-1} \) is the lagged error-correction term; \( \alpha_i \), \( \alpha_{ij} (i) \), \( \beta_i \) and \( \rho_i \) are the parameters; and \( \epsilon_{\text{lgdpt}} \), \( \epsilon_{\text{ltrt}} \) and \( \epsilon_{\text{lxrt}} \) are the white-noise disturbance terms that may be correlated with each other. All the endogenous variables in the model are in real terms in natural logarithm form. Using both the Akaike Information Criterion (AIC) and Schwarz Criterion (SC) (Akaike, 1974), we found that 4 lags should be included in the ECM. The fit of the three equations are best for the data and there is no sign of residual autocorrelations in the model.

Table 7.6 shows the results for the test of Granger causality based on the ECM model. The results show that, at the 5% significance level, (1) there is a bi-directional causal relationship between economic growth (LGDP) and tourism (LTR), (2) only a one-directional causal relationship runs from exchange rate (LXR) to economic growth (LGDP), and (3) there is no relationship between exchange rate and tourism. That is, the
empirical results above support the widely believed tourism-led growth hypothesis in the Chinese economy, and suggest that the real exchange rate affects China’s economic growth but not tourism. The findings are robust and consistent with the results by Jackson (2006), Wen and Tisdell (1996), and are consistent with the conclusions by Balaguer and Cantavella-Jorda (2002) for Spain, and Dritsakis (2004) for Greece.

Table 7.6 Granger causality test based on error correction modelling

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Wald test statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ΔLGDP&lt;sub&gt;t&lt;/sub&gt;</td>
</tr>
<tr>
<td>ΔLGDP&lt;sub&gt;t&lt;/sub&gt;</td>
<td>4.13**</td>
</tr>
<tr>
<td>ΔLTR&lt;sub&gt;t&lt;/sub&gt;</td>
<td>4.33**</td>
</tr>
<tr>
<td>ΔLXR&lt;sub&gt;t&lt;/sub&gt;</td>
<td>0.12</td>
</tr>
</tbody>
</table>

Conclusion: LGDP ⇒ LTR, LTR ⇒ LGDP, LXR ⇒ LGDP

Note: ** denotes rejection of the null hypothesis and the critical value with one degree of freedom is 3.84 at the 5% significance level.

7.4 Conclusion and policy implications

Applying quarterly time series data from 1988:1 to 2005:4 to the ECM, we tested for Granger causality and found that there exist causal links between tourism and economic growth which are bi-directional, whereas only a one-way directional causality runs from the real exchange rate to economic growth. That is, the tourism-led growth hypothesis has been held in the Chinese economy, and the real exchange rate has had impact on China’s economic growth but not on tourism.
These findings do have some important implications for policy makers in China and elsewhere. Since tourism is a natural resource leading growth, the Chinese government might consider a greater emphasis and utilization of tourism to form the basis for long-run competitive advantage hence fostering economic growth. Recently, the Chinese government in a five-year plan, promised to use foreign direct investment (FDI) effectively to make the service sector a key area to attract more FDI, and to steer FDI toward the less developed inland western regions\textsuperscript{11}. In this regard, it is strongly recommended that the Chinese Government should be wisely encouraging foreign investors to invest in the tourism industry or local infrastructure in the less developed inland western regions to promote tourism, where exports of manufacturing goods are disadvantaged while the natural resource of tourism is abundant. It is also suggested that in the course of tourism development in the western regions, encouraging participation of the locals to ensure that tourism is effectively linked with the local sectors should be preceded over any participants from outside. Finally, while promoting tourism and economic growth, it is urged that good environment protection laws and policies should be formulated and implemented in China.

**Endnotes**

1. The statistics of international tourist arrivals and international tourism receipts were collected from the website of China National Tourist Office: [http://www.cnto.org/chinastats.asp](http://www.cnto.org/chinastats.asp).

3. The statistics were released by the World Travel and Tourism Council’s Research and Economics Unit but cited from “China Daily” on line 10. 10. 2006.


5. The years (1978-1980, 1984-1989 and 1993) with negative rate are not included in the calculation for the average rate of 59.8%. Those negative rates present percentage rates of tourist receipts in net export (deficit).

6. The relevant quarterly time series data for the period 1978-1987 is not available, thus, this study focuses on the period 1988-2005.

7. This is international tourism receipts including transportation, food, accommodation, sightseeing, shopping and communication etc.

8. All data are in real values.

9. It is found that the annual growth pattern of GDP is similar to that of GIO. Following Liu, Song and Romilly (1997) and Liu, Burridge and Sinclair (2002), the estimated GDP is given as: GDP_{t,q} = g_t \times \text{GIO}_{t,q}, \text{q =1,.., 4; t = 1988, 1989,.., 2000;} \text{ where } g_t \text{ is the annual GDP/GIO ratio and } \text{GIO}_{t,q} \text{ is the quarterly value of GIO. However, the GDP quarterly data from 2001:1-2005:4 was obtained from the website of the National Bureau of Statistics (NBS) of China and China National Tourist Office.}

10. The fixed exchange rate regime has prevailed in China and the Chinese currency had been maintained at a certain fixed value over ten years from 1994 to 2005. Thus, the HEGY seasonal unit root test is not applied to the foreign exchange rate series.

11. Reported by Xinhua, the China state-run news agency on 15 January 2007.
Chapter 8. FDI and Regional Income Inequality

8.1 Introduction

The level of FDI in China has reached a new record high, US$61 billion, in 2004. The annual average growth rate of utilized FDI in China is remarkable at 34% during the period 1978 to 2004. With this persistent strong growth of FDI inflows, China has achieved its highest average annual economic growth rate of about 10% in the same period. Meanwhile, income inequality in China has substantially widened between households in the coastal and the inland regions. In 2004, the per capita annual disposable income of households in the richest coastal region Shanghai was RMB16683 (RMB is Chinese currency), which was almost 10 times as much as the per capita annual disposable income of households in the poorest inland region Guizhou (RMB1722). In contrast to the inland western regions (e.g. Guizhou, Sichun and Guangxi), the coastal regions (e.g. Shanghai, Jiangsu and Guangdong) where most FDI occurs are relatively well developed. The relationship between FDI and inequality has raised great concern amongst policy makers, and has been an important topic of interest in the areas of international economics and economic development. While some researchers (e.g. Mundell 1957, Feenstra and Hanson 1997) argue that FDI generally reduces income inequality in developing countries in particular, others claim (e.g. Tsai, 1995) that FDI does contribute to the rise in income inequality.

1 Source: Comprehensive Statistical Data and Materials on 55 Years of New China.
In this chapter, under a regression analytical framework, we seek answers to the above debate on China using time series data for the period 1978 to 2002. We identify the principal forces that affect regional income inequality in China. Such an analysis of FDI and regional income inequality in China is important not only because China is the largest FDI recipient country in the world but also, China, as a developing nation, needs to feed 1.3 billion people - one quarter of the world population. Therefore, an increase in income inequality could not only undermine the social stability but also disrupt political stability, which would eventually destroy the very foundation of China’s emergence as a major world economic power and consequently the high economic growth that China currently enjoys.

Theories as well as empirical findings regarding the impact of FDI on income inequality are divided. Dependency theorists argue that the predatory behavior of the MNEs creates a neo-colonial economy through FDI. This means that more FDI in a country means more foreign control in that country and as a consequence the greater the degree of income inequality in that country (Bornschier and Chase-Dunn, 1985; Gowan, 1999). It is also argued that FDI not only creates employment opportunities for “local labor elites” with higher wages, but also leads to productions that are more capital-intensive. As a consequence, the unemployment rate increases in the traditional sectors and income inequality becomes greater (Tsai, 1995). On the other hand, modernization theorists describe FDI as an ideal mechanism for the diffusion of capital, markets and knowledge that stimulates economic growth and its benefits eventually spread throughout the whole economy. Thus, in the long run a more even income distribution could be achieved (King and Varadi, 2002).
Using cross-country data, Tsai (1995) examines the relationship between FDI and income inequality in 33 less-developed countries (LDCs) and finds that FDI does give rise to more unequal income distribution in the host LDCs. The findings of Tsai (1995) are generally consistent with the argument of the dependency theorists. The study also supports Kuznets theory\(^2\) but suggests that trade has no correlation with income inequality; an improvement in human capital does not help achieve greater equality; and a high proportion of agricultural labor force is positively correlated with higher income inequality. Fu (2004) investigates the spillover and migration effects of exports and FDI and their impact on income inequalities in China. Towards this purpose, Fu applies panel data from 1990 to 1999 to a log-linear dynamic panel model. Fu’s study supports the dependency theories that FDI does increase income inequality, especially between inland and coastal regions in China. In addition, Fu finds that, while exports and interstate labor migration from the inland to the coastal regions have played an important role in increasing regional disparities, urbanization in the inland regions helps to reduce regional income inequality leading to more balanced regional growth.

In contrast to the studies of Fu (2004) and Tsai (1995), Wan, Lu and Chen (2003), and Feenstra and Hanson (1997) provide support to the modernization theory. Wan, Lu and Chen estimate an income generating function and find that capital input and infrastructure are the largest contributors to regional inequality, FDI and trade exert a decreasing impact on regional inequality in China and privatization helps equalize income across regions. The study by Feenstra and Hanson (1997) concludes that FDI does not induce income inequality in developing countries.

\(^2\) Kuznets (1955) theory describes that the relationship between income inequality and the level of economic development is just like an inverted U-shaped curve.
The organization of this chapter is as follows. Section 8.2 presents an overview of FDI inflows and regional income inequality in China. Section 8.3 applies regression framework to identify the factors which influence regional income inequality in China. The last section of the chapter presents the implications and conclusions.

8.2 An Overview of the FDI inflows and the regional income inequality in China

In 1978, China finally opened its doors to the world after almost 30 years of isolation. Attracting FDI has been a key pillar of China’s “opening up” policies and economic reforms. The policies adopted to attract FDI were basically preferential ones, which provided tax concessions and special privileges to foreign investors. In Table 8.1, we present the timeline of China’s FDI and regional preferential policies during 1979 to 2002. The experiment of economic and social reforms, as listed in Table 8.1, started with the establishment of 3 Special Economic Zones (SEZs) in the southeast coastal province, Guangdong, next to Hongkong and Macao; and subsequently another SEZ was established in Fujian, next to Taiwan. Between 1984 and 1986, 27 additional FDI friendly (or SE) zones were established in Shanghai, Tianjin, Liaoning, Hebei, Shandong, Jiangsu, Zhejiang, Fujian, Guangdong and Guangxi. However, the amount of FDI entering China was small during this period and most of the FDI was located in the coastal region. During

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3 In this chapter, the geographical regions of China were divided into two major regions, the coastal and inland regions, for comparison. The coastal region includes the metro cities (Beijing, Tianjin and Shanghai) and the eight coastal provinces (Hebei, Liaoning, Jiangsu, Zhejiang, Fujian, Guangdong, Guangxi and Shandong). The inland region includes six central provinces (Shanxi, Anhui, Jiangxi, Henan, Hubei and Hunan), two northeast provinces (Jilin and Helongjiang), six northwest provinces (Inner Mongolia, Shanxi, Gansu, Qinghai, Ningxia and Xinjiang) and three southwest provinces (Sichun, Guizhou and Yunnan). Hainan and Tibet provinces are excluded from the
this period, the Chinese government also promulgated FDI legislations and policies such as the “Equity Joint Venture Law”; and changed China’s FDI regulatory regime from “permitting” to “encouraging” FDI. Furthermore, in 1990, the Chinese government provided a more complete legal structure to facilitate the operations of the foreign-invested enterprises (FIEs) by issuing “Amendments to the Equity Joint Venture Law and Wholly Foreign-Invested Enterprise Implementing Rules.”

Figure 8.1 shows FDI inflows in China during the years 1978 to 2002. As can be seen, FDI inflows continued to grow in most of the years during this period, as more and more economic zones were developed and cities opened. FDI inflows were very low until the late 1980s and increased at a faster rate during the 1990s.

In 1992, following the famous “Southern Tour” by Mr. Deng Xiaoping, the government pushed ahead with further economic reforms in China. This led to a new phase of FDI liberalization. In the same year, after 14 years of opening up in the coastal region, China finally extended the “economic zones” to some selective inland provinces, and the “open cities” to all capital cities of the inland region. In the meantime, FDI and ownership laws, property rights and contract laws were developed to improve investment conditions and business environment. As a result, as can clearly be seen from Figure 8.1, FDI entered into a stage of accelerating growth during the 1990’s. This positioned China as the largest FDI hosting country in the developing world after 1992. While new economic zones were
<table>
<thead>
<tr>
<th>Year</th>
<th>Number and Type of Opened Zones or Specific Events and FDI Policies</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>Economic reforms started</td>
<td></td>
</tr>
<tr>
<td>1979</td>
<td>3 Special Economic Zones (The Joint Venture Law was enacted)</td>
<td>Guangdong</td>
</tr>
<tr>
<td>1980</td>
<td>1 Special Economic Zone</td>
<td>Fujian</td>
</tr>
<tr>
<td>1984</td>
<td>14 Coastal Open Cities</td>
<td>Liaoning, Hebei, Tianjin, Shandong, Jiangsu, Shang hai, Zhejiang, Fujian, Guangdong and Guangxi</td>
</tr>
<tr>
<td></td>
<td>10 Economic and Technological Development Zones</td>
<td>Liaoning, Hebei, Tianjin, Shandong, Jiangsu, Zhejiang and Guangdong</td>
</tr>
<tr>
<td>1985</td>
<td>1 Economic and Technological Development Zone</td>
<td>Fujian</td>
</tr>
<tr>
<td>1986</td>
<td>2 Economic and Technological Development Zones (The PRC law grants legal rights to wholly owned foreign enterprises. More freedom and tax incentive for FIEs.*)</td>
<td>Shanghai</td>
</tr>
<tr>
<td>1988</td>
<td>Open Coastal Belt</td>
<td>Liaoning, Shandong, Guangxi and Hebei</td>
</tr>
<tr>
<td></td>
<td>1 Special Economic Zone</td>
<td>Hainan</td>
</tr>
<tr>
<td>1990</td>
<td>Pudong New Area (The Amendments to the Joint Venture law and the Tax Income law for FIEs were issued)</td>
<td>Shanghai</td>
</tr>
<tr>
<td>1992</td>
<td>13 Bonded Areas in Major Coastal Port Cities (Deng Xiaoping's Southern China Tour)</td>
<td>Tianjin, Guangdong, Liaoning, Shandong, Jiangsu, Zhejiang Fujian and Hainan</td>
</tr>
<tr>
<td></td>
<td>10 Major Cities Along the Yangtze River</td>
<td>Jiangsu, Anhui, Jiangxi, Hunan, Hubei and Sichuan</td>
</tr>
<tr>
<td></td>
<td>13 Border Economic Cooperation Zones</td>
<td>Jilin, Heilongjiang, Inner Mongolia, Xinjiang, Yunnan and Guangxi</td>
</tr>
<tr>
<td></td>
<td>All Capital Cities of Inland Provinces and Autonomous Regions</td>
<td>Fujian, Liaoning, Jianxi, Shandong and Zhejiang</td>
</tr>
<tr>
<td>1993</td>
<td>5 Economic and Technological Development Zones</td>
<td>Anhui, Guangdong, Hubei, Liaoning, Sichuan, Fujian, Jilin, and Zhejiang</td>
</tr>
<tr>
<td>1994</td>
<td>2 Economic and Technological Development Zones (Foreign Exchange System Reform &amp; Decentralize FDI Policies)</td>
<td>Beijing and Xinjiang</td>
</tr>
<tr>
<td>1995</td>
<td>Encourages Greater Geographical Dispersion of FDI</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inflows and Promotes FDI Inflows Into Export-Oriented, High Technology, Agriculture and Infrastructure Sectors</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>Encourages More FDI Flowing Into Western Area of the Inland Regions</td>
<td>Northwest and Southwest Provinces</td>
</tr>
<tr>
<td>1998</td>
<td>Abolished the FDI projects approval requirement</td>
<td></td>
</tr>
<tr>
<td>2001-</td>
<td>A New Era of FDI Liberalization (China Became the 143rd Member of WTO)</td>
<td></td>
</tr>
</tbody>
</table>

Source: Almanac of China's Economy, various issues, and Demurger et al. (2002). FIEs: Foreign Invested Enterprises.
created across the country, the distribution of FDI continued to be skewed in favor of the coastal region. During 1996, the Chinese government encouraged foreign investors to invest in the western areas of China in order to facilitate the economic development of the inland region and reduce income inequality between the coastal and the inland regions. In 1998, during the Asian financial crisis, the Chinese government further liberalized its FDI policy. One such liberalization policy was the abolition of the FDI project approval requirement. However, these new liberalization policies did not improve the situation as the impact of the Asian financial crisis was very strong leading to a decrease in FDI inflows during the years of 1999 and 2000 to a point below the previous year’s level (see Figure 8.1). In December 2001, China joined the World Trade Organization (WTO), which marked a new era of FDI liberalization. In the same year, as can be seen in Figure 8.1, China’s FDI inflows increased dramatically from US$40.7 billion in 2000 to US$46.9 billion in 2001. By 2002, China had become the largest FDI host country in the world attracting US$52.7 billion of FDI. Indeed, China successfully attracted enormous amounts of FDI inflows, but the distribution of FDI inflows continued to be geographically uneven.
Table 8.2 presents the total and regional distribution of FDI inflows into China during 1984 and 2002. Column 1 presents the names of the regions and sub-regions; Columns 2 and 4 show the amount of FDI in 1984 and 2002, respectively; and Columns 3 and 5 express FDI in percentage terms for the two years. As indicated in Table 8.2, FDI inflows into the coastal region are much higher than inflows to the inland region in both 1984 and 2002. In percentages, FDI inflows were 95% and 87% into the coastal region compared to 5% and 13% into the inland region in 1984 and 2002, respectively.

