

FDI Linkage: Impacts, Determinants and
Policies

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Abstract

The main objective of this research is to study the way that a developing country could reap the benefit maximally from inward foreign direct investment (FDI). The key arguable point both in academic and practice is to promote the input-output linkage of foreign invested enterprises (FIEs) with local firms.

The first two stages work involves the empirical study using two originally collected and compiled panel data sets from China. The first stage work, Study One, is designed to investigate the impact of FDI linkage. FDI Backward Linkage (the relationship between foreign producers and indigenous suppliers) is empirically proved to be important in promoting the development of indigenous Chinese manufacturing firms through both vertical and indirect horizontal spillovers (taking effects in the up/down stream sectors and same sector respectively). Subsequently, several crucial factors which are determinative to the creation of FDI Backward Linkage are found in Study Two.

As the behaviour of foreign firms' are normally very sensitive to the host

government policies, the third stage study is designed to investigate government policies or other conditions if possible under which FIEs would prefer to source locally and impose vertical technology transfer (VTT) to local suppliers. Apart from the above two empirical studies, the analysis in Study Three is fulfilled by a two-stage dynamic game theoretical model.

The findings have important managerial and policy implications. Briefly, a) self-development of indigenous firms is vital to both the creation of FDI Linkage and benefiting from such linkage; b) targeting foreign investors with higher FDI Linkage potential is an effective way for Chinese government to promote the development of indigenous firms; c) the after care policies to those established FIEs should not be neglected; d) the adjustment of the FDI policies needs to take into account the circumstance of the host economies.

Declaration

The research described in this thesis is the sole work of the author. No portion of the work has been submitted for the award of a higher degree elsewhere. The author claims copyright. Use shall not be made of the material contained herein without proper acknowledgement.

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Chapter 1 Introduction

1.1 Preamble

At the international academic and policy-making scene the attitude towards inward FDI has changed considerably over the last couple of decades. Gone are earlier discussions on restrictive business practices, transfer pricing, crowding out of local business, technological dependence, unequal development and loss of sovereignty, which prevailed during the 1970s. Instead, most countries have liberalised their policies to attract investments from foreign multinational corporations (MNCs) since the early 1980s. In accordance with World Investment Report 2005 (UNCTAD, 2005), the amount of inward FDI in the world as a whole has reached \$648 billion until the end of 2004, among which around 40% were to developing countries (\$233 billion); FDI outflows increased to \$730 billion in 2004, with firms based in the developed countries accounting for more than 87% (\$637 billion).

Admittedly, the fundamental reason behind this trend is the globalisation and regionalisation of the international economy e.g. be it globally, through GATT and WTO, or regionally, in the form of EU, NAFTA, AFTA and other regional agreements. But there are also more direct explanations for the

increasing emphasis on FDI promotion in recent years. Policy makers and academics often believe that host economy could derive benefits from inward FDI. The scholarly literature on FDI is vast and has been surveyed many times (For recent surveys see Blomstrom and Kokko, 2003; Hanson, 2001; and Lipsey, 2002).

Just as Kofi A. Annan, Secretary-General of the United Nations (UNCTAD, 2001b) stated,

“Investment is of decisive importance for the developing world. The only developing countries that really are developing are those that have succeeded in attracting significant amounts of foreign direct investment”.

1.2 Necessity of Current Research and the Research Objectives

On the expectation that host economy could gain benefits from inward FDI, many governments have not only reduced barriers to FDI but also offered various special incentives to attract foreign firms.

Policies to promote FDI take a variety of forms: fiscal incentives, such as tax holidays and lower taxes for foreign investors; financial incentives: such as government grants, credits at subsidised rates, government equity participation and government insurance at preferential rates. Other incentives can include subsidised dedicated infrastructure, subsidised services, contract preferences or foreign exchange privileges and even monopoly rights. To make their investment environments more investor friendly, host governments adopted new laws and regulations. For example in 1998, 103 countries offered tax concessions to foreign invested enterprises (FIEs) that set up production or administrative facilities within their border (Hanson, 2001). In 2004, out of 271 such changes pertaining to FDI introduced 235 involved steps to open up new areas to FDI along with new promotional measures. In addition, more than 20 countries lowered their income taxes on FIEs in their bid to attract more FDI (UNCTAD,

2005).

The most popular arguments for the benefits of FDI to the host country include employment generation, taxation, and positive externalities, among which the incentives of employment generation and taxation, obviously, are not always reliable arguments. In an economy with unemployment, a solution to the problem would depend on the causes and nature of unemployment. Thus it is not clear whether more investment would help to solve unemployment. With regard to tax generation, since tax deduction even remission for FIEs is often utilised as an incentive policy to attract FDI by host governments, gaining benefits through taxation usually does not work as well. Considering the above two situations, a more sophisticated argument is that FDI incentives are valid as a way to tap the positive externalities of FDI.

One robust finding is that FIEs tend to have higher productivity than indigenous firms in the same sector (Haddad and Harrison, 1993; Blomstrom and Wolff, 1994; Kokko, Zejan and Tainsini, 2001). Thus it can be imagined that if the production of FIEs did not negatively impact the productivity level of indigenous firms, in long term inward FDI would lead to a higher GDP in the

host country¹. Yet if FIEs paid market wages, the increased GDP would be completely captured by FIEs, and hence long term national welfare would not increase. There is ample evidence, however, that FIEs do pay above market wages (Blomstrom, 1983; Haddad and Harrison, 1993; Aitken, Harrison and Lipsey, 1996; Girma, Greenaway and Wakelin, 1999; Lipsey and Sjöholm, 2002) so that they could contribute to the increase of long term national welfare. But just as mentioned above, the long term national welfare would increase if the production of FIEs did not negatively impact the productivity level of indigenous firms of the host country. Did FIEs have a positive impact on the productivity levels of indigenous firms, the host country would in long term benefit from inward FDI.

Under these circumstances, there has been a growing research interest in exploring the existence of this type of externality (e.g. Caves, 1974; Blomstrom and Persson, 1983; Haddad and Harrison, 1993; Kokko, 1994, 1996; Aitken and Harrison, 1999; Li et al. 2001; Buckley et al. 2002; Javorcik, 2004).

Surprisingly, however, the academic findings are not optimistic. The

¹ It takes time to apply the productivity effect.

empirical literature has not been able to confirm the existence of positive externalities from FDI to host countries². Thus there appears to be a significant gap between the consensus among optimistic practitioners and the ambiguous empirical literature regarding the importance of positive FDI externalities. Alfaro & Rodriguez-Clare (2004) argue that, so far most studies have looked for the presence of these productivity externalities without trying to understand channels or mechanisms through which they occur. This may be just the reason that leads to the gap.

Based on these backgrounds, current research will mainly focus on the productivity externalities arising from FIEs to indigenous firms in the host country as a possible valid reason for subsidising FDI. The general research objectives are four fold:

- To investigate the existence of productivity externalities from FIEs to indigenous firms of host countries and to explore channels or mechanisms through which they could occur;

² For recent surveys of empirical work, see Hanson (2001), Gorg and Strobl (2002), and Lipsey (2002).

- To discover the possible determinants of the mechanisms that could induce positive productivity externalities from FIEs to indigenous firms;
- To examine the interaction between the host government and FIEs;
- To improve the existing FDI promotion tools and policies or develop new ones for policy makers especially of the developing countries to effectively maximise their benefit from FDI in the circumstances of globalisation and liberalisation.

The data set utilised for all empirical studies will be collected from China, which comes from the following consideration: Because of its size, China's "open door policy" launched twenty years ago constitutes a unique and vast laboratory for the study of major structural changes in China and the world economy. It also provides an opportunity to test the benefits and the shortcomings of the economic policies which have been followed by the Chinese authorities and identify the improvements that could be brought about to increase the economic positive fall-outs of Chinese economic reforms.

Then to be consistent with the data set utilised in current research, there

come the following specific research objectives:

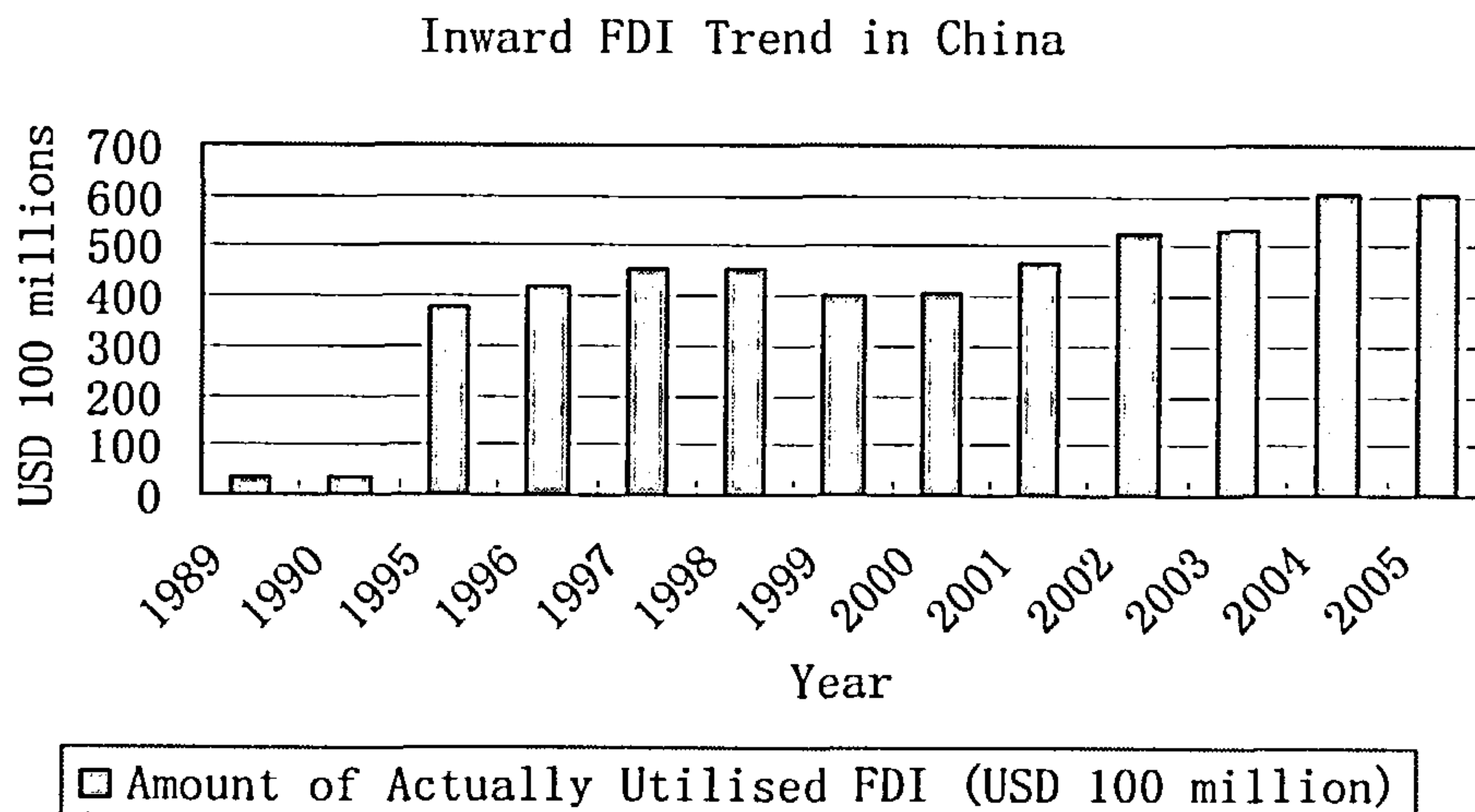
- To investigate the existence of productivity externalities from FIEs to indigenous Chinese firms in China and to explore channels or mechanisms through which they could occur;
- To discover the possible determinants of the mechanisms that could induce positive productivity externalities from FIEs to indigenous Chinese firms;
- To examine the interaction between the host government and FIEs;
- To improve the existing FDI promotion tools and policies or develop new ones for policy makers in China to effectively maximise the benefit China could reap from FDI in the circumstances of globalisation and liberalisation.

1.3 The Evolution of FDI in China

1.3.1 Basic Patterns

Since 1993 China has been the biggest developing FDI host country in the world. In fact, in 2005, China accumulated more than USD 60.3 billion in FDI which is equivalent to around 9.3 percent of inward direct investment worldwide and about 25.8 percent of the investment amount for all the developing countries put together. Figure 1-1 and Table 1-1 see the continuously increasing trend of FDI flow to China except the two years of 1999 and 2000, which are affected by the Asian Financial Crisis in 1997.

Figure 1-1 FDI in China, 1989-2005



Source: China statistical yearbook, various years, compiled by the author.

Table 1-1 Utilisation of FDI (1979-2005)

Year	Number of Projects	Amount of Contracted FDI (USD 100 million)	Amount of Actually Utilised FDI (USD 100 million)
1979-1984	3724	97.50	41.04
1985	3073	63.33	19.56
1989	5779	56.00	33.93
1990	7273	65.96	34.87
1995	37011	912.82	375.21
1996	24556	732.76	417.26
1997	21001	510.03	452.57
1998	19799	521.02	454.63
1999	16918	412.23	403.19
2000	22347	623.80	407.15
2001	26140	691.95	468.78
2002	34171	827.68	527.43
2003	41081	1150.69	535.05
2004	43664	1534.79	606.30
2005	44001		603.20
1979-2005	552942		6224.25

Note: Data in this table come from the Ministry of Commerce.

Source: China statistical yearbook, various years, compiled by the author.

There are mainly three types of foreign firms in China, through which FDI occurs: joint ventures, cooperative enterprises, and solely foreign-owned enterprises (table 1-2).

- Joint ventures refer to enterprises composed of joint investments by foreign companies, enterprises, and other economic organizations or individuals and Chinese companies, enterprises, or other economic organizations. In China, however, foreign parties are required to contribute at least 25 percent of the total capital, which is higher than the 10 percent required by the Organization for Economic Cooperation and Development (OECD) countries and others.
- Cooperative enterprises are also called “agreement-based partnership businesses,” since they are based on cooperative terms and conditions agreed upon by foreign companies, enterprises, and other economic organizations or individuals together with Chinese companies, enterprises, or other economic organizations.
- Solely foreign-owned enterprises refer to the firms with full foreign equity.

Before 2001, the type of solely foreign-owned enterprises was not permitted unless they either adopted advanced technology and equipment or exported a

majority of their products³. But after China being a member of WTO in 2001, these restrictions were removed, as they are contrary to their WTO commitments⁴. As a result, solely foreign-owned enterprises replaced joint ventures as the most popular form of FDI in China.

3 See the 1990 Detailed Implementing Rules for the Law of the People's Republic of China on Wholly Foreign-Owned Enterprises.

4 See the 2001 Detailed Implementing Rules for the Law of the People's Republic of China on Wholly Foreign-Owned Enterprises.

Table 1-2 Amount of FDI in China by Type (2003-2004) USD 100 Million

	2003				2004							
	Number of projects	Percent	Amount contracted	Percent	Amount utilised	Percent	Number of projects	Amount contracted	Percent	Amount utilised	Percent	
Joint venture	12558.00	30.57	258.95	22.50	157.20	29.38	11613.00	26.60	284.15	18.51	171.63	28.31
Cooperative	1555.00	3.79	75.65	6.57	38.68	7.23	1343.00	3.08	77.88	5.07	32.21	5.31
Solely foreign owned	26943.00	65.59	816.09	70.92	333.84	62.39	30708.00	70.33	1172.75	76.41	402.22	66.34
Others	25.00	0.06		0.00	5.31	0.99		0.00		0.00	0.24	0.04
Total	41081.00	100.00	1150.70	100.00	535.05	100.00	43664.00	100.00	1534.79	100.00	606.30	100.00

Source: China statistical yearbook, various years

1.3.2 Sources of FDI in China

East Asia, particularly Hong Kong, is the most important origin of China's FDI. In 2004, Hong Kong's accumulated paid-in FDI amounted to \$19 billion. Based on official statistical data, Taiwan is also a pivotal origin of China's FDI with an accumulated USD 3.1 billion in 2004. In fact, quite a few businessmen from Taiwan invested in mainland China via such springboards as Hong Kong, the Virgin Islands, and the Cayman Islands in order to avoid the multiple restrictions exerted by the incumbent Taiwan authority. Indeed, the actual amount of Taiwan-originated investment in mainland China may be two to three times the amount publicly acknowledged. Therefore, although Taiwan ranks as the 6th source of FDI in mainland China in 2004, it is still looked as the second most important place of origin of FDI in China. In addition, Japan, the United States, and some developed countries in Europe have also contributed to FDI in China (see table 1-3 and 1-4). It is worth pointing out that renowned FIEs from developed countries have been the primary investors in China, and they fund large scale capital- and technology-intensive projects. The presence of these FIEs, such as IBM, GE, GM, Motorola, Sony, and Samsung, is particularly

significant for China since it signals the greater possibility of even more future foreign investment.

Table 1-3 Top 15 sources of FDI in China (cumulated to the end of 2004)

	2003		2004	
	FDI realized (millions of dollars)	Share (percent)	FDI realized (millions of dollars)	Share (percent)
Hong Kong	17700.10	33.08	18998.30	31.33
Virgin Islands	5776.96	10.80	6730.30	11.10
Japan	5054.19	9.45	5451.57	8.99
Republic of Korea	4488.54	8.39	6247.86	10.30
United States	4198.51	7.85	3940.95	6.50
Taiwan, China	3377.24	6.31	3117.49	5.14
Singapore	2058.40	3.85	2008.14	3.31
Samoa	985.72	1.84	1128.85	1.86
Cayman Islands	866.04	1.62	2042.58	3.37
Germany	856.97	1.60	1058.48	1.75
United Kingdom	742.47	1.39	792.82	1.31
Netherlands	725.49	1.36	810.56	1.34
France	604.31	1.13	656.74	1.08
Australia	592.53	1.11	662.63	1.09
Canada	563.51	1.05	613.87	1.01
Others	4913.69	9.18	6368.84	10.50
Total	53504.67	100.00	60629.98	100.00

Source: Compiled from *China Statistical Yearbook 1996-2005*, National Bureau of Statistics of China

Table 1-4 Distribution of FDI by Source Country or Region (USD 10000)

Source Country (Region)	2003	2004
Total	5350467	6062998
Asia	3410169	3761986
Afghanistan		2190
Bahrain	101	380
Bangladesh	306	749
Brunei	5260	9605
Myanmar	351	878
Cambodia	1252	2069
Cyprus	83	160
Korea DPR	238	273
Hong Kong, China	1770010	1899830
India	1593	1948
Indonesia	15013	10452
Iran	55	429
Iraq	7	549
Israel	1573	2330
Japan	505419	545157
Jordan	622	937
Kuwait	10	89
Laos	40	425
Lebanon	124	304
Macao, China	41660	54639
Malaysia	25103	38504
Mongolia	18	15
Oman	126	
Nepal		78
Pakistan	343	454
Philippines	22001	23324
Saudi Arabia	355	701
Singapore	205840	200814
Republic of Korea	448854	624786
Sri Lanka	112	526
Syria	39	64
Thailand	17352	17868
Turkey	1270	745
United Arab Emirates	6958	8565

Republic of Yemen	26	286
Vietnam	331	114
Taiwan, China	337724	311749
Other Countries (Regions) in Asia		
Africa	61776	77568
Algeria	183	206
Benin	330	270
Botswana	137	47
Congo	137	
Egypt	334	396
Gabon	12	65
Kenya		106
Madagascar	190	318
Mauritius	52098	60232
Morocco	76	97
Namibia	391	80
Niger		10
Nigeria	2083	1583
Seychelles	246	654
Sierra Leone	2	82
South Africa	3245	10940
Sudan		41
Tanzania	50	15
Togo	210	19
Uganda		
Zambia	109	385
Zimbabwe		325
Libyan		15
Gambia		
Liberia	1124	285
Guinea		258
Guinea Bissau	20	110
Cameroon	73	590
Cape Verde	33	70
Ghana		40
Mali		11
Somalia		10
TuNiSia		60
BurkinaFaso		98

Eritrea		40
Other Countries (Regions) in Africa	693	110
Europe	427197	479830
Belgium	11059	8209
Denmark	4282	6571
United Kingdom	74247	79282
Germany	85697	105848
France	60431	65674
Ireland	1061	456
Italy	31670	28082
Luxembourg	17543	2878
Netherlands	72549	81056
Greece	177	2819
Portugal	415	3322
Spain	9181	15075
Albania	65	13
Austria	9450	9761
Bulgaria	234	577
Finland	3239	2801
Gibraltar	49	100
Hungary	2366	4996
Iceland		50
Liechtenstein	229	4780
Malta	113	73
Monaco		188
Norway	1861	178
Poland	364	318
Romania	1527	3058
San Marino	450	
Sweden	12030	12070
Switzerland	18134	20312
Azerbaijan	25	230
Belorussia	83	
Kazakhstan	70	196
Russia	5430	12638
Ukraine	279	1386
Uzbekistan		15
Yugoslavia	190	327
Croatia	4	

Czech	1245	3363
Slovakia	1175	207
Macedonia	6	14
Kirghizia	90	248
Armenia		359
Lithuania		364
Other Countries (Regions) in Europe	177	1936
Latin America	690657	904353
Argentina	1889	3080
Bahamas	8787	4800
Barbados	2446	3129
Belize	1990	1033
Bolivia	290	134
Brazil	1671	3070
Cayman Islands	86604	204258
Chile	801	339
Colombia	47	10
Costa Rica		2
Cuba	1407	100
Dominica		35
Dominica Rep.	307	114
Ecuador	53	10
Honduras	69	539
Jamaica	10	360
Mexico	555	2129
Nicaragua	120	
Panama	3283	3592
Paraguay	60	830
Peru	90	445
Puerto Rico	10	
El Salvador	34	7
Suriname	243	1629
Turks and Caicos Islands	57	127
Venezuela	128	
Virgin Islands	577696	673030
St.Kitts-Nevis	1400	1057
Saint Vincent & Grenadines		127
Other Countries (Regions) in Latin America	610	367
North America	516135	497759

Canada	56351	61387
United States	419851	394095
Bermuda	39820	42277
Other Countries (Regions) in North America	113	
Oceanic and Pacific Islands	173119	197437
Australia	59253	66263
Cook Islands	251	637
Fiji		76
Nauru	258	700
New Zealand	6577	11528
Papua New Guinea	45	400
Solomon Is.		30
Tonga	81	41
Samoa	98572	112885
Kiribati	110	30
Marshall Islands	1102	1543
East Samoan		1252
Palau	5158	34
Other Pacific Islands	1247	1808
Other Countries (Regions) in Oceanic	465	210
Others	71414	144065

Note: The "Others" item of foreign other investment includes the stock issued in foreign countries at the same year.

Source: Compiled from *China Statistical Yearbook 1996-2005*, National Bureau of Statistics of China

1.3.3 Distribution of FDI in Various Chinese industries

More than 80 percent of FDI in China is Greenfield investments, and most FDI is in the manufacturing industry. In 2005, FDI in manufacturing industry constituted 65 percent of total FDI projects, and 70 percent of the actually utilised amount of FDI in China. In the services sector, FDI is mainly poured into the real estate industry. The investment in the primary industry occupies a rather low proportion of the total investment amount (table 1-5). A majority of FDI has gone into the manufacturing industry because China possesses a competitive edge thanks to its lower costs of production and relatively powerful ability to supply supporting parts. In contrast, China has strictly controlled the flow of FDI into the services sector for a long period.

Table 1-5 FDI by Sector (2005)

Sector	Number of Projects (unit)	Increase than Last Year (%)	Actually Utilized Value (USD 100 million)	Increase than Last Year (%)
Total	44001	0.8	603.2	-0.5
Agriculture, Forestry, Animal Husbandry and Fishing	1058	-6.4	7.2	-35.5
Mining	252	-9.7	3.5	-34.0
Manufacturing	28928	-4.8	424.5	-1.3
Production and Distribution of Electricity, Gas and Water	390	-14.3	13.9	22.7
Construction	457	11.2	4.9	-36.5
Transport, Storage and Post	734	15.1	18.1	42.4
Information Transmission, Computer Services and Software	1493	-8.0	10.1	10.7
Wholesale and Retail Trade	2602	53.1	10.4	40.4
Hotel and Restaurants	1207	2.8	5.6	-33.4
Financial Intermediation	40	-7.0	2.2	-13.0
Real Estate	2120	20.0	54.2	-8.9
Leasing and Business Services	2981	12.0	37.5	32.6
Scientific Research, Technical Service and Geologic Prospecting	926	47.2	3.4	15.8
Management of Water Conservancy, Environment and Public Facilities	139	-15.2	1.4	-39.3
Services to Households and Other Services	329	31.1	2.6	64.6
Education	51	-13.6	0.2	-53.8
Health, Social Security and Social Welfare	22	4.8	0.4	-55.1
Culture, Sports and Entertainment	272	0	3.1	-31.8
Public Management and Social Organization			0.04	105.6

Source: Compiled from *China Statistical Yearbook 2006*, National Bureau of Statistics of China

1.3.4 Distribution of FDI by Host Region

FDI in China started in the four special economic zones in 1979-1980, and gradually extended to other coastal areas and inland areas. As we can see in table 1-6, FDI distribution by host region varies and eastern coastal area⁵ dominates. By 2003, five east coastal provinces (Guangdong, Jiangsu, Fujian, Shandong, and Shanghai) occupied more than 60 percent of the total cumulative FDI.

⁵ Eastern coastal area includes: north part of eastern coastal area (Liaoning, Hebei, Beijing, Tianjin, and Shandong); middle part of eastern coastal area (Jiangsu, Zhejiang, and Shanghai); south part of eastern coastal area (Guangdong, Guangxi, Hainan, and Fujian).

Table 1-6 Distribution of FDI by Host Region (USD 1 Million)

Region	2002		2003	
	Amount (USD million)	Share (%)	Amount (USD million)	Share (%)
National Total	52742.86	100.00	53504.67	100.00
Jiangsu	10189.60	19.32	10563.65	19.74
Guangdong	11334.00	21.49	7822.94	14.62
Shandong	4734.04	8.98	6016.17	11.24
Shanghai	4272.29	8.10	5468.49	10.22
Zhejiang	3076.10	5.83	4980.55	9.31
Liaoning	3411.68	6.47	2824.10	5.28
Fujian	3838.37	7.28	2599.03	4.86
Beijing	1724.64	3.27	2191.26	4.10
Jiangxi	1081.97	2.05	1612.02	3.01
Hubei	1426.65	2.70	1568.86	2.93
Tianjin	1581.95	3.00	1534.73	2.87
Hunan	900.22	1.71	1018.35	1.90
Hebei	782.71	1.48	964.05	1.80
Henan	404.63	0.77	539.03	1.01
Hainan	511.96	0.97	421.25	0.79
Guangxi	417.26	0.79	418.56	0.78
Sichuan	555.83	1.05	412.31	0.77
Anhui	383.75	0.73	367.20	0.69
Shaanxi	360.05	0.68	331.90	0.62
Heilongjiang	355.11	0.67	321.80	0.60
Chongqing	195.76	0.37	260.83	0.49
Shanxi	211.64	0.40	213.61	0.40
Jilin	244.68	0.46	190.59	0.36
Inner Mongolia	177.01	0.34	88.54	0.17
Yunnan	111.69	0.21	83.84	0.16
Guizhou	38.21	0.07	45.21	0.08
Qinghai	47.26	0.09	25.22	0.05
Gansu	61.21	0.12	23.42	0.04
Ningxia	22.00	0.04	17.43	0.03
Xinjiang	18.99	0.04	15.34	0.03
Tibet				

Source: Compiled from *China Statistical Yearbook 2005*, National Bureau of Statistics of China.

Throughout the reform period, the share of the eastern region always remained at the level of over 85 percent of actual investment and only underwent a minor decrease compared to the early 1980s. The share of the central region saw a modest increase, rising from 1.12 percent in 1983 to 4.02 percent in 1990 and further to 9.17 percent in 1999. In comparison, the share of the western region suffered a significant decrease, dropping from 5.59 percent in 1983 to 3.75 percent in 1993 and further to 3.03 percent in 1999. This huge disparity between the eastern coastal area and the inland area could attribute to the long dominated export-oriented FDI in China, which will be discussed in section 1.3.5.

Although the broad regional pattern of FDI basically remained unchanged, the distribution within the East has witnessed some important changes. In the early period of 1979-1982, FDI was concentrated on the four special economic zones (especially, Shenzhen). The actual investment in these four cities accounted for about 70 percent of the national total. All these four cities lie in the south coastal areas. After 1984, this concentration gradually decreased. While the actual investment share of the south coastal

area decreased from a peak level of 81.7 percent in 1984 to 59.3 percent in 1991 and further to 38.8 percent in 2000, the share of the north coastal area increased from 7.1 percent in 1984 to 22.9 percent in 1991 and then decreased to 21.2 percent in 2000, and the central coastal area increased from 8.0 percent in 1984 to 10.3 percent in 1991 and further to 27.8 percent in 2000. Jiangsu saw an especially fast growth of foreign capital inflow. From 1994 on Jiangsu replaced Shanghai as the second largest recipient of FDI. In contrast, Shanghai saw a big fluctuation of investment. One reason is that while much of investment in Shanghai was directed at speculative real estate, investment in Jiangsu was mainly concentrated in manufacturing industry. For a detailed discussion and related data, see the FDI research group of IOIE of CASS (2000) as well as *China Foreign Economic and Trade Statistical Yearbook* (various years).

1.3.5 Dominant Type of FDI in China

From the aspect of market orientation, as concerned before, FDI can be divided into two categories: In “domestic-market seeking” investment, investors seek to enter the host country’s local market. In “export-oriented” or

“efficiency-pursuing” investment, investors establish production bases in the host country but export most of their products to the global market.

In China, process trade i.e. export-oriented FDI has long been the dominant type of FDI.

After a lapse of 25 years, in 2003 China ranked 4th among other countries in the world’s international trade chart, which was a major improvement from its 32nd rank in 1978. China’s rapid rise as a trading power has been considered a global economic miracle, and FDI has played a crucial role in developing China’s foreign trade.

Table 1-7 displays the development of China’s foreign trade as well as the export and import performance of FIEs. As illustrated in the table, the export value registered by FIEs made up only 1.9 percent of China’s total export value in 1986, but had climbed up to 58.3 percent in 2005. Between 1986 and 2005, FIEs contributed up to 58.8 percent to China’s total increase of export and 62 percent to its increase of import value.

Table 1-7 Development of China's Foreign Trade by FIEs, 1986-2005

year	Foreign Trade Turnover			Export			Import			
	Total (billions of USD)	by (billions of USD)	FDI of (%)	Share of FDI (%)	Total (billions of USD)	by (billions of USD)	FDI of (%)	Share of FDI (%)	Total (billions of USD)	by (billions of USD)
1986	73.8	3.0	4.1	30.9	0.6	1.9	42.9	2.4	5.6	
1987	82.7	4.6	5.6	39.4	1.2	3.0	43.3	3.4	7.9	
1988	102.8	8.3	8.1	47.5	2.5	5.3	55.3	5.8	10.5	
1989	111.7	13.7	12.3	32.5	4.9	15.1	79.2	8.8	11.1	
1990	115.4	20.1	17.4	62.1	7.8	12.6	53.3	12.3	23.1	
1991	135.7	29.0	21.4	71.9	12.0	16.7	63.8	17.0	26.6	
1992	165.5	43.7	26.4	84.9	17.4	20.5	80.6	26.3	32.6	
1993	195.7	67.1	34.3	91.7	25.2	27.5	104.0	41.9	40.3	
1994	236.6	87.6	37.0	122.1	34.7	28.4	114.5	52.9	46.2	
1995	280.8	109.8	39.1	148.8	46.9	31.5	132.0	62.9	47.7	
1996	289.9	137.1	47.3	151.1	61.5	40.7	138.8	75.6	54.5	
1997	325.1	152.6	46.9	182.7	74.9	41.0	142.4	77.7	54.6	
1998	323.9	157.7	48.7	183.8	81.0	44.1	140.1	76.7	54.7	
1999	360.6	174.5	48.4	194.9	88.6	45.5	165.7	85.9	51.8	
2000	474.3	236.7	49.9	249.2	119.4	47.9	225.1	117.3	52.1	
2001	509.7	259.1	50.8	266.1	133.2	50.1	343.6	125.9	36.6	
2002	620.8	330.2	53.2	325.6	169.9	52.2	295.2	160.3	54.3	
2003	851.2	472.2	55.5	438.4	240.3	54.8	412.8	231.9	56.2	
2004	1154.6	663.2	57.4	593.3	338.6	57.1	561.2	324.6	57.8	
2005	1422.1	831.7	58.5	762.0	444.2	58.3	660.1	387.5	58.7	

Source: Compiled from *China Statistical Yearbook 1996-2006*, National Bureau of Statistics of China

1.3.6 Preview of China's FDI Policies

For the last 25 years, Chinese government has aggressively shaped a relatively complete range of laws and regulations governing foreign investment, which include the Law of the People's Republic of China upon Foreign Wholly Owned Enterprises, Law of the People's Republic of China upon Sino-Foreign Joint Ventures, Law of the People's Republic of China upon Sino-Foreign Cooperative Enterprises, and the Guiding Directory on Industries Open to Foreign Investment. China's laws and regulations on FDI also include related preferential policies and stipulations for special economic zones in the country.

In a nutshell, China encourages favourable FDI policies. Therefore, FIEs enjoy preferential treatment when compared to domestic enterprises. In fact, FIEs are entitled to markedly different treatments depending on the region and industry, and this differential treatment is outlined by policies. Furthermore, the Chinese government has stipulated different FDI performance requirements depending on these distinctions.

China has designated certain parts of the country as special economic areas and each is governed by different policies. China has also enforced two policies

called Develop China's West at Full Blast and Strategy of Reviving Rusty Industrial Bases to encourage FDI into its western and northeast regions. Therefore, FDI policies in China's western region entitle foreign enterprises to even more preferential treatment than in other regions of the country.

The Chinese government pays much attention to industrial guidance on FDI. In June 1995, China first promulgated the Provisional Regulations upon Guidance for Foreign Investment Orientations and the Guiding Directory on Industries Open to Foreign Investment. Furthermore, the different preferential treatments granted to enterprises in various industries have mainly been determined under the Guiding Directory. This Guiding Directory was revised first in December 1997, and then again in April 2002 because of China's accession to the WTO. The Guiding Directory is important because it divides FDI-involved projects into four categories: projects that were encouraged, allowed, restricted, and prohibited. These categories are then subdivided even further. For instance, 262 types of encouraged projects, 75 types of restricted projects, and 34 types of prohibited projects exist.

China currently encourages FDI for the purposes of (NDRC, 2004)

- transforming traditional agriculture, developing modern agriculture, and promoting the industrialization of agriculture;
- producing transportation infrastructure, energy sources, and raw materials, and other basic industries;
- tapping into cutting-edge, technology-oriented industries such as electronic information, bioengineering, new materials, and aviation and aerospace, as well as establishing local R&D centres;
- encouraging foreign businesses to utilize advanced and applicable techniques to transform traditional industries such as machinery, textiles, and consumption goods manufacturing industries as well as to upgrade their equipment and facilities;
- using raw and renewable resources comprehensively, initiating environmental protection projects, and modernizing public utilities;
- encouraging export-oriented FDI projects; and
- building up the industries in China's western region.

1.4 Research Process

The research process flow chart (Figure 1-2) shows how the study is conducted, the objective of each stage, the research methodologies, samples applied, and outcomes of each stage.

The research is conducted in three stages. The main purpose of Stage One is to initially investigate the existence of productivity externalities that indigenous Chinese firms benefit from inward FDI, and then try to explore the channels or mechanisms through which they occur. Unmasking the possible spillover mechanisms in this stage is a vital basis to the following study of Stage Two and Stage Three.

Based on the findings in Stage One of FDI backward linkage (the relationship between foreign producers and indigenous suppliers) being the most important FDI spillover channel to benefit indigenous Chinese firms vertically and indirect-horizontally (taking effect in the up/down stream sectors and the same sectors respectively), the following stage will focus on the within impellent forces of FIEs' backward linkage creation in China. Accordingly,

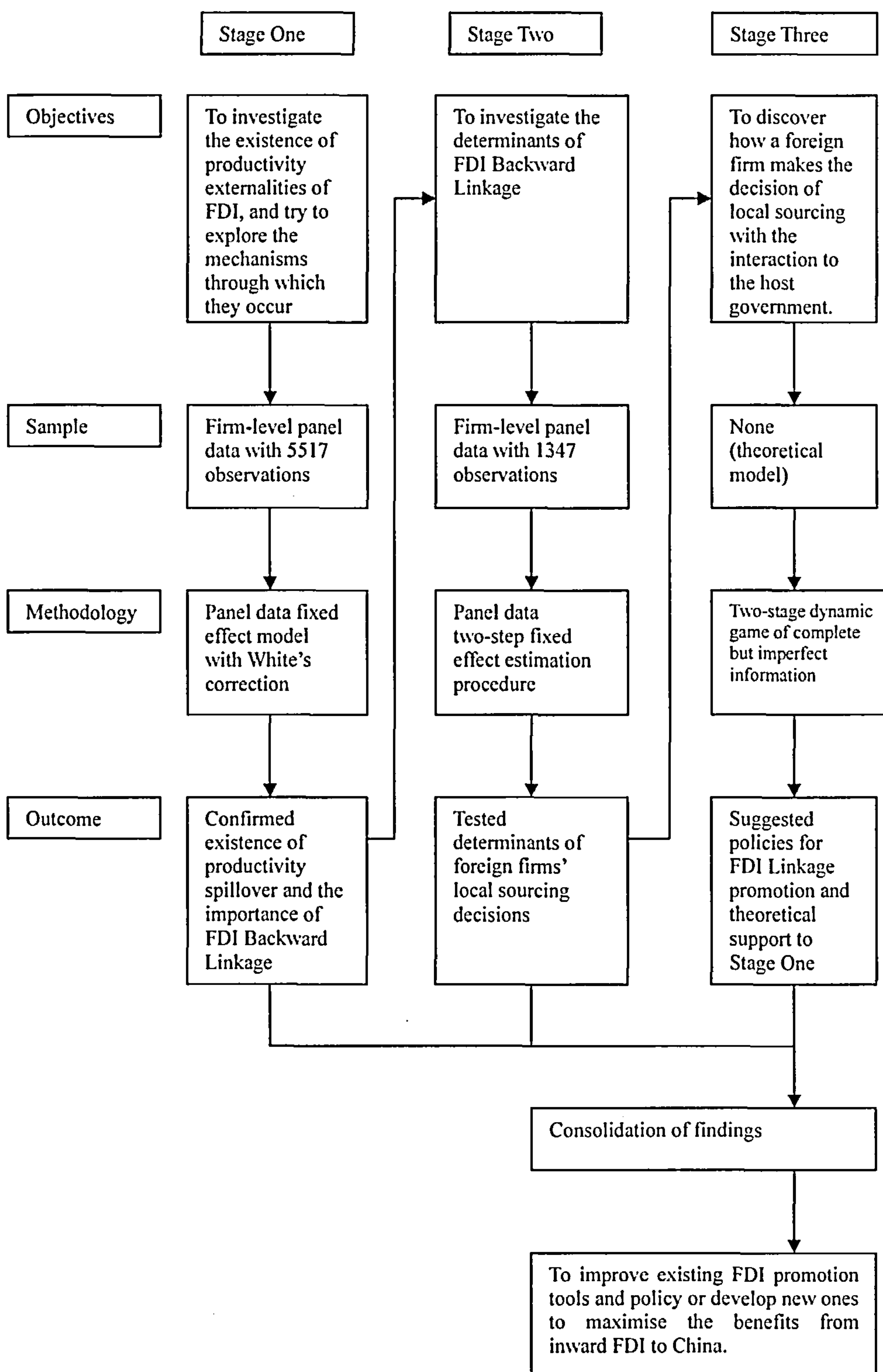
Stage Two investigated the determinants of FIEs' backward linkage creation (local sourcing decision) from the angle of foreign firms' within characteristics.

Several determinative factors of FDI backward linkage are revealed in this stage.

These findings will be instructive in formulating the FDI attracting policies.

Different from the empirical studies in the above two stages, the last stage work tries to investigate how the host government policies could make an influence on FIEs' sourcing choice. It develops a two-stage dynamic game theoretical model to consider how a FIE makes the choice between importing and local sourcing, with the interaction to the host government policies focusing on the creation of FDI Linkage.

Figure 1-2 Research Process Flow Chart



1.5 Structure of the Thesis

The thesis is presented in five chapters. This chapter introduces and lays the foundations for the whole three stage research. It presents the background and necessity of the research and outlines the important practical value of the study before moving on to the topic area where the research was conducted.

Chapter 2 empirically investigates the existence of productivity externalities that indigenous Chinese firms benefit from inward FDI, and then tries to explore the channels or mechanisms through which they occur. The findings of FDI Backward Linkage being the most important FDI spillover channel to benefit indigenous Chinese firms provide a key clue to the subsequent study of Stage Two and Stage Three.

After confirming the positive impact of FDI Backward Linkage, Chapter 3 examines the determinants of such linkage from the angle of FIEs' within characteristics.

Different from the empirical studies in the above two chapters, Chapter 4 develops a two-stage dynamic game theoretical model to simulate the

interaction between FIEs and the host government, while focuses on how a FIE makes the choice between importing and local sourcing.

The last chapter presents a discussion of the implications of the findings in this research and self critique along with conclusions and recommendations.

1.6 Summary

This chapter has introduced the background, necessity, objectives, rationality and structure of the research. The preamble offered a background and justification for the study. The research necessity was stated in combination with the objectives of this study. In addition, an overview of the research process and structure was presented with supporting rationale. Next chapter will introduce the work done in Stage One of current research.

Chapter 2 Foreign-Local Firm Linkages and Productivity Spillovers in Chinese

Manufacturing

2.1 Introduction

Foreign direct investment (FDI) theory suggests that Foreign Invested Enterprises (FIEs) can generate productivity spillovers to indigenous firms in host countries. Accordingly, there has been a growing interest in exploring the existence of this type of externality (e.g. Caves, 1974; Blomstrom and Persson, 1983; Haddad and Harrison, 1993; Kokko, 1994, 1996; Aitken and Harrison, 1999; Li et al. 2001; Buckley et al. 2002; Javorcik, 2004). However, as Alfaro & Rodriguez-Clare (2004) argue, so far most studies have looked for the presence of these productivity externalities without trying to understand channels or mechanisms through which they occur. In other words, empirical studies have focused on finding indirect evidence of externalities by investigating whether an increase in the presence of FIEs is associated with an increase in indigenous firms' productivity in the same or upstream sectors.

A relatively small number of empirical studies have examined horizontal or vertical productivity spillovers from FIEs to local firms (Schoors & van der Tol, 2001; Görg and Ruane, 2000, 2001; Driffield et al, 2002; Blalock & Gertler,

2003; Javorcik, 2004). Their results are not very optimistic and the crucial issue is that it is difficult to find evidence of positive externalities from FIEs to indigenous firms in the same sector (horizontal spillovers). In fact, some of these studies find evidence of negative horizontal spillovers arising from multinational activity while confirming the existence of positive externalities via backward linkage between FIEs and indigenous firms in upstream industries (vertical spillovers) (Driffield et al. 2002; Javorcik 2004). Although these studies shed some light on the widely accepted mechanisms or channels for productivity externalities, it is believed that the existing measure of FDI Backward Linkage is problematic due to two unrealistic implicit assumptions behind and that an important mechanism, i.e. “indirect horizontal externalities”⁶, is ignored in empirical investigations.

This study aims to assess the relationship between productivity spillovers and foreign-local firm linkages using firm level panel data in Henan Province, China from 1999 to 2003. The unique features of this study include (1) an application of an improved measure of FDI Backward Linkage; (2) an

⁶ Briefly speaking, indigenous firms benefit from FIEs in the same industry but through indirect channel. Further illustration will be provided in the following section.

introduction of indirect horizontal externalities; and (3) an assessment of the impact of local firms' ownership and trade orientation on the effectiveness of productivity spillovers. The results suggest that FDI in China generates positive vertical and indirect horizontal spillovers via FDI Backward Linkage, but negative general horizontal externalities. In other words, through the creation of FDI Backward Linkage indigenous Chinese firms both in the upper stream sectors as suppliers and those in the same sector as competitors could benefit from the presence of FDI, although at the same time local Chinese firms might suffer as well from the competition with FIEs, which often overweighs the positive FDI spillovers.

The remainder of this chapter is organised as follows. Section 2.2 reviews the relevant literature and provides my arguments. Section 2.3 gives an overview of spillover mechanisms. Section 2.4 presents the dataset employed. Section 2.5 states the empirical model and methodology. Section 2.6 describes estimation results. The last section concludes the main findings and discusses policy implications.

2.2 Brief Review of Recent Empirical Literature

FIEs can have a significant impact on the productivity levels of indigenous firms, and the possible channels or mechanisms of such externalities are comprehensively reviewed by Blomström and Kokko (1998), Saggi (2002) and Görg and Greenaway (2004). However, empirical evidence on whether FDI generates positive externalities for host countries is still ambiguous. Although the picture is usually optimistic for industrialized countries (see Gorg & Strobel 2002; Haskel et al. 2002)⁷, the results for developing countries are generally pessimistic. Many studies either fail to detect the presence of positive horizontal productivity externalities or actually find evidence of negative horizontal externalities in developing countries. For instance, Gorg and Strobl (2002) show that only two studies for industrialized countries and none for developing countries report positive evidence for intra-industry externalities; all other studies using panel data find either negative or no statistically significant effects.

⁷ The evidence for industrialized countries tends to be more promising. Haskel, Pereira and Slaughter (2002) give convincing evidence of positive FDI spillovers taking place in the UK. Also Gorg and Strobl (2002) find that foreign presence reduces exit and encourages entry by domestic-owned firms in the high-tech sector in Ireland.

More encouraging results for developing or transitional countries are provided in some very recent studies on vertical externalities of FDI. Using a panel dataset of Indonesian manufacturing establishments from 1988 to 1996, Blalock and Gertler (2003) find evidence of positive vertical externalities. They also find that downstream FDI increases output and firm value added while decreasing prices and market concentration. Similarly, using plant level data for manufacturing firms in Mexico from 1993 to 2000, Lopez-Cordova (2003) finds that foreign capital improves total factor productivity (TFP), with positive inter-industry externalities prevailing over a negative intra industry effect. Using firm level panel data for Lithuania from 1996 to 2000, Javorcik (2004) examines whether the productivity of indigenous firms is correlated with the presence of FIEs in downstream sectors (potential customers). Her empirical results indicate the existence of productivity externalities from FDI taking place through contacts between FIEs and their indigenous suppliers in upstream sectors but there is no indication of externalities occurring within the same industry.

The conclusion that emerges from the empirical literature so far is that it is

difficult to find robust evidence of positive externalities from FIEs to indigenous firms in the same sector (horizontal spillovers), while there exist positive externalities from FIEs to indigenous firms in upstream industries (vertical spillovers). One possible explanation for this situation is that “researchers have been looking for FDI spillovers in the wrong place. Since FIEs have an incentive to prevent information leakage that would enhance the performance of their local competitors, but at the same time might want to transfer knowledge to their local suppliers, spillovers from FDI are more likely to be vertical rather than horizontal in nature” (Javorcik, 2004)

Although these cited and some other studies help shed light on some general channels or mechanisms with which productivity spills over from foreign to local firms, the widely used measure of FDI Backward Linkage still may lead to biased results, and that one important mechanism, Indirect Horizontal Externality, identified in the theoretical model developed by Rodriguez-Clare (1996) is still ignored in any empirical study. This study attempts to resolve these two problems.

2.3 Spillover Mechanisms

There are different mechanisms through which FDI can generate positive productivity externalities.

2.3.1 Mechanisms of Vertical Spillovers

As stated by Javorcik (2004), vertical spillovers can operate through three ways. (1) Direct knowledge transfer from foreign customers to local suppliers. Numerous case studies indicate (see e.g. Moran 2001, Altenburg 2000) that FIEs often provide technical assistance to their suppliers in order to raise the quality of their products or facilitate innovation. They help suppliers with management training and organisation of the production process, purchasing raw materials and even finding additional customers. (2) Higher requirements regarding product quality and on-time delivery introduced by FIEs, which provide incentive to domestic suppliers to upgrade their production management or technology. (Alvarez 2002) (3) Indirect knowledge transfer through movement of labour. (UNCTAD 2001a)

In their theoretical model, Lin and Saggi (2004) argue that FDI can affect

the degree of backward linkages in two conflicting ways. On one hand, it creates demand for intermediate goods (demand effect), whilst on the other hand, local firms competing with foreign firms may be forced to reduce their output and hence reduce their own demand for these intermediate goods (competition effect). If the competition effect exceeds the demand effect, there will be net negative backward linkage effects. Dolan and Humphrey (2000), Weatherspoon and Reardon (2003) and Dries and Swinnen (2004) also provide some anecdotal evidence that there are negative spillovers from backward linkages in developing countries as local suppliers cannot comply with the higher standards and grading requirements for the supplied products.

Following the theoretical discussion, an ideal measure of FDI Backward Linkage is a share of an indigenous firm's output that is sold to FIEs, but this information is usually not available in most data sets except through some kind of surveys. Instead, almost all FDI linkage studies measure backward linkage as follows. Suppose we need to measure sector j 's backward linkage, then

$$Backward_{jt} = \sum_{i/k \neq j} (\alpha_{jkt} \frac{\sum_{i \in j} Foreign_OUTPUT_{it}}{\sum_{i \in j} OUTPUT_{it}}) \quad (2.1)$$

This measure proxies the share of an indigenous firm's output sold to FIEs with the share of the sector's (to which the indigenous firm belongs) output that is sold to FIEs. $\alpha_{jk,t}$ is the proportion of sector j 's output consumed by sector k at year t ; $Foeign_OUTPUT_{i,t}$ is the output of firm i if the firm is multinational, and zero otherwise; $OUTPUT_{i,t}$ is the output of firm i at year t . The amount that firms in sector j purchase from each of the other sectors can be calculated through IO matrix of year t . The share of output in sector j that is produced by FIEs can be calculated through the data set. If a firm's share of a sector's use of a particular input is assumed to be equal to the output share, then the measure of the share of a sector's output sold to FIEs is the sum of the output shares purchased by other sectors multiplied by the share of foreign output in each sector.⁸

This measure of FDI Backward Linkage is widely applied, but its two implicit crucial assumptions are neglected in most linkage studies. (1) There is no difference in the production procedure between FIEs and indigenous firms in the same sector. (2) All inputs of the investigated firms are sourced from the

⁸ See Blalock & Gertler 2003; Javorcik 2004; Lopez-Cordova 2003.

host country rather than from imports. Obviously, these two assumptions are unrealistic. As stated in the 2001 World Investment Report (UNCTAD, 2001a),

(1) FIEs normally hold higher producing technology than local firms in developing countries, thus much difference exists in their producing procedure;

(2) Many FIEs import inputs from the world market rather than source locally, thus this measure of backward linkage may induce severe estimation bias.

Therefore, an alternative measure will be developed in the next section.

2.3.2 Mechanisms of Horizontal Spillovers

According to the Economic Survey of Europe 2001 (ESE, 2001), FDI horizontal intra-industry spillovers occur in three ways. First, competition with FIEs can increase intra-industry spillovers by stimulating technical change and technological learning. Greater competitive pressure faced by local firms may force them to introduce new products to defend their market shares and adopt new management methods to increase productivity. It is usually called the “stimulus effect”. Second, human capital may spill over from FIEs to other firms if skilled employees move between employers, which can be called the “human capital effect”. Finally, the proximity of local firms to FIEs can

sometimes lead to demonstration or imitation spillovers, which is usually called the “demonstration effect”. When FIEs introduce new products, processes and organizational forms, they provide a demonstration of increased efficiency to other local firms. A similar classification is stated separately in the research by Kokko (1994), Perez (1997), Blomstrom and Kokko (1998) and Javorcik (2004). Fosfuri et al. (2001) also give detailed explanations on the “human capital effect”: there is evidence that FIEs undertake substantial efforts in the education of local workers (Lindsey, 1986; Ritchie, Zhuang and Whitworth, 2001) and that FIEs offer more training to technical workers and managers than do local firms (Chen, 1983; Gershenson, 1987). Given that a large part of this labour training is not paid for by workers and constitutes knowledge that is not completely firm specific, this generates a positive externality, leading to higher wages for these workers and/or higher productivity for firms that hire these workers after they leave the FIEs. In general, these labour training externalities would show up as “horizontal” knowledge spillovers, in the sense that they would benefit other firms in the same sector. Something very similar happens if workers increase their knowledge not through formal labour training

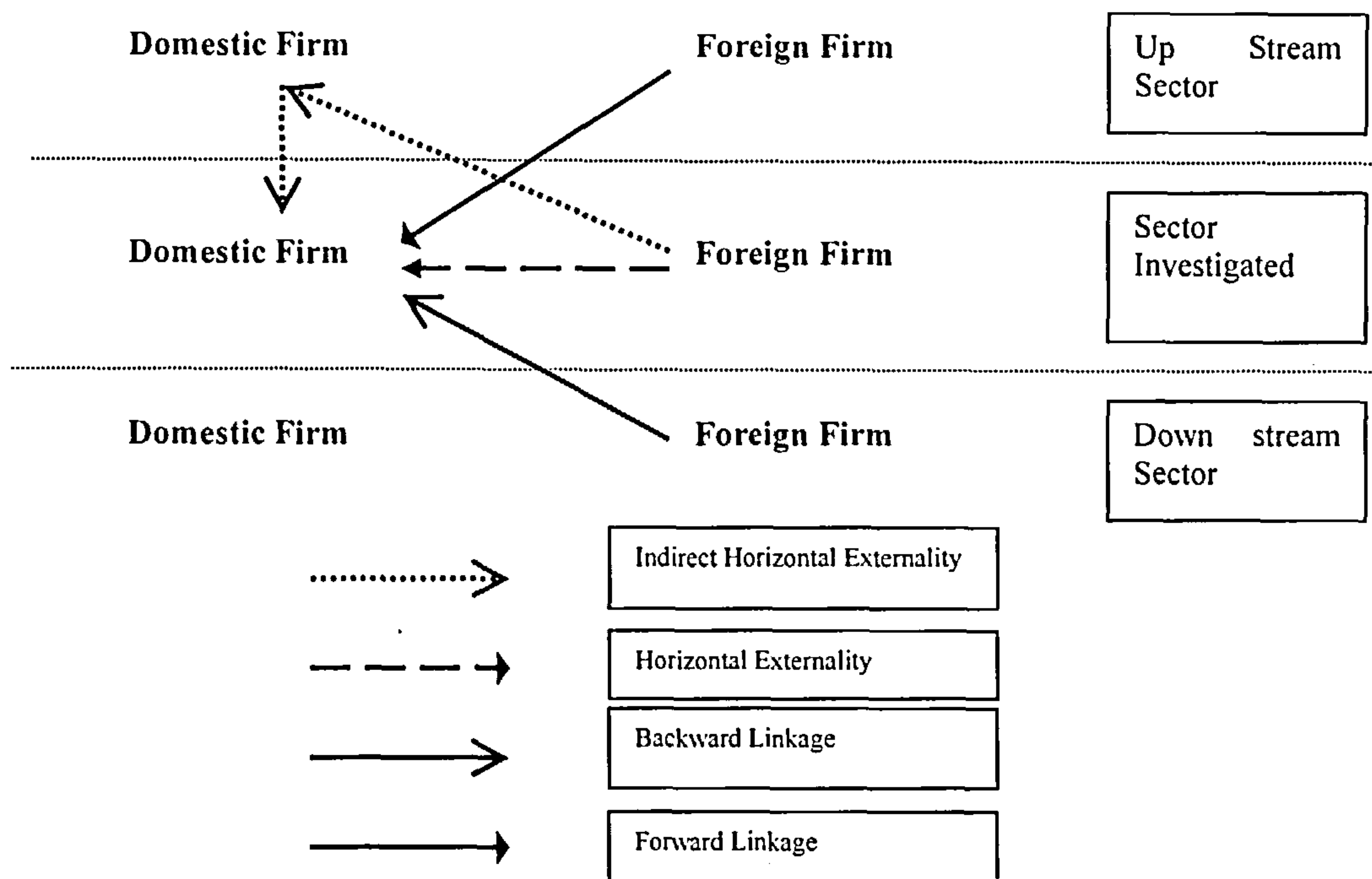
but through on-the-job training, learning by doing or learning by observing.

The spillover can also take place through “spin-off”. These are cases where workers leave FIEs to set up their own firms and benefit from the knowledge they gained while at the FIEs.