FDI, as expected by the Chinese government, has played a significant role in China’s economic development. It has helped to develop technologies and management know-how. It has also expanded China’s export sector, improved total factor productivity and contributed to significant GDP growth through the establishment of FIEs and the spillover effects on domestic enterprises. Table 8.3 presents the various forms of significant contribution of FDI to China’s exceptional economic performance during 1985 and 1990-2002. Columns 2 and 3 provide the share of FDI inflows in the total domestic investment and the percentages of FDI stocks in GDP, respectively. Column 4 shows the exports by FIEs. The last two columns present the share of the industrial output by FIEs in the total industrial output and the number of employees in FIEs, respectively. FDI inflows have provided significant foreign capital investment flows and accounted for over 10% of the total domestic investment per year since 1993 (see column 2). The ratio of FDI stocks to GDP in 1985 was 1.5% and had increased to 23.5% in 1997 (see column 3). FDI has also assisted China in gaining access to new export markets. Exports by FIEs were US$0.3
Table 8.2  Regional distribution of FDI in China (millions of US$ and %)

<table>
<thead>
<tr>
<th>Region</th>
<th>1984</th>
<th></th>
<th>2002</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FDI inflow</td>
<td>Percentage</td>
<td>FDI inflow</td>
<td>Percentage</td>
</tr>
<tr>
<td></td>
<td>$million</td>
<td>%</td>
<td>$million</td>
<td>%</td>
</tr>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>Coastal region</td>
<td>2575.8</td>
<td>94.9</td>
<td>45362.7</td>
<td>87.3</td>
</tr>
<tr>
<td>Metro cities</td>
<td>655.2</td>
<td>24.1</td>
<td>7578.9</td>
<td>14.6</td>
</tr>
<tr>
<td>Beijing</td>
<td>118.7</td>
<td>4.4</td>
<td>1724.6</td>
<td>3.3</td>
</tr>
<tr>
<td>Tianjin</td>
<td>105.7</td>
<td>3.9</td>
<td>1582</td>
<td>3</td>
</tr>
<tr>
<td>Shanghai</td>
<td>430.8</td>
<td>15.9</td>
<td>4272.3</td>
<td>8.2</td>
</tr>
<tr>
<td>Coastal provinces</td>
<td>1920.5</td>
<td>70.8</td>
<td>37783.8</td>
<td>72.7</td>
</tr>
<tr>
<td>Hebei</td>
<td>11.2</td>
<td>0.4</td>
<td>782.7</td>
<td>1.5</td>
</tr>
<tr>
<td>Liaoning</td>
<td>44.1</td>
<td>1.6</td>
<td>3411.7</td>
<td>6.6</td>
</tr>
<tr>
<td>Jiangsu</td>
<td>56.5</td>
<td>2.1</td>
<td>10189.6</td>
<td>19.6</td>
</tr>
<tr>
<td>Zhejiang</td>
<td>31.5</td>
<td>1.2</td>
<td>3076.2</td>
<td>5.9</td>
</tr>
<tr>
<td>Fujian</td>
<td>236.2</td>
<td>8.7</td>
<td>3838.4</td>
<td>7.4</td>
</tr>
<tr>
<td>Shangdong</td>
<td>104.9</td>
<td>3.9</td>
<td>4734</td>
<td>9.1</td>
</tr>
<tr>
<td>Guangdong</td>
<td>1409.3</td>
<td>52</td>
<td>11334</td>
<td>21.8</td>
</tr>
<tr>
<td>Guangxi</td>
<td>26.7</td>
<td>1</td>
<td>417.3</td>
<td>0.8</td>
</tr>
<tr>
<td>Inland region</td>
<td>136.6</td>
<td>5.1</td>
<td>6596.7</td>
<td>12.7</td>
</tr>
<tr>
<td>Central</td>
<td>62.1</td>
<td>2.3</td>
<td>4408.9</td>
<td>8.5</td>
</tr>
<tr>
<td>Shanxi</td>
<td>1.1</td>
<td>0</td>
<td>211.6</td>
<td>0.4</td>
</tr>
<tr>
<td>Anhui</td>
<td>3.6</td>
<td>0.1</td>
<td>383.8</td>
<td>0.7</td>
</tr>
<tr>
<td>Jiangxi</td>
<td>6.9</td>
<td>0.3</td>
<td>1082</td>
<td>2.1</td>
</tr>
<tr>
<td>Henan</td>
<td>6</td>
<td>0.2</td>
<td>404.6</td>
<td>0.8</td>
</tr>
<tr>
<td>Hubei</td>
<td>9.9</td>
<td>0.4</td>
<td>1426.7</td>
<td>2.8</td>
</tr>
<tr>
<td>Hunan</td>
<td>34.6</td>
<td>1.3</td>
<td>900.2</td>
<td>1.7</td>
</tr>
<tr>
<td>Northeast</td>
<td>6.6</td>
<td>0.2</td>
<td>599.8</td>
<td>1.2</td>
</tr>
<tr>
<td>Jilin</td>
<td>1.4</td>
<td>0.1</td>
<td>244.7</td>
<td>0.5</td>
</tr>
<tr>
<td>Heilongjiang</td>
<td>5.2</td>
<td>0.2</td>
<td>355.1</td>
<td>0.7</td>
</tr>
<tr>
<td>Northwest</td>
<td>34.7</td>
<td>1.3</td>
<td>686.5</td>
<td>1.3</td>
</tr>
<tr>
<td>Mongolia</td>
<td>3</td>
<td>0.1</td>
<td>177</td>
<td>0.3</td>
</tr>
<tr>
<td>Shaanxi</td>
<td>1.6</td>
<td>0.1</td>
<td>360.1</td>
<td>0.7</td>
</tr>
<tr>
<td>Gansu</td>
<td>0.3</td>
<td>0</td>
<td>61.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Qinghai</td>
<td>23.5</td>
<td>0.9</td>
<td>47.3</td>
<td>0.1</td>
</tr>
<tr>
<td>Ningxia</td>
<td>3</td>
<td>0.1</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>Xinjiang</td>
<td>3.3</td>
<td>0.1</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td>Southwest</td>
<td>33.3</td>
<td>1.2</td>
<td>901.5</td>
<td>1.7</td>
</tr>
<tr>
<td>Sichuan</td>
<td>28.9</td>
<td>1.1</td>
<td>751.6</td>
<td>1.5</td>
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<tr>
<td>Yunnan</td>
<td>1.5</td>
<td>0.1</td>
<td>111.7</td>
<td>0.2</td>
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<tr>
<td>Guizhou</td>
<td>2.9</td>
<td>0.1</td>
<td>38.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Total</td>
<td>2712.4</td>
<td>100</td>
<td>51959.4</td>
<td>100</td>
</tr>
</tbody>
</table>

### Table 8.3 Various forms of contribution of FDI in China, 1985, 1990 - 2002

<table>
<thead>
<tr>
<th>Year</th>
<th>FDI inflows / total DI %</th>
<th>FDI stocks / GDP %</th>
<th>Exports by FIEs $billion</th>
<th>FIEs output / total output %</th>
<th>No. of employees in FIEs million</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>2.0</td>
<td>1.5</td>
<td>0.3</td>
<td></td>
<td>0.1</td>
</tr>
<tr>
<td>1990</td>
<td>3.9</td>
<td>5.2</td>
<td>7.8</td>
<td></td>
<td>0.7</td>
</tr>
<tr>
<td>1991</td>
<td>4.4</td>
<td>5.6</td>
<td>12.1</td>
<td>5.0</td>
<td>1.7</td>
</tr>
<tr>
<td>1992</td>
<td>8.0</td>
<td>7.1</td>
<td>17.4</td>
<td>6.0</td>
<td>2.2</td>
</tr>
<tr>
<td>1993</td>
<td>13.1</td>
<td>10.2</td>
<td>25.2</td>
<td>9.0</td>
<td>2.9</td>
</tr>
<tr>
<td>1994</td>
<td>18.1</td>
<td>17.6</td>
<td>34.7</td>
<td>11.0</td>
<td>4.1</td>
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<td>1995</td>
<td>17.2</td>
<td>18.8</td>
<td>46.9</td>
<td>13.0</td>
<td>5.1</td>
</tr>
<tr>
<td>1996</td>
<td>16.8</td>
<td>24.7</td>
<td>61.5</td>
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<td>5.4</td>
</tr>
<tr>
<td>1997</td>
<td>16.6</td>
<td>23.5</td>
<td>75.0</td>
<td>18.6</td>
<td>5.8</td>
</tr>
<tr>
<td>1998</td>
<td>14.4</td>
<td></td>
<td>81.0</td>
<td></td>
<td>5.9</td>
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<tr>
<td>1999</td>
<td>12.0</td>
<td></td>
<td>88.6</td>
<td></td>
<td>6.1</td>
</tr>
<tr>
<td>2000</td>
<td>10.7</td>
<td></td>
<td>119.4</td>
<td>27.4</td>
<td>6.4</td>
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<tr>
<td>2001</td>
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<td></td>
<td>133.2</td>
<td>28.5</td>
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<td>2002</td>
<td>10.2</td>
<td></td>
<td>170.0</td>
<td></td>
<td>7.6</td>
</tr>
</tbody>
</table>

Source: World Investment Report, various issues; Almanac of China’s Economy, various issues; and China Statistical Yearbook, various issues.

Billion in 1985, while in 2002 it had increased to US$170 billion (column 4). The share of FIEs contributed to total industrial output also demonstrated great strength. This share has increased from 5% in 1991 to 29% in 2002 (column 5). With 208056 FIEs operating in almost every sector of China, FDI has created local employment opportunities. The number of employees in FIEs has increased from an insignificant 0.1 million in 1985 to 7.6 million in 2002 (column 6).

While FDI has had a strong impact on China’s overall economic development, the unequal distribution of FDI between different regions has undoubtedly skewed regional economic development. This can clearly be seen from Table 8.4, where we present some economic data.

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4 Calculated from China Statistical Yearbooks, various issues.
<table>
<thead>
<tr>
<th>Type of variable</th>
<th>Coastal region (1)</th>
<th>Inland region (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Export by FIEs (US billion dollars)</td>
<td>130</td>
<td>3</td>
</tr>
<tr>
<td>2. Share of export by FIEs</td>
<td>53%</td>
<td>16%</td>
</tr>
<tr>
<td>In regional total export (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Regional total export (US billion dollars) annual growth rate: 1978-2002 (%)</td>
<td>244</td>
<td>21</td>
</tr>
<tr>
<td>4. Share of export by region in national total export (%)</td>
<td>92%</td>
<td>8%</td>
</tr>
<tr>
<td>5. Industrial output by FIEs (RMB billion Yuan)</td>
<td>2469</td>
<td>249</td>
</tr>
<tr>
<td>6. Share of industrial output by FIEs in regional total industrial Output (%)</td>
<td>36%</td>
<td>9%</td>
</tr>
<tr>
<td>7. Regional industrial total output (RMB billion Yuan)</td>
<td>6815</td>
<td>2706</td>
</tr>
<tr>
<td>8. Share of industrial output by Region in national total industrial Output (%)</td>
<td>72%</td>
<td>28%</td>
</tr>
<tr>
<td>9. Number of employees in FIEs (million Persons)</td>
<td>5.83</td>
<td>0.85</td>
</tr>
</tbody>
</table>

Source: Calculated from China Statistical Yearbook 2002.

statistics for 2001 which reflect the differences between the coastal and the inland regions economies. As can be seen, FDI made a much greater contribution to economic development in the coastal region than the inland provinces. Exports by FIEs in the coastal region were about US$130 billion which accounted for 53% of the coastal region’s total exports, whereas, the inland provinces had only US$3 billion which represented 16% of the inland region’s total exports. Exports of coastal and inland regions in 2001 were US$244 billion and US$21 billion, respectively, which accounted for 92% and 8% of the national total exports, respectively. Undoubtedly, opening up the Chinese economy to the world economy not only benefited the coastal region, but also stimulated demand for exports in
the inland region through enhanced competition throughout China. This occurred despite the fact that the FDI policies have favored the coastal region, resulting in more FDI flows being channeled into the coastal region. Similarly, the industrial output by FIEs in coastal and the inland regions, respectively, were RMB2469 billion (see row 5) and RMB249 billion. This accounted for 36% and 9% (see row 6) of the respective regions’ total industrial output. This led to the share of industrial output of coastal and inland regions in the national total industrial output to be 72% and 28%, respectively (see row 8). Moreover, FDI has also led to much higher local employment in the coastal region compared to the inland region. The number of employees in the FIEs, as shown in the Table 8.4 (row 9), in the coastal region reached 5.83 million compared to only 0.85 million in the inland region. In terms of earnings, employees in FIEs are much better paid than in the comparable domestic sectors, especially, in the state-owned enterprises. Thus, the average wage in all sectors in the coastal region has increased\(^5\). As a consequence of the extremely unbalanced economic development and FDI movements in the two regions, regional income inequality in China has widened. Figure 8.2 shows the per capita income in the coastal and the inland regions from 1970 to 2002. As can be seen, the income disparity between the two regions has increased gradually since 1978. From the mid 1980s, the disparity became more pronounced.

Facing the issue of growing regional income inequality, the Chinese government undertook steps to bridge the widening gap between inland and coastal regions throughout the economic reform period. During the mid 1980s, a new emphasis on economic development in the poorer areas was introduced in the 7th Five Year Plan (1986–1990) and further

\(^5\) The statement is based on the calculation from China Statistical Yearbook 2003. For instance, the average annual wage in the richest metro city Shanghai was 2.52 times higher than that in the poorest province Guizhou.
strengthened in the 8th Five Year Plan (1991–1995) (World Bank, 1992). The plan includes special programs to improve education and health; a Food-for-Work-Program to assist with the building of roads, irrigation works and other capital constructions; price reforms to deregulate raw material and agricultural prices; and subsidized bank loans for economic development (World Bank, 1992).

The Chinese government also regarded the decline in the performance of rural enterprises as a factor contributing to the widening economic gap between the coastal and the inland regions and promoted a domestic investment plan supporting rural enterprises in the inland region (excluding northeast provinces). For example, large additional bank loans and a special state council loan of RMB10 billion were introduced during the period 1993–2000 to be used towards the growth and development of inland region⁶. In addition, a three-year income tax exemption for all newly established rural enterprises in central provinces, as well as the new tax policy of exemption of all items of export from value-added tax and consumer tax were introduced.

⁶ The State Statistical Bureau of China (SSBC) online information in Chinese.
The Chinese government, in 2000, further addressed concerns about widening regional income disparity and planned to narrow regional inequalities as one of its principal objectives. Thus, in 2001, RMB205.4 billion was transferred to poor provinces and cities to finance social security cash-flow\(^7\). Meanwhile, the social security system was being reformed by transferring the social security responsibility from enterprises to the state at the provincial and municipal prefecture levels. Besides social security reform, in the 10\(^{th}\) Five-Year Plan (2001–2005), the Chinese government aimed to 1) increase productivity in agriculture and industrial state-owned enterprises, 2) develop collective, private and individual businesses, 3) promote labor-intensive activities in service sectors, 4) invest in human capital, and 5) protecting natural capital. In addition, the Chinese government also emphasized the need for establishing economic development zones in the inland provinces by attracting foreign investors to invest in strategic physical infrastructure for transport, water resources management, energy and mining\(^8\).