In addition, Rodriguez-Clare (1996) described an entirely different mechanism for FDI horizontal externalities, and here it is called “indirect horizontal externalities”. In contrast to knowledge spillovers, he discusses the pecuniary externalities that take place through market transactions. In his model, FIEs’ demand for inputs in upstream sectors may lead to the production of a large variety of intermediate goods. Thanks to the benefits of specialization, these improved inputs generate an increase in productivity for downstream domestic producers (positive horizontal productivity spillover). In other words, this allows the economy to gain a comparative advantage in the production of more sophisticated final goods or lowers production costs. Finally, the economy ends up with higher productivity and higher wages. Thus FDI Backward Linkage can also entail a positive indirect horizontal productivity externality. The relationship between backward linkage, forward linkage, horizontal

externality and indirect horizontal externality can be illustrated by the following schematic diagram:

Figure 2-1 Mechanism System of Productivity Spillovers from FDI



Of course indirect horizontal externalities can also be negative. As Alfaro and Rodriguez-Clare (2003) explain, “It could occur, if FIEs behave as enclaves, by importing all their inputs and restricting their local activities to hiring labour. In this case, demand for inputs decreases as FIEs increase in importance relative to indigenous firms and this leads to a reduction in input variety and

specialization. This would show up as a negative horizontal externality”⁹.

Although there is some theoretical discussion, the effect of indirect horizontal externalities has not been considered in any previous empirical studies.

The following sections will provide an alternative measure of FDI Backward Linkage which does not rely on the two unrealistic assumptions thus is believed to be able to correct the measurement error mentioned above, and incorporate indirect horizontal externalities into the spillover mechanism system illustrated in figure 1 to analyse the effect of FDI on the productivity of local firms in Chinese manufacturing for the period 1999-2003.

⁹ Note that in this argumentation it is a key issue that FIEs displace indigenous firms from the market: this could be resulted from labour market constraints (in this case of exports) or the competition between FIEs and indigenous firms in the host market, as discussed by Markusen and Venables (1999).

2.4 Data Description

The firm level data set used in this study is from the *Annual Survey of All State-owned Enterprises and Other Firms with Their Sales Being More Than Five Million Yuan*¹⁰, conducted by Henan Statistical Bureau of China. Henan ranked 14th in 2003/2004 and 13th in 2005 on the total amount of FDI utilised overall 31 provinces in China, thus its FDI status is very close to the average level of China¹¹. The survey coverage is extensive, as the firms included in the sample accounted for more than 70 percent of output in each sector. Since this study focuses on manufacturing only, the sample constitutes unbalanced data covering firms in 36 two-digit industries during the period 1999-2003.

For each industry, the Bureau collects detailed data on each industrial firm that continues in operation as a going concern. The data include information on ownership classification, sales, employment, inventories, fixed assets, intangible assets, intermediate inputs cost, imports and exports. Due to entry and exit

¹⁰ The rationale for focusing on large firms is that it is these firms which are generally perceived to be “leaders” in the industry and are likely to have the greatest influence on the local economy.

¹¹ The author has tried to involve data from more other representative provinces, but the data availability in those areas is not good enough to proceed the analysis necessary in current research.

and ownership restructuring, the number of firms in operation varies over time from a low of one thousand in 1999 to a high of one thousand and two hundred in 2003, of which 37% are FIEs and 63% are indigenous firms. A firm has been defined to be domestically-owned if its foreign equity participation, if any, is below 25%¹². To focus on the performance of indigenous firms, the full sample data set is divided into two sub-samples, indigenous firms and foreign firms.

The data are cleaned via extensive checks for nonsense observations, outliers, coding mistakes and the like. In addition, only firms with at least three years of data for ownership classification, fixed assets, intermediate inputs cost, employment and total sales are kept. The final data set includes a panel of 463 foreign-invested and 785 domestically-owned firms in 36 sub-sectors in Chinese manufacturing in 2003.¹³ Detailed sample distribution can be found in Table 2-1.

¹² The definition of domestically-owned firm varies in the literature. But the 25% cut-off is officially defined by Chinese government.

¹³ The downside of this data set is that the short duration of the panel makes it more difficult to detect the presence of spillovers. Extending the panel to earlier years would not mitigate this problem because of limited FDI presence during the early 1990 s.

Table 2-1 Brief Description of the Sample by Sectors and by Years

Sectors	1999	2000	2001	2002	2003
Oil & Gas Exploration	15	17	15	13	15
Nonferrous Mining	11	17	17	17	17
Non-metal Mining	33	34	33	33	33
Agricultural & Food Processing	30	37	37	30	30
Food Manufacturing	81	84	85	81	81
Drink Manufacturing	27	64	67	67	67
Tobacco Manufacturing	22	27	25	22	22
Textile	10	50	53	57	50
Garment	76	86	83	85	86
Leather & Feather Product	24	24	28	24	24
Wood Processing	36	37	34	36	36
Furniture Manufacturing	17	37	37	32	37
Paper Manufacturing	6	16	16	12	16
Printing	19	19	14	15	19
Educational Product Manufacturing	12	12	12	12	12
Oil Processing	7	11	13	11	11
Chemical Product	8	12	18	18	18
Pharmaceuticals	68	64	68	68	68
Chemical Fabric Manufacturing	33	33	37	33	33
Rubber Product	11	68	64	68	68
Plastic Product	26	16	16	13	16
Non-metal Ming Product	14	44	44	42	44
Black Metal making	72	72	71	71	72
Nonferrous Metal making	25	25	21	21	25
Metal Product	19	49	49	44	49
General Facility Manufacturing	15	15	15	14	15
Specialised Facility Manufacturing	28	23	28	28	28
Transportation Facility Manufacturing	48	43	48	48	48
Electrical Machinery Manufacturing	32	32	32	32	32
Communication Facility Manufacturing	17	12	17	17	17
Scientific Instruments & Office Machinery Manufacturing	22	19	13	19	19
Craft Product Manufacturing	21	17	17	17	13
Electricity & Energy Production and Supply	47	47	47	47	49
Gas Production and Supply	61	61	61	62	61
Water Production and Supply	7	5	5	5	7

2.5 Methodology

The empirical model used in the current study is an augmented production function with the horizontal, backward and forward linkage indices added¹⁴.

$$\ln Y_{ijt} = \alpha + \beta_1 \ln K_{ijt} + \beta_2 \ln L_{ijt} + \beta_3 \text{Horizontal_FDI}_{jt} + \beta_4 \text{Backward_FDI}_{jt} + \beta_5 \text{Forward_FDI}_{jt} + \delta X + \varepsilon \quad (2.2)$$

where Y_{ijt} stands for real output of firm i operating in sector j at time t , which is calculated by adjusting the reported sales for changes in inventories of finished goods and deflating the resulting value by the producer price of industrial products index¹⁵. K_{ijt} stands for capital, which is defined as the value of fixed assets at the beginning of the year, deflated by the fixed assets investment index. L_{ijt} stands for labour, which is defined as the average number of workers. $\text{Horizontal_FDI}_{jt}$, Backward_FDI_{jt} and Forward_FDI_{jt} capture the horizontal, backward and forward linkages of FIEs respectively; X is a vector of control variables including time and sector dummies to allow for period-specific and sector-specific effects on productivity not attributable to the explanatory variables in the equation. All variables vary across sectors and

¹⁴ This formality is widely applied in the topic area. Further more, it is proved by Box-Cox test.

¹⁵ All deflator indices are collected from the Henan Statistical Bureau.

over time.

Similar to Blalock (2001), horizontal externality is measured as follows.

$$Horizontal_FDI_{jt} = \frac{\sum_i (Foreign_{ijt} * Y_{ijt})}{\sum_i Y_{ijt}} \quad (2.3)$$

where i , j , and t refer to firm i , sector j and time t respectively, and

$Foreign_{ijt}$ is a dummy variable that takes the value of one if foreign capital accounts for at least 25% of firm i 's total equity. Therefore $Horizontal_FDI_{jt}$ captures the extent of foreign presence in sector j at time t .

As indicated earlier, the widely used measure of FDI Backward Linkage may induce severe estimation bias to the backward linkage effect on indigenous firms' productivity. Instead, in the current study, $Backward_FDI_{jt}$ is defined as the weighted share of local input in downstream sectors sourced by firms with foreign capital participation, which can correct the measurement error mentioned. It is a proxy to measure the extent of FIEs' input sourced locally in downstream sectors. Thus the following formula is used:

$$Backward_FDI_{jt} = \sum_{k|k \neq j} (\alpha_{jk} Horizontal_{kt} Input\ Share\ Coefficient_{kt})^{16} \quad (2.4)$$

where α_{jk} is the share of sector j 's output supplied to sector k taken from the 2002 input-output table of Henan with 122 sectors compiled by Henan Statistical Bureau (HSB)¹⁷, in which some sectors are aggregated to match the sector classification of the firm database. *Input Share Coefficient_{jt}* captures the extent of foreign firms' input sourced locally in sector j at time t . It is measured as the average share of the FIE's total input that is sourced locally¹⁸.

Specifically,

$$Input\ Share\ Coefficient_{jt} = \text{Average}_{foreigni \in j} (Local\ Input_{it} / Total\ Input_{it}) \quad (2.5)$$

where *Local Input_{it}* equals the residual of the FIE's total input minus the input imported.

To illustrate the meaning of the variable, suppose that 1/3 of the Metal

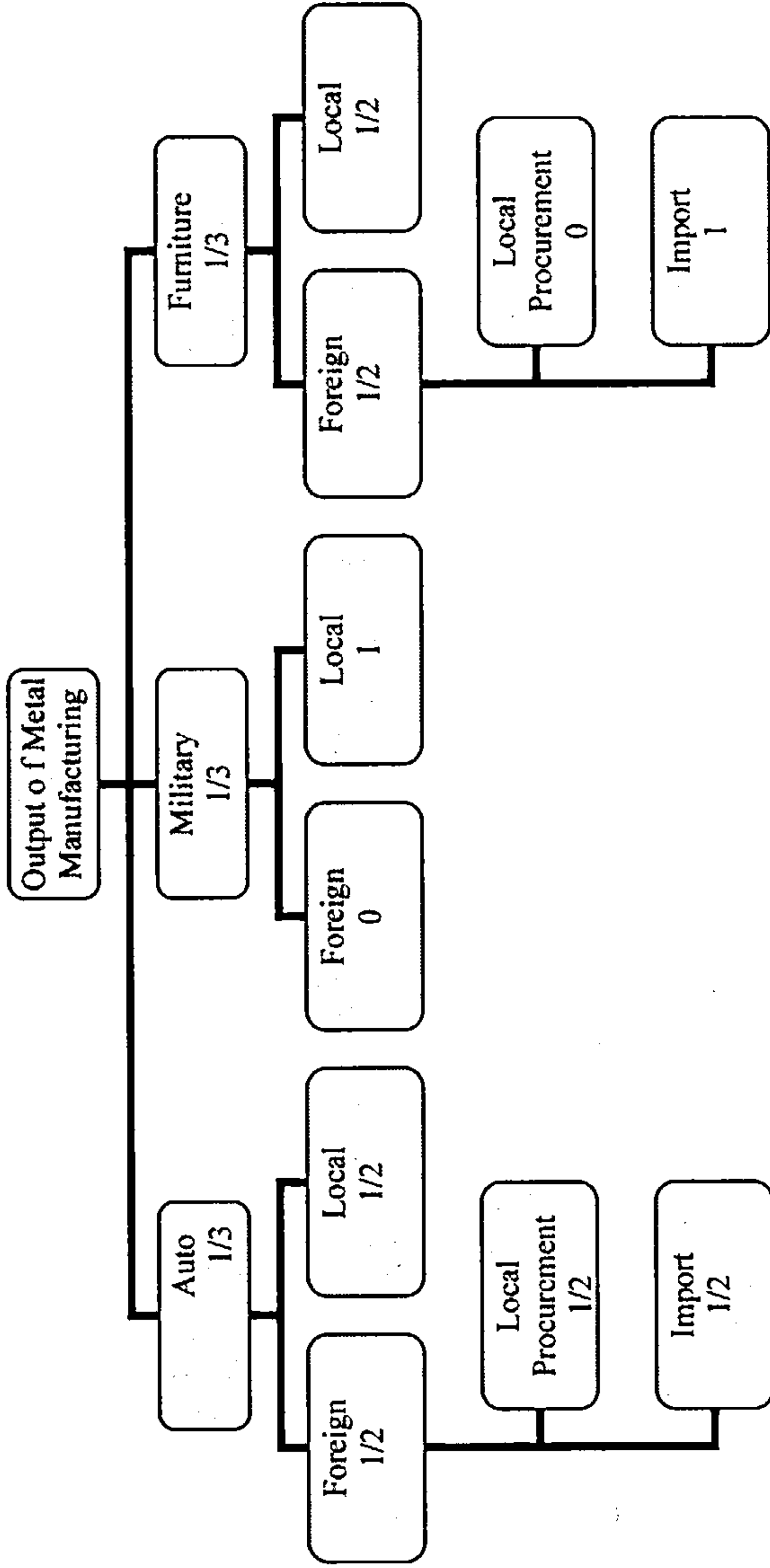
¹⁶ Inputs supplied within a sector are not included, as they are already captured in the *Horizontal _ FDI* variable.

¹⁷ It is the latest IO table of Henan published by HSB now. The 1997 IO table of Henan which is the previous term edition is not applied, since it may not fully capture the influence of Asian Financial Crisis in 1997.

¹⁸ Industry characteristics have often been found to be a predictor of variations in backward linkages of FIEs with indigenous firms. For detailed discussion see Lever (1974), Reid (1995), UNCTAD (2000) and Culverwell (2000).

manufacturing industry's output is sold to the auto industry, $1/3$ to the Military industry and the remaining to the Furniture industry. If half of the production of the Auto industry is produced by foreign firms and the foreign firms in this industry source half of their inputs locally, there are no foreign firms in the Military industry, and half of the production of the Furniture industry is produced by foreign firms but all inputs of the foreign firms in the cake industry are imported:

Figure 2-1 Metal Manufacturing industry and backward linkages



Then the local source extent of foreign firms in downstream industries for the water industry, i.e. *Backward_FDI*, will be calculated as follows: $1/3*1/2*1/2 + 1/3*0*0 + 1/3*1/2*0 = 1/12$. However, if we calculate *Backward_FDI* by applying previous widely used measure as stated in equation (2.1), it would be $1/3*1/2+1/3*0+1/3*1/2=1/3$. Obviously, the extent of Backward Linkage of FDI would be overrated, and the more foreign firms source their inputs by importing the higher extent of this kind of overrating. Thus we argue that widely used measure of *Backward_FDI* could lead to serious estimation bias.

Analogically *Forward_FDI_{jt}* is intended to capture the extent of potential contacts between domestic consumers and foreign suppliers in upstream sectors.

Following Javorcik (2004), it is defined as:

$$Forward_FDI_{jt} = \sum_{j|j \neq l} \beta_{jl} \left[\frac{\sum_{foreign i \in l} (Y_{it} - X_{it})}{\sum_{i \in l} (Y_{it} - X_{it})} \right] \quad (2.6)$$

where β_{jl} is the proportion of sector j 's input sourced from sector l out of total inputs of sector j . Exports (X_{it}) produced by foreign firms are excluded.

While the coefficients taken from the IO table remain fixed, the values of

the *Horizontal_FDI* and *InputShareCoefficient* do change over time so the resulting proxies for horizontal externalities and vertical linkages are time-varying and sector-specific variables.

In an exploratory regression, using OLS with White's correction for heteroskedasticity, the model (2.2) presented above is estimated with both the traditional measure of backward linkage and the new bias-corrected one. The estimations are performed on the full sample and on the sub-sample of indigenous firms¹⁹. The model includes fixed effects for years and sectors. The results in Table 2-2 indicate that the significance of both equation and variables is much improved. Furthermore, with the improved measure, for both full sample and sub-sample a significant and positive coefficient for *Backward_FDI* , and a significant but negative coefficient for *Horizontal_FDI* are found. The spillover variable, *Forward_FDI* does not appear to be statistically significant.

¹⁹ Indigenous firms are defined as those which have less than 25 percent foreign equity as mentioned above.

Table 2-2 Comparison between Traditional and New Measures of Linkage Variables

	Traditional Measure		New Measure for bias correction			
	All firms	significance	Indigenous firms	All firms	Indigenous firms	significance
	coefficient		coefficient	coefficient	coefficient	
Horizontal_FDI	-0.3969***	0.003	-0.4018***	-0.3955***	-0.4002***	0.000
Backward_FDI	-1.1656*	0.082	1.3561*	1.2155***	1.2000***	0.001
Forward_FDI	1.8868	0.638	0.2219	1.0716	0.3864	0.824
Number of		5517		5517		3671
Observations						
Adj. R-sq.		0.73		0.80		0.89
Prob F>0		0.23		0.05		0.00
Hausman (F statistic)				1219.2		773.68
[Ho:Random Effect]				[0.000]		[0.000]
Wu-Hausman (χ^2)				42.52		36.65
[Ho: Exogeneity]				[0.000]		[0.000]

Note: *Significant at the 10 percent level; **Significant at the 5 percent level; ***Significant at the 1 percent level

The negative coefficient for *Horizontal_FDI* does not necessarily mean that there is no horizontal externality from FDI. As discussed in the previous section, the Indirect Horizontal Externality effect of FDI can be separated from the general FDI horizontal effect. For this purpose, the following equation is estimated:

$$\ln Y_{ijt} = \alpha + \beta_1 \ln K_{ijt} + \beta_2 \ln L_{ijt} + \beta_3 \text{Horizontal_FDI}_{jt} + \beta_4 \text{Backward_FDI}_{jt} + \beta_5 \text{Forward_FDI}_{jt} + \beta_6 \text{IndirectHorizontal_FDI}_{jt} + \delta X + \varepsilon \quad (2.7)$$

Based on the assumptions (benefits of specialization, increasing returns and transportation costs)²⁰ in Rodriguez-Clare's (1996) model,

Indirect Horizontal_FDI_{jt} is measured as follows:

$$\text{Indirect Horizontal_FDI}_{jt} = \left(\sum_{l|l \neq j} \beta_{jl} \right) \text{Horizontal}_{jt} \text{Backward Coefficient}_{jt} \quad (2.8)$$

where β_{jl} is, the same as before, the proportion of sector j 's inputs sourced from sector l out of total inputs of sector j calculated based on the information on sourcing patterns from the input-output (IO) table, and the

Backward Coefficient_{jt} is defined as follows.

²⁰ For details see Rodriguez-Clare (1996).

$$\text{Backward Coefficient}_{j_i} = \text{Average}_{\text{foreign}_i \in j} (\text{Local Input}_{ii} / \text{Wage}_{ii})^{21} \quad (2.9)$$

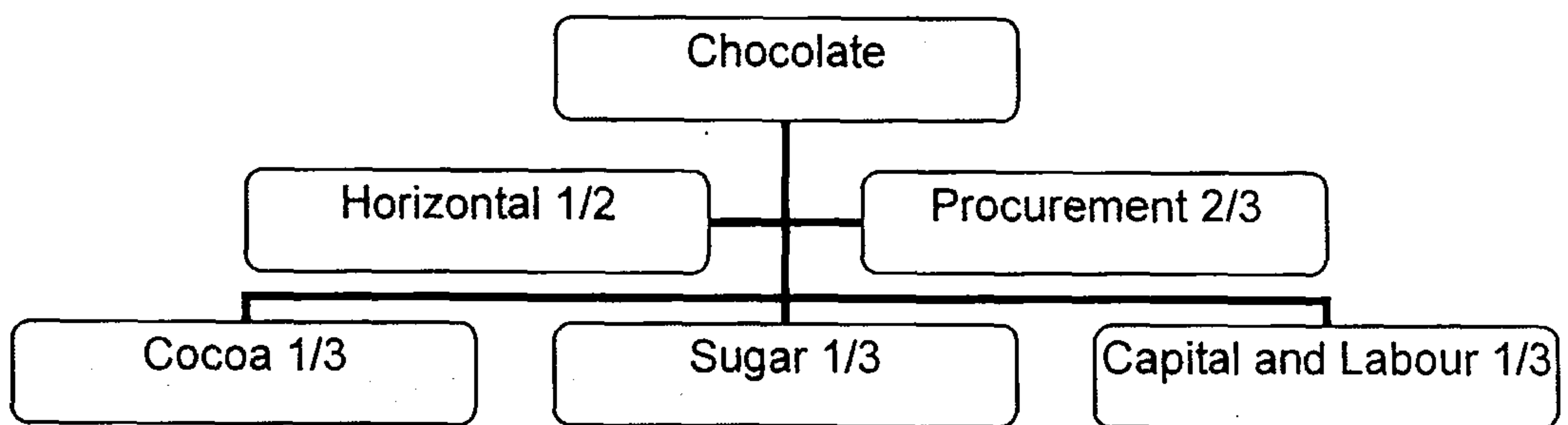
As the formula indicates, the inputs sourced within the sector are not included, since this effect is captured in the variable Horizontal. The greater the foreign presence in sector j and the larger the share of inputs sourced from upstream sectors, the higher the value of the variable.

To illustrate the meaning of Indirect Horizontal Externality clearly, suppose that the chocolate industry sources 1/3 of its inputs from the cocoa industry and 1/3 from the sugar industry. If half of total chocolate production comes from FIEs, and the backward coefficient of FIEs in the chocolate industry is 2/3:

²¹ Alfaro and Rodriguez-Clare (2003) propose the Backward Coefficient as follows.

$\text{Backward Coefficient}_{j_i} = \text{Average}_{\text{foreign}_i \in j} (\text{Local Input}_{ii} / \text{Skilled Labor}_{ii})$. But due to the data set limitation, it is proxied with $\text{Backward Coefficient}_{j_i} = \text{Average}_{\text{foreign}_i \in j} (\text{Local Input}_{ii} / \text{Wage}_{ii})$ as advised by Bravo-Ortega (2004).

Figure 2-2 Chocolate Industry and Indirect Horizontal Externality



Then the indirect horizontal externality can be calculated as follows:

$(1/3+1/3)*1/2*2/3=2/9$. A positive correlation between Indirect Horizontal

Externality from FDI and indigenous firms' productivity is anticipated.²²

An econometric concern needs to be addressed before the analysis. As Moulton (1990) illustrates, the OLS method is based upon the assumption of independent disturbances, which is not appropriate for disturbances with grouped structure. Failing to take this into account can lead to a serious downward bias in standard errors, and spurious findings of statistical significance for the aggregate variable of interest. Since the data set is unbalanced and several sectoral variables are included in explaining firm level productivity, I have clustered the standard errors for all observations in the same industry and year on both full sample and sub-sample of indigenous firms.

²² The test of autocorrelation is not reported but available upon request.

The correlation test sees the following Correlation Matrix.

Correlation Matrix

	Horizontal _FDI	Backward_FDI	Forward_FDI	IndirectHorizontal_FDI
Horizontal _FDI	<i>1.00</i>			
Backward_FDI	<i>0.29</i>	<i>1.00</i>		
Forward_FDI	<i>0.17</i>	<i>0.20</i>	<i>1.00</i>	
IndirectHorizontal_FDI	<i>0.15</i>	<i>0.33</i>	<i>0.05</i>	<i>1.00</i>

2.6 Empirical Results

2.6.1 Baseline Specifications

It is started by estimating equation (2.7) on both full sample and sub-sample of indigenous firms. Since knowledge externalities from FDI may take time to manifest themselves, two specifications are employed: one with contemporaneous and one with lagged spillover variables. Since the longer lagged variables can seriously strain the time span of the data set and hence reduce the size of the observations, only one-year lagged spillover variables are included.

As can be seen from table 2-3, the results from these two samples are quite consistent in the two specifications. The coefficients for both FDI Backward Linkage and Indirect Horizontal Externality are positive and statistically significant, while the coefficient for general horizontal externality is negative and statistically significant. Forward linkage does not appear to be statistically significant.

Table 2-3 Estimation Results with Lagged and Contemporaneous Spillover Variables

	All firms		Indigenous Firms	
	coefficient	significance	coefficient	significance
Horizontal_FDI	-0.3965**	0.034	-0.5469**	0.044
Backward_FDI	1.4679**	0.030	1.0322***	0.002
Forward_FDI	0.4551	0.792	0.4774	0.803
Indirect Horizontal_FDI	0.0029*	0.056	0.0024**	0.042
Adj. R-sq.	0.90		0.90	
Prob F>0	0.00		0.07	
Lag1_Backward_FDI	1.2123**	0.024	1.2105***	0.001
Lag1_Forward_FDI	0.4054	0.826	-0.2309	0.893
Lag1_IndirectHorizontal_FDI	0.0105**	0.015	0.0051**	0.037
Number of observations	4137		2753	
Adj. R-sq.	0.71		0.89	
Prob F>0	0.05		0.09	

Note: *Significant at the 10 percent level; **Significant at the 5 percent level; ***Significant at the 1 percent level

The central message from table 2-3 is that the influence of FDI on the productivity of indigenous firms is complicated. On one hand, indigenous suppliers in upstream sectors can gain technical and managerial assistance through FDI Backward Linkage and firms in the same sector can benefit from the increasing variety or decreasing cost of inputs through the channel of Indirect Horizontal Externalities of FDI; on the other hand, the competition effect still dominates the influence of FDI on firms in the same sector.

2.6.2 Different Firm Groups and Productivity Spillovers

In many FDI spillover studies, all domestic firms are assumed to benefit equally from FDI. However, different indigenous firms have various absorptive capacities and the effectiveness of knowledge spillovers depending largely on the technical capabilities of indigenous firms. (Cantwell, 1995; Kokko et al. 1996; Kinoshita, 2001; Girma et al. 2001). To shed more insight into the effects of different FDI externality channels, the whole manufacturing sector is divided into different groups of firms to see which group actually benefits from horizontal, vertical and indirect horizontal spillovers from FDI.

2.6.2.A. State-owned enterprises (SOEs) and non-state-owned enterprises (Non-SOEs)

In China, there are two main types of indigenous manufacturing firms: state-owned enterprises (SOEs) and non-state-owned enterprises (non-SOEs). The latter include collectively- and privately-owned enterprises. SOEs are still perceived as being faced with soft-budget constraints and privileged access to financial capital. On the other hand, non-SOEs are much more market-oriented than SOEs. Indigenous Chinese firms of different ownership behave differently with respect to imitation, innovation and competition, and have different technological capabilities for knowledge absorption from the presence of foreign firms (Li et al. 2001).

The estimation results for these two different groups of indigenous firms are presented in table 2-4. As can be seen in the left panel of the table, there appears to be no statistically significant backward linkage effect on the productivity of SOEs. Both horizontal and forward linkages of FDI produce significantly negative effects. The only exception is that SOEs can gain

statistically positive indirect horizontal externalities from FDI. In the right panel of Non-SOEs, it is interesting to note that both backward linkages and indirect horizontal effects are significantly positive. Furthermore, although the general horizontal effect on Non-SOEs is still negative, its magnitude is lower than on SOEs. The magnitude of the Indirect Horizontal Externality effect on Non-SOEs is higher than on SOEs. These phenomena may be due to the following reasons.

Table 2-4 Estimation Results for Grouped Data: SOEs and Non-SOEs

	SOEs		Non-SOEs	
	coefficient	significance	coefficient	significance
Horizontal_FDI	-0.4660***	0.002	-0.3320***	0.000
Backward_FDI	0.5751	0.280	0.9524***	0.000
Forward_FDI	-0.0029***	0.009	1.1067	0.127
Indirect	0.0013*	0.075	0.0017**	0.023
Horizontal_FDI				
Number of observations		909		2762
R ²		0.89		0.91
Prob F>0		0.07		0.00

Note: *Significant at the 10 percent level; **Significant at the 5 percent level; ***Significant at the 1 percent level

As mentioned above, with weak technology and management skills, SOEs in China are generally inefficient as managers do not have very strong incentives to innovate and improve productivity. Thus the negative horizontal

effects may arise from fierce competition with FIEs operating in the same industries. As for backward linkages, SOEs may not be able to comply with the higher standards for the goods and services required by FIEs, or have difficulties in contract enforcement. The technological gap between SOEs and FIEs creates a significant barrier for effective technological diffusion, limiting the establishment of backward linkages between SOEs and FIEs and constraining the absorbability of SOEs. One tentative explanation for negative forward linkage effects on SOEs is the bargaining power of FIEs. It is widely accepted that FIEs have large bargaining power especially when they are operating in developing countries. They are also cautious about protecting their technologies and know-how. When downstream customers, especially SOEs, purchase products such as important components or parts from these multinationals, these customers or firms may have to accept some unfavourable terms such as high prices, resulting in higher production costs for them.

However, non-SOEs seem to do much better than SOEs in these facets. Although they are generally small-sized and probably have lower technological capabilities as they have not been traditionally supported by the Chinese

government, non-SOEs have more flexible human resource management styles and stronger incentives to learn and imitate. Therefore, they can benefit more from the presence of FDI in downstream sectors and suffer less from competition from FIEs in the same sectors.