8.3 The model and empirical results

In this section, we use a regression framework to empirically analyze the factors that influence the level of regional income inequality in China. We specifically attempt to answer the following questions: (1) has FDI influenced China’s regional inequality? (2) what are the other principal factors which affect regional income inequality in China?

\(^7\) The China Internet Information Centre (The State Council of China official website): www.org.cn.

The conceptual framework adopted to analyze the causality between FDI and regional income inequality is based on the argument between the modernization and dependency theories outlined in Section 1 of the thesis. The Kuznets theory will be used to guide the study on the relationship between economic development and regional income inequality. Other variables which are used to explain regional income inequality include (i) the variables that represent the Chinese government’s intervention to reduce income inequalities; and (ii) the variables commonly used in past income inequality studies that could be defined and measured such as GDP and human capital. Thus, the following basic model is considered to estimate the relationship between regional income inequality and other possible factors. The dependent variable regional income inequality is measured by the well-known Gini coefficient. That is,

\[ GINI_i = \alpha + \beta FDI_i + \kappa TRADE_i + \gamma PCG_i + \delta PCG^2_i + \mu AGR_i + \lambda HCAP_i + \rho HCAP^2_i + \nu GOV_i + u_i \]

where the variables are denoted as follows:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GINI</td>
<td>Gini coefficient</td>
</tr>
<tr>
<td>FDI</td>
<td>Share of FDI inflows in total investment</td>
</tr>
<tr>
<td>TRADE</td>
<td>Share of trade in GDP</td>
</tr>
<tr>
<td>PCG</td>
<td>Logarithm of real per capita GDP</td>
</tr>
<tr>
<td>PCG2</td>
<td>Squared PCG</td>
</tr>
<tr>
<td>AGR</td>
<td>Ratio of the agricultural labor force with respect to total labor force</td>
</tr>
<tr>
<td>HCAP</td>
<td>Human capital, share of higher education in total population</td>
</tr>
</tbody>
</table>
HCAP2  Squared HCAP

GOV     Share of total government expenditure in GDP

u      Contemporaneous disturbance term.

The Gini coefficient\(^9\) is used as the dependent variable because it is the most widely accepted measure for income inequality. The calculation of the Chinese Gini coefficient is based on the corresponding household disposable income data of China. The required time series data for 1978–2002 is compiled from *Comprehensive Statistical Data and Materials for 50 Years of New China* and the various issues of *China Statistical Yearbook*, both published by the National Bureau of Statistics (NBS). Data for all independent variables in the model are also collected from the same data source and all variables are measured in the Chinese currency, RMB.

Table 8.5 provides a summary of the expected signs of all the coefficients on the variables for the model. The observed signs of all the coefficients noted from the estimated results for the model also are presented in the same table.

The view on the expected signs of the coefficients \(\beta\) and \(\kappa\) are divided. Dependency theorists believe that greater income inequalities are associated with increasing FDI inflows, thus, the expected sign of the coefficient \(\beta\) should be positive under dependency theory. On the other hand, if the modernization theory holds, an increase in FDI would reduce regional income inequality. Thus, the expected sign of the coefficient \(\beta\) under modernization theory would be negative.

\(^9\) The Gini coefficient measurement is detailed in Appendix 2 of this thesis.
Trade (TRADE) is generally used to measure the degree of openness of an economy. According to the modernization theory, trade enhances competition, fosters economic growth and leads to more balanced income distribution. Thereby, a negative sign of $\kappa$ is expected if the modernization theory holds. On the other hand, under the dependency theory, trade assumed to widen the income of the population and hence $\kappa$ is expected to be positive.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Dependency theory</th>
<th>Modernization theory</th>
<th>The expected signs</th>
<th>The observed signs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(i)</td>
<td>(ii)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>FDI</td>
<td>$\beta$</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>TRADE</td>
<td>$\kappa$</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>- *</td>
</tr>
<tr>
<td>PCG</td>
<td>$\gamma$</td>
<td>+</td>
<td>or -</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>PCG2</td>
<td>$\delta$</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>AGR</td>
<td>$\mu$</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>HCAP</td>
<td>$\lambda$</td>
<td>+</td>
<td>or -</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>HCAP2</td>
<td>$\rho$</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>GOV</td>
<td>$\nu$</td>
<td>-</td>
<td>+</td>
<td>+ *</td>
<td></td>
</tr>
</tbody>
</table>

Note: * not statistically significant.

According to the Kuznets theory, the relationship between income inequality and economic growth is an inverted U-shape. Accordingly, the coefficient corresponding to PCG2, $\delta$, is expected to be negative.

Agricultural transformation has been widely acknowledged by many researchers as a force of convergence towards income equality. That is, if more people are employed in the agricultural sector, then, there will be an increase in income inequality. In general, a higher ratio of agricultural labor force with respect to the total labor force (AGR) would indicate
divergence in income equality. Thus, the sign of the AGR coefficient is expected to be positive.

It is widely believed that improving education could reduce income inequality (e.g. Sylwester, 2002, Wan, Lu and Chen, 2003 and Tsai, 1995). However, this consensus has been challenged by Rehme (2007), Banerjee and Duflo (2003), Ram (1989) and Jallade (1982). In particular, recent studies (e.g. Banerjee and Duflo, 2003; and Rehme, 2007) present theory and empirical evidences to the fact that the relationship between income inequality and education is non-linear with an inverted U-shaped curve, which is as same as the relationship between income inequality and growth (the Kuznets theory). That is, increase in education initially increases income inequality, and later, at certain stage, increase in education reduces income inequality. Therefore, we have included the variables HCAP and HCAP2. The variable HCAP is measured by the ratio of the number of higher education enrolment to the population level. The higher education enrolment rates are a more appropriate measurement in the case of China as it may have more regional variations than the secondary school enrolment in China. The coefficient of the variables HCAP2, $\rho$, is expected to be negative.

The Chinese government has attempted to narrow regional income inequality throughout the whole economic reform period. The role of government in income redistribution is crucial. Thus, it is expected that a high share of national government expenditure (GOV) would narrow income disparities. Therefore, the sign of the coefficient of GOV is expected to be negative.
The least squares estimation results of the model are contained in Table 8.6. The model fits the data very well as the adjusted $R^2$ values is 98%. The Durbin-Watson statistics for the model indicates no serial correlation in the error terms.

The estimated coefficient of FDI for the model is positive and statistically significant at the 1% level. This indicates that increasing FDI inflows in China has accelerated regional income inequality. The finding lends some support to the dependency theory, and is consistent with what were reported by Tsai (1995) and Fu (2004).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimation</th>
<th>t-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSTANT</td>
<td>-2.670</td>
<td>-5.842</td>
</tr>
<tr>
<td>FDI</td>
<td>0.361</td>
<td>5.056</td>
</tr>
<tr>
<td>TRADE</td>
<td>-0.0002</td>
<td>-0.487</td>
</tr>
<tr>
<td>PCG</td>
<td>1.194</td>
<td>6.680</td>
</tr>
<tr>
<td>PCG2</td>
<td>-0.162</td>
<td>-6.533</td>
</tr>
<tr>
<td>AGR</td>
<td>0.007</td>
<td>4.347</td>
</tr>
<tr>
<td>HCAP</td>
<td>0.079</td>
<td>2.172</td>
</tr>
<tr>
<td>HCAP2</td>
<td>-0.004</td>
<td>-1.356</td>
</tr>
<tr>
<td>GOV</td>
<td>0.001</td>
<td>0.564</td>
</tr>
</tbody>
</table>

The TRADE coefficient is negative as expected under modernization theory but it is statistically insignificant. The coefficients of PCG and PCG2 are both statistically significant. The signs of the coefficients are all consistent with an inverted U-shaped curve as expected. That is, the Kuznets theory is generally supported by the data.
The estimated AGR coefficient in the model is positive and statistically significant. This confirms that agricultural transformation towards industrialization can effectively narrow regional income inequality. This also confirms the findings in Tsai (1995) and Fu (2004).

The coefficients of HCAP and HCAP2 in the model are associated with a positive and a negative sign, respectively, as expected, but only the coefficient of HCAP is statistically significant. This indicates that an increase in education level would increase regional income inequality in China at the current development stage. Similar results are also reported in other studies, for example, see Rehme (2007), and Banerjee and Duflo (2003). This may be due to a significant proportion of educated “labor elites” from the inland region have been attracted to the high-income coastal region or overseas. This has led to a situation that income inequality is on the increase (Fu, 2004). It is well known that inter-regional labor migration from the inland to the coastal region and to overseas has been an important phenomenon in China over the last two decades.

The sign of the coefficient of the GOV variable is positive, however, it is statistically insignificant. Therefore, it appears that the government expenditure used in the economic reforms to narrow regional income inequality have not been effective. This could be due to the underdeveloped inland regions are massive, the economic reforms and other initiatives of the government may not be strong enough to have any impact, and some economic policies are inappropriate or not effective for the inland regions.
8.4 Implications and conclusion

In this chapter, using time series data for the period 1978 to 2002, we investigated the factors that influence regional income inequality in China. We found that FDI has significant impact on China’s regional income inequality by widening the difference in income of Chinese people. The transformation from an agricultural focus to industrialization has reduced regional income inequality, while economic development and human capital have widened regional income inequality. The impact of trade and the government expenditure on regional income inequality is statistically insignificant.

It is clear that FDI does come with both benefits and costs. The data presented in this chapter show a significant difference in the amount of FDI received by the coastal and the inland regions. In order to reduce regional income inequality across China, the Chinese government should consider implementing selective and sustainable long-term geographical dispersion FDI policies to encourage FDI flowing into the inland regions in the export-oriented manufacturing, high technology, agriculture and infrastructure sectors. Meanwhile, the Chinese government must carefully develop any FDI policies and strategies in order to avoid any excessive protection, tax rebates, investment allowances and the cheap factory sites and social services for MNEs, otherwise, the less developed regions economy could be harmed and further worsen regional income inequality. As the transformation from an agricultural focus to industrialization has reduced income inequality, the Chinese government should also consider promoting investment in the rural areas, particularly in the inland regions, in the industries such as tourism and
This will effectively help China to transform from an agricultural focus to industrialization. Although our findings regarding education is not in favour reducing regional income inequality, the Chinese government should still consider investing more in education, but, such policy should be complied with some incentive policies to prevent brain drain and encourage those educated “local elites” to contribute to the local economic development in the inland regions rather than migrating to the coastal regions and overseas. Moreover, as the Chinese government expenditure policy in narrowing regional income inequality is not effective as expected, thus, the Chinese government should review its expenditure policies to ensure more appropriate and effective policies can be implemented in the inland regions.

Finally, it should be acknowledged that there are some limitations in this chapter. These limitations are given and discussed in Chapter 10.
Chapter 9. FDI Spill-over Effects on Consumption

9.1 Introduction

Economic reforms have marked the beginning of globalization in China with a sign of vigour and prosperity since 1978. It is commonly believed that globalization provides more and more countries with opportunities to enjoy higher standards of living. Indeed, China is one of the countries in the globalization era evidently and revolutionarily pulling hundreds of millions of their people out of poverty towards higher standards of living. In the last quarter of the century, the real income per capita in China increased dramatically from $US241 in 1978 to $US1272 in 2004. Accordingly, the household saving ratio has also risen sharply over the same period. The share of savings in GDP has increased from 2% in 1978 to 24% in 2004. In sharp contrast, consumer confidence and private consumption spending over the same period in China have continuously declined and plunged to an exceptionally weak point in 2004, despite the interest rate being cut eight times over the period 1996 to 2004. The household consumption rate$^1$ fell from 50% in 1978 to 43% in 2004, a record low consumption rate since 1952.

The economic phenomenon in China in the globalization era seems to defy the traditional consumption hypotheses. The Keynesian absolute income hypothesis has played a key role in explaining aggregate consumption, which gave primary importance to disposable national income as the chief determinant of aggregate consumption, but its empirical

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$^1$ All values are calculated from data published in China Statistical Yearbook, various issues.
inadequacies have led to development of the life-cycle hypothesis (LCH) and permanent-income (PIH) hypothesis. The LCH proposes that, instead of planning their consumption and saving behaviour over long periods, individuals have the intention of allocating their consumption in the best possible way over their entire lifetimes. The PIH argues that people gear their consumption behaviour to their permanent or long-term consumption opportunities, not to their current level income. However, none of these traditional hypotheses can adequately and fully explain the economic phenomenon in the context of consumption in China during the globalization era.

Since 1978, when China opened its door to the rest of the world, several puzzling consumption traits have emerged: the excessive sensitivity of consumption to current income; the extraordinary saving and consumption behaviour of Chinese consumers; and the emergence of new national consumption attitudes. Thus, this paper attempts to investigate and empirically test the following hypotheses:

\( H_1: \) that rapid income expansion has significant impact on consumption in China.

The rapid income expansion in China is partly attributable to FDI\(^2\). FDI has its spill-over effects on production, and it is argued that, through increase in income, FDI has also shown its effects on consumption (Keller, 2004);

\( H_2: \) A consumption propensity shift has occurred due to FDI spill-over effects on consumption.

That is, while Chinese consumers enjoy higher standards of living, globalization also places pressure on societies to alter their traditional practices and consumption patterns towards

new products and time saving items. With ten millions of MNEs operating in China, FDI spill-over effects (e.g. management know-how) have shown its power in changing the traditional SOE and COU work style, and consequently, the pace of life in China has been pushed much faster. This implies time saving products are demanded. MNEs have also brought many new products and brand names into China, which has no doubt attracted many thousands Chinese consumers to alter their traditional practices and consumptions.

\textit{H3: An excess sensitivity of consumption to current income has emerged and precautionary saving has reached a historically high level due to uncertainty effects.}

With the deepening of the economic reforms, enormous amount of FDI has flowed into China resulting in ten millions of MNEs operating in China, whereas, the number of State-Owned-Enterprises (SOE) and Collective-Owned-Units (COU) have declined sharply resulting in millions of employees being laid off\footnote{Those laid off employees also lost the social safety net benefits.}. Through promoting the reforms of industrial structure, it seems that MNEs have forced many SOE and COU exiting from their industries and left millions of former SOE and COU employees with “uncertainty” for their future employment incomes and social safety net benefits. Uncertainty has become more prevalent for many Chinese consumers. In that context or as a partial explanation, Chinese consumers are cautious about spending and are instead saving as much as possible;

\textit{H4: An increase in the accumulated wealth affects Chinese household consumption behaviour.}

The rapid income expansion and the high saving rate in China have accumulated more wealth for Chinese consumers;
$H_5$: Changes in the interest rates affect Chinese consumption behaviour.

Existing consumption studies focus mainly on testing LCH, PIH or LCH-PIH by using the Euler equation-based model of Robert Hall (1978). In the context of China, most existing consumption studies are qualitative research based on survey information, and relevant quantitative studies are scarce (Zhang and Wan, 2004). Our study is one of the very few quantitative studies attempting to provide systematic evidence of FDI spill-over effects on household consumption behaviour in China. It adopts the cointegration approach by using an ECM but still on the basis of the consumption function to incorporate more economic variables, which allows the data to tell a substantial part of the story (Craigwell and Rock, 1995) on consumption. This approach concentrates on specifying long-run equilibrium properties while allowing a rich enough dynamic specification to explain short-run activity (Davidson et al., 1978). Moreover, complex and interacting pressures within the system of this methodology assure that consumption behaviour is appropriately explained in the increasingly globalizing economy. These are the major advantages over the Euler equation-based models of Robert Hall.

Consumption is a result of production and a reality mirror of globalisation expressing values, culture and tradition. Understanding the consumption patterns and the factors that influence consumer behaviour in China has important implications to a) the world economy as a whole, because, with a population of 1.3 billion, China accounts for a large percentage of the world’s consumption; b) China’s economic growth, because massive consumer demand is a major driver of the economy and crucial to China’s long-run economic development; c) fiscal policy and its implications; and d) further research and study on consumption theory and its empirical implications in the increasingly globalizing world.
Section 9.2 discusses FDI spill-over effects on consumption in China and reviews previous empirical consumption studies. Section 9.3 reviews the theories and models to encompass the variables of spill-over effects, uncertainty and other factors in the empirical formulation. Section 9.4 describes the data, modelling procedure and empirical results. The final section presents conclusions and implications.

### 9.2 FDI spill-over effects on consumption

According to the new endogenous growth theory, the remarkable economic growth experienced by China since 1978 has been achieved through technology diffusion (Broenszttein, et al. 1998; de Mello 1999). FDI is a major channel for diffusing technology in host developing countries. Indeed, China has attracted enormous amounts of FDI totalling $US561 billion in the period 1978 to 2004 and has been the largest FDI recipient country in the developing world since 1993 and in the world in 2002. China’s trade has also increased significantly reaching $US6751 billion in the same period, which, many argue, in fact, is FDI-led growth. Moreover, the international tourist arrivals and receipts reached 109 million and $US26 billion, respectively, in 2004\(^4\), with the direct and indirect contribution of tourism to GDP accounting for 2% and 11%\(^5\), respectively, for which, FDI has also played a great role\(^6\). For example, FDI generates the development of new tourist venues (hotels) and facilities which in turn attracting more tourists.

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3. These two statistics are collected from China Statistical Yearbook, 2005 which was published by the National Bureau of Statistics of China.
4. The statistics were released by the World Travel and Tourism Council's Research and Economics Unit but cited from China Daily on line 10.10.2006.
Meanwhile, China has achieved an average annual economic growth rate of about 10% over the 26 year period. During the period, while per capita income in China has increased rapidly, the choices of available goods and services have also been expanded. Many argue (e.g. Miyamoto, K. and Liu, H, 2005 and Whalley, J. and Xin, X, 2006) that FDI has contributed to China’s income growth. With production site located in China, MNEs have also significantly expanded China’s goods and services bring many international well-known brands to many thousands Chinese consumers. The majority of the urban middle class appear to have readily adopted globalisation. They not only seek maximum consumers’ utility, but also try to transform the western positional values into “positional consumption”. This positional consumption takes many forms. For example, possessing brand named products such as sporting goods “Nike” shoes, “Levi” jeans and “Chanel” perfumes are seen as promoting one’s position in society; millions of young students have a preference for overseas education in order to achieve their positional goals and to meet their new desires; and consumption of Coca-Cola and 7-Up soft drinks has widely challenged the preference for traditional Chinese teas, especially, among the younger generation. Obviously, FDI does not only have spill-over effects on production but on consumption too.

Moreover, it can be observed in today’s China that consumers in general have a much faster pace of life which obviously is partly attributable to the rapidly growing economy and the consecutive FDI spill-over effects. MNEs management know-how has changed the traditional SOE and COU work style and consequently, the pace of life becomes faster and more time is demanded. With increased income and demand for time, many Chinese consumers are willing to alter their traditional consumption patterns when offered new choices, e.g. adoption of time-saving processed food items against a long held tradition of
buying fresh food every day (Veeck and Burns, 2003). Consumer behaviour in China is interdependent rather than independent of one another. Because, as a part of culture and custom, consumption in China is influenced strongly by peer group members, colleagues, neighbours, relatives and friends. This has further reinforced “FDI spill-over effects” on consumption, especially, when the presence of those channels of communications are very powerful in rapidly spreading news and programs (James, 2000). Consequently, Chinese household consumption behaviour has been changing. New consumption values arise, develop and are sustained with the deepening economic reforms and globalization. Through the consecutive FDI spill-over effects, new consumption patterns have emerged and a consumption propensity shift has occurred towards international brand products and time saving items in China.

As FDI has increased in China, the number of SOE and COU has begun to decline and workers have been laid off on a massive scale in China’s urban areas. Simultaneously, pensions, health care, education benefits and subsidised/free houses for laid off workers have been removed. Traditionally, SOE and COU not only provided permanent employment, but they also supplied life-long subsidised/free housing, education and health care for their employees and employees’ family members. Through promoting the reforms of industrial structure, it seems that MNEs have forced many SOE and COU exiting from their industries and left millions of former SOE and COU employees jobless. The reforms in this large communist nation are, in fact, a revolution to link the nation to the global economy and to transform socialism to capitalism. Enterprise privatization is encouraged, and the reforms in housing market, health care and financial systems are all transformed towards “western capitalism style”. In this context, “FDI spill-over effects” on the welfare

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7 The number of SOE decreased from 102,300 in 1989 to 23,228 in 2003.
of Chinese consumers are prone to the forms of deep uncertainty about future incomes and the social safety net. Moreover, the financial system and the traditional debt-free values in China have generated new barriers in China’s consumption market. In China, the reforms in the banking and financial sectors are far behind the reforms in other sectors. China’s financial system is still dominated by the four major state-owned banks and there are almost no permits for new enterprises to enter the sector, thus, there are hardly any competitors. The consumer credit and loan markets only started to operate since 1997 but housing loans and a limited number of other personal loans to individual households were and are still highly restricted. On the other hand, Chinese consumers are very reluctant to obtain loans from any financial institutions due to the traditional debt-free values and poor knowledge on loans. As a result, many middle-class Chinese consumers also have been liquidity constrained and unable to use loans for current consumption on the products which previously were supplied through the social safety net such as houses and education. Purchasing a house in China for most Chinese is a very expensive business given relatively low levels of income. Education has also become almost unaffordable, especially for those who dream of studying abroad. Consequently, many middle-class Chinese consumers desperately cut current consumption but save for future spending on housing and education. In China, saving is no longer only for traditional precautionary effects of uncertainty and consumption when old. With the deepening globalization, an increasing income inequality has become more pronounced. In urban areas, a large percentage of the population makes, on average, as little as $US550 to $US810 per head a year.\textsuperscript{8} The income arrangements can barely support a minimal standard of living. Not surprisingly, consumption spending by a large percentage of the urban population is weak.

In rural areas, uncertainty about future incomes increases as more and more land is lost to industrialization. The ambiguity of property policies, constant government intervention, lack of comprehensive property laws and agricultural insurances are the direct causes of uncertainty. Traditionally, rural residents did not have any social safety net for houses and health care but education was freely supplied by the Chinese government. However, as a result of the economic reforms, secondary and tertiary educations are no longer free, and health care and houses have both become unaffordable for many rural residents. Many argue that China’s economic reforms have provided more benefits to urban areas whilst leaving as many as 59% of the total population (rural residents)\(^9\) vulnerable in these times of change. Many farmers only make, on average, as little as $US300 per head a year. Consequently, consumption expenditure by a large percentage of the rural population is weak as well.

The economic reforms, the surging in FDI and its spill-over effects in China have generated great shocks on China’s aggregate consumption. An extraordinary sensitivity of consumption to current income has emerged and China’s domestic demand has continuously declined despite the average income per capita having increased 15% per annum on average from 1978 to 2004. In an effort to avoid the weakening domestic demand thwarting the economic growth target, the Chinese government cut the lending interest rates eight times in the period 1996 to 2004. The government has also extended both national holidays, 1\(^{st}\) May and 1\(^{st}\) October, to last for an entire week since 1997 to encourage tourism consumption in order to boost domestic demand and stimulate consumption. However, Chinese consumer confidence and consumption spending have still remained slack plunging to an exceptionally low level in 2004.

Figure 9.1 plots the average propensity to consume (APC) to consume in China. For the purpose of comparison, the APC of the pre-reform period 1952 to 1977 and the post reform period 1978 to 2004 are plotted in Figure 9.1. The APC demonstrates a continuously declining trend throughout the period 1952 to 2004 and plummets to a historically low level since 1952 at 43% in 2004. The slight downward trend in the APC seems discernible.

![Figure 9.1 Average propensities to consume (APC)](image)

Figure 9.1 Average propensities to consume (APC)

Figure 9.2 plots the marginal propensity to consume (MPC) to consume in China. For the purpose of comparison, the MPC of the pre-reform period 1952 to 1977 and the post reform period 1978 to 2004 are also plotted in Figure 9.2. The MPC behaves more erratically than the APC, and more so in years before the early 1980s.
Figures 9.1 and 9.2 provide grounds for a few inferences. First, it is likely that a change occurred in Chinese household consumption behaviour after two to three years of the economic reforms in 1978. Second, the continuous decrease in the APC also means a continuous increase in the average propensity to save, which reached to a historically high level in 2004 since 1952. Third, given that the real income per capita in China increased dramatically from $US241 in 1978 to $US1272 in 2004, it would be natural to expect that consumer spending share in China would also increase, but this did not happen. Thus, the high saving rates obviously are induced by either the disequilibrium consumer goods market or an imperfection system.

Zhang and Wan (2004) investigate China’s aggregated household consumption of the period 1961 to 1998 by using the Euler equation-based model of Robert Hall. Zhang and Wan find that the extremely low consumption in the post-reform period was caused by increased liquidity constraint and uncertainty due to the regime shift in China. However, the study neglects some important factors such as wealth and inflation which obviously have significant influences on China’s aggregated household consumption. Focusing on
testing PIH and precautionary saving motives by applying Chinese urban data to a simple regression model, Meng (2003) finds that Chinese urban households have been capable of smoothing most consumption but unable to smooth educational expenditure, and have had a strong motive for precautionary saving when facing high income uncertainties. But, Meng fails to explain consumption determinants in China clearly.

Using an error correction model, Qin (1991) studies China’s aggregate household consumption and income relations for the period 1952 to 1985. Qin indicates that China had excessive expansion of consumption since economic reform to 1985. Qin argues that the factors which led to China’s excessive expansion of consumption were income, current changes in income, inflation, lagged changes in household consumption, social consumption and savings, whereas, the coexistence of the planned and market income distribution systems rather than private consumers’ behaviour mainly were responsible for the excessive expansion of consumption. There are some limitations to Qin’s study. First, China’s consumption trend for the period 1978 to 1985 was not correctly observed. In accordance with the data published by China’s National Bureau of Statistics, China did not have excessive expansion of consumption during the period 1978 to 1985. Second, there was not any stable long-run equilibrium relationship between consumption and income during the period 1952 to 1985. In fact, this period was marked by several major events, namely, the Great Leap Forward in 1958, the Cultural Revolution between 1966 and 1976 and subsequent economic reforms since 1978. Surely the major political, economic and social changes generated by these events would have generated great shocks on China’s aggregate consumption. Theoretically, these shocks could lead to a structural break in consumption within a fixed parameter framework.
Veeck and Burns (2003) investigate Chinese household consumption behaviour based on a year long field study in Nanjing in China, and claim that rapid consumption changes in post-reform China were due to globalization. Global marketing is often a mixture of financial considerations, social forces, full of new products and services. Thus, Veeck and Burns further argue that the adoption of time-saving processed food items by contemporary Chinese consumers is influenced by increased income and increased demands on time. However, their study is a qualitative analysis based on a year long survey data and may suffer from a lack of full consideration of important economic and social factors which obviously influence Chinese consumer behaviours.

9.3 The consumption function and the econometric methodology

The modern theories of the consumption function combine the expectations formation emphasized by the permanent-income approach with the emphasis on wealth and demographic variables suggested by the life-cycle approach. A simplified version of a basic modern consumption function is given as:

\[ C = aW + b\theta Y + b(1 - \theta) Y_{-1} \quad 0 < \theta < 1 \]  

where \( C \) is consumption, \( W \) is real wealth, \( Y \) is disposable labour income, \( a \) and \( b \) are the marginal propensity to consume out of wealth/labour income, respectively, \( \theta \) is a fraction and \( Y_{-1} \) is last year’s labour income. This modern consumption function shows that consumption spending is determined by wealth, current income, and income of last year. It also assumes that consumers are perfectly aware of their income, wealth, preference, the
range of available products and no uncertainty exists, hence, consumers’ utility-maximizing can be achieved when consumption occurs at the point of purchase. These assumptions obviously are violated in the real world. When uncertainty arises, for instance, unemployment or changes in welfare policy, consumption does not always respond as modern consumption theory predicts. That is, when income rises, consumption goes up by more than $b_0$, and when income falls, consumption goes down by more than $b_0$. This is not implied by the combined rational expectations and permanent income theory. Obviously, consumers are excessively sensitive to changes in income. In order to explain how consumption responds excessively to changes in current income, Carroll (1992) incorporated uncertainty into the consumption model by using unemployment rate as the proxy. An increase in the probability of unemployment has been the most important component of uncertainty to reduce overall household expected income. When fears of unemployment are high or rising, consumers may consume less but save more. A continuous decline in consumer demand may slow down economic growth hence cutting interest rates seems a way to stimulate consumption. If real interest rates are not assumed ex ante to be constant, then it should be included in the aggregate consumption function (Blinder and Deaton, 1985) as in the Euler Equation of Hall (1978) and the adjusted Euler Equation, a linear regression model (Hall, 1988). Following Hall, many researchers (e.g. Chow, 1985; Qian, 1988, Campbell and Mankiw, 1990; Shea, 1995; Jappelli et al, 1997; and Zhang and Wan, 2004) adopted partial adjusted Euler Equations to test uncertainty, income and interest rates.

Distinguishing from the Euler Equation and the adjusted Euler Equations, but still focusing on the implications of LCH-PIH of consumption, many researchers (e.g. Davis 1984, Campos and Ericsson 1988, Qin 1990, Molana 1991, Craigwell and Rock 1995, and
Meghir 2004) developed an ECM model to study consumption issues. The following ECM model is derived by Craigwell and Rock (p244, 1995) to estimate aggregate consumption function:

\[
\Delta C_t = \alpha + \sum_{i=1}^{4} \gamma_i \Delta C_{t-i} + \sum_{j=1}^{4} \delta_{ij} \Delta Q_{jt-i} + \sum_{k=1}^{3} \beta_k Z_{t-i}^{1} 
\]

where \( C_t \) is consumption at time \( t \); \( Q_{it} \)'s are the regressor variables at time \( t \) [\( Q_{1t} = Y_t \) (real disposable income), \( Q_{2t} = W_t \) (wealth), \( Q_{3t} = G_t \) (the government expenditures), \( Q_{4t} = P_t \) (relative price), \( Q_{5t} = R_t \) (interest rates) and \( Q_{6t} = UR_t \) (uncertainty or liquidity constraints)]; and \( Z_{t-i} \) is a lagged error correction term. In contrast to the study by Craigwell and Rock (1995), Qin (1990) considered four factors, household savings and cash holdings, household income, purchase of consumer goods by social groups and inflation, which are relevant to the determination of household consumption. However, Meghir (2004) argues that the source of changes in consumption growth should include interest rates, savings, changes in taste shifter variable and labour supply.

Based on the equation (2) developed by Craigwell and Rock, we develop an ECM model which incorporates some alternative theoretically plausible variables to study China’s consumption issues. These variables are \( Y_t \) (real disposable income), \( SP_t \) (FDI spill-over effects), \( W_t \) (wealth), \( R_t \) (real interest rates), and \( UR_t \) (uncertainty or liquidity constraints). The variable of FDI spill-over effects is a new element to be augmented in the consumption function. The increasingly globalizing economy has brought challenges to the traditional consumption practice. FDI not only transfer knowledge on the production side, but also have spill-over effects on the consumption side (Keller, 2004). FDI spill-over effects
influence traditional cultural preferences, national tastes and consumption standards. For example, the international fast food giant, McDonald’s franchise restaurants exist all over the whole world. The goods and services of McDonald’s restaurants obviously have successfully influenced many thousands people’s habits and consumption patterns. Thus, it is argued, as a result of FDI spill-over effects, that new consumption patterns have emerged and a consumer propensity shift has occurred. FDI spill-over effects, thus, is used to measure changes in tastes and consumption patterns. Accordingly, the consumption ECM model is given by:

\[ \Delta C_t = \pi_{10} + \pi_{1c} \hat{e}_{t-1} + \sum_{i=1}^{k} \pi_{11} (i) \Delta C_{t-i} + \sum_{i=1}^{k} \pi_{12} (i) \Delta Y_{t-i} + \sum_{i=1}^{k} \pi_{13} (i) \Delta SP_{t-i} \]

\[ + \sum_{i=1}^{k} \pi_{14} (i) \Delta W_{t-i} + \sum_{i=1}^{k} \pi_{15} (i) \Delta R_{t-i} + \sum_{i=1}^{k} \pi_{16} (i) \Delta UR_{t-i} + \varphi_{1c} D_{1t} + \varepsilon_{1t} \] (3)