2.6.2.B Exporters and Non-Exporters

To further investigate the various spillover effects of FDI, the firms are divided into exporters and non-exporters. The division is based on the following account. First, the competition effect of horizontal externalities would be expected to apply most strongly to non-exporting firms, since they have to compete with FIEs in the indigenous market. Similarly, this effect should be less for exporters since their export activities should enable them to avoid, at least to a certain extent, competition with FIEs in the indigenous market. Second, as stated by Kokko et al. (1996), exporters and non-exporters can be regarded as having different levels of absorptive capacity, since it has recently been shown theoretically and empirically that exporters have higher efficiency and productivity levels than non-exporters (Bernard and Jensen, 1999, Melitz,

2003)²³.

To examine whether there are different FDI spillover effects between exporters and non-exporters, the estimation is based on the following equation.

$$\begin{aligned} \ln Y_{ijt} = & \alpha + \beta_1 \ln K_{ijt} + \beta_2 \ln L_{ijt} + \beta_3 \text{Horizontal_FDI}_{jt} + \beta_4 \text{Backward_FDI}_{jt} \\ & + \beta_5 \text{Forward_FDI}_{jt} + \beta_6 \text{Indirect Horizontal_FDI}_{jt} + \text{Dummy_export} + \\ & \beta_7 \text{Horizontal_FDI}_{jt} * \text{Dummy_export} + \beta_8 \text{Backward_FDI}_{jt} * \text{Dummy_export} \\ & + \beta_9 \text{Forward_FDI}_{jt} * \text{Dummy_export} + \delta X + \varepsilon \end{aligned} \quad (2.10)$$

where *Dummy_export* is a dummy variable for export activity, which equals one if firm *i* exports products. The variables with spillover variables being multiplied respectively by the export dummy are proposed to capture the interaction effects between spillover and export activities.

The estimation results are presented in table 2-5. In the right panel for the full sample, it can be seen that all coefficients for spillover variables are statistically significant except for that of forward linkage, and the sign for each variable is similar to the estimation results above. It is interesting to note that the coefficient of the export dummy is significantly positive, indicating that the

²³ In order to substantiate this assumption, Girma et al. (2004) test the performances of exporters and non-exporters separately on their data set. As a result, exporters perform much better for all performance measures, which support the assumption that exporters are more efficient and therefore have better levels of absorptive capacity than non-exporters.

productivity of exporters is higher than non-exporters. This is consistent with the finding of Girma et al. (2004). The interaction terms of *Horizontal * Dummy* and *Backward * Dummy* are significantly positive, showing that exporters have better absorptive capacity for horizontal externalities and vertical externalities via FDI Backward Linkage, or can better avoid competition with FIEs in the indigenous market.

Table 2-5 Interactions between Export and Spillovers

	All firms		Indigenous firms	
	coefficient	significance	coefficient	significance
Horizontal_FDI	-0.4611***	0.005	-0.5746**	0.044
Backward_FDI	1.8289**	0.023	1.2339*	0.060
Forward_FDI	0.9521	0.602	0.3116	0.862
Indirect Horizontal_FDI	0.0107**	0.020	0.0058**	0.039
Dummy_export	0.0037*	0.054	0.0685**	0.034
D*Horizontal_FDI	0.0095	0.967	0.5057**	0.036
D*Backward_FDI	1.0137**	0.041	1.0555***	0.001
D*Forward_FDI	-1.0024*	0.069	-0.9087	0.156
Number of observations	5517		3671	
R ²	0.93		0.92	
Prob F>0	0.00		0.01	

Note: *Significant at the 10 percent level; **Significant at the 5 percent level; ***Significant at the 1 percent level

Furthermore, comparing the differences of the estimation results on the full sample of all firms and the sub-sample of indigenous firms, the magnitudes of the coefficients on the spillover variables for the full sample are larger than those for the sub-sample, but the reverse is true for the interaction variables. These differences indicate that FIEs in China have better absorptive and competitive capacities than indigenous Chinese firms, but the difference of absorptive and competitive capacity between FIE exporters and non-exporters is smaller or less significant than that between Chinese indigenous exporters and non-exporters. As a robust check, the same estimation was also performed for export intensity instead of export dummy, and similar results were obtained. This corroborates the findings²⁴.

²⁴ The results are not reported but available upon request.

2.7 Conclusions and Policy Implications

Using an unbalanced panel data set of foreign and indigenous Chinese manufacturing firms from 1999 to 2003, this chapter investigates whether productivity spillovers from FDI in the host economy exist. Different from the existing studies, this study incorporates a mechanism of Indirect Horizontal Externalities and what is believed as a better measure of vertical linkages into the spillover channel system for the first time. The heterogeneity of firms in terms of absorptive capacity is also considered.

Together with confirming the existence of positive spillovers on manufacturing firms in China through backward linkages and negative spillovers from horizontal externalities of FDI, this study has empirically proven the Indirect Horizontal Externalities of FDI to be a channel that benefits the host economy. Furthermore, it is found that non-SOEs perform better than SOEs as the former have higher incentives to learn and imitate from FIEs in Chinese manufacturing. It is also found that indigenous exporting firms are more likely to benefit from FDI spillovers.

The findings in this chapter have important managerial and policy implications. While backward linkages between FIEs and indigenous firms can improve the productivity of the domestic manufacturing sector in a developing country, the tendency for FIEs to source the most sophisticated and complex components depends essentially on the capabilities of local suppliers. In particular, to absorb and benefit more from such externalities, indigenous firms must have a certain level of technological capability and management skills. Additionally, a commitment of top management to quality upgrading is also inevitable. As researched by Yoon, 1994; Belderbos et al., 2001, the “right attitude” is often regarded by some MNCs as more important character than the actual level of quality at any given point of time. Thus on one hand, indigenous firms in the developing countries should not be short-sightedly putting a high premium on short-term profit only, on the other hand there should be sufficient policy support provided from local government side, including provision of information, matchmaking, financial support, training to improve management knowledge and practices, and policies to effectively promote R&D and technical progress of local firms. In addition, managers in

indigenous firms should participate in foreign trade to get in touch with the newest technology in the world. With higher levels of technological capabilities and managerial skills, indigenous firms will be in a better position to learn from and compete with FIEs. Therefore, there will be a virtuous reaction between FIEs and indigenous firms for productivity development in a developing country.

Since it has been empirically proved in this chapter that backward linkage between FIEs and their local suppliers (FDI Backward Linkage) is an important channel through which the host country may benefit from the inward FDI, the subsequent studies will try to make a contribution to investigate the ways that the host government could use to promote such linkage.

**Chapter 3: Is There a Link between FIEs' Characteristics and the Creation of
FDI Linkage?**

3.1 Chapter Preamble

It has been empirically proved in Chapter 2 that backward linkage between FIEs and their local suppliers (FDI Backward Linkage) is an important channel through which the host country may benefit from the inward FDI. Specifically, the creation of FDI backward linkage may induce vertical spillovers from MNEs to their local suppliers in the upstream industry and even indirect horizontal spillovers to the local firms in the same industry. Thus promoting FDI Linkage²⁵ is recommended to the government for the development of local economy in the host country.

Generally speaking, FDI policies imposed by the host government can be divided into two categories, attracting policy and administrating policy. As the second stage of current research, this chapter will try to make a contribution to the investigation of the determinants of FDI Linkage so that the host government could strategically take these determinants into consideration as a filter when making FDI attracting policies.

²⁵ FDI Backward Linkage is abbreviated as FDI Linkage in the following studies.

3.2 Introduction

Creating production linkage between foreign investment enterprises (FIEs) and indigenous suppliers i.e. FDI Linkage has been widely accepted both in academics and practice as an important way for the host country to tap the benefits of inward FDI (Rodriguez-Clare, 1996; Markusen and Venables, 1999; UNCTAD, 2001a).

Dunning (1993) states that in comparison to pure indigenous firms FIEs usually have better information about world wide prices and quality of components. Thus connecting with FIEs, indigenous suppliers could benefit from such linkage by three ways. Firstly, the linkage could raise output and employment of linked indigenous suppliers. The indirect effect on supplier capabilities is probably more important. Linkage could be powerful channels for diffusing knowledge and skills from FIEs to their indigenous suppliers. Strong linkage could promote productivity growth, technological and managerial capabilities and market diversification in supplier firms. The strengthening of suppliers could in turn lead to various indirect effects and spillovers for the rest of the host economy. Another advantage of such linkage is that it could increase

the local integration and rooting of FIEs and make them less footloose (UNCTAD, 2001a).²⁶

In retrospect, FDI linkage promotion is not a new policy issue for host countries (see, for example, Lall, 1980; UNCTC, 1981), but it deserves renewed attention. Although some frequently used measures to promote linkage, like local content requirements, are no longer permissible in the context of the WTO or other international agreements. It is still possible to promote linkage, but tools would be different from those which were used in the past. Therefore this subject re-attracts considerable attention in these days. Based on these backgrounds, current study tries to complement the existing FDI Linkage promotion policies by filtering out more local linkage preferable FIEs.

This study focuses on analysing the factors that could impact the creation of FDI linkage, using a unique firm level panel data set covering the entire manufacturing industries in China from 2003 to 2005. Current study extends the existing findings by focusing on four issues that are likely to play an

²⁶ Since FDI linkage involve cost and effort by FIEs, stronger linkage could make it more difficult for them to divest.

important role but neglected in previous literature, namely measure bias of the FDI linkage, firm heterogeneity, linkage quality, and appropriate methodology. Firstly both two types of normally used measures of FDI linkage may overstate the magnitude of a FIE's linkage with indigenous suppliers. It is argued that the findings through applying those traditional measures could be misleading. Therefore the main body of the empirical analysis will employ a better measure²⁷ of FDI linkage. Secondly the data set, which includes panel information of 527 manufacturing FIEs from 2003 to 2005, allows this study to reap the advantages of panel data analysis such as more accurate inference of estimation and controlling for individual unobserved heterogeneity etc²⁸. Thirdly the issue of linkage quality is taken into consideration in the analysis. To the best of my knowledge, it is the first time for empirical work to touch this issue. Finally the application of so-called "two-step fixed effect panel analysis procedure" makes the estimation of time-constant variables practicable while still benefits from the merits of panel fixed effect analysis.

The remainder of the chapter is organised as follows. The next section

²⁷ The new measure does not overstate the magnitude of FDI Linkage.

²⁸ For details, see Cheng Hsiao (2003).

reviews the existing literature with regard to the determining factors of FDI linkage, and several traditionally used measures of FDI linkage as well as my arguments on them. Section 3.4 gives a description of the data set. Section 3.5 presents the empirical models and the methodologies. Section 3.6 describes estimation results. The last section concludes the main findings and discusses policy implications.

3.3 Literature Review

3.3.1 Determinants of FDI Linkage

Based on previous literature, the following 7 factors might impact a FIE on its sourcing decision, i.e. the possibility of the creation of FDI linkage in the host country.

- Market Orientation
- Familiarity to the Host Economy
- Entry Mode
- Size
- Main originality
- Autonomy of sourcing
- Industry Characteristics

a) Market Orientation

A FIE's market-orientation has been found to lead to variation in level of

local content and subsequent relations with host suppliers (Pangestu et al., 1992; Supapol, 1995). Driffield and Noor (1999) find evidence that firms with a desire to enter the indigenous market, to supply other foreign firms, or seek low labour costs and government incentives, show higher levels of FDI linkage. It is suggested that FIEs that serve essentially the host market have more intense FDI linkage with indigenous suppliers than those who are export oriented (UNCTAD, 2000b; Altenburg, 2000). Giroud (2003) also finds that export-oriented foreign firms would tend to purchase less locally in developing countries, even though they show a tendency to have closer relationship with existing indigenous suppliers.

b) Familiarity to the Host Economy

Theoretically, FIEs may increase their local sourcing over time due to a “familiar effect”, i.e. it may take time for FIEs to be familiar with the host market as well as indigenous suppliers, and then to find the appropriate suppliers. Several factors may contribute to the gradual development of linkage: further production processing stages are added over time, the autonomous growth of the manufacturing sector brings up new suppliers, the knowledge

about the local business environment is complemented by the recruitment of local managers, and some FIEs take deliberate actions to attract and develop indigenous suppliers.

The findings of a number of studies support this point. McAleese and McDonald (1978), who studied Irish manufacturing during the period between 1952 and 1974, explain that the age of the plant is a key factor in explaining embeddings into the host economy, and local purchase of inputs increases as the FIE becomes familiar to the host market. With cross-sectional data for Ireland, O'Farrell and O'Loughlin (1981) also find that more established foreign firms have higher FDI linkage than new firms. Analogously, using the cross country survey data Tavares and Young (2002) find that the age of the subsidiary is negatively associated with import propensity. The similar result is found by Driffield and Noor (1999) as well. However, as Phelps (1997) has argued, plants established in more recent decades may be more "in tune" with contemporary (perhaps more internationalised) patterns of sourcing than plants of older "vintage", which may be slower to adjust new sourcing imperatives and retain stronger ties to the regional economy.

c) Entry Mode

Belderbos et al. (2001) in a study of Japanese FIEs find that acquired FIEs have significantly higher local content levels than those established through Greenfield investment due to their pre-acquisition embeddings in the host economy. Similarly, affiliates of Swedish FIEs and affiliates in Central and Eastern European countries have been found to rely more on imports of inputs when established via Greenfield investment. As stated in the World Investment Report 2001 (UNCTAD, 2001a), wholly-owned FIEs usually have to take time and effort to develop local supply linkage while the joint ventures have “ready-made” linkage that are likely to be retained by their cooperation partners.

However, not all findings support this argument. Driffield and Noor (1999) find no relationship between joint ventures and FDI linkage. And Tavares and Young (2002) find no relationship between Greenfield investment and the import propensity of that FIE. In addition, it is found that if existing local supply linkage maintained by cooperation partners is inefficient, FIEs may take a chance to switch to foreign suppliers (UNCTAD, 2001a).

d) Size of FIEs

Lots of research verifies that the functions of network linkage may depend on the size of the investor. Large FIEs have been found to source less locally than small ones (UNCTAD, 2001a). An Irish study shows that large and expanding FIEs have relatively lower local procurement level (Gorg and Ruane, 2000). This is explained as larger firms may have greater difficulty finding a global supplier of appropriate scale locally, as Irish suppliers may lack the necessary scale for supplying the global need of large firms. In Mexico, the small size of indigenous suppliers is found to be an obstacle to linkage creation by large foreign electronic and auto-parts firms (Carrillo et al, 2001). Other studies, including Schachmann and Fallis (1989), Halbach (1989) and Barkley and McNamara (1994), support this point with their empirical evidence.

However, some researchers raise diverse statements and argue that large firms might find it easier to penetrate into a large and primitive market on account of their sheer size. "For a large investor who demands sizable local supply linkage in the production process, host country agents and suppliers may modify themselves to accommodate the needs of the foreign investor in the

process of forming a network of their own.” (Chen and Chen, 1998). And Tavares and Young (2002) do not find a significant relationship between the size of a FIE subsidiary and its import propensity.

e) The origin of FIEs

Blomstrom and Kokko (1998) point out that there is systematic difference in local purchase depending on the foreign firms’ originality. This attributes to the different histories and cultures within which the foreign firms originate (Porter, 1990; Ruigrok and Van, 1995). Dicken et al (1994) hold similar assertion in the geographical literature, insisting that different nationalities may have different dispositions towards host country sourcing. They suggest that European FIEs may rely more on indigenous firms than U.S. or Japanese firms. Driffield and Noor (1999) find that United States firms originating from United States are more embedded in Malaysia, and suggest that the creation of FDI linkage with American firms are much easier than with Japanese, EU or other Southeast Asian firms. While in some other studies, no country effect is found when explaining input behaviour (Tavares and Young, 2002). In summary, the origin of a FIE is a controversial factor when it comes to

explaining FDI linkage.

f) Autonomy of sourcing

The relationship between a FIE and its parent firm or in other words, the level of autonomy is another key factor in connection with the procurement choice of FIEs. The greater the autonomy of an affiliate the more likely it chooses to try and identify indigenous suppliers and to create relationship with indigenous suppliers (UNCTAD, 2001a). Similarly, O'Farrell and O'Loughlin (1981) find that foreign firms which have total autonomy over input purchasing source more of their inputs locally than firms that do not have the sourcing autonomy. In fact, most multinational firms locate their decision-making centres in their home countries, thus the affiliates will have less freedom in their choice of input sourcing; and parent companies may show some favouritism towards home country suppliers because they are closer and more familiar with home country suppliers.

However, these arguments are open to debate, as parochialism is surely unsustainable in an increasingly competitive global market. Tavares and Young

(2002) find a positive significant relationship between input import propensity and the “product mandates” affiliates. Yet Giroud and Mirza (2004) find that foreign subsidiaries that were product mandates show higher level of imported inputs.

g) Industry characteristics

Industry characteristics have often been found to be a predictor of variations in supply linkage of FIEs with Indigenous firms (Crone and Watts, 2003). In the primary sector, such as mining industry, the scope of the linkage between FIEs and indigenous suppliers is often limited (UNCTAD, 2000; Culverwell, 2000). Textile and clothing sector show relatively lower FDI linkage. Food processing and engineering activities involve extensive supply linkage between FIEs and indigenous suppliers but mainly of raw and packaging materials. Relatively, supply chain management becomes more important in electronics and automobile sector. A number of investigations show that many FIEs in electronics industry attain benefits from linkage with indigenous suppliers. In Mexico and the Caribbean Basin, FIEs in electronics industry have sought greater efficiency by integrating host country production facilities into

their regional systems, while targeting the United States market (ECKEL, 2003). Tavares and Young (2002) find that FIEs in the textile, clothing and footwear industries have a strong propensity to import inputs, thus few FDI linkage would be expected. In the hard disk drive industry, the local content level of FIEs in Thailand is estimated over 30 to 40 per cent of total production cost in 2001 (Fosfuri et al., 2001). In addition, although the level of local purchasing may be limited in developing countries within the electronics and electrical industries, there are extensive scopes for linkage creation between FIEs and indigenous suppliers (Halbach, 1989; Rasiah, 1995; Supapol, 1995; Giroud, 2003).

In the other direction, researchers try to find out what common characters of an industry affect the FIEs' local sourcing decision. Lever (1974) and Reid (1995) discover that it is easier to source externally when the technology is divisible into separate stages and services than when it is a continuous process. Phelps (1996) finds that FIEs producing low-tech products often use relatively simple inputs, which are more likely to be available from indigenous suppliers because they are established technologies with low barriers to market entry. In

contrast, specialised inputs are less likely to be sourced from indigenous suppliers because fewer indigenous suppliers will possess the technical capability to manufacture complex inputs, so there would be fewer local sourcing opportunities. Also, the higher value-to-weight ratio of technologically complex inputs means they can bear the higher transportation costs associated with purchasing from distant suppliers (O'Farrel and O'Loughlin, 1981). In addition, Giroud and Mirza (2004) state that in an industry where product circles are short and new inputs are likely to be needed often, a foreign firm may be more active in looking for alternative sources of supply. Thus the age of the production of key products may also have an impact on FDI linkage. According to the World Investment Report (UNCTAD, 2001a), "FIEs making standardised products with mature, non-proprietary technologies tend to prefer externalised, arm's length procurement." This phenomenon may be interpreted in a way that for FIEs there are many suppliers to choose from, so that it is not necessary to develop special capabilities in any supplier. On the other hand, when products are specialised and technologically advanced, FIEs tend to prefer in-house production or to retain the relationship with a few selected

suppliers. However, Amin and Malmberg (1992) hold complete disagreement that standardised inputs tend to be sourced longer distance from other regions where non-standardised inputs tend to be procured from nearby specialist suppliers. They explain that standardised inputs, associated with standardised products, can be readily obtained from distant suppliers once the initial deal has been struck as only the size of order needs to be discussed. Conversely, close proximity to suppliers is thought to be beneficial for specific inputs because of the need to frequently renegotiate supply contracts and amend specifications.

Through the literature review, it can be realised that the findings of previous research on the determinants of FDI linkage are still ambiguous. Hereby I argue that the inconsistent empirical findings may attribute to the overstated measure of *FDI linkage*²⁹ and the shortcomings of cross-section analysis.

The problem of those traditionally applied measures of *FDI linkage* will be fully discussed in next section. This study will incorporate a better measure and

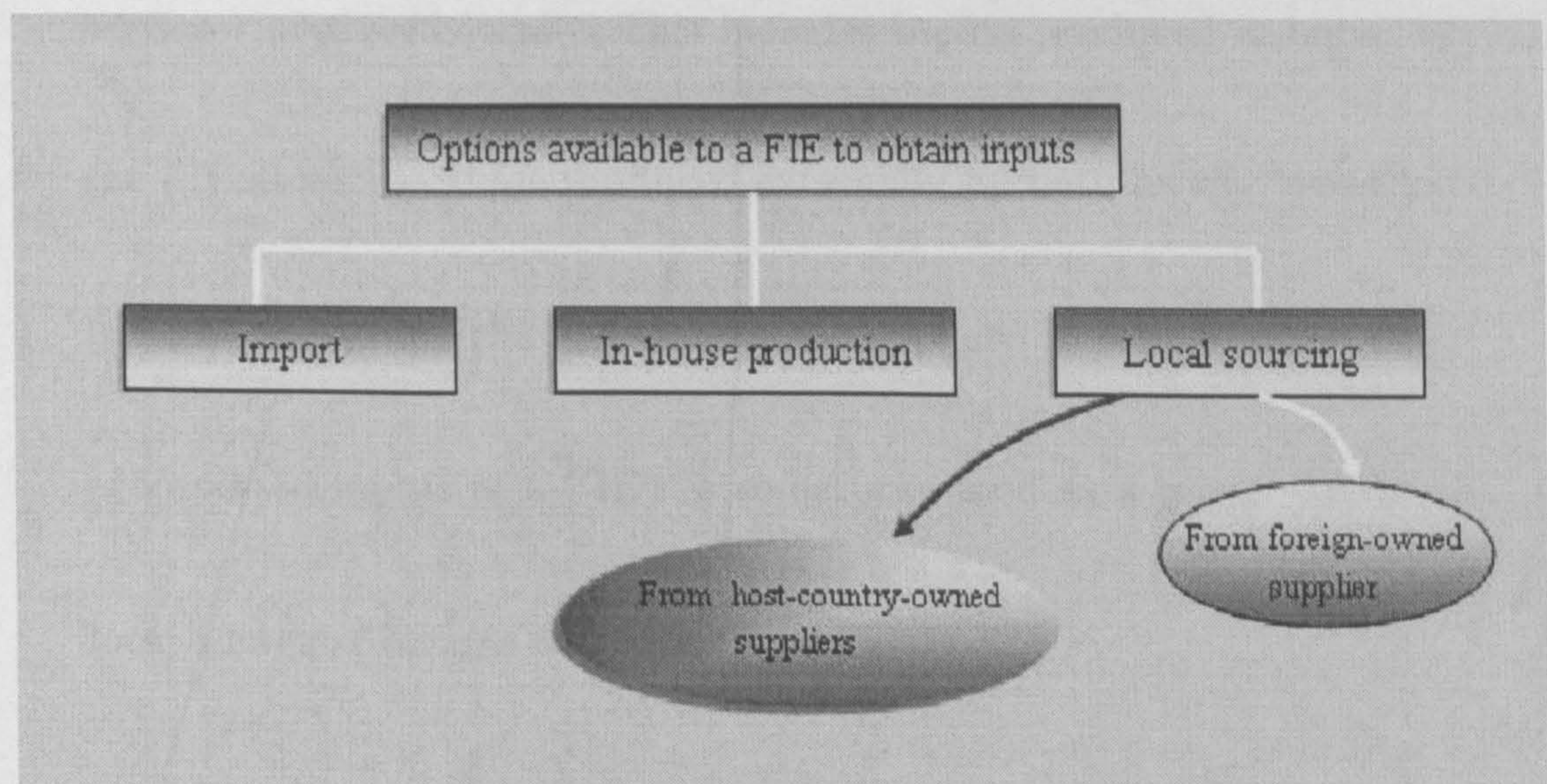
²⁹ Theoretically speaking the exaggerated measurement can not guarantee the accuracy of the empirical finding, and the exaggeration varies according to the different situation where the analysed data is collected, thus the inconsistent empirical findings may more or less attribute to the overstated measure of FDI Linkage.

employ “two-step fixed effect panel procedure” panel data model into the estimation, which is believed to be likely to result in more convincing results.

3.3.3 Extent of Local Supply Linkage

As stated in *World Investment Report 2001* (UNCTAD, 2001a), a FIE may have four options to obtain production inputs in a host country: import, produce locally in house, procure from locally based foreign-owned suppliers, or from indigenous suppliers (see Figure 1). Among them, FDI linkage, i.e. the link between a FIE and those indigenous suppliers is the focus of current study.

Figure 3-1 Options for FIEs with regards to Obtaining Inputs



Source: UNCTAD, 2001a

In the existing literature, FDI linkage is usually measured by either the local share of a FIE's input sourcing or the local content of a FIE's.

- *Local share of a FIE's input sourcing* indicates the share of inputs supplied by all locally based suppliers in the host country, which include locally based but foreign-owned suppliers and indigenous suppliers.

Note that this measure does not divide the ownership of suppliers (indigenous or foreign-owned).

- *Local content of a FIE's production* indicates the share of total outputs (components or intermediate products and ancillary products and services) produced locally. This includes inputs produced in-house by the FIE as well as those produced externally by both locally based but foreign-owned suppliers and indigenous suppliers. In some studies, share of imported inputs of a FIE's is sometimes used as a mirror image of local content (Tavares and Young, 2005).

It is obvious that the proxy *local share of a FIE's input sourcing* can not distinguish the locally based foreign-owned suppliers from the indigenous

suppliers. Thus by covering all locally based suppliers, the analysis on the extent of FDI linkage undoubtedly overstates the contribution of FDI linkage to indigenous firms³⁰. While further including in-house production by FIEs, the proxy *Local content of a FIE's production* could perform worse. Thus I argue that these traditional measures of FDI linkage may not accurately reflect the magnitude of a FIE's supply linkage with indigenous suppliers, and the existing findings through employing these measures could be more or less misleading. The more FIEs source inputs from other FIEs in the host country or even make in-house production, the more the estimation bias would be. Theoretically, the measure by *local share of a FIE's input sourcing* would relatively hold less bias than the measure by *Local content of a FIE's production* if this type of bias could not be at all avoided.

With more information of suppliers, fortunately, the unique dataset for this study allows correcting this bias and provides more convincing results. In current study *FDI linkage* is measured as the share of inputs purchased by a

³⁰ For example, in Malaysia, although locally-procured components by FIEs in the electronics and electrical industries comprised 62 percent of exports in 1994; the corresponding figure for Thailand was 40 percent, the most strategic parts and components were supplied mainly by foreign-owned companies rather than domestic ones in both countries (UNCTAD, 2000a).

FIE from indigenous suppliers in a host country. To further illustrate the bias that could be made by those traditional utilised measures, the estimation results by different measures will be compared.

3.4 Data Description

The firm level data set used in this study is from the *Annual Foreign Firm Statistics*, conducted by Henan Provincial Department of Commerce, China.

Henan ranked 14th in 2003/2004 and 13th in 2005 on the total amount of FDI utilised overall 31 provinces in China, thus its FDI status is very close to the average level of China³¹. The *Annual Foreign Firm Statistics* has been undertaken since 2003 and data are available for this study within the period 2003-2005. The main advantages of this statistic are that it covers virtually all known active firms, and the response rate is generally over 61 percent. Since this study focuses on foreign manufacturing only, the sample constitutes 527 FIEs in 36 two-digit manufacturing industries. The data include information on ownership classification, sales, intangible assets, employment, start-up year, intermediate inputs cost, imports and exports, main input suppliers³² and volume of transaction, etc. A firm has been defined to be indigenous if its

³¹ The author has tried to involve data from more other representative provinces, but the data availability in those areas is not good enough to proceed the analysis necessary in current research.

³² This information is obtained through an additional survey. The survey questionnaire is provided as appendix.

foreign equity participation, if any, is below 25%³³.

In order to be comparable with previous literature, the 36 two-digit sectors are aggregated into 11 sectors.³⁴ Table 3.1 provides a brief description of the sample by sectors. The number of firms in operation varies over time, of which 437 existed at the beginning and 461 at the end of the sample period. Of those that existed from the beginning, 371 remained at the end of the sample period. Due to entry and exit and ownership restructuring, the dataset appears holding a unique feature of rotating unbalanced panel in this dataset. After a test for potential sample selection bias, which is suggested by Nijman and Verbeek (1992), it is proved that there exists no statistically significant *sample selection bias* at 97 percent probability of rejection. Furthermore, the data are cleaned via extensive checks for nonsense observations, outliers, coding mistakes and the like.