The other five equations in the ECM model system are:

\[ \Delta Y_t = \pi_{20} + \pi_{2y} \hat{e}_{t-1} + \sum_{i=1}^{k} \pi_{21} (i) \Delta C_{t-i} + \sum_{i=1}^{k} \pi_{22} (i) \Delta Y_{t-i} + \sum_{i=1}^{k} \pi_{23} (i) \Delta SP_{t-i} \]

\[ + \sum_{i=1}^{k} \pi_{24} (i) \Delta W_{t-i} + \sum_{i=1}^{k} \pi_{25} (i) \Delta R_{t-i} + \sum_{i=1}^{k} \pi_{26} (i) \Delta UR_{t-i} + \varphi_{2y} D_{2t} + \varepsilon_{2t} \] (4)

\[ \Delta SP_t = \pi_{30} + \pi_{3sp} \hat{e}_{t-1} + \sum_{i=1}^{k} \pi_{31} (i) \Delta C_{t-i} + \sum_{i=1}^{k} \pi_{32} (i) \Delta Y_{t-i} + \sum_{i=1}^{k} \pi_{33} (i) \Delta SP_{t-i} \]

\[ + \sum_{i=1}^{k} \pi_{34} (i) \Delta W_{t-i} + \sum_{i=1}^{k} \pi_{35} (i) \Delta R_{t-i} + \sum_{i=1}^{k} \pi_{36} (i) \Delta UR_{t-i} + \varphi_{3sp} D_{3t} + \varepsilon_{3t} \] (5)

\[ \Delta W_t = \pi_{40} + \pi_{4w} \hat{e}_{t-1} + \sum_{i=1}^{k} \pi_{41} (i) \Delta C_{t-i} + \sum_{i=1}^{k} \pi_{42} (i) \Delta Y_{t-i} + \sum_{i=1}^{k} \pi_{43} (i) \Delta SP_{t-i} \]

\[ + \sum_{i=1}^{k} \pi_{44} (i) \Delta W_{t-i} + \sum_{i=1}^{k} \pi_{45} (i) \Delta R_{t-i} + \sum_{i=1}^{k} \pi_{46} (i) \Delta UR_{t-i} + \varphi_{4w} D_{4t} + \varepsilon_{4t} \] (6)

\[ \Delta R_t = \pi_{50} + \pi_{5r} \hat{e}_{t-1} + \sum_{i=1}^{k} \pi_{51} (i) \Delta C_{t-i} + \sum_{i=1}^{k} \pi_{52} (i) \Delta Y_{t-i} + \sum_{i=1}^{k} \pi_{53} (i) \Delta SP_{t-i} \]

\[ + \sum_{i=1}^{k} \pi_{54} (i) \Delta W_{t-i} + \sum_{i=1}^{k} \pi_{55} (i) \Delta R_{t-i} + \sum_{i=1}^{k} \pi_{56} (i) \Delta UR_{t-i} + \varphi_{5r} D_{5t} + \varepsilon_{5t} \] (7)
\[ \Delta UR_t = \pi_{60} + \pi_{6ur} \hat{e}_{t-1} + \sum_{i=1}^{k} \pi_{61} (i) \Delta C_{t-i} + \sum_{i=1}^{k} \pi_{62} (i) \Delta Y_{t-i} + \sum_{i=1}^{k} \pi_{63} (i) \Delta SP_{t-i} + \sum_{i=1}^{k} \pi_{64} (i) \Delta W_{t-i} + \sum_{i=1}^{k} \pi_{65} (i) \Delta R_{t-i} + \sum_{i=1}^{k} \pi_{66} (i) \Delta UR_{t-i} + \varphi_{6ur} D_{6t} + \epsilon_{6t} \] (8)

where

- \( C_t \) = consumption;
- \( Y_t \) = real disposable income;
- \( SP_t \) = FDI spill-over effects;
- \( W_t \) = wealth;
- \( R_t \) = real interest rates;
- \( UR_t \) = uncertainty or liquidity constraints;
- \( \hat{e}_{t-1} \) = the error-correction term;
- \( \pi_{10}, \pi_{1c}, \pi_{ij} (i) \) and \( \varphi_{1c} \) = the parameters;
- \( D_{it} \) = the dummy variable for capturing any special events (e.g. the Tianmen Square Massacre in 1989, the depreciation of the Chinese currency in terms of US dollars in 1994, and the Asian Financial Crisis in late 1990s and early 2000s) on consumption;
- \( \epsilon_{1t} \) = white-noise disturbance terms that may be correlated with each other.

The variables \( C, Y, SP, W, R \) AND \( UR \) in the model (3) to (8) are assumed to be potentially endogenous.

9.4 Data analysis, modelling procedure and empirical results

Data and unit root test

The data of the variables, \( C_t, Y_t, SP_t, W_t, R_t, \) and \( UR_t \) are quarterly time series from 1987 to 2004. They are compiled and calculated from \textit{Comprehensive Statistical Data and Materials for 50 years of New China}, the various issues of \textit{China Monthly Statistics}, \textit{China Statistical...}
Yearbook, Almanac of China’s Finance and Banking and China Population Statistics Yearbook all published by the National Bureau of Statistics (NBS). Consumption $C_t$ is measured by per capita real consumer expenditures which include both durables and non-durables\(^{10}\). Disposable income data is not available for most of the period hence $Y_t$ is replaced by per capita real GDP. The actually utilised FDI is used to measure FDI spillover effects. Wealth $W_t$ is estimated as:

$$W_t = C_a (NL - WL)$$

$$= \frac{[YL \times WL]}{NL} \times (NL - WL)$$

where $C_a$ is an annual average consumption over a lifetime of a person, NL, WL and YL are the assumed number of years of life, the working life and labour income, respectively. The average life expectancy NL in China was estimated to be 67 in 1987 and gradually increased to 71 since 2000\(^{11}\). The retirement ages are 55 for women and 60 for men, which leads to an average working life WL from 35-40 years\(^{12}\). A quarterly average wage of staff is used to indicate labour income $YL$. The real interest rate $R_t$ is obtained by nominal interest rate minus the official inflation rate. Due to the lack of aggregate unemployment time series data, the uncertainty $UR_t$ is measured by the ratio of laid-off employees in SOE to total employment in China as a large percentage of SOE were closed and millions of SOE employees lost their jobs in past decades.

To ensure all time series in this study are stationary, hence avoiding potential problems of spurious regression, the augmented Dickey-Fuller (ADF) tests for unit roots are performed on both the original level series and the first differenced series for all six variables in three

\(^{10}\) The data of per capita real household expenditure on non-durables is not available.

\(^{11}\) & \(^{10}\) The information is collected from China Population Statistics Yearbook 2002.
regression models: (1) with constant and trend, (2) constant and no trend and (3) no constant and no trend. The augmented Dickey-Fuller (ADF) tests for unit roots have been discussed in details in Chapter 4 already, hence not repeated in this chapter.

Table 9.1 presents the results of the ADF tests for unit roots. As can be seen, the ADF test demonstrates that all series in level form are stationary in the three models except SP and URt. In the form of first difference, ADF tests indicate that all series are stationary integrated of order one, I (1).

**Table 9.1 ADF test for unit root**

<table>
<thead>
<tr>
<th>Variables</th>
<th>(9) Constant and trend</th>
<th>(10) Constant and no trend</th>
<th>(11) No constant and no trend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level</td>
<td>1st differenced</td>
<td>Level</td>
</tr>
<tr>
<td>C</td>
<td>1.56</td>
<td>-3.83**</td>
<td>2.89*</td>
</tr>
<tr>
<td>Y</td>
<td>2.07</td>
<td>-0.64</td>
<td>3.27**</td>
</tr>
<tr>
<td>SP</td>
<td>-1.03</td>
<td>-3.60*</td>
<td>-1.90</td>
</tr>
<tr>
<td>W</td>
<td>3.08</td>
<td>-0.33</td>
<td>3.25**</td>
</tr>
<tr>
<td>R</td>
<td>-4.03**</td>
<td>-6.32***</td>
<td>-4.08***</td>
</tr>
<tr>
<td>UR</td>
<td>-1.86</td>
<td>-4.52***</td>
<td>-2.35</td>
</tr>
</tbody>
</table>

Notes: *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

**Cointegration test**

A cointegration test is performed to investigate whether there have been any long-run equilibrium relationships among the variables C_t, Y_t, SP_t, W_t, R_t, and UR_t. Using the Schwarz (1978) Criterion (SC) and the Akaike (1974) Information Criterion (AIC), a model with 4 optimal lag lengths and a dummy variable was chosen. The result of the Johansen cointegration rank test is summarized in Table 9.2. Max-eigenvalue and trace tests both
indicate that there are 4 cointegrating equations at the 1% significant level. This means that there exist long-run stationary relationships among the variables.

<table>
<thead>
<tr>
<th>Null (H₀)</th>
<th>Alternative (H₁)</th>
<th>( \lambda_{\text{max}} )</th>
<th>99% CV</th>
<th>( \lambda_{\text{trace}} )</th>
<th>99% CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rank ≤ 0</td>
<td>( r \geq 1 )</td>
<td>74.69**</td>
<td>41.00</td>
<td>202.17**</td>
<td>90.45</td>
</tr>
<tr>
<td>Rank ≤ 1</td>
<td>( r \geq 2 )</td>
<td>60.04**</td>
<td>35.17</td>
<td>127.47**</td>
<td>66.52</td>
</tr>
<tr>
<td>Rank ≤ 2</td>
<td>( r \geq 3 )</td>
<td>34.80**</td>
<td>28.82</td>
<td>67.44**</td>
<td>45.58</td>
</tr>
<tr>
<td>Rank ≤ 3</td>
<td>( r \geq 4 )</td>
<td>24.44**</td>
<td>22.99</td>
<td>32.64**</td>
<td>29.75</td>
</tr>
<tr>
<td>Rank ≤ 4</td>
<td>( r \geq 5 )</td>
<td>8.08</td>
<td>15.69</td>
<td>8.20</td>
<td>16.31</td>
</tr>
<tr>
<td>Rank ≤ 5</td>
<td>( r \geq 6 )</td>
<td>0.12</td>
<td>6.51</td>
<td>0.12</td>
<td>6.51</td>
</tr>
</tbody>
</table>

Note: ** denotes rejection of the null hypothesis at the 1% significance level.

**Estimating the ECM and the Granger causality test**

A specific model with lag length of 3, a constant term and a dummy variable is chosen for estimating the consumption ECM model given by equations (3) to (8) after a general-to-specific search by using the Schwarz Criterion (SC) and the Akaike Information Criterion (AIC). The model estimation shows that the consumption ECM performs well with the Chinese data. As reported in Table 9.3, none of the diagnostic statistics are significant at the 95% critical value and, therefore, there is nothing to suggest that the system model is misspecified. The adjusted R² values are 98%, 98%, 95%, 98%, 63% and 15% for equations (3) to (8), respectively.
Following Zapata and Rambaldi (1997), the Wald test for Granger causality is performed. Table 9.4 presents the results of the Granger causality test among C, Y, SP, W, R and UR. In the consumption ECM, Y, SP, W and UR are statistically significant at the 5%

Table 9.3 Model diagnostic

<table>
<thead>
<tr>
<th></th>
<th>∆Ct</th>
<th>∆Yt</th>
<th>∆SPt</th>
<th>∆Wt</th>
<th>∆Rt</th>
<th>∆URt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adj-R²</td>
<td>0.98</td>
<td>0.98</td>
<td>0.95</td>
<td>0.98</td>
<td>0.63</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Autocorrelation test for the model
LM (1), CHISQ (36) = 27.38, P-value = 0.85; LM (8), CHISQ (36) = 34.12, P-value = 0.56

Normality test for the model
CHISQ (6) = 3.06, P-value = 0.22

level rejecting H₀, while R is not rejecting H₀. In the Granger sense, Y, SP, W and UR variables in the model cause C except R. In a macroeconomic context, China’s consumption function is jointly determined by Y, SP, W and UR. In other words, China’s consumption function can be explained by income, FDI spill-over effects, wealth and uncertainty. Changes in interest rates have had no influences on consumption. The result confirms that the hypotheses $H_1$ to $H_4$ in Section 9.1 are supported by the data. However, the hypothesis $H_5$ that changes in the interest rates affect Chinese consumption behaviour is rejected by the data.

Our findings lend support to Veeck and Burns (2003) that changes in tastes and consumption patterns have occurred in China in the post-reform period due to FDI spill-

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13 Null hypothesis ($H_0$): each of the variables Y, SP, W, R and UR does not Granger causes consumption variable C, respectively.
over effects. Our empirical analysis also confirms Qin’s (1988) claim that income and current changes in income explain consumption changes in China. Moreover, the results indicate that the extremely low consumption in the post-reform period was caused by increased liquidity constraint and uncertainty, and changes in interest rates have had no influences on household consumption, which are consistent with the findings of Zhang and Wan (2004).

Table 9.4 Results of the Granger causality test

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Wald test statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>∆C₁</td>
</tr>
<tr>
<td>(i)</td>
<td></td>
</tr>
<tr>
<td>(1)∆C₁</td>
<td></td>
</tr>
<tr>
<td>(2)∆Y₁</td>
<td></td>
</tr>
<tr>
<td>(3)∆SP₁</td>
<td></td>
</tr>
<tr>
<td>(4)∆W₁</td>
<td></td>
</tr>
<tr>
<td>(5)∆R₁</td>
<td></td>
</tr>
<tr>
<td>(6)∆UR₁</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion

Y ↔ C  SP ↔ C  W → C  W ↔ Y  SP ↔ Y  W ↔ SP
R → Y  R → W  UR → C  UR → Y  UR → W  R → C
C ➞ R  Y ➞ R  SP ➞ R  W ➞ R  UR ➞ R  UR ➞ SP
C ➞ UR  Y ➞ UR  SP ➞ UR  W ➞ UR  R ➞ UR  R ➞ SP

Null hypothesis (Ho): column (i-v) variable does not Granger cause row (1-6) consumption variable. The critical values χ²₀₅,₃ = 7.81; and * denotes rejection of the null hypothesis at the 5% significance level.

As can be seen from Table 9.4, in the Granger sense, bi-directional causality exists between the following variables, Y vs. C, SP vs. C, and W vs. C, W vs. Y, SP vs. Y and W vs. SP. This suggests that the interactions among the variables within the ECM system are captured
and consumption behaviour is appropriately explained. The result also indicates that a single-directional relationship runs from R to Y and W; and from UR to C, Y, and W. Moreover, in the Granger sense, R and UR are not caused by any other variables.

9.5 Conclusion and implications

Using quarterly time series data for the period 1987 to 2004 and the ECM methodology, we investigated FDI spill-over effects on Chinese consumer consumption behaviour. We have found that (1) rapid income expansion has significant impact on consumption in China; (2) a consumption propensity shift has occurred due to FDI spill-over effects; (3) an excessive sensitivity of consumption to current income has emerged and precautionary saving has reached a historically high level due to uncertainty effects; and (4) an increase in the accumulated wealth also affects Chinese household consumption behaviour. However, changes in the interest rates do not affect Chinese consumption behaviour. Overall, Chinese consumption function is jointly determined by rapid growth income, accumulated wealth, FDI spill-over effects and increased uncertainty.

These findings have important policy implications for China. The Chinese government is recommended to consider implementing the following policies and strategies:

(a) Establish an integrated income redistribution system such as reforming taxation and social security system. This could provide some welfare backup certainty on income and hence increasing consumer confidence.
(b) Special regulations should be imposed to MNEs to urge them undertaking some obligations to re-employ / give some priority consideration to former SOE and COU employees if appropriate (e.g. direct takeover or merging occurs).

(c) In order to reduce rural uncertainties and to control land requisition, developing an integrated land requisition legislation, laws, property rights and contract laws is required. This is extremely important because more than 59% of the Chinese population live in the rural areas and the 1.3 billion total populations rely on the land to supply basic food.

(d) Speed up the reform in the banking and financial sectors, especially the credit and lending system that could ease liquidity constraints for a large proportion of credit qualified consumers.

The limitations of this chapter are discussed in Chapter 10.
Chapter 10. FDI and its Overall Impact in China

10.1 Introduction

This final chapter presents a summary of the thesis by discussing (1) the methodology of the research used in the thesis (Section 10.2); (2) the principal findings of the thesis, the overall impact of FDI on China’s economic growth and policy implications (Section 10.3); (3) the limitations of the research and opportunities for further research (Section 10.4).

10.2 The methodology

This thesis is an extensive applied econometric time series study of FDI and its impact on China, in which, multivariate time series models including VAR model and ECM have been utilized. In addition, various statistical techniques such as unit root tests, Granger causality, cointegration, impulse response analysis and variance decompositions are also frequently used in the empirical analysis of the thesis. Using the historical time series data of China, these methodologies and techniques are utilized for carrying out quantitative analyzes on the determinants of FDI and the impact of FDI in China for the post economic reform period of 1978 to 2005.