³³ The definition of indigenous firm varies in the literature. But the 25% cut-off is officially defined by Chinese government.

³⁴ They are Mining, Food processing & manufacturing, Textiles & clothing, Mineral processing, Chemicals, Pharmaceuticals, Ordinary machinery manufacturing, Transport equipment manufacturing, Electronics, Energy manufacturing & supply, and others. The aggregation scheme is not reported but available upon request.

Table 3-1 Brief Description of the Sample by Sectors

Sample	2003	2004	2005
Number of foreign firms	437	429	461
Mining	7	7	8
Food processing & manufacturing	38	37	38
Textiles, clothing & footwear	103	100	108
Mineral processing	54	54	53
Chemicals	59	60	68
Pharmaceuticals	12	14	15
Ordinary machinery manufacturing	34	36	37
Transport equipment manufacturing	19	19	20
Electronics	72	73	78
Energy manufacturing and supply	10	10	10
Others	29	19	27

3.5 Methodology

To find out the determinants and their impacts on FIEs' FDI linkage, the following equation are estimated.

$$FDI_Linkage_{ijt} = \beta_1 MO_{it} + \beta_2 Familiarity_{it} + \beta_3 size_{it} + \beta_4 D_EntryMode_i + \beta_5 D_Autonomy_i + \chi Origin_i + \delta Industry_j + \mu_t + \mu_i + \varepsilon_{ijt} \quad (3.1)$$

$$FDI_Linkage_{ijt} = \beta_1 MO_{it} + \beta_2 Familiarity_{it}^2 + \beta_3 size_{it} + \beta_4 D_EntryMode_i + \beta_5 D_Autonomy_i + \chi Origin_i + \delta Industry_j + \mu_t + \mu_i + \varepsilon_{ijt} \quad (3.2)$$

$$FDI_Linkage_{ijt} = \beta_1 MO_{it} + \beta_2 Familiarity_{it} + \beta_3 size_{it} + \beta_4 D_EntryMode_i + \beta_5 D_Autonomy_i + \beta_6 D_New_i \times Familiarity_{it} + \chi Origin_i + \delta Industry_j + \mu_t + \mu_i + \varepsilon_{ijt} \quad (3.3)$$

where $FDI_Linkage_{ijt}$ stands for the supply linkage with indigenous suppliers of foreign firm i operating in sector j at time t , which is calculated by the share of inputs purchased from indigenous suppliers. MO_{it} stands for the market orientation (international or host market) of foreign firm i at time t , which is calculated by the share of export in total sale. $Familiarity_{it}$ is a proxy to account for the development of familiarity to the host market after a foreign firm entered the host country. It is specified as the number of years that foreign firm i has been established in the host country. Following Gorg and Ruane

(2001), I also allow for a possible non-linearity (quadratic) relationship by including $Familiarity_{it}^2$ in model (3.2). To capture “vintage effect”, an interaction variable $D_New_i * Familiarity_{it}$ is further included in model (3.3). Dummy variable D_New_i equals one if foreign firm i was established within 3 years. $Size_{it}$ is calculated as the employment of foreign firm i at time t . $D_EntryMode_i$ is a dummy variable taking the value of zero if foreign firm i is established through Greenfield investment. $D_Autonomy_i$ is a dummy variable taking the value of zero if foreign firm i has no sourcing autonomy as a foreign affiliate. $Origin_i$ is a dummy vector that stands for the main origin of foreign firm i , i.e. Europe, North America, Japan, Asian but except Japan, Hong Kong or Taiwan, and others. $Industry_i$ is an industry group dummy vector. χ is the vector of coefficients on $Origin$ of main ownership; δ is the vector of coefficients on $Industry$; μ_t and μ_i are time and firm specific errors and meant to capture time and firm specific effects on the FDI linkage not attributable to the explanatory variables in the equation, ε_{ijt} is an *iid* error term.

Although it is believed that the detailed information contained in the

survey allows extracting much of the previously unobserved firm specific effect, the remaining omitted time-invariant firm specific effect still can bias the estimation³⁵. Fortunately, panel data within model can help solve this issue. If within estimator was employed³⁶, all firm observed and unobserved time-invariant fixed effects would be dropped out, and the bias in estimating time-variant variables could be removed. However this would lose the opportunity to perform the impact of observed but time-invariant variables. Therefore, this study adopts the two-step fixed effect panel estimation procedure for all the estimations³⁷. Taking equation (3.1) as an example, in the first step, the within estimator is used to get unbiased estimates of β_1 , β_2 and β_3 . Year dummies are also included in the estimated equation to control for time trend, e.g. the effect of policy. Predicted values of the time-variant effects are generated by taking the residuals which contain the portion of Local supply Linkage decision that could not be explained by the estimates of time-variant variables as well as time dummies:

³⁵ See Schmidt (1985) for a discussion on using panel data to estimate firm level efficiency.

³⁶ First difference estimator is an alternative, but it is less consistent than within estimator.

³⁷ See Black and Lynch (1997) for an initial application.

$$FDI_Linkage_{ijt} - \beta_1' MO_{it} - \beta_2' Familiarity_{it} - \beta_3' size_{it} = \beta_4 D_EntryMode_{it} + \beta_5 D_Autonomy_{it} + \chi Origin_{it} + \delta Industry_j + \mu_i + \mu_t + \varepsilon_{ijt} \quad (3.4)$$

Then average this value over the 2003-2005 periods for each firm to get an estimate of the firm specific, time-invariant component of residual.

In the second step, regress the averaged residual on those variables observed but omitted in the first step as well as time dummies to get estimates of $\beta_4, \beta_5, \varphi$ and δ . The advantage of this two-step fixed effect panel analysis procedure is two fold. On one hand relative to cross section estimation, it can address the issue of bias due to the heterogeneity; on the other hand relative to pure fixed effect model, it allows us to estimate those observed time-invariant variables.³⁸

In addition, all models are corrected for heteroscedasticity using White's correction (White, 1980), which ensures the consistency of estimates. As a robust check of the estimations, the sample is also divided into a number of finite categories using the discrete choice model to perform all estimations (through ordered probit models with distinct thresholds), and similar results

³⁸ Although bias can still arise in the estimation of the second step, this methodology reduces the heterogeneity problem to the maximum extent.

were obtained³⁹. This corroborates the above findings.

The equation (3.1) is also estimated with *local share of a FIE's input sourcing* and *local content of a FIE's production*, two traditionally utilised measures of FDI linkage of a FIE's, in order to illustrate the bias that could be made by employing these measures.

³⁹ The results are not reported in the paper, but available upon request.

3.6 Empirical Results

The estimation comparison between my measure and the two traditionally utilised ones is shown in table 3-2. It can be found in table 3-2 that the differences among the results by employing different measures are considerable. They are not just in magnitude, but imply opposite findings in some cases; and in general, the measure by *local content of a FIE's production* leads more bias. Thus this study appeals the cautious application of previous findings based on those traditional measures of FIEs' FDI linkage.

Table 3-3 presents the results by employing the bias-corrected measure of FIEs' FDI linkage, unique data set, and performed "two-step fixed effect panel analysis procedure". Generally speaking, the results confirm some usually held expectations but also highlight some innovative and less commonly explored aspects. It is believed that the results are more convincing than previous empirical studies'.

Table 3-2 Comparison between New and Traditional Measures of FDI Linkage

Variables	New Measure		Traditional Measure (1)		Traditional Measure (2)	
	Coefficients	Significance	Coefficients	Significance	Coefficients	Significance
Market Orientation	-0.275***	0.001	-0.186**	0.047	0.174	0.182
Familiarity	0.382***	0.007	0.383**	0.046	0.393*	0.071
Entry Mode	0.136**	0.027	0.137*	0.071	0.140	0.211
Size	-0.198**	0.041	-0.179**	0.049	0.274*	0.082
Autonomy	0.367*	0.054	0.173	0.527	0.171	0.467
Originality						
Europe	0.071	0.273	0.095*	0.089	0.112*	0.084
North America	0.114	0.189	0.127**	0.042	0.273*	0.054
Japan	-0.153	0.271	-0.162*	0.091	-0.119	0.254
Asian but except Japan	-0.074	0.473	-0.039	0.421	0.027	0.385
Hong Kong and Taiwan	0.159**	0.035	0.157*	0.081	0.140	0.211
Others	0.003	0.317	0.007	0.124	0.021	0.362
Industry						
Mining	0.319	0.174	0.221	0.514	-0.417	0.213
Food Processing &	0.471***	0.008	0.013**	0.010	0.016**	0.041
Manufacturing						

<i>Textiles & Clothing</i>	0.216	0.165	0.056	0.358	0.413	0.425
<i>Mineral Processing</i>	0.003	0.671	0.176	0.657	0.017	0.544
<i>Chemicals</i>	0.047	0.357	0.291	0.425	0.026	0.415
<i>Pharmaceuticals</i>	-0.132**	0.041	-0.110**	0.045	0.117	0.152
<i>Ordinary Machinery Manufacturing</i>	0.210**	0.039	0.117	0.120	0.036	0.152
<i>Transport Equipment Manufacturing</i>	0.111**	0.037	0.120*	0.076	0.041*	0.487
<i>Electronics</i>	-0.311***	0.008	-0.219	0.854	-0.174	0.741
<i>Energy Manufacturing & Supply</i>	0.018	0.168	0.011	0.564	0.009	0.842
<i>others</i>	0.174	0.421	0.109	0.214	0.101	0.521
Number of Observations	527		527		527	
Adj. R-sq.	0.367		0.271		0.269	
Prob F>0	0.004		0.045		0.091	

Note: 1. *Significant at the 10 percent level; **Significant at the 5 percent level; ***Significant at the 1 percent level

2. Traditional measure (1) refers to *local share of a FIE's input sourcing*, one of the traditionally utilised measures of FDI linkage.

3. Traditional measure (2) refers to *local content of a FIE's production*, one of the traditionally utilised measures of FDI linkage.

Table 3-3 Estimation Results

Variables	Equation (1)		Equation (2)		Equation (3)	
	Coefficients	Significance	Coefficients	Significance	Coefficients	Significance
Market Orientation	-0.275***	0.001	-0.196***	0.004	-0.207***	0.000
Familiarity	0.382***	0.007			0.342***	0.004
Familiarity ²			0.381	0.274		
Entry Mode	0.136**	0.027	0.134*	0.054	0.150**	0.037
Size	-0.198**	0.041	-0.214**	0.049	-0.185**	0.031
Autonomy	0.367*	0.054	0.314*	0.074	0.374*	0.064
D_New * Familiarity					-0.181*	0.074
Originality						
Europe	0.071	0.273	0.095*	0.089	0.077	0.225
North America	0.114	0.189	0.127	0.424	0.152	0.147
Japan	-0.153	0.271	-0.162	0.191	-0.174	0.215
Asian but except Japan	-0.074	0.473	-0.039	0.421	-0.057	0.673
Hong Kong and Taiwan	0.159**	0.035	0.157*	0.081	0.194**	0.045
Others	0.003	0.317	0.007	0.124	0.005	0.352
Industry						
Mining	0.319	0.174	0.221	0.514	0.359	0.149

<i>Food Processing</i>	£	0.471***	0.008	0.013**	0.010	0.372***	0.004
<i>Manufacturing</i>							
<i>Textiles & Clothing</i>		0.216	0.165	0.056	0.358	0.218	0.188
<i>Mineral Processing</i>		0.003	0.671	0.176	0.657	0.012	0.270
<i>Chemicals</i>		0.047	0.357	0.291	0.425	0.057	0.322
<i>Pharmaceuticals</i>		-0.132**	0.041	-0.110**	0.045	-0.144**	0.040
<i>Ordinary Machinery</i>		0.210**	0.039	0.117*	0.057	0.220**	0.041
<i>Manufacturing</i>							
<i>Transport Equipment</i>		0.111**	0.037	0.120**	0.046	0.148**	0.038
<i>Manufacturing</i>							
<i>Electronics</i>		-0.311***	0.008	-0.219*	0.054	-0.324***	0.008
<i>Energy Manufacturing</i>	£	0.018	0.168	0.011	0.564	0.109	0.246
<i>Supply</i>							
<i>others</i>		0.174	0.421	0.109	0.214	0.101	0.454
Number of Observations			527		527		527
Adj. R-sq.			0.314		0.271		0.367
Prob F>0			0.004		0.045		0.002

Note: *Significant at the 10 percent level; **Significant at the 5 percent level; ***Significant at the 1 percent level

a) Market Orientation

It is found that the more export out of the sales of a FIE, the less input sourcing from indigenous suppliers. The findings statistically proved the relationship between market orientation of a FIE in China and its propensity of FDI linkage creation. Host market orientation would make a FIE have higher intention to purchase inputs from indigenous suppliers. Some researchers explained this phenomenon. Altenburg (2000) stated that when serving the local market, foreign firms will need to adapt their production to the local conditions and tend to be more integrated in host economy. On the other hand, export oriented foreign affiliates are generally part of a global sourcing and distribution network managed by the parent company and have higher quality requirements which can be difficult for the indigenous suppliers to meet (Mucchielli & Jabbour, 2001). Specified on Chinese market, this trend may also attribute to the government policy on indigenization of business. Chinese government, which pursues more export-generating development rather than import-substituting development in the previous years, may impose less control on the import of intermediate goods (Huang, 1998). Hence, it seems natural

that export-oriented firms need less cooperation with local firms, to the extent that they can import intermediate goods. Blomstrom and Kokko (1998) hold the same view and state that perhaps it is because import licenses are easier to obtain for exporters.

b) Familiarity to the host economy

Both “familiar effect” and “vintage effect” mentioned above are supported by this study. It is found there is positive and statistically significant relationship between FDI linkage and a FIE’s familiarity in China. This suggests that FIEs may procure more from Chinese owned suppliers along with their increasing familiarity in China. But there is no quadratic relationship found given the non-significance of $Familiarity_u^2$. As far as “vintage effect” is concerned, the empirical results show that newly established FIEs have lower linkage potential although it will increase as well following with the development of familiarity in the host economy. Another key fact behind this phenomenon is that this type of linkage may enhance at an increasing rate when the firm is more familiar with the host market.

c) Entry Mode

FIEs established through merge and acquisition (M&A) are proved to have a higher propensity of FDI linkage creation than those established through Greenfield investment. As explained by Barkley and McNamara (1994) as well as Scott-Kennel and Enderwick (2001), a possible reason is that a regional purchasing network is already established in the former case. Correspondingly, wholly foreign-owned firms through Greenfield investment may initially rely on familiar sources of inputs rather than develop local supply linkage with indigenous firms.

d) Size

A FIE's size measured by employment is confirmed negatively correlated with its extent of FDI linkage. This may be due to that large firms normally are able to internalise their operations better, and indigenous suppliers may find it difficult to supply very large volumes. While for the small firms, they are generally more adaptive than large firms which may have difficulty in finding a niche in highly internationalised networks.

Although large FIEs usually have low FDI propensity, they might on the other hand be more beneficial to the host country in terms of linkage quality. Relative to small firms, large firms normally have more strength due to better technological and managerial capabilities. Thus the connection with large FIEs may be more efficient for indigenous suppliers to obtain benefits. In order to explore this further, the relationship between a FIE's strength and its FDI linkage is analysed. To the best of my knowledge, current study is the first to involve the issue of linkage quality in the relevant empirical study. The strength of a firm is proxied as the ratio of its intangible assets to gross profit. Because there may exist co-linearity between variables *strength* and *size*, *size* is not included in the regression. It is found no relationship between the strength of FIEs' and their FDI due to the low level significance.

e) Autonomy of Sourcing

The autonomy level of sourcing is predicted to be another factor relating to the procurement of FIEs. This study supports this point. It is found that foreign firms as affiliates which have thorough autonomy over input purchasing may source more of their inputs from Chinese owned suppliers than those have

less or no autonomy. Dunning's statement (1993) indicates a possible explanation: some multinational firms centralise some or all of their input purchasing at one location so as to achieve economics of bulk buying and many affiliates will have little autonomy in making purchasing decisions. In such circumstances, individual supplier may be the optimal supplier for a single FIE affiliates.

f) Originality

The results highlight the significant FDI linkage propensities of FIEs whose originality is Hong Kong or Taiwan. However the results for other originalities are not statistically significant.

g) Industry Characteristics

FIEs in the industries of Food processing & manufacturing, Transport equipment manufacturing, and Ordinary machinery manufacturing are linked with higher FDI linkage propensity based on the analysis. While FIEs belong to Electronics or Pharmaceuticals have lower propensity of local procurement. Tests for other industries are not statistically significant in my estimation

results. In general, the results are in conformity with previous research with one exception of Transport equipment manufacturing. As mentioned above FIEs in the Food processing & manufacturing industries usually involve extensive supply linkage indigenous suppliers of raw and packaging materials. The result confirms this. The higher FDI linkage propensity of FIEs in Ordinary machinery manufacturing industry may result in the normally lower value-to-weight ratio of technologically complex inputs in this industry. While both Electronics and Pharmaceuticals are high tech industries, which need higher value-to-weight ratio of inputs, the comparatively lower FDI linkage propensity of FIEs in these industries is found. The exceptional higher local procurement propensity of Transport equipment manufacturing industry may be attributed to the 40 to 50 percent of "localisation" policy by Chinese government aiming at automobile industry (Xia and Lu, 2001).

To shed more insights into what common characters of an industry affect FIEs' local sourcing decision, based on an OECD sectoral classification (see Klette and Forre, 1995), the 36 2-digit sectors is aggregated into four groups, i.e.

high-tech, medium-high-tech, medium-low-tech and low tech. ⁴⁰ Tavares and Young (2001) use the different classification in their analogous study by grouping the manufacturing sectors into “global industries”⁴¹ and “non-global industries”. Those “global industries” are actually encompassed by the higher-tech groups (high-tech and medium-high-tech) of this study. Thus current classification more or less is also supported by theirs. Lower FDI linkage potential of FIEs in higher-tech industry and higher potential of FIEs in lower-tech industry are clearly performed in my estimation results.

⁴⁰ Accordingly, high-tech sectors are Aerospace, Computers & Office Machinery, Electronics & Communications, Pharmaceuticals; medium-high-tech sectors include Scientific Instruments, Electrical Machinery, Motor Vehicles, Chemicals, and Non-electrical Machinery; medium-low-tech sectors refer to Shipbuilding, Rubber and Plastic Equipment, Other Transport Equipment, Stone, Clay and Glass, Non-ferrous Metals, Other Manufacturing, and Fabricated Metal Products; low-tech sectors are Petroleum Refining, Ferrous Metals, Paper & printing, Textiles & Clothing, Wood & Furniture, and Food & beverages.

⁴¹ “Global industries” include Automobiles, Chemicals, Electronics, and Pharmaceuticals.

3.7 Conclusions and Policy Implications

Using unbalanced firm-level panel data for China and two-step fixed effect panel analysis procedure, current results are believed to be more effective and creditable than previous analyses based on cross sectional data and other estimation method. Apart from confirming some existing findings, this study not only develops them in depth, but also challenge previous notions as well. In the other direction, there are a series of important policy implications of this work for FDI linkage promotion activity. These implications could be two fold based on the two principal roles of FDI linkage. First, aiming at filtering valuable FDI (high linkage potential); second, relating to providing aftercare for existing investment in favour of local embeddedness.⁴²

From the angle of helping the development of indigenous firms, targeting foreign investors with higher FDI linkage potential is an effective way to replace some frequently used measures for linkage promotion, because most of them like local content requirements are no longer permissible in the context of the

⁴² Although Phelps and Fuller (2001) claim that already emphasis is moving from attracting inward investment to aftercare of existing investments in the first decade of the twenty-first century, attracting FDI is still necessary to most of developing countries such as China.

WTO or other international agreements. According to my estimation results, the following factors could be considered for Chinese government to filter foreign investors with high FDI linkage potentials.

a) FIEs with net export contribution: As export is proved to be negatively associated with FDI linkage propensity, Chinese government should pursue more import-substituting investment rather than export-generating investment. To deal with this net export contribution is a more appropriate measure to value FIEs than gross export ability.

b) FIEs established through joint ventures rather than Greenfield investment.

c) FIEs with high strength other than big size: Since larger FIEs are proved to hold lower local sourcing potential while higher strength ones do not, current research questions targeting strategies should be based on the size of a FIE's rather than strength in terms of linkage quality. Further more, if the priority is local embeddedness, small FIEs may need more attention.

d) Although FIEs from Hong Kong and Taiwan are proved to procure more

from Chinese owned suppliers, it can not be an evidence for country targeting promotion policy. An evolving doubtful view from the researchers of IMF, World Bank and other international institutions is that about a quarter or more of China's officially-recorded FDI is actually mainland Chinese money originally⁴³. These monies may flow out to access better financial, regulatory and legal services and take on a "round trip" by returning to China as apparent FDI to access the fiscal incentives and improved investor protection offered in China to foreign investors. Analysts also point to the numerical coincidence (and rising share) of China's FDI inflows from Hong Kong, the British Virgin Islands and other tax havens and the outflows recorded as "errors and omissions" in China's balance of payments. From this point of view, the findings in this study that FIEs from Hong Kong and Taiwan have high potential of FDI linkage may result from those "round-trip" monies through Hong Kong or Taiwan but originally from mainland China. If so this finding has nothing to do with the objective of this study. Although there is still no solid evidence to back up this doubt, at least caution needs to be raised.

⁴³ For details, see Geng Xiao (2004)

e) FIE affiliates with sourcing autonomy: policies favouring attracting FIE affiliates with sourcing autonomy can be advocated.

As shown in this analysis, FIEs usually need time to get familiar with the host market, and even those FIEs linked with indigenous suppliers may have chance to switch to foreign suppliers or importing. Thus besides those 5 factors mentioned above, the after care of those established FIEs is also an important issue to the host government. In addition, the findings of negative FDI linkage intention of high tech FIEs and large FIEs inform may come from the weak local supply base, thus to promote attracting high tech FDI and stimulate the embeddedness of existing investment, policies that favour strengthening local supplier base (availability, capacity and competitiveness) are advocated. These policies may include information and matchmaking, technology upgrading of local firms, human resource development programmes with local suppliers and other forms of training support, financial assistance, and cluster-oriented programmes (UNCTAD, 2001b)

After two empirical studies, next chapter will try to examine the FDI administrating policies in terms of FDI Linkage creation from theoretical

perspective.

Chapter 4: FIEs, Host Government, and FDI Linkage

4.1 Chapter Preamble

The importance of FDI Linkage to the development of local economy has been empirically proved in Chapter 2. Then in Chapter 3, several factors have been found to have close link with the creation of FDI Linkage. The host government could strategically take these determinants into consideration as a filter when making FDI attracting policies.

To shed light on the FDI administrating policies, this chapter will try to theoretically discover the interaction between FIEs and the host government focusing on the creation of FDI Linkage. In addition, the model will provide theoretical support to the empirical findings in Chapter 2.

4.2 Introduction

It is well recognised that Foreign Invested Enterprises (FIEs) are normally very sensitive to the change of host country policies implemented by the host government. Host governments may play a crucial role in attracting and guiding FIEs' activities through their policies. Key policies might be adopted by host governments to act as incentives to the creation of FDI linkage. Such policies might comprise import restrictions, local content requirements or other soft incentives aimed at deepening the inter-firm relationships between foreign and local firms. But those policies like import restrictions and local content requirements are no longer permissible in the context of the WTO or other international agreements⁴⁴. Instead, an increasing number of countries have adopted soft policies to promote not only local sourcing but also the deepening of relationships between foreign and local firms⁴⁵.

Following previous literature two questions of immediate interest could be raised. First, would the vertical technology transfer (VTT) from FIEs to their

⁴⁴ Those policies have not been found to be very effective as well (Hackett and Srinivasan, 1998).

⁴⁵ For some examples, see the World Investment Report 2001, (UNCTAD,2001a)

local suppliers inevitably happen if the FIE source locally? Second, and perhaps more importantly, how could the host government policies impact the sourcing choice of those FIEs which are already established in the host country?

In general, a FIE faces the following conflicting incentives in the host country. On one hand, local sourcing seems more natural with comparison to importing when a FIE attempts to avoid any inconvenience that may caused by being away from suppliers such as the high delivery cost and importing tariff etc.; and in order to offset the weakness of those linked local suppliers against foreign suppliers FIEs would like to make VTT to local suppliers. On the other hand, it would be hard for FIEs to prevent local rivals from reaping the benefit from the “VTT leakage” as what has been proved in Chapter 2 as “indirect horizontal spillover”, but this can be prevented by abandoning local sourcing while importing input from foreign suppliers. However, local sourcing of FIEs would be a preferable choice for the host government as analysed previously. It turns out that, in equilibrium, FIEs would choose to import input if the cost of competition arising from “VTT leakage” exceeds the importing cost.

Through the following theoretical model, this study will focus on an

investigation of government policies or other conditions if possible under which FIEs prefer to source locally and impose VTT to local suppliers. Although relevant discussions are occasionally found in some case studies (see e.g. Barry and Bradley 1997, Buckley and Casson 1976), systematic study on this subject is still rare. Furthermore, the model will be able to provide support from the theoretical side to the empirical findings in Chapter 2.

4.3 Literature Review

A voluminous informal as well as empirical body of literature exists on FDI backward linkages. For example, the 2001 issue of the *World Investment Report* was devoted entirely to the effects of foreign direct investment on backward linkages in host countries. However, theoretical models that explore the relationship between FIEs and backward linkages in the host country are rare. As argued by Alfaro and Rodriguez-Clare (2003), most of the existing FDI linkage studies lack a tight link to theoretical models, thus their findings may be unconvincing.

So far there exist only three theoretical studies which are relevant to FDI linkage: Rodriguez-Clare (1996), Markusen and Venables (1999) and Lin and Saggi (2004). All of their theoretical models provide important insights regarding the two-way relationship between FIEs and supply linkages. Both models of Rodriguez-Clare (1996) and Markusen and Venables (1999) are based on the monopolistic competition in the host market. In both models, Ethier's (1982) formulation of the so called love-variety production function for final goods, which

is in turn derived from Dixit and Stiglitz (1977), lies at the heart of the interaction between FIEs and local suppliers. Their models denote that the entry of FIEs can have profound effects on backward linkages, industrial development, and welfare of the host country. In addition, the Markusen and Venables (1999) model also allows for a competition effect wherein the entry of a multinational damages its local rivals. The Lin and Saggi (2004) model focuses on investigating how the nature of contractual relationships between multinational and their local suppliers affect the degree of backward linkages in the local industry. Their model is designed for oligopolistic competition in the host market. They find the exclusivity contractual agreement between multinationals and their local suppliers could lead to de-linking effect, which makes the intermediate goods market less competitive due to market separation and causes the total output of the intermediate goods to shrink.

According to the existing literature, there are at least four main areas identified that deserve further research to be carried out:

- Existing theoretical literature has not addressed the sourcing choice of FIEs between importing and local sourcing. Although the analytical

literature on FDI linkage and spillover is vast (See Blalock and Gertler, 2002 and Javorick, 2004), most of the literature merely dedicates to studying the spillover of FDI linkage (stated in Study One of current research). As far as this topic is concerned, no one has investigated the force behind FDI linkage creation, or in other words, how FIEs make the choice between importing and local sourcing. Thus, this study complements existing research by providing an analysis of how a FIE makes sourcing choice according to the circumstances of the host economy.

- Few literature systematically studied the reaction of FIEs to the host government policies despite it is widely accepted that the behaviour of FIEs' is very sensitive to the host government policies. Furthermore, under the increasingly liberalised world economic circumstances⁴⁶, how to affect the sourcing choice of FIEs and promote FDI linkage through policies implemented by the host government is vital to the host countries. The following model will uncover this to complement existing research.

⁴⁶ As noted in Chapter 3, some frequently used measures to promote linkage, like local content requirements are no longer permissible in the context of the WTO or other international agreements.

- Existing theoretical literature has not adequately analysed the mechanisms behind FDI spillover. Although some recent empirical studies appear to involve them, their findings are criticised due to lack of support from theoretical model. To improve it, the model developed below will consider all known possible mechanisms of FDI spillover, i.e. horizontal, vertical, indirect horizontal spillover of FDI are all taken into account.
- Most of the theoretical literature on FDI Linkage has ignored strategic interaction among firms with the exception of Lin and Saggi (2004) despite the evidence that firms are quite responsive to each others' choices. Current model will consider the creation of FDI Linkage in an oligopolistic environment rather than in a monopolistic competition model.

Whilst challenging existing research, current study will make a contribution to balance out all issues mentioned above.