The majority of time series data used in this study were compiled or computed from the published data of the National Bureau of Statistics of China, the Ministry of Commerce of China and China National Tourist Office. It is well understood, by researchers who work on
research projects which involve Chinese data, that the quality of most Chinese official statistics varies. To minimize the effects of trend distortions, missing data and irregular effects, a preliminary data analysis and cross-check were conducted wherever possible to ensure data quality and reliability. The techniques used for data quality control include trend correction, data plotting analysis, and irregular effects correction or employing a dummy variable to capture irregular effects. The statistical software used for the preliminary data analysis includes Shazam, Eviews and Seasabs.¹ Seasonal fluctuations are an important aspect² in most Chinese time series data. To minimize the effect of seasonal fluctuations, a number of seasonal correction/testing methods were used. These include seasonally adjusting those time series data by using Eviews (Census X12 methodology) (e.g. Chapter 9), using a centered (orthogonalized) seasonal dummy variable (Johansen, 1995) (e.g. Chapter 5) and testing seasonal unit roots by applying the commonly used HEGY (Hylleberg et al, 1990) test (e.g. Chapter 7).

In this thesis, unit root tests were carried out to ensure that all time series used in the study were stationary in order to avoid any potential problems of spurious regression. Investigation of stationary time series includes three major tests, namely, the augmented Dickey-Fuller (ADF) test, the Phillip-Perron test and the HEGY test. In addition, when a structural change was a present in a time series, the procedure developed by Perron (1989) was used to test for a unit root, as the standard Dickey-Fuller and Phillips-Perron test statistics are biased towards the non-rejection of a unit root (Enders, 1995). In order to

¹ Seasabs is a time series analysis software specifically designed and used by the Australia Bureau of Statistics for data quality control.
² China’s central planned economic regime has been a major force in generating a regular pattern of large seasonal fluctuations (Rawski, 2002).
investigate the causality and cointegration of variables, the Engle-Granger and the Johansen methodologies were also utilized.

In Chapter 4, a VAR model was chosen for analyzing the long-run relationship between FDI and its potential determinants (FDI, infrastructure, openness, labour costs, exchange rate, market size and labour quality). A VAR model was also used in Chapter 8 to investigate the causal link between FDI and tourism in China. All variables in Chapters 4 and 8 are in natural logarithms treated as endogenous variables. The use of a VAR model has been proven to generate more reliable estimates in an endogenous context (Gujarati, 1995). The AIC and SC criteria were used in assisting the selection of optimal lag lengths. The adjusted R squares, the autocorrelation and normality tests were also used in assisting the selection of a best model for the analyzes. Finally, under the VAR framework, the test for Granger causality was carried out to test the determinants of FDI in China and the causal links between FDI and tourism in China.

It is believed that the interactions of all variables can be captured, and the short and long run effects of all variables can be revealed in an ECM. Thus, Chapters 5, 7 and 9 use an ECM to investigate the causal links between FDI, domestic investment and economic growth; to analyze international spill-over effects on Chinese household consumption behavior; and to examine the role of tourism in the long-run economic development of China. The AIC and SC criteria, the adjusted R squares, the LM test for autocorrelation and $\chi^2$-test for normality were also used in Chapters 5, 7 and 9 to select an optimal lag length and to check the fit of model. In Chapter 5, within the ECM system, the accounting innovation (variance decomposition and impulse response function) technique was utilized to examine the complementary or substitution effects of FDI on domestic investment hence
economic growth in China. The forecast error variance decomposition explains all the forecast error variance effects on each endogenous variable at short horizons and smaller proportions at longer horizons, and the impulse response function analysis traces out the time path of the effects of the various shocks on each endogenous variable to determine how each endogenous variable responds over time to a shock in that variable and in every other endogenous variable. The ECM in Chapter 5 contains an exogenous centered seasonal dummy variable, which was used for capturing the effect of seasonal fluctuations. In order to take account of the Great Leap Forward in 1958, the Cultural Revolution between 1966 and 1976, and the post economic reforms from 1978 to 2003, an exogenous dummy variable was also included in Chapter 7. Similarly, two exogenous dummy variables were selected in Chapter 9 to capture the effects of seasonality, and the possible effects of the 1989 Tianmen Square Massacre, the 1998 Asian Financial Crisis and the 2003 SARS epidemic. Finally, under the ECM framework, the Granger causality analysis was used to investigate the causal links between the variables in each of the three chapters.

Chapter 6 uses a different approach from other chapters, in which, a multiple regression model was developed to analyze the impact of FDI on income inequality, as well as the impact of other variables on China’s income distribution in China for the period 1978 to 2002. This approach is more appropriate given the availability of the time series data and the length of the variables. The Gini coefficient was used as the dependent variable in the model because it is the most widely accepted measure of income inequality. The least squares technique was used to estimate the regression model.
10.3 FDI and its overall impact in China: the major findings, the impact of FDI on economic growth and policy implications

The main focus of the thesis is to extend the existing FDI theories to develop a theoretical framework of the impact of FDI on the development of a host country, and to present an empirical analysis on FDI and its impact in China by using the extended theoretical framework. This has been investigated in various forms through materials presented in Chapters 2 to 9. This section presents a summary of the major findings of the thesis, the overall impact of FDI on China’s economic growth and policy implications.

The major findings

Theoretical extensions and institutional discussions on China

The findings from a theoretical view and institutional discussions of the thesis are summarized below.

(I) *FDI generates both positive and adverse externalities on the economic development of a host country*

The existing theories of FDI have been primarily from the perspective of MNEs to identify and analyze the determinants of FDI or the motives of MNEs investing abroad, while the theoretical framework developed in this thesis stems from a macroeconomic perspective and analyzes the impact of FDI on the economic development of a host country. In the economic development of a host country, FDI
generates both positive and adverse externalities. The positive externalities of FDI occur when MNEs provide sufficient capital to complement domestic investment, transfer efficient technology and management know-how to indigenous firms, boost export industries and create more investment opportunities resulting in greater economic growth. The adverse externalities of FDI occur when MNEs crowd out domestic investment, disrupt backward linkages through substitution of imports for domestic commodities, control supplies of inputs in an industry of a host economy and gain benefits of tax subsidy provided by the host government, increase income inequality, create pollutions and damage the environment, eventually holding back the economic development of a host country. Thus, the impact of FDI depends on many conditions. While well-developed and proper implementation of FDI policies can help maximize gains from FDI, introduction of inappropriate FDI policies could also lead to severe damage to an economy and create social problems. The contemporary opinions of the impact of FDI on the economic development of a host country are that, in general, the impact of FDI in an economy should be tested in a rigorous empirical work and be examined on a case-by-case basis (see Chapters 3, 5 and 6).

(II) Location-specific advantages led China to become one of the world’s highest value-added manufacturing production locations

The eclectic paradigm provides a framework for understanding the extent, pattern and growth of international production by MNEs. Ownership-specific, market internalization and location-specific advantages will vary according to industry, country or region, and firm-specific characteristics. In the case of China, although there are many location-specific advantages, low labor costs is the primary
determinant of China’s FDI inflows. Given the fact that over 55 per cent of China’s FDI comes from Hong Kong and Taiwan, cultural link is found to be another major determinant of China’s FDI inflows. With continuously large amounts of FDI flowing into China’s manufacturing industries and the competitive advantage of low labor costs, China has demonstrated the great potential to be one of the world’s highest value-added manufacturing production locations (see Chapters 2 and 4).

(III) *China has entered into the more advanced development stage of FDI and should promote select types of FDI*

It has been seen that the stage and structure of China’s economic development have played an important role in levels of FDI over the period 1978 to 2005. China attracted very small amounts of FDI inflows at the beginning of the economic reforms from 1978 to 1985, which may constitute Stage I of the development stages of FDI. In Stage II, in order to attract FDI for economic development and industrialization, China pursued policies such as offering subsidies, incentives, protection and guarantees to potential investors. Consequently, China’s FDI inflows, mainly labor intensive FDI inflows, doubled in the period 1986 to 1989 over the previous period. FDI surged once again with the focus on economic reforms in China in 1992. The upward trend and characteristics of FDI continued until 2004/2005. The remarkable economic development and the continuously large amounts of FDI inflows into China eventually led the Chinese government to create new strategies and policies towards FDI. In recent years, select types of FDI inflows (e.g. capital-intensive, higher technology and manufacturing with export-oriented) have been encouraged. This
signifies China’s entry into the more advanced development stage (the Stage III) of FDI (see Chapters 2 and 4).

Empirical findings

The findings based on the empirical analysis are summarized below.

(i)  *Labor cost is a primary and significant factor attracting FDI to China*

During the period 1978 to 2005, China has attracted enormous amounts of FDI inflows about $US621 billion. While location-specific advantages such as low labor costs, huge market demand, good infrastructure, openness and labor quality have been found to be the driving forces in determining China’s enormous amount of FDI inflows, whereas, it was found that the exchange rates have no impact on China’s FDI. Among the factors of location-specific advantages, low labor cost is a primary factor attracting FDI inflows to China. For the period 1978 to 2005, the manufacturing industries absorbed about 65% of FDI inflows and the real estate, public utilities and other services were the second largest FDI recipient industries absorbing about 18% of FDI inflows. Most foreign investors in China are from Asian regions, but their investment share in total FDI has been declining, whereas, FDI from western countries and other regions has been on the increase (see Chapter 4).

(ii) *FDI has played an important role in China’s economic growth and development*
FDI has not only provided some solutions to the shortage of capital formation in China’s economic reform era, it has also stimulated domestic investment through the channel of technology diffusion and the rapid expansion of the export industries. The empirical findings of the thesis indicate a single directional causality from FDI to economic growth and FDI to domestic investment, and a bi-directional causality between domestic investment and economic growth. Furthermore, the results show that FDI does not crowd out domestic investment, instead, FDI had complimentary effects on domestic investment in China during the period 1988 to 2003 (see Chapter 5).

(iii) *FDI has impacted significantly on income inequality in China*

FDI not only played a major role in improving China’s economic growth, but also it has made significant impact on income inequality in China. The research finds that FDI was one of the main factors responsible for the increase in income inequality in China during the period 1978 to 2002. In addition, it was found that the transformation from an agricultural focus to industrialization has reduced income inequality, while economic development and human capital have widened income inequality. The impact of trade and the government expenditure on the income inequality in China is statistically insignificant (see Chapter 6).

(iv) *FDI has had spill-over effects on Chinese consumption patterns*

FDI and international bilateral trade have not only transferred knowledge on the production side, but have also resulted in spill-over effects on the consumption side.
It has been found that international spill-over effects substantially changed the Chinese household consumption behavior since China opened its door to the rest of the world in 1978. While Chinese consumers have adopted new consumption values and patterns, Chinese consumer confidence and consumption has continuously declined and plunged to an extremely low level. The empirical results reveal that uncertainty is responsible for the weak consumption and low level of consumer confidence. However, uncertainty is a bi-product of the fundamental economic transformation in China from a traditional socialism style to the western capitalism style since economic reforms were introduced in 1978. In addition, the variables such as rapid income growth and accumulated wealth were also found to explain Chinese household consumption behavior (see Chapter 7).

(v) **FDI significantly influences the tourism sector of China**

Internationalization is a common character linking FDI and tourism. FDI plays an increasingly important role in the global economy, whereas, tourism is one of the main export services in a domestic economy. The research finds that there has been a single directional causality from FDI to tourism in China. This explains the rapid growth in the tourism market in China during the period 1985 to 2001 (see Chapter 8).

(vi) **Tourism-led growth hypothesis is held in the Chinese economy**

With the tourism boom in recent decades, the direct contribution of tourism to China’s GDP increased from 0.1% in 1978 to 1.6% in 2004, but its impact on the whole economy was much greater. That is, tourism generated $US183.6 billion worth
economic activities (11% of China’s GDP) and 13.6 million employments (2% of China’s total employment) in 2004. The research finds that there were two-way links between international tourism receipts and economic growth, only a one-directional causality from the real exchange rates to economic growth and the real exchange rates do not Granger cause international tourism earnings. This confirms that tourism-led growth hypothesis is held in the case of the Chinese economy for the period 1988 to 2004 (see Chapter 9).

The overall impact of FDI on China’s economic growth

In terms of the role of FDI in China’s economic development and growth and based on the empirical analysis through chapters 2 to 9 and the major findings of the thesis, an analytical summary is presented in two parts: positive and negative effects on economic growth.

Positive effects on economic growth

(A) The most prominent contribution of FDI to China’s economic development and growth is expending China’s manufacturing exports, whereas, export has long been recognized by researchers and policy makers as an engine of economic growth. MNEs not only augment China’s export volumes, but also upgrade its export structure. Moreover, with boosting in export, more investment opportunities in export industries have been generated, China becomes one of the world’s highest value-added manufacturing production centers.
(B) FDI has enhanced China’s economic growth through raising capital formation in complementing domestic investment, increasing industrial output, generating millions employment and adding tax revenue.

(C) FDI contributes to China’s economic growth through spill-over effects, transferring management know-how and diffusing technology, and raising productivity.

(D) FDI contributes to China’s economic development and growth by facilitating China’s transition toward a market system that started in 1978 and the reforms of industrial structure to be more efficient and competitive.

(E) FDI has brought extra gains by integrating China into the world economy, stimulating tourism, raising income growth and promoting new consumption values and patterns.

**Negative effects on economic growth**

(a) FDI has exacerbated China’s income inequality due to its uneven distributions in regions and uneven impact on regional economic development. This, in the long-run, may be detrimental to the Chinese economy.

(b) Through promoting the reforms of state-owned-enterprises, FDI has indirectly disrupted China’s social welfare system, as a result, Chinese consumer confidence has plunged to an extremely low level in recent years. This has restrained China’s economic growth.
(c) The ownership-advantages of MNEs may force many domestic competitors exiting from their industries. The rapid decline of the number of state-owned-enterprises is a good example. MNEs may also disrupt backward linkages through substitution of imports for domestic commodities and control supplies of inputs in industries.

(d) With increasing power, MNEs may control over Chinese assets and jobs, and this could exert considerable influences on political as well as economic decisions at all levels in China. Some of those influences, for example, gaining excessive protection, tax rebates, investment allowances and the cheap factory sites and social services, are very unfavorable to China’s economic development and growth.

(e) With 242799 MNEs\(^3\) operating in China, FDI has exacerbated China’s pollutions and the natural environment. This, in the long-run, would hold back China’s economic development and growth.

**Policy implications**

In accordance with the theoretical extensions, institutional discussions on China, the empirical findings and the analytical summary of the overall impact of FDI on China’s economic growth, several policy implications have been derived in the thesis. A summary of such recommendations are as follows.

(1) China's economy has surged more than tenfold since FDI was permitted when the economic reforms were introduced in 1978. It is notable that the overall positive

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\(^3\) China Statistical Yearbook 2006.
impact of FDI on China’s economic development and growth has been greater than the negative effects. Thus, it is important for China to maintain stable FDI growth in the future. Given most FDI inflows have been in manufacturing industries, it means that there is great potential for the Chinese government to promote FDI into different industries. That is, the Chinese government should utilize FDI effectively. For example, to make the service sector a key area in attracting FDI, and to channel more FDI to the primary industries, high technology and infrastructure sectors, and projects for energy and the environment. Since many MNEs invest in China in manufacturing industries in the search of a low cost but highly trained workforce, the Chinese government should continuously promote its low cost labor advantage to encourage FDI flow into export-oriented manufacturing industries. Even though, Japan, the European Union and the U.S. (the Triad) supply 90% of global FDI, FDI by the Triad in China is relatively very small. Therefore, the Chinese government should improve the investment environment and develop specific strategies to attract more FDI from the Triad. Furthermore, since China has entered into the more advanced development Stage of FDI, the capital-intensive FDI and higher technology FDI should be encouraged as well.

(2) In the case of China, FDI complements domestic investment but depending on conditions. Those conditions include having appropriate FDI policies and regulations to ensure that MNEs undertake export obligations and have vertical inter-firm linkages with domestic firms to transfer technology and management know-how or direct foreign investors to invest in high risk areas or in resource industries where domestic investment is limited. Furthermore, in order to avoid adverse FDI externalities on growth, the Chinese government should not blindly reduce
regulations, taxes, environmental protections, wages and working conditions in exchange for FDI. Given that China’s domestic investment exerts much greater contributions on growth than FDI, encouraging and promoting domestic savings should take precedence over attracting FDI in designing and executing investment strategy and investment policies in China.