4.4 Methodology

A model is developed as a two-stage dynamic game of complete but imperfect information. The key features of this type of game are that moves occur in sequence for each stage, simultaneous moves are allowed within stages, all previous moves are observed before the next move is chosen, and the players' payoffs from each feasible combination of moves are common knowledge.

Suppose that there are two main roles in the game, a game leader as a dominant player and some game followers as subordinate players, then, equilibrium is obtained if the game leader can commit itself to an action before the other players (e.g. before the followers knowing all the parameters of the game, the leader can predict the responses of the followers and this knowledge is used in deciding his own action). The game followers choose their best actions after observing the leader's action. To be specified in this model, the game will include the following players: government of the host country, FIE producer (denoted by f), local producer (denoted by h), local supplier (denoted by s)

and foreign supplier (denoted by sf). From hereon, “producer” refers to the final product producer and “supplier” refers to the intermediate product producer. The sequence of moves is as follows:

- First, the government decides its policy strategy noting that two types of government policies are assessed in this model, i.e. international trade policy and industrial policy. The policies will be strategically combined in order to fulfil the government’s administrating objective (maximizing total welfare of the host country).
- Second, the FIE producer chooses between three alternatives. Under a local arms length arrangement (market interaction), it simply buys the intermediate from the local supply market as an anonymous buyer. But it also can choose to provide the technological know-how and information to its local supplier that improves the productivity of the suppliers and lowers the cost of intermediate supply (or improves the quality of intermediate). This knowledge exchange is referred as vertical technology transfer (VTT). Alternatively, it can abandon local sourcing while import inputs from foreign supplier.

- Then, both local and foreign suppliers react using the amount of output produced to optimize their objective (maximising profit).

The dynamic game will be solved by using an approach in the spirit of backwards induction. The first step in working backwards from the end of the game (the second stage) involves solving a simultaneous-move game for the FIE producer's sourcing choice given each feasible policy choice of host government in Stage One (Chapter 2). Then the optimal policy choice of host government belonging to the first stage will be solved with the anticipation of all firms' behaviour in the second stage. Finally the objective of this model will be achieved by understanding how the government's optimal policy strategy affects the optimal sourcing choice of a FIE and the market structure in the host country. The second stage game will be solved in the following section as the first step of backward induction to find out the FIE's response to any policy choices of host government.

4.5 The Model

A two-tier partial equilibrium model is developed in this study, in which the production of final goods requires intermediate goods and the attention is focused on a single industry. The market structure is oligopolistic since FIEs mostly operate in oligopolistic industries (see Markusen, 1995). The interest lies in examining the interaction relationship between the policies of the host government and the sourcing decision of a FIE that produces the final goods in a host country. Facing the policies implemented by the host government, the FIE chooses between sourcing inputs from local supplier and from foreign supplier through importing. Moreover, it chooses whether to make the vertical technology transfer to its local supplier if importing input is abandoned.

As mentioned above, two types of government policies are weighed up in this model, i.e. international trade policy and industrial policy. The instrument employed for international trade policy is an import tariff t , while industrial policy is implemented through taxes τ . Although government usually applies an “income” tax on the profit of each firm in practice, to simplify the model, let

τ denote the “effective tax rate” on production, thus the host government’s income tax over a firm becomes $T = \tau q$, where q is the amount of production of the firm. Note that the import tariff t is constrained to be non-negative and the tax rate τ is constrained to be non-negative and less than one i.e. $0 < \tau < 1$, so as to prevent tax rates that confiscate output from the firms. This is due to the fact that the basic premise for a government to impose tax is to keep non-negative profits for all firms in the country.

The marginal cost of a producer equals the sum of the price of intermediate goods (given by $\omega > 0$), the unit cost of transforming the input into the final product (given by $c > 0$), and the income tax. The demand function for final product is assumed to be linear $p(q) = \alpha - \beta q$ and all producers are assumed to compete in the Cournot fashion. The FIEs’ (including both producer and supplier) marginal cost of transforming the intermediate goods is $(1 - \delta)c$, where $\delta \in [0, 1]$ measures the degree of its cost advantage over local firms, since FIEs are assumed to have technological advantages over their local rivals. This assumption hardly needs defence. In fact, the theory of the multinational firm itself is built on the premise that multinational rely on intangible assets such as

superior technology to successfully compete with local firms that are better acquainted with the host country environment (Markusen, 1995). A wealth of evidence indicates that multinationals usually possess technologies that are superior to those of local firms in developing countries (see Markusen, 1995; Moran, 1998; and Saggi, 2002).

As a benchmark, the market equilibrium is firstly described in the case that FIE producer sources input from local supplier but without VTT.

4.5.1 The Benchmark Case: Local Sourcing but No VTT (Vertical Technology Transfer)

Denote the aggregate quantity of production in the final product market by

$$Q, \text{ then} \quad Q = q_f + q_h \quad (4.1).$$

Given the demand function of $p(Q) = \alpha - \beta Q = p(q_f, q_h)$ as assumed above,

FIE producer's profit function (payoff) is given by

$$\pi_f(q_f, q_h) = q_f [p(q_f, q_h) - \omega - \tau - (1 - \delta)c] \quad (4.2);$$

Local producer's payoff function is given by

$$\pi_f(q_f, q_h) = q_h [p(q_f, q_h) - \omega - \tau - c] \quad (4.3)$$

FIE producer chooses its output q_f to maximize its profit taking q_h' as given

$$\max_{0 \leq q_f < \infty} \pi_f(q_f, q_h') \quad (4.4)$$

Solving the first order condition for this problem has

$$q_f = \frac{\alpha - \beta q_h' - \omega - \tau - (1 - \delta)c}{2\beta} \quad (4.5)$$

Likewise, the feasible q_h chosen by local producer is

$$q_h = \frac{\alpha - \beta q_f' - \omega - \tau - c}{2\beta} \quad (4.6)$$

Solving (4.5) and (4.6) yields the output quantities simultaneously chosen by

both FIE and local producer:

$$q_f' = \frac{\alpha - \omega - \tau - (1 - 2\delta)c}{3\beta}, q_h' = \frac{\alpha - \omega - \tau - (1 + \delta)c}{3\beta} \quad (4.7)$$

Using the aggregate production function specified in equation(4.1), it derives a

demand curve for the intermediate goods:

$$\omega = \alpha - \tau - c + \frac{1}{2}\delta c - \frac{1}{2}\beta Q_D \quad (4.8)$$

Since only one local supplier is designed in the upstream sector, the aggregate quantity of intermediate supply $Q_s = q_s$. The profit of local supplier is calculated as:

$$\pi_s(q_s) = q_s [\omega(q_s) - \omega_1 - \tau - c] \quad (4.9)$$

where ω_1 denotes the unit price of input for intermediate production.

Calculating the first order condition over q_s to maximise its profit can derive the equilibrium output of the local supplier

$$q_s^* = \frac{2\alpha - 4\tau - 4c + \delta c - 2\omega_1}{6\beta} = Q_s^* \quad (4.10)$$

Then solving the equilibrium between demand and supply of intermediate ($Q_D^* = Q_s^*$) yields the equilibrium price of intermediate:

$$\omega^* = \frac{2\alpha + 2\omega_1 + \delta c}{4} \quad (4.11)$$

With the equilibrium price of intermediate ω^* , the equilibrium production quantity of FIE producer is easily calculated:

$$q_f^* = \frac{2\alpha - 2\omega_1 - 4\tau - 4c + 7\delta c}{12\beta} \quad (4.12)$$

Similarly, the equilibrium production quantity chosen non-cooperatively and simultaneously by the local producer equals:

$$q_h^* = \frac{2\alpha - 2\omega_1 - 4\tau - 4c - 5\delta c}{12\beta} \quad (4.13)$$

Comparing the equation (4.12) with (4.13), it shows that the FIE produces larger quantity of product than its local rivals and holds higher market share because of its cost-advantage. And similarly calculating (4.12)/(4.13) can derive the market segmentation between foreign and local firms in the final product market. Obviously, the FIE producer's market share increases with the technology gap between FIEs over local firms.

Lemma 1: The higher the technology advantage δ of the FIE over local firms, the bigger market share the FIE producer would take.

Given both producers' output, the equilibrium profit of FIE producer can be calculated:

$$\pi_f^* = \frac{(2\alpha - 2\omega_1 - 4\tau - 4c + 7\delta c)^2}{144\beta} \quad (4.14)$$

Similarly the profit of local producer equals:

$$\pi_h^* = \frac{(2\alpha - 2\omega_1 - 4\tau - 4c - 5\delta c)^2}{144\beta} \quad (4.15)$$

Inspection of the above shows that the profit of local producer decreases with the FIE's cost advantage δ . Together with Lemma 1, it is concluded that the higher the FIE's cost advantage δ , the more negative competition effect the local producer suffers. Thus the FIE has the upper hand in the competition with local producer.

Proposition 1: Local firms suffer from the competition with FIE rivals due to the weak technology level, and the larger is the technology gap between local firms and their FIE rivals, the more will the local firms suffer.

In addition, the equilibrium profit of local supplier can be derived as:

$$\pi_s^* = \frac{(2\alpha - 2\omega_1 - 4\tau - 4c + \delta c)^2}{24\beta} \quad (4.16)$$

Let the aggregate level of output of the intermediate goods measure the degree

of backward linkage (BL^B) under benchmark case of local sourcing but no VTT:

$$BL^B = Q_D^* = \frac{2\alpha - 2\omega_1 - 4\tau - 4c + \delta c}{6\beta} \quad (4.17)$$

Although the local producer suffers from the technology advantage of FIE's and thus lowers the demand of intermediate for the local supplier, equation (4.17) shows that a net demand creation effect of the FIE's technology advantage to the upstream industry still exists. Similar result can be found in Lin and Saggi (2004) as well.

Remark 1: The demand creation effect increases with the technology advantage of FIE over local rival.

The issue now is whether the above results hold when the FIE opts to provide VTT to its local supplier. To explore the reaction of all firms' (in both final and intermediate production sectors) to the appearance of VTT, let us now study the game with the VTT from FIE producer to its local supplier.

4.5.2 Local Sourcing with VTT

Before deriving the sub-game perfect equilibrium of this game, further details about the assumption with regard to VTT need to be presented. As discussed above, FIEs often transfer technology to their local suppliers and help upgrade their production methods. VTT is modelled as a reduction in the marginal cost for transforming input of the supplier from c to $c - d$ where the parameter d captures the degree of VTT. In this situation, the local supplier's marginal cost of production equals $\omega_1 + \tau + c - d$.

Solving the first order condition on q_s to maximise the profit of the local supplier yields:

$$q_s^* = \frac{2\alpha - 4\tau - 4c + \delta c - 2\omega_1 + 2d}{6\beta} = Q_s^* \quad (4.18)$$

Then solving the equilibrium between demand and supply of intermediate ($Q_D^* = Q_S^*$) yields the equilibrium price of intermediate:

$$\omega^* = \frac{2\alpha + 2\omega_1 + \delta c - 2d}{4} \quad (4.19)$$

With the equilibrium price of intermediate ω^* , the equilibrium production

quantity of FIE producer is easily calculated:

$$q_f^* = \frac{2\alpha - 2\omega_1 - 4\tau - 4c + 2d + 7\delta c}{12\beta} \quad (4.20)$$

Similarly, the equilibrium production quantity of local producer equals:

$$q_h^* = \frac{2\alpha - 2\omega_1 - 4\tau - 4c + 2d - 5\delta c}{12\beta} \quad (4.21)$$

Then the equilibrium profit of FIE producer can be calculated as:

$$\pi_f^* = \frac{(2\alpha - 2\omega_1 - 4\tau - 4c + 2d + 7\delta c)^2}{144\beta} \quad (4.22)$$

Comparing (4.22) with (4.14), the profit of the FIE producer's under the benchmark case of local sourcing but no VTT, it is shown that vertical technology transfer to the local supplier is a dominant strategy for the FIE producer. And the more VTT, the more profit the FIE could benefit from it. Thus the FIE producer would like to maximise the technology transfer, which is denoted as $d = \delta c$.

Lemma 2: The FIE producer prefers transferring technology to its local supplier as much as possible if maximising profit is the sole administration goal.

The equilibrium profit of local producer equals:

$$\pi_h^* = \frac{(2\alpha - 2\omega_1 - 4\tau - 4c + 2d - 5\delta c)^2}{144\beta} \quad (4.23)$$

This time comparing (4.23) with (4.15), it is clear that the profit of the local producer increases with the appearance of FIE's VTT. If considering the competition between the FIE and local producers from the aspect of market segmentation by comparing the quotient of (4.20)/(4.21) under VTT with that of (4.12)/(4.13) under non-VTT, it is demonstrated that the market share of FIE's decreases with the increase of VTT. Both points above denote that as the rival of FIE producer, local producers could benefit from the VTT from FIEs to local suppliers.

Lemma 3: Local firms could benefit from the creation of backward linkages of FIEs in the same industry with local suppliers in the upstream industry if VTT provided by FIEs exists.

The result is intuitive. The local producer will benefit as well from lower cost (or higher quality) of inputs provided by the local supplier if the local supplier benefit from the VTT provided by the FIE producer. It is called as

“indirect horizontal spillover” (noting that it has been empirically analysed in the study one) since the spillover is from the FIE producer in the same industry and the transfer channel is indirect. This is consistent with the findings in study one that there exist “FDI indirect horizontal spillovers”. Be aware that the FIE producer still holds upper hand in the final product market both by profit and market share although its local rival is strengthened through the VTT.

Lemma 4: FIEs have to face a trade-off as follows. On one hand, FIEs benefit from cutting down the intermediate cost by providing VTT to their local suppliers; on the other hand, however, VTT by FIEs also indirectly benefits their local rivals.

The profit of local supplier in equilibrium equals:

$$\pi_s^* = \frac{(2\alpha - 2\omega_1 - 4\tau - 4c + 2d + \delta c)^2}{24\beta} \quad (4.24)$$

And the equilibrium degree of backward linkage (BL^B) under the case of local sourcing with VTT equals:

$$BL^B = Q_D^* = \frac{2\alpha - 2\omega_1 - 4\tau - 4c + 2d + \delta c}{6\beta} \quad (4.25)$$

Comparing both (4.24) with (4.16) and (4.25) with (4.17), the local supplier is better off when obtaining the VTT from the FIE customer. The intuition behind is simple: not only there is no cost for the local supplier to obtain VTT, but also the demand for its product can increase consequently.

Let us next examine the reactions of all firms in the host country when the FIE decides to abandon local sourcing but import intermediate input from foreign supplier.

4.5.3 Importing Intermediate

Now let us contend with the case that when FIE producer decides to import intermediate input from foreign supplier only but the linkage still exists between local producer and supplier. The focus will be the changes of the market structure both in upstream and downstream sectors because of the withdrawal of the FIE producer from local sourcing.

In this situation, the price the FIE pays for the intermediate will generally differ from the price paid by local producer since they have distinctively different suppliers, foreign supplier in the overseas supply market and local

supplier respectively. Let ω_f and ω_h denote the unit price of the intermediate paid by the FIE to its foreign supplier and that paid by the local producer to its local supplier. The biggest difference from previous analysis is in the intermediate supply side. For the purpose of simplicity, foreign supplier is assumed to use same input to produce intermediate as local supplier thus pay the same price of ω_1 for a unit of input. But it is also assumed that foreign supplier holds the cost advantage of δ over local supplier which is the same as the FIE producer over the local producer. In addition, foreign supplier has to pay income tax to foreign government by the rate of τ_f and import tariff to host government by the rate of t . Furthermore, as Rodriguez-Clare (1996) notes, producer services (such as banking, auditing, consulting, wholesale services, transportation, machine repair etc.) are non-tradable goods and proximity between suppliers and producers is convenient. Thus additional unit cost of ϕ is also considered in this case to cover the expenditure because of the possible inconvenience mentioned above. Then the marginal cost of production for the FIE producer and foreign supplier equals $\omega_f + \tau + (1 - \delta)c + \phi$ and $\omega_1 + \tau_f + t + (1 - \delta)c$ respectively. The Cournot competition in the final

product market yields the equilibrium output for both the FIE and local producer:

$$q_f' = \frac{\alpha + \omega_h - 2\omega_f - \tau - c + 2\delta c - 2\phi}{3\beta} \quad (4.26)$$

$$q_h' = \frac{\alpha + \omega_f - 2\omega - \tau - c - \delta c}{3\beta} \quad (4.27)$$

Rewriting the above two equations in terms of prices gives the derived demand curves for import intermediate and local intermediate respectively:

$$\omega_f = \frac{1}{2}(\alpha + \omega_h - \tau - c + 2\delta c - 2\phi - 3\beta Q_D^f) \quad (4.28)$$

$$\omega_h = \frac{1}{2}(\alpha + \omega_f - \tau - c - \delta c + \phi - 3\beta Q_D^h) \quad (4.29)$$

where Q_{Df} and Q_{Dh} denote the demand quantity for import and local intermediate respectively. Since only one foreign supplier is designed in the overseas supply sector, the aggregate quality of import intermediate supply $Q_{Sf} = q_{sf}$, where q_{sf} represents the output of the foreign supplier. The profit of foreign supplier is calculated as:

$$\pi_{sf}(q_{sf}) = q_{sf} [\omega_f(q_{sf}) - \omega_1 - \tau_f - t - (1 - \delta)c] \quad (4.30)$$

Calculating the first order condition over q_{sf} to maximise its profit can derive the equilibrium output of the foreign supplier:

$$q_{sf}' = \frac{\alpha + \omega_h - \tau - 2\tau_f - 2\omega_1 - 2t - 3c + 4\delta c - 2\phi}{6\beta} = Q_{sf}' \quad (4.31)$$

Then solving the equilibrium between demand and supply of import intermediate ($Q_{Df}' = Q_{sf}'$) yields the equilibrium price of import intermediate:

$$\omega_f' = \frac{\alpha + \omega_h + 2\omega_1 - \tau + 2\tau_f + 2t + c - 2\phi}{4} \quad (4.32)$$

Similarly, the equilibrium price of local intermediate can be derived:

$$\omega_h' = \frac{\alpha + \omega_f + 2\omega_1 + \tau + c - \delta c - \phi}{4} \quad (4.33)$$

Solving (4.32) and (4.33) yields both the equilibrium import and local intermediate price as follows:

$$\omega_h^* = \frac{5\alpha + 10\omega_1 + 3\tau + 2\tau_f + 2t + 5c - 4\delta c - 6\phi}{15} \quad (4.34)$$

$$\omega_f^* = \frac{5\alpha + 10\omega_1 - 3\tau + 8\tau_f + 8t + 5c - \delta c - 9\phi}{15} \quad (4.35)$$

With the equilibrium price of intermediate ω_h^* and ω_f^* , the equilibrium

production quantity of both FIE producer and foreign supplier is easily calculated:

$$q_f^* = q_{sf}^* = \frac{10\alpha - 10\omega_1 - 6\tau - 14\tau_f - 14t - 20c + 28\delta c - 18\phi}{45\beta} \quad (4.36)$$

Similarly, the equilibrium production quantity of both local producer and local supplier equals:

$$q_h^* = q_{sh}^* = \frac{10\alpha - 10\omega_1 - 24\tau + 4\tau_f + 4t - 20c - 8\delta c + 3\phi}{45\beta} \quad (4.37)$$

Then the equilibrium profit of the FIE producer is calculated as:

$$\pi_f^* = \frac{4\alpha - 4\omega_1 - 6\tau - 2\tau_f - 2t - 8c + 4\delta c}{9} \times q_f^* \quad (4.38)$$

The equilibrium profit of local producer:

$$\pi_h^* = \frac{4\alpha - 4\omega_1 - 6\tau - 2\tau_f - 2t - 8c + 4\delta c + 3\phi}{9} \times q_h^* \quad (4.39)$$

The equilibrium profit of local supplier:

$$\pi_{sh}^* = \frac{5\alpha - 5\omega_1 - 12\tau + 2\tau_f + 2t - 10c - 4\delta c - 6\phi}{15} \times q_{sh}^* \quad (4.40)$$

And the degree of backward linkage (BL^I) under the case that the FIE

producer import intermediate from foreign supplier:

$$BL^I = \frac{10\alpha - 10\omega_1 - 24\tau + 4\tau_f + 4t - 20c - 8\delta c + 3\phi}{45\beta} \quad (4.41)$$

Since the equilibrium profit of the FIE under all three regimes (local sourcing with non-VTT, local sourcing with VTT, and importing) has been derived, it is now in a position to describe the sub-game perfect equilibrium in the second stage of the entire game.

4.5.4 Second Stage Equilibrium

Based on the three sub-games studied above, it is identified that the sub-game perfect equilibrium of the sourcing game depends on the comparison of π_f^B , π_f^V and π_f^I . Because $\pi_f^B < \pi_f^V$, together with Lemma 2, 3 and 4, the following results can be concluded:

Proposition 2: The FIE producer would always prefer providing VTT to its local supplier, but the extent of VTT would depend on its strategy towards the market segmentation and the competition with local rival.

Regarding the choice between local sourcing and importing, Lemma 5 is

concluded.

Lemma 5: The sub-game perfect Nash equilibrium of the sourcing game is local sourcing or importing, depends on whether or not $\pi_f^I < \pi_f^V$.

The basic trade-off faced by the FIE producer is as follows. As what has been rectified by now, there are two advantages to local sourcing. First, the proximity to supplier would be convenient to the production process and reduces the cost of the FIE. Second, through vertical technology transfer the FIE could further reduce the input cost. The disadvantage of local sourcing over importing is that it would be hard for the FIE to prevent its local rivals reaping the benefit from the “VTT leakage” as what has been proved in study one, but this can be precluded by importing input from foreign supplier while abandoning local sourcing. Depending on the host government policies and other parameters value, either sourcing mode can be optimal for the FIE producer. From previous analysis, it is obvious that local sourcing is preferred by the host country. Now that the conditions that imply equilibrium decisions for all firms under three cases in the second stage game has been specified, the first stage game will be solved to derive the optimal policies for the host

government.

4.6 Government Optimal Policies

It is assumed that maximising the total welfare of the host country (noted as W) is the main basic objective of the host government although some political sub-objectives may co-exist such as the long term development of local firms and the promotion of FIEs' local sourcing etc.

Host country total welfare W is the sum of consumer's surplus, local firms' production surplus and host government's revenue of import tariff and income tax:

$$W = \int_0^{Q^*} P(Q) dQ - P^* Q^* + \pi_s^* + \pi_h^* + \tau(q_h^* + q_s^* + q_f^*) + tq_{sf}^* \quad (4.42)$$

Using the equilibrium results (4.34)-(4.40) under the case of importing, the total welfare W^I can be calculated. As discussed above, in this model τ and t are the policy tools that the host government could implement to impact the behaviours of the firms in the host country. The feasible policy strategy should be the combination of (τ, t) that can maximise the total welfare of the host

country W^I .

Calculating the first order condition of W^I over tax rate τ with the given t , we can have the most feasible industrial policy as a policy combination with each international trade policy imposed by the host government:

$$\tau = \frac{-125\alpha + 46\delta c + 125\omega_1 - 68t - 23\tau_f + 250c}{132} \quad (4.43)$$

The key point shown in the above equation is that the optimal tax rate τ decreases in import tariff t , which denotes that if the host government employs a tighter international trade policy by increasing import tariff, it will be better off if there is a looser industrial policy imposed by reducing tax rate. Seemingly the host government could urge the FIE producer to source intermediate from local supplier solely by imposing high import tariff; however, from equation (4.43) it becomes logical that without considering an appropriate correspondent adjustment on the tax rate it would inevitably hurt the total welfare of the host country.

Proposition 3: Host government has to keep a balance between its international trade and industrial policies.

4.6.1 Effect of the Host Government Policies on FIE's Sourcing Choice

As claimed in Lemma 5, the sub-game perfect Nash equilibrium of the sourcing game is local sourcing or importing, depending on whether or not $\pi_f^I < \pi_f^V$. In other words if $\Delta > 0$ (let $\Delta = \pi_f^V - \pi_f^I$), the FIE would prefer local sourcing; on the contrary if $\Delta < 0$ the FIE would choose to import intermediate input. And the lower is Δ , the higher possibility the FIE chooses to import. Counting on parameter values, either sourcing choice can be optimal for the FIE producer. To further explore the impact of the government policies on a FIE's sourcing choice, I will try to simplify the model and focus the spotlight on the interaction between the FIE's sourcing choice and the host government's policies.

It is assumed that the only objective the FIE holds in the host country is to maximise profit, thus as claimed in Lemma 2 when the FIE source intermediate locally it will transfer technology to its local supplier as much as possible so that $d = \delta c$. The foreign supplier is assumed to be under the system of

refunding taxes on exported goods so that $\tau_f = 0$.

From (4.43), we can derive the feasible policy combination of (τ, t) as follows:

$$\tau = \frac{-125\alpha + 46\delta c + 125\omega_1 - 68t + 250c}{132} \quad (4.44)$$

Calculating the first order partial differential equation of Δ over import tariff t , we can have

$$\frac{\partial \Delta}{\partial t} = \frac{32t + 53624(\alpha - \omega_1 - 2c) - 37016\delta c}{156816\beta} \quad (4.45)$$

The sign of $\frac{\partial \Delta}{\partial t}$ denotes the orientation of the FIE's sourcing choice to the adjustment of import tariff t . If $\frac{\partial \Delta}{\partial t} > 0$, the increase of import tariff t would increase the FIE's profit under local sourcing while decrease its profit under importing, thus lead the FIE to choose local sourcing; vice versa, if $\frac{\partial \Delta}{\partial t} < 0$ the increase of import tariff would lead the FIE to choose importing. Let

$$k = \frac{4627\delta c - 6703(\alpha - \omega_1 - 2c)}{4} \quad (4.46), \text{ then if } t > k, \frac{\partial \Delta}{\partial t} > 0; \text{ while if}$$

$t < k, \frac{\partial \Delta}{\partial t} < 0$. Apparently, the reaction of FIE's local sourcing potential to the change of host government policy t depends on the value of k .

●If $k < 0 \Rightarrow t > k \Rightarrow \frac{\partial \Delta}{\partial t} > 0$ (Note that the optimal import tariff is restricted in the sense of $t > 0$)

●If $k > 0$ and $t > k \Rightarrow \frac{\partial \Delta}{\partial t} > 0$

while $t < k \Rightarrow \frac{\partial \Delta}{\partial t} < 0$

From (4.46) we can find that the sign of k mainly depends on the value of δ and α relative to other parameters, suppose that δ denotes the technology advantage of the foreign firm over local firm and α denotes the market size of the host country. In the situation that the market size of the host country is small and the technology gap between local firm and foreign firm is large, wherein k will be higher than zero, then how the FIE makes sourcing choice will depend on whether $t > k$ or not. This result is different from general notion and need to be noticed in practice. In practice increasing import tariff used to be employed by the host government as a most convenient tool to promote FIEs' local sourcing. But the finding of this model tells us that this tool may not work and it depends on various factors such as the technology gap between local firm and foreign firm as well as the market size of the host

country.

Lemma 6: If the situations that the market size of the host country is small and foreign firms hold large technology advantage over local firms, the host government should employ very tight international trade policy like high import tariff to guarantee this policy works.

Proposition 4: How the FIE makes sourcing choice in accordance with the adjustment of import tariff by the host government will depend on the economy position of the host country such as its market size, technology gap and the development of local firms.

4.6.2 Local Firms' Development and FIEs' Sourcing Choice

It is widely accepted that the improvement of local firms will promote local sourcing of FIE's. In this model it means that reducing the technology gap of local firms from foreign firms could increase the FIE's local sourcing propensity in this model. Now let us investigate whether the development of local firms could affect FIEs' sourcing choice. Calculating the first order partial differential equation of Δ over technology gap δ can have

$$\frac{\partial \Delta}{\partial \delta} = \frac{43849c^2\delta - 102301c(\alpha - \omega_1 - 2c) - 18508ct}{78408\beta} \quad (4.47)$$

The sign of $\frac{\partial \Delta}{\partial \delta}$ denotes the orientation of the FIE's sourcing choice to the technology improvement of local firms (lowering δ). If $\frac{\partial \Delta}{\partial \delta} > 0$, the decrease of technology gap δ would decrease the FIE's profit under local sourcing while increase its profit under importing, thus induce the FIE to choose importing; vice versa, if $\frac{\partial \Delta}{\partial \delta} < 0$ the decrease of technology gap would lead the FIE to choose local sourcing. Let $m = \frac{18508t + 102301(\alpha - \omega_1 - 2c)}{43849c}$ (4.48), then if $\delta > m$, $\frac{\partial \Delta}{\partial \delta} > 0$; while if $\delta < m$, $\frac{\partial \Delta}{\partial \delta} < 0$. Thus the reaction of the FIE's local sourcing potential to the technology improvement of local firms depends on the comparison between the values of δ and m .