(3) FDI does come with both benefits and costs. Since FDI has been one of the main factors responsible for the increase in income inequality in China, and has a negative impact on society as a whole, thus, selective and sustainable long-term geographical dispersion FDI policies to encourage FDI flowing into the inland regions in the export-oriented manufacturing, high technology, agriculture and infrastructure sectors should be encouraged. As the transformation from an agricultural focus to industrialization has reduced income inequality, the Chinese government should also consider promoting investment in the rural areas, particularly in the inland regions, and in industries such as tourism and manufacturing. This will effectively help China to transform from an agricultural focus to industrialization. Although our findings regarding education is not in favour of reducing income inequality, the Chinese government should still consider investing more in education, but, such policy should be complied with some incentives policies to prevent brain drain and encourage those educated “local elites” to contribute to the local economic development in the inland regions rather than migrating to the coastal regions and overseas. Moreover, as the Chinese government expenditure policy in narrowing income inequality is not effective as expected, thus, the Chinese government should review its expenditure policies to ensure more appropriate and effective policies can be implemented in the inland regions.
Due to Chinese consumers’ excessive sensitivity of consumption to current income, low consumer confidence and reduced consumption when facing uncertainty or liquidity constraints, the Chinese government should consider implementing the following policies and strategies: (1) establish an integrated income redistribution system such as reforming taxation and social security system; (2) in order to reduce rural uncertainties and to control land requisition, develop an integrated land requisition legislation, laws, property rights and contract laws; and (3) speed up the reform in the banking and financial sectors, especially the credit and lending system that could ease liquidity constraints for a large proportion of credit qualified consumers.

FDI plays a significant role in expanding the tourism sector in China, whereas, tourism has been proven to be an effective strategy in promoting China’s economic growth and development, especially, for regional economic development. Thus, tourism and FDI can be utilized as a combined strategy to resolve China’s increasing environmental, income inequality and social friction issues. That is, the Chinese government should encourage foreign investors to invest in tourism and tourism related industries to develop new tourist venues and facilities in the less developed inland regions such as the southwest provinces of Yunnan, Guizhou and Sichuan, where tourism resources are very rich. Meanwhile, the government should develop effective tourism policies and strategies to explore tourism resources for the less developed western regions. As a result, a cyclical effect of investigative business and holiday travel could be generated, as well as the demand for other services (e.g. retailers, restaurants and accommodation) in the regions would increase. Those cluster
industries would further contribute to the increase in local employment, improve income distribution and welfare in the regions.

10.4 Limitations of the current study and future research

This section presents a number of limitations of the current study and the direction for future research.

Limitations

A complete and systematic time series study on FDI and its impact on China would require more resources than were made available for this study. There are number of specific limitations which should be noted with respect to this thesis. They are described below:

(1) Chapter 4 only addresses China’s location-specific advantage at an aggregate level, has 28 observations and utilizes a VAR model, as a consequence, the empirical results of the chapter need to be treated with some cautions.

(2) Chapter 6 uses provincial cross-sectional data to calculate the Gini coefficient but inflation effects and the difference in price levels across regions were not taken into account, although very few studies have paid attention to this possible problem. Second, some important variables, for instance, political democracy and demographic variables are not included. Moreover, Chapter 6 is different from the rest of chapters, in which, a multiple regression model was developed due to a lack of sufficient data
observations. The use of a basic regression framework may lead to a less reliable conclusion in contrast to the VAR/ECM approach.

(3) The measurement of international spill-over effects in Chapter 7 might be crude, whereas, the time series of income and uncertainty are the proximity measurements, thus, the empirical results of the chapter need to be treated with some cautions.

(4) Some important restrictions also have arisen from the complexity of using a VAR/ECM system, although the use of a VAR/ECM system has been proven to generate more reliable estimates in an endogenous context. The VAR/ECM approach has been criticized as lacking of a priori information. It is also known that the use of a VAR/ECM system could lead to the system of equations being over-parameterized. Consequently, for example, there were limited variables included in chapters 4, 5, 7, 8 and 9 when analyzing China’s FDI determinants and the impact of FDI on other economic variables. This means that some important variables might be excluded from the analysis (e.g. trade and productivity), which could result in a biased conclusion. This occurred due to the effort to trim down the over-parameterized VAR model and lacking of a priori information concerning any of the coefficients within the system. To increase the observations of the variables or to use more frequent time series such as monthly or quarterly observations certainly is a solution. Unfortunately, for many variables monthly or quarterly time series data are not available for China.

(5) It is well-known that the published Chinese data is not totally reliable. However, we cross-checked whatever possible with other alternate sources to maintain and ensure
the data used in the thesis are of good quality. To our best of knowledge, the research has been carried out with reasonably good quality data.

**Future research**

Based on the empirical analysis, the findings and the limitations of the thesis, the following future research is recommended:

(i) Due to data unavailability and limited time allocated for this thesis, Chapter 4 does not include studies on ownership-specific and internationalization-specific advantages of each major individual FDI source country, and the determinants of different types of FDI in different industries and regions. These matters need to be looked at as they are important to investors and governments.

(ii) Different types of FDI and the impact of FDI on income inequality based on average incomes of different percentiles for urban and rural residents in different provinces might be more interesting than the analysis based on aggregate data used in the current study.

(iii) Chapter 9 does not include analysis of the economic impact of tourism in different regions of China which should be of great interest to the disadvantaged regions and the Chinese government.

(iv) Globalization is increasingly testing the ability of China’s economy to adapt and maintain its competitive edge. There is evidence that the cost of investing in China is
increasing, and environmental issues, income inequality and social frictions are worsening. Can China maintain stable FDI growth in the future? Can China maintain its economy at the tenfold growth rate? The answer to the first question seems positive at least in the short-run. FDI in China rebounded to $US69.47 billion in 2006 after a fall in 2005 and is expected to be stable in 2007\textsuperscript{4}. China is still a very attractive FDI destination and investors cannot ignore the huge market and the competitive labor force although the cost of investing in China has increased due to the Chinese currency appreciation. Answering the second question is important as the issues associated with environment, income inequality and social frictions could undermine the social stability and disrupt political stability, which could eventually destroy the very foundation of China’s emergence as a major world economic power and consequently the high economic growth that China currently enjoys. Thus, the final appraisal of this study would be that FDI researches should not only focus on economic benefits, but also emphasize the effects of FDI on the environment and society. This will assist in making better policies and strategies for sustainable economic development and economic growth in the long run for China.

\textsuperscript{4} This statement was made by the Commerce Minister Xilai Bo at a conference in Beijing on 15 January 2007 and reported by Xinhua, the China state-run news agency.
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Appendix 1. Time Series Analysis

A1.1 Introduction

Time series is any variable that is measured in sequential order at successive times and spaced at time intervals. Time series analysis comprises methods that attempt to understand the nature of the phenomenon of time series and/or in a traditional way to use information from past values of a variable for forecasting its future values by using what amounts to a sophisticated extrapolation procedure. The growing interest in economic dynamics has given a new emphasis to time series analysis. Time series analysis is also concerned with developing reasonably simple econometric models capable of interpreting and testing hypotheses of economic data.

The remaining section of this appendix is organized as follows. Section A1.2 discusses patterns in time series data and stationarity of time series; Section A1.3 reviews techniques that are useful for analyzing time series data such as testing for unit roots and trends, and the concept of cointegration; Section A1.4 presents a brief introduction of a general class of models (e.g. the AR (p), VAR model and ECM) that can be used to represent time series data and test Granger causality.
A1.2 Patterns and stationarity of time series

General aspects of time series patterns

In time series analysis it is assumed that the data consists of a systematic pattern and random noise (error). A time series can consist of four different components: long-term trend, cyclical variation, seasonal variation and random variation. A trend is a long-term, relatively smooth pattern or direction exhibited by a series. The trend of a time series is a linear or nonlinear. Cyclical variation is a wavelike pattern describing a long-term trend that is generally apparent over a number of periods, resulting in a cyclical effect. Seasonal variation refers to cycles that repeat itself in systematic intervals over time and its patterns that occur during a season, a month, a week or even a day. Random variation is caused by irregular and unpredictable changes in a time series. For example, Figure A1 shows the time series of natural logarithm of China’s GDP in level form. This time series of China’s GDP exhibits a trend of relatively steady growth, seasonal variations and some irregular effects occurred during 1990 to 1994.

Figure A1 The natural logarithm of China’s GDP in level form
Once the pattern of observed time series data is identified and more or less formally described, we can interpret and integrate it with other information and data for further analysis to reduce the effects of the random and seasonal variations and to reinstall the distorted trend. Quality time series data is vital to econometric studies of dynamic modeling.

**Stationarity of time series**

Time series can be categorized stationary and nonstationary, and there are important differences between them. A stationary series tends to return to its mean value and fluctuate around it within a more or less constant range, its finite variance is time-invariant and its theoretical correlogram diminishes as lag length increases. Obviously, the China GDP series presented in Figure A1 is non-stationary. Assume we have a first-order regressive AR (1) model:

\[ y_t = \theta y_{t-1} + e_t \]  \hspace{1cm} (A1.1)

where \( e_t \) is a random disturbance and assume that \(|\theta| < 1\). That is, the time series \( y_t \) is stationary, and for all values it is true that

\[
\begin{align*}
E (y_t) &= \mu \text{ (constant mean)} \hspace{1cm} (A1.1a) \\
Var (y_t) &= \sigma^2 \text{ (constant variance)} \hspace{1cm} (A1.1b) \\
\text{Con} (y_t, y_{t+s}) &= \text{Con} (y_t, y_{t-s}) = \gamma_s \text{ (covariance depends on time lags, not on } t) \hspace{1cm} (A1.1c)
\end{align*}
\]
An example of a stationary time series is given in Figure A2, which is the first differenced series of China’s GDP in natural logs. As can be seen, the series varies randomly at a constant mean level with constant variance. Note that the same series in its level form (Figure A1) is non-stationary.

![Figure A2 The first differenced series of China’s GDP in natural logs](image)

In contrast, a nonstationary time series has a different mean at different points in time, the variance is time-dependent and increases with the sample size, and its theoretical correlogram dies out slowly. An example of a nonstationary time series is given in Figure A3, which is the natural logarithm of China’s FDI in level form. As can be seen, the series has no constant mean wandering upwards and downwards.

![Figure A3 The natural logarithm of China’s FDI in level form](image)
It is important to distinguish stationary time series from nonstationary time series. Nonstationary time series variables used in regression models often lead to a problem of spurious regression. A spurious regression has a high $R^2$ and its results are apparently significant, such as its t-statistics. Additionally, the estimated residuals exhibit a high degree of autocorrelation but, in fact, its least squares, test statistics and predictors are all unreliable and misleading. Many macroeconomic time series are nonstationary, and to ensure that only stationary macroeconomic time series data are used in regression analysis, statistical techniques are developed to identify stationary time series.

### A1.3 Time series analysis techniques

#### Unit root tests for stationarity

The stationarity of a time series can be formally and statistically tested with a unit root test. Recall the equation (A1.1) of the AR (1) model for the time series $y_t$:

$$y_t = \theta y_{t-1} + e_t$$

Assume that $e_t$ is a random disturbance with zero mean and constant variance $\sigma^2_e$. In the model, if $\theta = 1$, then $y_t$ is the nonstationary random walk, $y_t = y_{t-1} + e_t$, and is said to have a

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1 The stationarity of a time series can also be checked by using the autocorrelation function but is not discussed here.
unit root. It can be easily shown that the variance of a random walk time series varies with the time $t$.

A unit root or stationarity can be tested by testing the null hypothesis $H_0: \theta = 1$ against the alternative $H_1: \theta < 1$. Since conventional null hypotheses regarding the regression coefficients take the form of the coefficient being equal to zero, we re-arrange equation A1.1 as follows. We subtract $y_{t-1}$ from both sides of equation A1.1 and re-arrange the equation in the form

$$\Delta y_t = \gamma y_{t-1} + e_t \quad (A1.2)$$

where $\gamma = 0-1$ and $\Delta y_t = y_t - y_{t-1}$, which is the first difference of the series $y_t$. Now, we re-state the set of null alternate hypothesis in terms of $\gamma$. That is

$$H_0 : \theta = 1 \leftrightarrow H_0 : \gamma = 0 \quad \text{The series } y_t \text{ has a unit root (or } y_t \text{ is a nonstationary)}$$

$$H_\lambda : \theta = 1 \leftrightarrow H_\lambda : \gamma = 0 \quad \text{The series } y_t \text{ has no unit root (or } y_t \text{ is a stationary)} \quad (A1.3)$$

If $y_t$ follows a random walk, then $\gamma = 0$, and obviously $y_t$ is nonstationary. However, if we consider its first-difference

$$\Delta y_t = y_t - y_{t-1} = e_t \quad (A1.4)$$

Because we assumed that the random error $e_t$ is purely random, thus, the series $\Delta y_t = y_t - y_{t-1}$ can be stationary. In general, when $y_t$ is nonstationary and if $y_t$ can be made stationary by taking the first difference, then $y_t$ is said to be integrated of order 1, and denoted by $I(1)$. If
a series $y_t$ needs to be differenced $d$ times to make it stationary, then the series $y_t$ is integrated of order $d$, or I $(d)$.

**The Dickey-Fuller tests**

To test the hypothesis in (A1.3) for the presence of a unit root, Dickey and Fuller (1979) considered the following three forms of regression equations:

\[
\Delta y_t = \gamma y_{t-1} + e_t \quad \text{(A1.5)}
\]

\[
\Delta y_t = \theta_0 + \gamma y_{t-1} + e_t \quad \text{(A1.6)}
\]

\[
\Delta y_t = \theta_0 + \theta_2 t + \gamma y_{t-1} + e_t \quad \text{(A1.7)}
\]

The difference between the three regressions is the presence of the deterministic elements $\theta_0$ and $\theta_2 t$. Equation (A1.5) is a pure random walk model, the second equation (A1.6) adds a constant term or drift term and the third equation (A1.7) includes both a drift and a linear time trend.

In order to obtain the estimated $\gamma$ and associated t-statistics and standard error, OLS has been used to estimate the above one or more equations (A1.5), (A1.6) and (A1.7). To determine whether to accept or reject the null hypothesis $\gamma = 0$ or $\theta = 1$, the resulting t-statistic is compared to the critical values which is specially constructed by Dickey and Fuller.

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2 There are other methods available to test for unit roots such as Phillips-Perron test but not discussed here.
Fuller. The test of using these critical values is well known as the Dickey-Fuller test. In their Monte Carlo study, Dickey and Fuller specified that the critical values for $\gamma = 0$ depending on the form of the regression and sample size.

In order to control for the possibility that the error term in the equations, (A1.5), (A1.6) and (A1.7), is autocorrelated, additional lagged terms of $y_t$ are included for the above three equations (A1.5), (A1.6) and (A1.7) are replaced by the autoregressive processes. The modified models are:

$$\Delta y_t = \gamma y_{t-1} + \sum \beta_i \Delta y_{t-i} + e_t \quad (A1.8)$$

$$\Delta y_t = \theta_0 + \gamma y_{t-1} + \sum \beta_i \Delta y_{t-i} + e_t \quad (A1.9)$$

$$\Delta y_t = \theta_0 + \theta_2 t + \gamma y_{t-1} + \sum \beta_i \Delta y_{t-i} + e_t \quad (A1.10)$$

where $\Delta y_{t-1} = (y_{t-1} - y_{t-2})$, $\Delta y_{t-2} = (y_{t-2} - y_{t-3})$, …

Testing the null hypothesis that $\gamma = 0$ against $\gamma < 0$ in one or more of the above equations is called the augmented Dickey-Fuller test. The critical values for the augmented Dickey-Fuller tests are the same as for the Dickey-Fuller test. We closely follow the flowchart presented in Enders (1995, p257), reproduced in Figure A4, for the purpose of unit root test.
Seasonal unit roots test

Most of the empirical studies in econometrics use seasonal adjusted data (Maddala and Kim 1998 p364), as seasonality is a key feature of many economic time series. Therefore, when original (seasonal unadjusted) time series is used, testing for seasonal unit roots becomes necessary. The most commonly used and direct method to investigate the
possibility of seasonal unit roots in a time series is the HEGY (Hylleberg et al, 1990) test. For quarterly time series, the test is based on the following auxiliary regression model:

\[ y_{4t} = \pi_1 y_{1t-1} + \pi_2 y_{2t-1} + \pi_3 y_{3t-2} + \pi_4 y_{3t-1} + \varepsilon_t \]  

(A1.11)

where

\[
\begin{align*}
y_{4t} & = y_t - y_{t-4}; & y_{1t-1} & = y_{t-1} + y_{t-2} + y_{t-3} + y_{t-4} ; \\
y_{2t-1} & = - y_{t-1} + y_{t-2} - y_{t-3} + y_{t-4} ; & y_{3t-2} & = - y_{t-2} + y_{t-4} ; \\
y_{3t-1} & = - y_{t-1} + y_{t-3} ;
\end{align*}
\]

and \( \varepsilon_t \) is a normally and independently distributed error term with zero mean and constant variance. For estimation, we apply the least squares method and include an intercept, three seasonal dummies and a time trend in the model (A1.11). The HEGY test involves testing the following three hypotheses:

(i) \( H_0: \pi_1 = 0 \) vs \( H_1: \pi_1 < 0 \);

(ii) \( H_0: \pi_2 = 0 \) vs \( H_1: \pi_2 < 0 \);

(iii) \( H_0: \pi_3 = \pi_4 = 0 \) vs \( H_1: \) at least one \( \pi_i \neq 0 \) \( i=3,4 \)

The first two hypotheses, (i) and (ii), involve the use of the t-test and the third involves the use of F-test. If the null hypothesis (i) is not rejected, it means that there is a unit root at the zero frequency (i.e. a non-seasonal unit root in the series). If the null hypothesis (ii) is not rejected, it means that there is a seasonal unit root at the semi-annual frequency only. If the
null hypothesis (iii) is not rejected, it means that there is a seasonal unit root at the annual frequency only.

**Test for structural change**

Structural breaks are very common in economic time series. When there are structural breaks (change trends) in a time series, the Dickey-Fuller and Phillips-Perron test statistics are biased towards the non-rejection of a unit root (Enders, 1995). Thus, it is necessary to use the procedure developed by Perron (1989) to test for a unit root in the presence of a structural change. Towards this purpose, the following regression equation was considered for a time series:

\[
y_t = \alpha_0 + \mu_1 DU_t + \mu_2 DT_t + \alpha_1 y_{t-1} + \alpha_2 T + \sum_{i=1}^{k} \beta_i \Delta y_{t-i} + \varepsilon_t \quad (A1.12)
\]

where

\[
DU_t = \begin{cases} 
1, & \text{if } t \geq \tau + 1 \\
0, & \text{otherwise}
\end{cases} \quad DT_t = \begin{cases} 
 t - \tau, & \text{if } t \geq \tau + 1 \\
 0, & \text{otherwise}
\end{cases}
\]

where \(\tau = m\), at a time a structural break occurs; \(DU_t\) is a level dummy variable and \(DT_t\) is a slope dummy variable.

- \(\alpha_0\): a vector of intercept term;
- \(T\): a deterministic trend;
- \(\alpha_1, \mu,\) and \(\beta_i\): the parameters;
- \(k\): the lag length; and
- \(\varepsilon_t\): the disturbance terms.
The model is generalized to allow a one-time change in the structure occurring at a time. It permits an exogenous change in the level of the series and in the rate of growth. To test the hypothesis of a unit root, we test $H_0: \alpha_1 = 0$. The value of the t-test statistics of the Perron (1989) test at various lag lengths of a time series are compared to the critical values, which are specifically constructed by Perron, to decide whether the null hypothesis of a unit root is rejected in the presence of a structural break at all lag lengths.

**Cointegration**

Many economic time series are nonstationary and there may exist a long-run equilibrium relationship between nonstationary variables. In other words, while individual time series are non-stationary, their linear combination may be stationary. Assume $y_t$ and $x_t$ are nonstationary variables, and their long-run equilibrium relationship is defined by

$$y_t = \beta_1 + \beta_2 x_t + e_t \quad (A1.13)$$

where $e_t$ is the equilibrium error, and $\beta_i$'s are parameters. Further, we assume that $y_t$ and $x_t$ can be integrated of order one I(1), their difference or error $e_t$ has a stochastic trend and represents short-term deviation from the long-term relationship:

$$e_t = y_t - \beta_1 - \beta_2 x_t \quad (A1.14)$$
According to Engle and Granger (1987), if $e_t$ is stationary, then, $y_t$ and $x_t$ are said to be cointegrated.

We can test whether $y_t$ and $x_t$ are cointegrated by testing whether the errors $e_t = y_t - \beta_1 - \beta_2 x_t$ are stationary. Let $\hat{e}_t = y_t - \hat{\beta}_1 - \hat{\beta}_2 x_t$, the least squares residuals of the cointegrating regression of the equation (A1.13). We then estimate the regression:

$$\Delta \hat{e}_t = \theta_0 + \gamma \hat{e}_{t-1} + \mu_t$$  (A1.15)

where $\Delta \hat{e}_t = \hat{e}_t - \hat{e}_{t-1}$ and test for unit roots in $\hat{e}_t$ (or equivalently $\hat{\epsilon}_t \sim I(0)$). This test method is the Engle-Granger methodology which seeks to determine whether the residuals of the equilibrium relationship are stationary\(^3\).

### A1.4 Time series models and Granger causality

Time series models relate current values of an economic variable only to its past values and to the values of current and past random disturbances. Time series models can be categorized univariate and multivariate time series models.

#### Univariate time series models

Assume we have an economic variable $y$, and its disturbance term is $e$, then, a univariate time series model relates the current and future values of $y$ to its own past values, and the

\(^3\) Another way of testing for cointegration is the Johansen methodology but not discussed here.
values of current and past values of a random disturbance term $e$. This univariate time series model neglects any relationship between $y_t$ and other economic variables, which leads to the dynamic model:

$$y_t = f(y_{t-1}, y_{t-2}, y_{t-3}, \ldots; e_{t-1}, e_{t-2}, e_{t-3}, \ldots)$$  \hspace{1cm} (A1.16)

Univariate time series models include autoregressive models AR($p$), moving average models MA($q$), or autoregressive-moving average models ARMA($p$, $q$). For a given time series, the Box-Jenkins approach can be used to identify a suitable ARIMA models. In this section, we only briefly discuss AR($p$) processes.

An autoregressive model of order 1 can be written as:

$$y_t = \delta + \theta y_{t-1} + e_t \quad \text{for} \quad t=1, 2, \ldots, T$$  \hspace{1cm} (A1.17)

where $\delta$ is an intercept parameter, $\theta$ is an unknown auto-regressive parameter that is assumed to be $| \theta | < 1$, and $e_t$ is an uncorrelated random error with mean zero, and constant variance $\sigma_e^2$. As can be seen, $y_t$ is an AR(1) process which depends only on its value in the previous period, $y_{t-1}$ and a random disturbance $e_t$. However, $y_t$ may not only depend on $y_{t-1}$, but also on other past values $y_{t-2}, y_{t-3}, \ldots y_{t-p}$, thus, in general, an autoregressive process of order $p$, AR ($p$), can be written as:

$$y_t = \delta + \theta_1 y_{t-1} + \theta_2 y_{t-2} + \theta_3 y_{t-3} + \ldots + \theta_p y_{t-p} + e_t$$  \hspace{1cm} (A1.18)
where \( \delta \) is an intercept parameter that is related to the mean of \( y_t \), the \( \theta \)s are the unknown autoregressive parameters, and the errors \( e_t \) are assumed to be uncorrelated random variables with zero mean and variance \( \sigma_e^2 \). The parameters of (A1.18) can be estimated by using the least square method in the usual way.

**Multivariate time series models**

Multivariate time series models jointly relate the current values of two or more time series variables to their past values and to the values of current and past random disturbances. Assume we have two economic time series \( \chi_t \) and \( y_t \), their disturbance term \( e_t \), and variations in \( y_t \) are determined by current and lagged values of \( \chi_t \), then, a multivariate time series model can be written as:

\[
y_t = f(\chi_t, \chi_{t-1}, y_{t-1}, y_{t-2}, \ldots) + e_t \quad (A1.19)
\]

The objective is to understand how changes in \( \chi_t \) at one point in time influence values of \( y_t \) in the current and subsequent periods. Here, we only focus on the discussions of two multivariate time series models, the VAR model and the ECM.

**Dynamics of a VAR model** The VAR model is just a generalization of the AR model. In matrix notation, the VAR model for \( n \) economic variables can be written as

\[
X_t = A_0 + A_1 X_{t-1} + A_2 X_{t-2} + \ldots + A_p X_{t-p} + e_t \quad (A1.20)
\]

where
\[ X_t = \text{an } (n \times 1) \text{ vector containing each of the } n \text{ variables included in the VAR;} \]

\[ A_0 = \text{an } (n \times 1) \text{ vector of intercept terms;} \]

\[ A_i = (n \times n) \text{ matrices of coefficients; } i = 1, 2, \ldots, p; \]

\[ e_t = \text{an } (n \times 1) \text{ vector of error terms.} \]

Assume all the variables in \( X_t \) are stationary and \( e_{it} \) are uncorrelated error terms with standard deviations of \( \sigma_{e_i} \). The VAR model is a stacked form of stationary AR(p) models and the regressors are the same for all the equations. The variables to be included in the VAR are selected according to the relevant economic model. The determination of optimal lag length for the VAR system can be obtained by using the Schwarz (1978) Criterion (SC) and the Akaike (1974) Information Criterion (AIC). Moreover, the regressors are likely to be highly collinear, so that the t-tests on individual coefficients may not be reliable\(^4\). The estimation of each equation in the VAR system is straightforward by using OLS.

The ECM The ECM has been a viable alternative to the VAR model. When the \( (n \times 1) \) vector \( X_t = (X_{1t}, X_{2t}, \ldots, X_{nt}) \) are CI \( (d, b) \)\(^5\) and has an error correction representation, then the ECM model can be expressed in the form

\[
\Delta X_t = \pi_0 + \pi X_{t-1} + \pi_1 \Delta X_{t-1} + \pi_2 \Delta X_{t-2} + \ldots + \pi_p \Delta X_{t-p} + e_t \quad \text{(A1.21)}
\]

where

\[ \pi_0 = \text{an } (n \times 1) \text{ vector of intercept terms with elements } \pi_{i0}; \]

\[ \pi_i = (n \times n) \text{ matrices of coefficients with elements } \pi_{jk} (i); \]

\[ \pi = \text{is a matrix with elements } \pi_{jk} \text{ such that one or more of the } \pi_{jk} \neq 0; \]

\[ e_t = \text{an } (n \times 1) \text{ vector of error terms with elements } e_{it}. \]

\(^4\) The test statistics are discussed in the section of Granger causality.

\(^5\) Cointegrated of order \( d, b \).
The ECM can be estimated using OLS and the test statistics used in the VAR system are appropriate for the ECM.

**Granger causality**

Recall a VAR model. Assume that there are two time series $Y_t$ and $X_t$, and both are stationary, $e_t$ and $\mu_t$ are uncorrelated error terms with standard deviations of $\sigma_e$ and $\sigma_\mu$, respectively. Thus, we write a simple bivariate VAR system with one lagged lag length as

$$
Y_t = \varphi_1 + \sum_{i=1}^{p} \alpha_{1i} Y_{t-i} + \sum_{i=1}^{p} \beta_{1i} X_{t-i} + e_t
$$

$$
X_t = \varphi_2 + \sum_{i=1}^{p} \alpha_{2i} Y_{t-i} + \sum_{i=1}^{p} \beta_{2i} X_{t-i} + \mu_t
$$

(A1.22) (A1.23)

In this case, for example, when the past and present values of $X_t$ provide some useful information to forecast $Y_{t+1}$ at time $t$, it is said that $X_t$ Granger cause $Y_t$. A commonly used testing procedure for Granger causality is testing the significance of the coefficients of lagged $Y_t$, which are used as the explanatory variables for $X_t$ in the regression context. That is, the null hypothesis of "$X_t$ doesn't Granger cause $Y_t$" can be tested by using a standard $F$-test or Wald test of the joint hypothesis

$$
H_0: \quad \beta_{11} = \beta_{21} = \ldots = \beta_{p1} = 0.
$$
$X_t$ is said to cause $Y_t$ in the Granger sense if the above null hypothesis is rejected. (That is, at least one of the $\beta_i$’s for $i=1,\ldots, p$ is statistically significant.) Similarly, the null hypothesis of "$Y_t$ doesn't Granger cause $X_t$" can be tested by defining the null hypothesis

$$H_0: \alpha_{12} = \alpha_{22} = \ldots = \alpha_{p2} = 0.$$ 

$Y_t$ is said to cause $X_t$ in the Granger sense if the null hypothesis is rejected.

**References**


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*p is the optimal lag lengths.*
Appendix 2. Inequality Measurement:

the Lorenz Curve and the Gini Coefficient

A2.1 Introduction

There are many inequality measures proposed in literature to measure income differences among different regions, different groups etc. within a country or a number of countries. The most widely used inequality measures are the Lorenz curve and the Gini coefficient. These two measures are closely related to each other. A Lorenz curve is a graphical device used in examining inequality, and a Gini coefficient is calculated from the areas derived using a Lorenz curve. In this Appendix, we only briefly present the Lorenz curve and the Gini coefficient.

A2.2 The Lorenz curve

Let $\pi = F(y)$ represent the distribution for income $Y$, for example, the cumulative percentage of income or wealth; and $\eta = F_1(y)$ is the corresponding first moment distribution function, for example, the cumulative percentage of income-receiving units (e.g. families or population). Then, a Lorenz curve is the graphical representation of the relationship between $\eta$ and $\pi$, where $0 \leq y < \infty$. Figure A2.1 presents Lorenz curves for income, in which, the cumulative percentage of income is graphed against the cumulative
percentage of population. If income was distributed equally among population, the cumulative percentage of income received by the cumulative percentage of population would fall along the 45° straight line, AD, which is the line of equality. If income was not distributed equally among population, the cumulative percentage of income received by the cumulative percentage of population would fall along the curve ACD or any curve which lies below the line of equality AD. A bottom income group will obviously receive a proportionally lower share of the income, the closer the Lorenz curve is to the line of equality AD, the more equal distribution.

The Lorenz curve ACD can be defined as

\[ \eta = \eta (\pi) \]
Along the Lorenz curve ACD, at the point A, when $\pi = 0$, $\eta = 0$, 0% of the population receives 0% of the income; and at the point D, when $\pi = 1$, $\eta = 1$, 100% of the population receive all the income 100%. In general, a Lorenz curve lies below the line of equality, AD, which implies that $0 < \eta < \pi < 1$ or $\frac{d\eta}{d\pi} \geq 0$, and the slope of the Lorenz curve is non-negative and monotonically increasing (Kakwani and Podder, 1973). The Lorenz curve only shows whether inequality is large or small relative to another distribution graphically.

**A2.3 The Gini coefficient**

In Figure A2.1, the area (ACDA) between the Lorenz curve ACD and the line of equality AD provides a measure of the degree of inequality of the income distribution. From the idea of the Lorenz curve, the Gini coefficient is derived. The Gini coefficient (GINI) is the ratio of the area ACDA and the triangular region (ABDA) underneath the line of equality AD, which is:

$$
\text{GINI} = \frac{\text{the area of ACDA}}{\text{the area of ABDA}} = 2 \text{ (the area of ACDA)}
$$

Since the area of ABDA = $\frac{1}{2}$. Thus the GINI coefficient is equal to twice the area between the 45° line and the Lorenz curve.

The Gini coefficient provides a cardinal measure of income inequality. Assume the individual incomes $y_1, y_2, \ldots, y_n$ are known, and $y_1 \leq y_2 \leq \ldots \leq y_n$, and then, the Lorenz curve can be approximated by a number of line segments with the ith line segment being a
straight line joining \((\pi_{i-1}, \eta_{i-1})\) to \((\pi_i, \eta_i)\). Then the Gini coefficient can be estimated by aggregating the areas between the linear segments and the \(45^0\) degree line. This process results in

\[
GINI = \sum_{i=1}^{n-1} \eta_{i+1} \pi_i - \sum_{i=1}^{n-1} \eta_i \pi_{i+1}
\]  

(A2.1)

Alternatively, the Lorenz curve can be interpreted by using the relative mean difference (Sen, 1973), and then, the Gini coefficient is found to be exactly one half of the relative mean difference given by

\[
GINI = \frac{1}{2n^2} \sum_{i=1}^{n} \sum_{j=1}^{n} \left| y_i - y_j \right|
\]  

(A2.2)

This Gini coefficient ranges from 0 to 1. When GINI = 0, the income is equally distributed (the Lorenz curve in Figure A2.1 is the line of equality, AD), which is interpreted as no inequality, and when GINI = 1, the whole income is accrued to only one person. The smaller the Gini coefficient (closer to zero) is, the more equal income distribution.

However, the most commonly used Gini coefficient measure method has been criticized as underestimating inequality (Gastwirth, 1972). The cause of underestimation is the straight line connecting the observed pairs \((\pi_{i-1}, \eta_{i-1})\) to \((\pi_i, \eta_i)\) lie above the actual Lorenz curve. There have been some complicated techniques developed to construct the Lorenz curve, and hence to derive the Gini coefficient. Perhaps, the best solution is to search for a suitable function to represent the Lorenz curve and/or an inequality measurement which satisfies all
the properties of a Lorenz curve and/or an inequality measure that fits the observed data best.

References