● If $m \geq 1 \Rightarrow \delta < m \Rightarrow \frac{\partial \Delta}{\partial \delta} < 0$ (Note that the technology gap δ is restricted as $0 \leq \delta < 1$ in this model)

● If $m < 1$ and $\delta > m \Rightarrow \frac{\partial \Delta}{\partial \delta} > 0$

while $\delta < m \Rightarrow \frac{\partial \Delta}{\partial \delta} < 0$

Since the market size parameter α is usually substantial relative to other

parameters, the result of $m \geq 1 \Rightarrow \delta < m \Rightarrow \frac{\partial \Delta}{\partial \delta} < 0$ should hold in most cases so that the technology improvement of local firms could induce the FIE producer to source input locally as expected.

Lemma 7: Normally the technology improvement of local firms could induce the FIE producer to source input locally

However, it has to be admitted that the statement in Lemma 7 does not always hold. Thinking of an extreme situation, where the market size of the host country is very small, the import tariff is very low and the technology gap is huge ($\delta > m$), the above lemma would become invalid. This in conjunction with Lemma 6 and Lemma 7, derive the proposition as follows:

Proposition 5: The technology improvement of local firms' could induce FIEs to choose local sourcing, except that the host government persists in imposing low import tariff while neglecting the small size of the host market and the disadvantage of local firms' from foreign firms.

4.7 Conclusion

The model developed in this section contributes to the literature on FDI in two main aspects. First, while it is widely accepted that the policies imposed by the host government is an important factor that could affect the decision making of the FIEs in the host country, there are only few related case studies in place in previous literature. Through a dynamic game model, in this section this study theoretically investigated the impact of host government's policies on a FIE's sourcing choice. It is found that (1) the host government should make efforts to the development of local firms, which would not only benefit local firms to increase competition power when facing FIE rivals, but also attract more FIEs to source inputs locally; (2) the adjustment of the FDI policies imposed by host government needs to take into account the circumstance of the host economy; (3) the host government should keep a balance between its international trade policy and industrial policy.

The second contribution of this model lies in providing support from the theoretical side to the findings in Study One of current research. It is found that

(1) FIEs prefer providing vertical technology transfer to their local suppliers, but the extent of technology transfer depends on their strategies to the market segmentation and the competition with local rivals; (2) local firms including both suppliers and producers benefit from the spillovers of FDI if FIEs source inputs locally. Specifically, local suppliers in the upstream sectors benefit from vertical spillovers of FDI and local producers benefit from indirect horizontal spillovers of FDI even as rivals with FIEs. These theoretical findings are consistent with the empirical results in Study One (Chapter 2).

Chapter 5: Conclusions and Policy Implications

5.1 Chapter Preamble

This chapter seeks to review the main objectives of the research identified in Chapter 1 and summarises the findings of the research in the context of these objectives. It discusses whether the research objectives have been achieved and what the shortcomings are. It reviews the revolution of FDI policies in China and then discusses the extent to which the findings can be applied to the policy making practice in China in order to maximise the benefit from inward FDI. It finally identifies some key areas for further research.

5.2 Research Objectives Review

As stated in Chapter 1, there are four specific objectives that are initially proposed for current research.

- a) To investigate the existence of productivity externalities from FIEs to indigenous Chinese firms in China and to explore channels or mechanisms through which they could occur;
- b) To discover the possible determinants of the mechanisms that could induce positive productivity externalities from FIEs to indigenous Chinese firms;
- c) To examine the interaction between the host government and FIEs;
- d) To improve the existing FDI promotion tools and policies or develop new ones for policy makers in China to effectively maximise the benefit China could reap from FDI in the circumstances of globalisation and liberalisation.

The whole research process is strictly designed based on these objectives.

With two empirical studies and one theoretical study of the main body of this

thesis, all objectives are elaborated into details and met. Respectively, Objective a) is studied in Chapter 2; Objective b) is investigated in Chapter 3; Objective c) is examined in Chapter 4; and Objective d) is considered through all studies of current research.

5.3 Findings and Original Contributions

Using a self-collected panel data set of foreign and indigenous Chinese manufacturing firms from 1999 to 2003, Chapter 2 investigates whether productivity spillovers from FDI to indigenous Chinese firms exist and tries to uncover the FDI spillover channels. Different from the existing literature, this study incorporates a previously neglected channel of indirect horizontal externalities and what is believed to be a better measure of FDI Backward Linkage into the spillover channel system for the first time.

In addition to confirming the negative horizontal effect of FIEs' on indigenous Chinese firms in the same industry, Chapter 2 has empirically proven the importance of FDI Backward Linkage (FDI Linkage) to the development of indigenous manufacturing firms in China. First, the FDI Linkage could raise output of linked indigenous suppliers. Second, FDI Linkage could be powerful channels for diffusing knowledge and skills from FIEs to their indigenous suppliers. Another significant finding of Chapter 2 is that the FDI Linkage could even lead positive horizontal spillover to indigenous firms in the same industry ("Indirect Horizontal Externality"). In other words, the creation

of FDI Linkage could help offset the negative competition effect of FIEs' on indigenous firms in the same industry. It is worth noting that these empirical results are consistent with the theoretical findings in Chapter 4.

The heterogeneity of firms in terms of absorptive capacity is also given consideration in the study of Chapter 2. It is found that non-SOEs perform better than SOEs as the former have higher incentives to learn and imitate from FIEs in Chinese manufacturing industry. It is also found that indigenous exporting firms are more likely to benefit from FDI spillovers.

After confirming the importance of FDI Linkage, Chapter 3 involves analysing the determinants of FDI Linkage. This empirical study extends the existing findings by focusing on four issues that are likely to play an important role but neglected in previous literature, namely measure bias of the FDI Linkage, firm heterogeneity, linkage quality, and appropriate methodology. Firstly both two types of normally used measures of FDI Linkage may not accurately reflect the magnitude of a FIE's linkage with indigenous suppliers. It is argued that the findings through applying those traditional measures could be misleading. Therefore the main body of the empirical analysis will employ a

better measure of FDI Linkage. Secondly the unique data set, which includes panel information of 527 manufacturing FIEs from 2003 to 2005, allows me to reap the advantages of panel data analysis such as more accurate inference of estimation and controlling for individual unobserved heterogeneity etc⁴⁷. Thirdly the issue of linkage quality is considered in my analysis. To the best of my knowledge, it is the first time for empirical work to touch on this issue. Finally the application of the so-called “two-step fixed effect panel analysis procedure” makes the estimation of time-constant variables practicable while still benefits from the merits of panel fixed effect analysis.

With these exclusive features, it is believed the results of current research are more effective and creditable than ever. Several factors are empirically proven to be closely related to the creation of FDI Linkage. This could provide guidance to the FDI attracting policies implemented by Chinese government if the objective of creating FDI Linkage is brought on to the round table.

After the two empirical studies, Chapter 4 involves a theoretical study. As argued by Alfaro and Rodriguez-Clare (2003), most existing FDI research is

⁴⁷ For details, see Cheng Hsiao (2003).

deficient in a tight link to theoretical models, which results in some unpersuasive conclusions. Therefore, an analysis of the two-stage dynamic game model in Chapter 4 may shed light from theoretical side to the topic of FDI Linkage especially to those exclusive issues like “Indirect Horizontal Externality” that are addressed in the above two empirical studies. On the other hand, this theoretical model complements existing literature by investigating the interaction between FIEs and host government focusing on the creation of FDI Linkage. The findings are vital to the formulation of host country’s FDI administrating policies.

5.4 Policy and Managerial Implications

Besides the academic contribution of current research stated above, the findings have important managerial and policy implications as well.

5.4.1 Self-upgrading of Local Firms

While it has been proven empirically and theoretically in current research that backward linkages between FIEs and indigenous suppliers can improve the productivity of the indigenous manufacturing sector in a developing country, the tendency for FIEs to source inputs from indigenous suppliers essentially depends on the capabilities of indigenous suppliers.

To absorb and benefit more from such externalities, indigenous firms must have a certain level of technological capability and management skills. Local suppliers in developing countries have to compete against both overseas suppliers and global suppliers. The previous lower domestic market supplier standards in developing countries have to be replaced by international standards, putting a strong pressure on suppliers of parts and components to approach the new standards of price, quality and timely delivery. If the local

FIEs do not move fast in the upgrading direction or if the barriers of entry are insurmountable such suppliers will be replaced by imports or by the global-in-place suppliers mentioned above. Additionally, a commitment of top management to quality upgrading is also inevitable. As researched by Yoon (1994) and Belderbos et al. (2001), the “right attitude” is often regarded by some FIEs as more important character than the actual level of quality at any given point in time. Thus to facilitate indigenous Chinese firms to benefit from FDI Linkage, current research suggests:

- Indigenous Chinese firms in developing countries should not be short-sightedly putting a high premium on short-term profit only.
- The improvement of innovation and management skills should be highlighted.
- Flexible human resource management styles and stronger incentives to learn and imitate should be advocated by SOEs especially.
- Managers in indigenous Chinese firms should participate in foreign trade to get in touch with the newest technology in the world.

On the other hand, there should be sufficient policy support provided by Chinese government to promote FDI linkage. As illustrated in Chapter 4, by adjusting policy portfolio host government does be able to influence the behaviour of foreign firms' in the host country. But it should be emphasised that the influence could vary significantly from country to country, very much depending on the capability of the host government. There is extremely little that we can expect weak – or predatory – government can do to influence FIE activities or assist local suppliers. But how policy interventions may influence technology transfer and spillovers? This may be done by attracting more foreign investment; by ensuring an appropriate selection of FIE investments; and by developing local capabilities and absorptive capacities, so that the local firms can take advantage of the links with foreign investors.

Before moving onto discussing the FDI Linkage promoting practice, the following section will provide a brief historic review of China's FDI policies.

5.4.2 A Historic Review of China's Policy towards FDI

The history of China's policy toward FDI is one of careful experimentation

and management in an attempt to use FDI to simultaneously develop an export-led and import substitution strategy. The decentralized nature of Chinese administration has meant that some of these centrifugal tendencies have undermined certain aspects of the regulatory process. Over time, however, as the low-wage export-led strategy has run its limit, and as the Chinese government has broadened its liberalization strategy, China has attempted to attract a broader array of FDI, including joint ventures to serve the Chinese market. At the same time, the sources of investment have evolved from the Chinese Diaspora to a broader set of countries, including those in the U.S., Europe and Japan.

At the second session of the Fifth National People's Congress in July 1979, a joint ventures law was passed, granting foreign investment a legal status in China (Chen, 1996). In this initial period FDI was restricted to joint ventures in China's four special economic zones (SEZs) at the time (three in Guangdong province across the sea from Hong Kong (Shenzhen, Zhuhai (contiguous with Macao), and Shantou, and the fourth, Xiamen in Fujian Province, on the other side of the Straits of Taiwan) (World Bank, 1994). SEZs offered significant freedoms and advantages for foreign investors, including concessionary tax policies, exemption

from export duties and import duties for equipment, instruments, and apparatus for producing export products, and an easing of entry and exit formalities (Chen, 1997b). Pressure from other localities led the State Council in 1984 to extend economic freedoms similar to those of the SEZs to 14 additional “open” coastal cities, and in 1985 to the Yangtze and Pearl River Deltas as well as to a larger proportion of Fujian (World Bank, 1992).

Specific encouragement of FDI really began in 1986, with passage of the Wholly Foreign-Owned Enterprise Law, which, in addition to permitting wholly foreign-owned enterprises, also reduced fees for labour and land use, established a limited foreign currency exchange market for joint ventures, and extended the maximum duration of a joint-venture agreement beyond 50 years (Chen, 1996; Huang, 1998). These policy initiatives coincided with a broadening of the reach of China’s Open Door Policy to include the entire coastal zone in 1988, a shift that became known as China’s coastal development strategy. Open policies for FDI now extended to the entire coastal region, stressing two main goals: (1) to develop labour-intensive industry in the coastal area; (2) to base the production of these industries in labour intensive export processing of imported raw

materials (Chen, 1997d).

The next watershed came in 1992, when Deng Xiaoping gave his now famous “Spring Wind” speech endorsing continued market reforms and rapid growth in the context of a post-Tiananmen conservative backlash (Shirk, 1994), and the size of FDI flows into China soon accelerated, especially from industrialized countries. It was also at this time that the Chinese domestic market became more open to foreign firms (Cheng and Kwan, 2000), certainly a strong incentive for developed source countries trying to get around China’s strict import controls. There was somewhat of a rollback on FDI liberalization in 1994, primarily to cool an overheating economy and discourage FDI in real estate (Cheng and Kwan, 2000), but when the economy cooled down liberalization continued. In recent years, FDI policy has also focused on encouraging technologically-intensive investment, as authorities have begun treating FDI as a means for acquiring foreign technology versus importing complete sets of advanced equipment (UNCTAD, 2000).

Since the mid-1990s, China’s policy towards FDI can be at least partly evaluated in terms of its desire to join the World Trade Organization. This desire

can help to explain the Chinese Government's attempt to rollback some of the special privileges for foreign investors. The idea is that as authorities reduce tariffs, they will also reduce preferential treatment for foreign-invested enterprises (FIEs), but preferential income tax treatment is expected to continue (Chen, 1996). In that spirit the Chinese government announced the removal of duty-free status on capital goods imports by FIEs to begin in April 1996, a measure that was heavily qualified by grandfather clauses. Partly as a result, FDI fell off in 1996-97, and successful lobbying by FIEs as well as provincial officials eager for FDI is having some effect: it has since been announced that previous exemptions, such as exemption from import duties and value-added taxes on imports of equipment, have been restored (Henley, Kirkpatrick and Wilde, 1999; UNCTAD, 1999).

In sum, China's policy towards FDI was clearly designed to encourage export-oriented FDI, looking externally to draw on both inputs and markets, and granting well-defined freedoms and incentives to the FIE sector. Policymakers, by developing the coastal development strategy that afforded SEZ-like privileges to the entire coast of China, created a kind of gigantic export processing zone,

where free markets were defined not so much by geography but more by ownership (Naughton, 1996). It is also important to note that these liberalizing policies were in line with the government's own import substitution strategies, where FIEs and the limited free market in which they operated were largely separate from the centrally planned and inward oriented sector (Kueh, 1992). It is only recently as the size of the foreign-invested sector has continued to grow and sell to the domestic market that it has begun to exert important influences throughout the wider economy.

5.4.3 Linkage and Supplier Development Policies

As concluded through current research, to maximise the benefit from FDI and pursue the long term development of local economy, Chinese government needs to reconsider and to adjust their policy portfolio to the new reality.

The policies that are under consideration here are those that promote the creation of new backward linkages as well as the deepening and upgrading of existing linkages with the ultimate aim of upgrading the capabilities of local suppliers. They consist in fostering and supporting dense networks of suppliers

who can reliably deliver high-quality, low-cost parts and components. By doing this formerly import-intensive import-substitution industrialisation (ISI)-assembly industries as well as import-intensive export-oriented industrialisation (EOI)-assembly industries could be deepened. Owing to the shift to export-oriented industrialisation and the more opening of the economies in many developing countries, the focus is increasingly on local firms that serve as suppliers to export-oriented assemblers. Such policies must also address information and co-ordination problems, because it is not obvious that individual assembly companies (often MNC subsidiaries or joint ventures) by themselves organise local procurement networks encompassing domestic suppliers.

Linkage and supplier development policies must be seen in combination with related policy fields, in particular FDI promotion policies and local firm development policies. The objective of linkage and supplier development policies is to promote willing FIEs, capable local firms and effective linkages between them.

- First, China needs to attract foreign investors and in particular

investors that have a large linkage potential and/or it needs to upgrade existing FIE activities so that they are more conducive to linkage formation.

As proved in Chapter 3, inward FDI flows do not automatically result in dense backward linkages. The decision to source locally from domestic suppliers depends on a variety of factors. First, the presence of reliable and flexible local suppliers that can meet the requirements of buyers (cost, quality and timely delivery) is of crucial importance for linkage formation. The technological and managerial gap between foreign firms and local supplier enterprises is often referred to as the main obstacle for efficient backward linkage formation in developing countries. Second, even when efficient local suppliers are not present, FIEs may look for potential domestic suppliers and assist them in improving their capabilities. Third, some industries have a larger linkage potential than others. Linkages are typically low in process industries and high in industries where the production process is divisible into multi-stage activities using a variety of materials, components and parts. Fourth, market position and technological sophistication are important. FIEs in price-sensitive market

segments are more footloose and thus less likely to 'invest' in local embeddedness. Similarly, FIEs producing very specialised and advanced products have fewer processes and products to outsource in a developing country context. Fifth, corporate strategies matter. FIEs in the same industry may source their inputs differently. Domestic-market-oriented FIEs have generally more local links to suppliers than export-oriented FIEs but the links between the latter and local suppliers may be more efficient and competitive. Further local sourcing varies according to the home country and corporate culture, so that European, American and Japanese FIEs display differences in their sourcing behaviour. There may even be considerable differences among affiliates from the same country. Finally, local procurement also seems to be influenced by the size of affiliates, by the degree of affiliate autonomy, by the length of operation in the host country and by regional trade agreements (Battat et al., 1996; Dicken, 1998; UNCTAD, 2001a; Altenburg, 2002).

- Second, policies should aim at expanding the local supplier base by preparing them for partnerships and by supporting potential domestic supplier firms in such areas as technology upgrading, training and

financing so that they can exploit such partnerships to their own advantage.

Mutual self-interest and strong commitment of both parties as well as time may lead to formation of developmental linkages if the capability gaps are not too wide. Yet, policy and institutional support are needed to foster a wide base of capable suppliers, and policies can affect both the terms of local procurement and the willingness of FIEs to transfer knowledge and skills to local suppliers.

- Third, policies can enhance linkages and support technology transfer from affiliates to local suppliers (Altenburg, 2002).

Policy-makers may develop specific linkage policies by using 'harder' command and control measures or by using 'softer' policy instruments giving particular incentives or promoting co-operation efforts. The traditional linkage policies were mostly of the former mandatory kind. Thus, many developing countries have set high tariffs on imports on parts and components, and imposed local content requirements (LCRs) on FIEs with the aim of expanding local procurement and strengthening domestic supplier industries. However,

these measures did not necessarily promote local procurement because FIEs could also choose to internalise input production or source input from foreign suppliers located in the host country. In addition, more liberal investment rules and restrictions on the trade-related investment measures have undermined the LCR instrument (Battat et al., 1996; UNCTAD, 2001a).

As backward linkages no longer can be forced upon FIEs, 'softer' policy instruments should be considered by Chinese government. Promotion of co-operation is an often-used policy instrument. Many countries have introduced information provision and matchmaking services. The former consist of various kinds of data banks, listing potential partners for subcontracting, while the latter goes a step further organising seminars, factory visits and follow-up initiatives. Such matchmaking services could be conducted either by public officials or by consultants from private firms/private associations. Moreover, industrial estate policies may be organised so as to cluster supporting enterprises near large-scale assemblers. Finally, a range of policy measures that rest on economic incentives for FIEs could be helpful as well. Some countries have introduced tax incentives to promote backward

linkages. Others utilise special credit and guarantee schemes, subsidies or privileged public procurement to induce FIEs to give special training and technical assistance to their suppliers.

The above mentioned policy measures that focus predominantly on the extent of linkages are technical in orientation and tend to present linkages in a benign manner – reciprocity and co-operation. However, linkages are also about asymmetry, stratification and power. This aspect has been forcefully addressed in the FIE debate. Besides studying the circumstances under which one can expect FIEs to utilise local sourcing of inputs rather than import, FIE critiques have pointed to the quality of such linkages. One criticism being that FIEs tend to procure only inferior or low-level inputs (packing, simple components, cleaning services etc.) from domestic suppliers. Another being that subcontracting may have more or less beneficial effects on the supplier firm (in relation to earnings, risk sharing, continuity in orders, and transfer of product and process know-how) depending on the rationale behind subcontracting and the power relations between suppliers and principals. Therefore, linkage policy must also encompass the quality of supplier linkages.

5.4.4 From Policy Formulation to Policy Implementation

Policy content and policy instruments are one matter, policy choice, policy design and policy implementation are another. Policy choice is often constrained by the structural power of leading social groups and the organisational structure of the state but is also the result of the play of political forces and interests. Formulation of a coherent policy and the translation of policy objectives effectively into policy outputs and further on to outcomes is a complicated matter. Thus to generate a successful process from policy formulation over policy implementation to policy impact with specific reference to linkage and supplier development policies, the following issues have to be aware of.

First, it should be acknowledged that though the space for policy intervention has become more limited with the introduction of a new international policy framework (trade-related investment measures, TRIMs), there is still scope for pro-active linkage policies if policy-makers manage to use the options allowed within this framework. Specific linkage policy is one such measure. To be effective there must be 'a vision' about supplier development

through backward linkages, and this vision should be built upon a strong political commitment and be shared among all stakeholders. Further, it should be based on a clear, realistic and detailed understanding of the level of supplier development in China, of the needs of FIEs, of the scope of the windows of opportunity, and of the policy measures that will work in the particular context. In order to create stakeholder credibility, a medium/long-term policy perspective is required. Therefore, constantly shifting policy priorities may constitute a problem.

Second, and related, policies have to take into account the broader development strategies, the economic environment and the institutional setting in China. As far as policy coherence is concerned, linkage and supplier development policies have to be consistent with broader policies, such as FDI policies, technology policies, skill development policies and competition policies. FDI policies are of special importance; those which attract 'developmental' foreign investors with a high linkage potential or which affect upgrading of existing affiliates have direct relations with linkage formation. Finally, the broader economic policies and incentive environment must not undermine the

strategic use of backward linkages for supplier upgrading or work to the detriment of local firms. If policies generally discriminate against local firms; if tax policies include sales taxes that are levied on the full value of the products so that they have a cascading effect (not found in value added taxing systems); if investment promotion policies favour global suppliers, or if the overall business and incentive environment work against supplier development, it will be extremely difficult to successfully implement linkage policies or local firm development policies more broadly.

Third, and related, there is generally a strong need for well-conceived and coordinated linkage policies. Such policies must take the following into consideration: selecting a target group with a realistic potential for becoming suppliers; focusing on the most capable and committed domestic enterprises; avoiding support to suppliers that are assisted by large-scale assemblers anyway or supporting only additional assistance from the principal; avoiding assistance to local firms that are unaware of their problems - and thus unprepared for changing their business; and avoiding assistance to principal-subcontractor arrangements of a highly asymmetric and short-term nature.

Fourth, the institutional framework for policy formulation and implementation must be in place. Though semi-public organisations may perform much of the practical implementation, a relatively autonomous and strong coordinating agency is an important prerequisite for co-ordinated programming. When more ministries and agencies are involved contradictory initiatives arise, just as functional duplication and conflicting lines of authority often result in 'blocking', inconsistency in implementation or 'side-tracking' during the process of implementation. As a range of intermediate supporting institutions are involved there will thus be a strong call for coordination both at the level of programming and at the level of actual service delivery. Furthermore, policy failure tends to prevail if weak, low-status agencies staffed with a few, poorly paid and inexperienced officials are responsible for the actual implementation.

Fifth, public-private networks are needed in the process of policy design as well as in policy implementation. Linkage and supplier development is a complicated process, and in order to be effective in influencing the pace and direction of this process, the state must strongly involve the two other partners in the 'linkage triangle'. In relation to the FIEs, the point of departure must be

that they only participate if there are tangible or other benefits for them and if a close collaboration is established. In relation to the suppliers, high awareness and certain capabilities must be in place or be created. Suppliers may more easily be approached if they have organised themselves collectively and this may also strengthen their bargaining position VS FIEs (cf. the asymmetric power issue). In relation to local firms as would-be suppliers, the involved agencies must – in order to understand clients' changing needs and provide relevant services – maintain a close contact with clients (individual firms/networking firms).

Finally, in relation to the policy impact, it should be noted that even well-designed and well-implemented policy and institutional support might not have the expected impact. A global downturn, new modes of organisation of the MNC business or better investment opportunities and cheaper suppliers elsewhere may work against linkage formation, just as, for example, tax evasion considerations may keep potential suppliers (local firms) at a certain distance from the state and its support agencies. It may also be that even with supplier development support or local firm assistance programmes most/many local

suppliers (e.g. former domestic-market-oriented local suppliers) cannot live up to the required lower prices, higher standards, higher product quality and faster delivery. Therefore, due to structural forces they are – despite policy initiatives – replaced by import and/or foreign suppliers located in China.

5.5 Limitations and Future Research Agenda

There are at least two main topics that deserve further research to conduct upon:

- More research is needed enabling a better understanding to be shared a propos the effect of FDI on host countries. In particular, as far as the study in Chapter 2 is concerned, it would be useful to verify the findings by using data that allow for disclosing identification of individual firms as suppliers to multinationals rather than relying on an input-output table to measure interactions between sectors.
- While the theoretical model in Chapter 4 provides some interesting insights, it does make some compelling assumptions. In particular, the interaction among local suppliers can not be brought in to the scene since only one local supplier is designed in the model. Thus the model can be extended to allow for multiple local suppliers, and I speculate that the main conclusions would remain valid under such a setting.

In addition, the other sourcing choices of in-house production and local

sourcing from locally based FIEs are ruled out. Recall that in Chapter 3 I point out the possible four options for FIEs to source input: importing, in-house production, local sourcing from locally based FIEs or indigenous suppliers. Therefore, recognising all sourcing options of FIEs would be another standpoint of future research.

Appendix

QUESTIONNAIRE

It would be greatly appreciated if you could complete the following questionnaire and return it to:

Liaison Office
Henan Provincial Department of Commerce
41 Jingsan Road
Zhengzhou
450003

1. Name and professional address of respondent (optional)

2. Share of your input sourcing from indigenous Chinese firm out of the total input sourcing.

2003	
2004	
2005	

3. Share of your input sourcing from foreign firms in China out of the total input sourcing.

2003	
2004	
2005	

References

Aitken, B., A. Harrison and R. E. Lipsey (1996), "Wages and Foreign Ownership: A Comparative Study of Mexico, Venezuela and the United States," *Journal of International Economics*, Vol. 40, 345-371.

Aitken, Brian J. and Ann E. Harrison (1999), "Do domestic firms benefit from direct foreign investment? Evidence from Venezuela", *American Economic Review*, Vol. 89, 605-618.

Alfaro, L., A. Chanda, S. Kalemli-Ozcan and S. Sayek (2003) "FDI and Economic Growth, The Role of Local Financial Markets", *Journal of International Economics*, forthcoming.

Alfaro, Laura; Rodríguez-Clare, Andrés (2004), "Multinationals and Linkages: An Empirical Investigation". *Economia*, Vol. 4 Issue 2, p113-169

Altenburg, Tilman (2000), "Linkages and Spillovers between Transnational Corporations and Small and Medium-Sized Enterprises: Opportunities and Best Policies", in UNCTAD, *TNC-SME Linkages for Development: Issues-Experiences-Best Practices*, New York and Geneva: United Nations

Altenburg, Tilman (2002), "Transnational Corporation and the Development of Local Firms", *Proceedings of the 2002 Conference of the Association of Development Researchers in Denmark (FAU)*, Copenhagen.

Alvarez, I., J.P. Damijan, and M. Knell (2002), "Do Spanish firms get technology through FDI and trade?" Mimeo, University of Madrid.

Amin, A. & Malmberg, A. (1992), "Competing Structural and Institutional Influences on the Geography of Production in Europe", *Environment & Planning A*, Vol. 24, 401-416.

Andersson, Ulf, Mats Forsgren, & Ulf Holm (2002), "The strategic impact of external networks: subsidiary performance and competence development in the multinational corporation", *Strategic Management Journal*, Vol. 23, 979-96.

Antweiler, W. and D. Trefler (2000), "Increasing Returns and All that: A View from Trade", NBER Working Paper 2941.

Aoki, M., B. Gustafsson, & O. E. Williamson (1990), "The Firm as a Nexus of Treaties". London, Newbury Park, New Delhi: Sage.

Arellano, M. and O. Bover (1995), "Another Look at Instrumental Variable Estimation of Error-Components Model", *Journal of Econometrics*, Vol. 68, 29-52.

Atuallah, Ali, Tony Cockerill, & Le Hang (2003), "Inward foreign direct investment and economic growth in developing countries", Paper presented at UK Academy of International Business Annual Conference, Leicester.

Balasubramanyam, V. N., Salisu, M. and Sapsford, D. (1996), "Foreign Direct Investment and Growth in EP and IS Countries", *Economic Journal*, Vol. 106,

92-105.

Baltagi, Badi H. (2002), *"Econometric Analysis of Panel Data"*, New York: Joan Wiley and Sons.

Barkley, D. L. & McNamara, K. (1994), "Local Input Linkages: A Comparison of Foreign-owned and Domestic Manufactures in Georgia and South Carolina", *Regional Studies*, Vol.28(7), 725-737.

Baron, S. (1990), "Overcoming Barriers to Technology Transfer: Bridging the Cultural Gap between Industry and the National Laboratories will Require Persistence and Creativity, *Research Technology Management*", Vol.33(1), 38-43.

Barrell, R. and N. Pain (1999), "Domestic institutions, agglomerations and foreign direct investment in Europe", *European Economic Review*, Vol.43,925-934.

Barrios, Salvador and Eric Strobl (2002), "Foreign direct investment and productivity spillovers: evidence from the Spanish experience", *Weltwirtschaftliches Archiv*, Vol. 138, 459-481.

Barry, F. and Bradley, J. (1997), "FDI and Trade: the Irish Host-Country Experience," *Economic Journal*, Vol. 107, 1798-1811.

Bartlett, Christopher A. & Sumantra Ghoshal (1998), *"Managing Across Borders: the Transnational Solution"*, Boston, MA: Harvard Business School

Press.

Battat Joseph, Isaiah Frank and Xiaofang Shen (1996), 'Suppliers to Multinationals - Linkage Programs to Strengthen Local Companies in Developing Countries', Foreign Investment Advisory Service (FIAS) Occasional Paper 6.

Behrman, J & Wallender (1976), "Transfer of Manufacturing Technology within Multinational Enterprises", Mass Cambridge Ballinger, Cambridge

Belderbos, R., Giovanni, C. & Kyoji, F. (2001), "Backward Vertical Linkages of Foreign Manufacturing Affiliates: Evidence from Japanese Multinational", *World Development*, 29 (1), 189-208

Belkindas, Misha, Mustafa Dinc, and Olga Ivanova (1999), "Statistical Systems Need Overhaul in Transition Economies", *Transition*, Vol.10, The World Bank, Washington, DC.

Bernard, Andrew B. and J. Bradford Jensen (1999), "Exceptional exporter performance: Cause, effect, or both?" , *Journal of International Economics*, Vol. 47, 1-25.

Biersteker, T. J. (1978), "Distortion or Development: Contending Perspectives on the Multinational Corporation", Cambridge, MA: MIT Press.

Birkinshaw, Julian & Peter Hagstr m. (2000), "The Flexible Firm: Capability

Management in Network Organization". Oxford, New York: Oxford University Press.

Black, Sandra and Lynch, Lisa (1997), "How to compete: the impact of workplace practices and information technology on productivity", NBER working paper No.6120

Blalock, Garrick (2001), "Technology from Foreign Direct Investment: Strategic Transfer through Supply Chains", mimeo, Haas School of Business, University of California, Berkeley.

Blalock, Garrick and Paul Gertler (2003), "Technology diffusion from foreign direct investment through supply chain", Working paper, Cornell University.

Blomstrom, M. (1983), "Foreign Investment and Spillovers", Routledge London and New York.

Blomstrom, Magnus and Ari Kokko (1998), "Multinational corporations and spillovers", Journal of Economic Surveys, Vol. 12, pp.247-277.

Blomstrom, Magnus and Ari Kokko (2003), "The economics of foreign direct investment incentives", NBER working paper 9489.

Blomstrom, Magnus and Edward W.Wolff (1994), "Multinational Corporations and Productivity Convergence in Mexico," in W. Baumol, R. Nelson and E. Wolff (eds.) Convergence of Productivity: Cross-national Studies and Historical Evidence, Oxford: Oxford University Press.

Blomstrom, Magnus and Hakan Persson (1983), "Foreign Investment and Spillover Efficiency in an Underdeveloped Economy: Evidence from the Mexican Manufacturing Industry", *World Development*, Vol. 11(6), 493- 501.

Blomstrom, Magnus, Ari Kokko and Mario Zejan (2000), "Foreign Direct Investment: Firm and Host Country Strategies", Macmillan Press: London.

Borensztein, E., J. De Gregorio, and J- W. Lee (1998), "How Does Foreign Direct Investment Affect Economic Growth?", *Journal of International Economics*, Vol. 45, 115-135.

Branstetter, L. (2000), "Is Foreign Direct Investment A Channel of Knowledge Spillovers? Evidence from Japan's FDI in the United States", NBER Working 8015.

Bravo-Ortega, Claudio (2004), "Comment on "Multinationals and Linkages: An Empirical Investigation", *Economia*, Vol. 4 Issue 2, p113-169, 57p

Breathnach, M. & Daragh, K. (1999), " Multinationals, Subcontracting Linkages and the Innovative Performance of Indigenous Firms: Some Irish Evidence", the European Network on Industrial Policy International Conference, 9-10 December, Dublin.

Buchinski, M. (1998), "Recent advances in quantile regression models", *Journal of Human Resources*, Vol. 33, pp.88-126.

Buckley, P. J., Clegg, J. and Wang, C. (2002), "The Impact of FDI on the

Performance of Chinese Manufacturing Firms", *Journal of International Business Studies*, Vol.33(4), 637-655.

Buckley, P.J. & M. Casson (1976), "The Future of the Multinational Enterprise", Basingstoke: Macmillan.

Cantwell, J. (1989), *Technological Innovation and Multinational Corporations*, Oxford: Basil Blackwell.

Cantwell, J. (1995), "The Globalisation of Technology: What Remains of the Product Cycle Model?", *Cambridge Journal of Economics*, Vol.19, 155-174.

Carkovic, M. and R. Levine (2002), "Does Foreign Direct Investment Accelerate Economic Growth?", University of Minnesota, Working Paper.

Carrillo, J. (2001), "Foreign Direct Investment and Local Linkages: Experiences and the Role of Policies: The Case of the Mexican Television Industry in Tijuana", UNCTAD, Geneva, United Nations

Casson, M. & Wadeson, N. (1998), "Communication Costs and the Boundaries of the Firm", *International Journal of the Economics of Business*, Vol.5(1), 5-27

Casson, Mark (2000), "Economics of International Business: a New Research Agenda", Cheltenham: Edward Elgar.

Caves, R.E. (1974), "Multinational Firms, Competition and Productivity in Host-Country Markets", *Economica*, Vol.41, 176-93

Caves, Richard E. (1996), "Multinational Enterprise and Economic Analysis. Second Edition", Cambridge: Cambridge University Press.

Chen, Chunlai (1996), "Recent Developments in Foreign Direct Investment in China." The University of Adelaide Chinese Economy Research Unit Working Paper No. 96/3.

Chen, Chunlai (1997a), "Foreign Direct Investment and Trade: An Empirical Investigation of the Evidence from China." The University of Adelaide Chinese Economics Research Centre Working Paper No. 97/11.

Chen, Chunlai (1997b), "The Composition and Location Determinants of Foreign Direct Investment in China's Manufacturing", The University of Adelaide Chinese Economics Research Centre Working Paper No. 97/13.

Chen, Chunlai (1997c), "Comparison of Investment Behaviour of Source Countries in China." The University of Adelaide Chinese Economics Research Centre Working Paper No. 97/14

Chen, Chunlai (1997d), "The Evolution and Main Features of China's Foreign Direct Investment Policies", The University of Adelaide Chinese Economics Research Centre Working Paper No. 97/15.

Chen, E.K.Y. (1983), "Multinational Corporations, Technology and Employment", Macmillan, London.

Chen, H.M. and Chen, T.J. (1998), "Network Linkages and Location Choices in

Foreign Direct Investment”, *Journal of International Business Studies*, Vol.29(3), 445-468.

Cheng, Hsiao (2003), *“Analysis of Panel Data second edition”*, Cambridge University Press

Cheng, Leonard K. and Yum K. Kwan (2000), “The Location of Foreign Direct Investment in Chinese Regions. Further Analysis of Labor Quality,” in Takatoshi Ito and Anne O. Krueger (eds.) *The Role of Foreign Direct Investment in East Asian Economic Development*. Chicago and London: University of Chicago Press.

Coase, Ronald H. (1937), "The Nature of the Firm", *Economica N.S.*, Vol.4, 386-405.

Cohen, B. (1973), "Comparative Behavior of Foreign and Domestic Export Firms in a Developing Economy", *Review of Economics Statistics*, Vol.55, 190-197.

Crone, M. and Watts, H.D. (2003), “The Determinants of Regional Sourcing by Multinational Manufacturing Firms: Evidence from Yorkshire and Humberside, UK”, *European Planning Studies*, Vol.11(6)

Crone, Mike & Stephen Roper (2001), "Local learning from multinational plants: Knowledge transfers in the supply chain", *Regional Studies*, Vol.35(6), 535-48.

Crowley, M. (1996), "National Linkage Programme: Final Evaluation Report",
Dublin: Industry Evaluation Unit

Csaki, Gyorgy (2001), "From Transition to Integration: FDI Inflows into
Hungary, a Success Story of the Hungarian Transition," mimeo, Budapest
College of Management.

Culverwell, M. (2000), "The Mining Cluster in Antofagasta: Integration Small
and Medium Suppliers into the Productive Chain", mimeo, Judge Institute of
Management Studies, Cambridge, University of Cambridge.

Cynn, J. W. (1999), "The Political Economy of Technical Learning: A Case
Study of Korea's Electronic Industry', University of Oxford, unpublished
dissertation mimeo.

Dicken, P., Forsgren, A. and Malmberg, A. (1994), "The Local Embeddedness
of Transnational Corporations", in Amin, A. & Thrift, N. (eds) *Globalization,
Institutions and Regional Development in Europe*, pp.23-45, Oxford, Oxford
University Press.

Dicken, Peter (1998), "*Global Shift - Transforming the World Economy*", third
edition, London: Paul Chapman/SAGE.

Dixit, Avinash and Joseph E. Stiglitz (1977), "Monopolistic Competition and
Optimum Product Diversity", *American Economic Review*, issue 67, pp. 297-308.

Djankov, Simeon and Bernard Hoekman (2000), "Foreign Investment and Productivity Growth in Czech Enterprises", *World Bank Economic Review*, Vol.14, pp.49-64.

Dobson, W., and Chia, S.Y., (eds.) (1997), "Multinationals and East Asian Integration", Singapore: Institute of Southeast Asian Studies.

Dolan, C. and Humphrey, J. (2000), "Governance and Trade in Fresh Vegetables: the Impact of UK Supermarkets on the African Horticulture Industry", *Journal of Development Studies* Vol. 37(2), 147-176.

Dries, L. and Swinnen, J. F. M. (2004), "Foreign Direct Investment, Vertical Integration, and Local Suppliers: Evidence from the Polish Dairy Sector", *World Development* Vol. 32(9): 1525-1544.

Driffield, N. (2000), "Regional and industry level spillovers from FDI", NIESR conference on inward investment.

Driffield, N. and K. Taylor (2001), "FDI and the labour market: a review of the evidence and policy implications", *Oxford Review of Economic Policy*, Vol.16, pp.90-103.

Driffield, N. and Moha, Noor, A.H. (1999), "Foreign Direct Investment and Local Input Linkages in Malaysia", *Transnational Corporations*, 8(3), pp.1-23.

Driffield, N., Munday, M. and Roberts, A. (2002), "Foreign Direct Investment, Transactions Linkages, and the Performance of the Domestic Sector",

International of the Economics of Business”, 9(3), pp.335-351.

Driffield, N., Noor, H.M. and Clarke, R. (2002), “Multinational Enterprises and Technological Effort by Local Firms: A Case Study of the Malaysian Electronics and Electrical Industry”, *The Journal of Development Studies*, 38(6), August, pp.129-141.

Dunning, J.H. & Narula, R. (1996), “The Investment Development Path Revisited: Some Emerging Issues”, in Dunning, J.H. & Narula, R. (eds) *Foreign Direct Investment and Governments: Catalysts for Economic Restructuring*, London, Routledge.

Dunning, J.H. (1993), *Multinational Enterprises and the Global Economy*, Reading: Addison-Wesley.

Dunning, J.H. (2000), "The eclectic paradigm as an envelope for economic and business theories of MNE activity", *International business review*, Vol.9, pp.163-190.

Dunning, John H. (1993). *The Governance of Japanese and U.S. Manufacturing Affiliates in the U.K.: Some Country-specific Differences*. In Kogut, Bruce, *Country Competitiveness: Technology and the Organizing of Work*. Oxford, New York: Oxford University Press.

Dyer, Jeffrey H. (1996). *How Chrysler Created an American Keiretsu*. *Harvard Business Review*, 74: 42-56.

- ECE (2001), *"Economic Survey of Europe 2001"*, New York and Geneva
- Eckel, C. (2003), "Does globalization lead to specialization?", manuscript, Department of Economics, University of G ttingen.
- Ellison, G. and E. Glaeser (1999), "The Geographic Concentration of Industry: Does Natural Advantage Explain Agglomeration?", *American Economic Review*, Vol.89, 311-316.
- Enright, Michael J. (2000), "Regional clusters and multinational enterprises: Independence, dependence, or interdependence?", *International Studies of Management & Organization*, Vol.30(2), 114-38.
- Ethier, W. (1982), "National and International Returns to Scale in the Modern Theory of International Trade", *American Economic Review*, Vol. 72, 389-405.
- Ethier, W.J. and Markusen, J.R. (1996) 'Multinational Firms, Technology Diffusion and Trade', *Journal of International Economics* 41(1-2) 1-28.
- Evans, Peter (1995), *"Embedded Autonomy, States and Industrial Transformation"*, Princeton, NJ: Princeton University Press.
- Evenett, Simon. J.and Alexandru Voicu (2001), "Picking Winners or Creating Them? Revisiting the Benefits of FDI in the Czech Republic?" mimeo, the World Bank.
- Fallick, B., C.A. Fleischman and J. B. Rebitzer (2003), "Job Hopping in Silicon Valley: The Micro-Foundations of a High Technology Cluster," mimeo.

Feenstra, R.C. (1994), "New Product Varieties and the Measurement of International Prices," *American Economic Review*, Vol.84, 157-177.

Findlay, R. (1978) 'Relative Backwardness, Direct Foreign Investment and the Transfer of Technology: a Simple Dynamic Model', *Quarterly Journal of Economics*, 92(1): 1-16.

Forsgren, M. & Johanson, J. eds (1992), *Managing Networks in International Business*, Philadelphia: Gordon and Breach.

Forsyth, D.J.C. (1972), "US Investments in Scotland", New York: Praeger.

Fosfuri A., M. Motta and T. Ronde (2001), "Foreign Direct Investment and Spillovers through Workers' Mobility", *Journal of International Economics*, Vol. 53, 205-222.

Fujita, M., P. Krugman and A.J. Venables (1999), "The Spatial Economy: Cities, Regions and International Trade", Cambridge: MIT Press.

Geng, Xiao (2004), "People's Republic of China's Round-Tripping FDI:Scale, Causes and Implications", *LAEBA working paper* No. 24

Gerschenberg, I. (1987), "The Training and Spread of Managerial Know-how: A Comparative Analysis of Multinationals and Other Firms in Kenya", *World Development* Vol. 15, 931-939.

Girma, S., D. Greenaway and K. Wakelin (1999), "Wages, Productivity and Foreign Ownership in UK Manufacturing," Working paper, Center for Research

on Globalisation and Labour markets, University of Nottingham.

Girma, Sourafel and Katharine Wakelin (2001), "Regional underdevelopment: Is FDI the solution? A semi-parametric analysis", Research paper from the internationalisation of economic policy programme, University of Nottingham, 2001/11.

Girma, Sourafel; David Greenaway and Katharine Wakelin (2001), "Who benefits from Foreign Direct Investment in the UK?", *Scottish Journal of Political Economy*, Vol. 48, pp.119-113.

Girma, Sourafel; Greenaway, David; Kneller, Richard (2004), "Does Exporting Increase Productivity? A Micro-econometric Analysis of Matched Firms", *Review of International Economics*, Vol. 12 Issue 5, p855-866

Giroud, Axele (2003), "Transnational Corporations, Technology and Economic Development: Backward Linkages and Knowledge Transfer in South East Asia", Cheltenham, Northampton: Edward Elgar.

Giroud, Axele L.A. and Mirza, Hafiz (2004), "Multinational Enterprises and Local Input Linkages in Southeast Asia", working paper, Bradford University.

Görg, H. and E. Strobl (2002), "Multinational Companies and Indigenous Development: An Empirical Analysis", *European Economic Review*, Vol. 46, 1305-1322.

Görg, H. and Greenaway, D. (2004) 'Much Ado about Nothing? Do Domestic

Firms Really Benefit from Foreign Direct Investment?' World Bank Research Observer 19(2): 171-197.

Görg, Holger and David Greenaway (2001), "Foreign direct investment and intra-industry spillovers: a review of the literature. GEP research paper 2001/37.

Görg, Holger and Eric Strobl (2001), "Multinational companies and productivity spillovers: A meta-analysis". Economic Journal, Vol. 111, pp.F723-F739.

Görg, Holger, and Frances Ruane (2000) 'An Analysis of Backward Linkages in the Irish Electronics Sector', Economic and Social Review, 31(3), 215-235.

Görg, Holger, and Frances Ruane (2001) 'Multinational Companies and Linkages: Panel-Data Evidence for the Irish Electronics Sector.' International Journal of the Economics of Business 8(1): 1 18.

Gow, H. and Swinnen, J. (1998) 'Agribusiness Restructuring, Foreign Direct Investment, and Hold-up Problems in Agricultural Transition', European Review of Agricultural Economics 25(4): 331-350.

Graham, Paul, Sally Thorpe and L. Hogan (1999): "Non-competitive market behaviour in the international cookery coal market". Energy Economics, Vol. 21, pp.195-212.

Greene, William H. (2000): Econometric Analysis. Fourth Edition. London:

Prentice Hall.

Griffith, Rachel (1999), "Using the ARD establishment level data to look at foreign ownership and productivity in the United Kingdom", *The Economic Journal*, Vol.109F, pp.416-442.

Griffith, Rachel and Helen Simpson (2003), "Characteristics of foreign-owned firms in British manufacturing", in R. Blundell, D. Card and R. Freeman (eds.), *Creating a Premier League Economy*, Chicago: Chicago University Press, forthcoming.

Griliches, Z. and J. Mairesse (1995), "Production Functions: the Search for Identification", NBER Working Paper 5067.

Grossman, G., and E. Helpman (1992), "Innovation and Growth in the Global Economy", Cambridge: MIT Press.

Gultom-Siregar, M. (1995). Indonesia. In Supapol, A.B., *Transnational Corporations and Backward Linkages in the Asian Electronics Industry*: UNESCAP.

Hackett, S.C., and Srinivasan, K. (1998). Are there spillovers from direct foreign investment? Evidence from panel data for Morocco. *Journal of Development Economics*, 42: 51-74.

Haddad, Mona and Ann Harrison (1993), "Are there positive spillovers from direct foreign investment? Evidence from panel data for Morocco", *Journal of*

Development Economics, Vol. 42, 51-74.

Halbach, A.J. (1989), "Multinational Enterprise and Subcontracting in the Third World: a Study of Inter-industrial Linkages", Multinational Enterprise Programme, Working Paper 58, Geneva, ILO

Halim, M.N., Roger, C. & Nigel, D. (2002), "Multinational Enterprises and Technological Effect by Local Firms: a Case Study of the Malaysian Electronics and Electrical Industry", The Journal of Development Studies, August, Vol.38(6), 129-141.

Hanson, Gordon H (2001), "Should countries promote foreign direct investment", G-24 Discussion Paper No.9, UNCTAD, Geneva.

Harris, Richard, Catherine Robinson (2001), "Productivity impacts and spillovers from foreign ownership in the united kingdom", mimeo, University of Durham.

Haskel, Jonathan E., Sonia C. Pereira and Matthew J. Staughter (2002), "Does inward foreign direct investment boost the productivity of domestic firms?", NBER working paper 8724.

Head, Keith (1998), "Comment on 'Comparing Wages, Skills, and Productivity between Domestically and Foreign-Owned Manufacturing Establishments in the United States'", in Baldwin, R., R. Lipsey and J.D. Richardson (eds.), Geography and Ownership as Bases for Economic

Accounting, Chicago University Press, pp. 255-258.

Helpman, E. and P. Krugman (1985), "Market Structure and Foreign Trade: Increasing Returns, Imperfect Competition, and the International Economy", Cambridge: MIT Press.

Henley, John, Colin Kirkpatrick and Georgina Wilde (1999), "Foreign Direct Investment in China: Recent Trends and Current Policy Issues." *The World Economy* 22(2): 223-43.

Hirschman, A. (1958), "The Strategy of Economic Development", New Haven: Yale University Press.

Holmes, T.J. (1995), "Localization of Industry and Vertical Disintegration", Federal Reserve Bank of Minneapolis, Staff Report No. 190.

Hood, N. & S. Young. (1979). *The Economics of Multinational Enterprise*. Singapore: Longman Publishers.

Hood, Neil, and Young Stephen. (2000). *The Globalization of Multinational Enterprise Activity and Economic Development*. Basingstoke: Macmillan Press Ltd.

Huang, Jr-Tsung (2004) 'Spillovers from Taiwan, Hong Kong, and Macau Investment and from other Foreign Investment in Chinese Industries', *Contemporary Economic Policy* 22(1): 13-25.

Huang, Yasheng (1998), "*FDI in China: An Asian Perspective*", Singapore: The

Institute of Southeast Asian Studies.

Hubert, F. and N. Pain (2001), "Inward investment and technical progress in the United Kingdom manufacturing sector", *Scottish journal of political economy*, Vol.48, pp.134-147.

Hummels, D. (1999), "Toward a Geography of Trade Costs", working paper, Purdue University.

Hummels, D. and P. Klenow (2002), "The Variety and Quality of a Nation's Exports," mimeo.

Humphrey, J. and H. Schmitz, 2002. "Developing Country Firms in the World Economy: Governance and Upgrading in Global Value Chains," INEF Report, No. 61, Duisburg: University of Duisburg.

IDE. (1994). *The Role of Japanese Direct Investment in Developing Countries: India, Indonesia, Taiwan*. Tokyo: Institute of Developing Economies.

Javorcik, Beata Smarzynska (2004), "Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers through Backward Linkages", *American Economic Review* Vol. 94(3): 605-627.

Johanson, J. & Mattsson, L.G. (1987), "Internationalization in Industry System: A Network Approach in Hood", N. & Vahlne, J.E. eds, *Strategies in Global Competition*, London, Routledge.

Johansson, J.K. (2003), *Global Marketing: Foreign Entry, Local Marketing &*

Global Marketing, 3rd ed, New York, McGraw- Hill/Irwin.

Joshi, Ashwin W ., Stump,Rodney L. (1999). The contingent effect of specific asset investments on joint action in manufacturer-supplier relationships: An empirical test of the moderating role of reciprocal asset investments, uncertainty, and trust. *Academy of Marketing Science Journal*, 27(3): 291-305.

Katayama, H., S. Lu and J. R. Tybout (2003), "Why Plant-Level Productivity Studies are Often Misleading, and an Alternative Approach to Inference", NBER Working Paper 9617.

Kearns, A. and Ruane, F. (2001), The tangible contribution of R&D spending by foreign-owned plants to a host region: a plant level study of the Irish manufacturing sector 1980-1996, *Research Policy*, 30, 227-244.

Keller, Wolfgang (2002), "International technology diffusion", NBER working paper 8573.

Key, N. and Runsten, D. (1999) 'Contract Farming, Smallholders, and Rural Development in Latin America: The Organisation of Agroprocessing Firms and the Scale of Outgrower Production', *World Development* 27(2), 381-401.

Kinoshita, Yuko (2001), "R&D and technology spillovers through FDI: Innovation and absorptive capacity", CEPR discussion paper DP2775.

Klaus, E.M. (2004), "Perspectives on Multinational Enterprises in Emerging Economies", *Journal of International Business Studies*, 10th, March, 2004

Klein, Benjamin, Crawford, Robert G. and Armen A. Alchian (1978), "Vertical Integration, Appropriable Rents, And The Competitive Contracting Process", *Journal of Law and Economics*, Vol. 21, pp.297-326.

Klenow, P. and A. Rodriguez-Clare (1997), "Quantifying Variety Gains from Trade Liberalization", mimeo.

Klette, T.J. and Forre, S.E. (1995), "Innovation and job creation in a small open economy: evidence from Norwegian manufacturing plants 1982-92, Research department of statistics Norway discussion paper No.159

Kobrin, J. (1991), "An empirical analysis of the determinants of global integration", *Strategic Management Journal*, 12, 17-31.

Kokko, A. (1994), "Technology, Market Characteristics and Spillovers," *Journal of Development Economics*, Vol. 43, 279-293.

Kokko, A., M. Zejan and R. Tansini (1994), "Trade Regime and Spillover Effects of FDI: Evidence from Uruguay", *Review of World Economics*, Vol. 137, 124-49.

Kokko, Ari, Ruben Tansini and Mario C. Zejan (1996), "Local Technological Capability and Productivity Spillovers from FDI in the Uruguayan Manufacturing Sector", *Journal of Development Studies*, Vol.32, pp.602-611.

Konings, J. (2001), "The effects of foreign direct investment on domestic firms: evidence from firm level panel data in emerging economies", CEPR discussion

paper 2586.

Krause, Daniel R. (2000). A structural analysis of the effectiveness of buying firms' strategies to improve supplier performance, *Decision Sciences*.

Krugman, P. R. and Venables, A. J. (1995) 'Globalisation and the Inequality of Nations', *Quarterly Journal of Economics* 110: 857-880.

Kueh, Y. Y. (1992), "Foreign Investment and Economic Change in China." *China Quarterly* 131: 637-90.

Kugler M (2000), "The diffusion of externalities form foreign direct investment: theory ahead of measurement", NBER working papers 7819.

Lall, S., (1993). *Transnational Corporations and Economic Development*. London: Routledge, United Nations Library on Transnational Corporations.

Lall, Sanjaya (1980), "Vertical Inter-Firm Linkages in LDCs: An Empirical Study", *Oxford Bulletin of Economics and Statistics*, Vol.42(3), 203 06.

Larrain, Felipe B., Luis F. Lopez-Calva and Andres Rodriguez-Clare (2000), "Intel: A Case Study of Foreign Direct Investment in Central America", Center for International Development Working Paper no. 58, Harvard University.

Lateef, A. (1997), "Linking up with the global economy: a case study of the Bangladore software industry", Discussion paper no Db-97-1997, International Institute of Labou Sudies.

Lever, W.F. (1974), "Manufacturing Linkages and the Search for Suppliers and Markets, in Hamilton", F.E.I. (Ed.) *Spatial Perspectives on Industrial Organization and Decision-making*, pp.309-334, London, John Wiley & Sons.

Li, X., Liu, X. and Parker, D. (2001), "Foreign Direct Investment and Productivity Spillovers in the Chinese Manufacturing Sector", *Economic Systems* Vol. 25(4), 305-321.

Lim, L.Y.C. & E.F. Pang. (1982). Vertical linkages and multinational enterprises in developing countries. *World Development*, 10(7): 585-95.

Lim, L.Y.C. & E.F. Pang. (1991). *Foreign Direct Investment and Industrialization in Malaysia, Taiwan and Thailand*. Paris: OECD Development Centre.

Lin, Ping and Kamal Saggi (2003), "Backward Linkages under Foreign Direct Investment", <http://gemini.econ.umd.edu/cgi-bin/conference/download.cgi?>

Lin, Ping and Kamal Saggi (2004), "Multinational Firms, Exclusivity, and the Degree of Backward Linkages" Lingnan University and Southern Methodist University. Photocopy.

Lindsey, C.W. (1986), "Transfer of technology to the ASEAN region by U.S. transnational corporations", *ASEAN Economic Bulletin* Vol. 3, 225-247.

Lipsey, R. E. (2002), "Home and Host Country Effects of FDI", NBER Working Paper 9293.

Lipse, R. E. and F. Sjöholm (2002), "Foreign Direct Investment and Indonesian Manufacturing Wages: An Analysis with Panel Data", NBER Working Paper 9417.

Lopez-Cordova, J.E. (2003), "NAFTA and Manufacturing Productivity in Mexico", Mimeo.

Maddala, G.S (1983), "Limited-dependent and Qualitative Variables in Econometrics", Cambridge: Cambridge University Press.

Markusen, J. (1995), "The Boundaries of Multinational Enterprises and the Theory of International Trade", *Journal of Economic Perspectives*, Vol.9, 169-89.

Markusen, James R. and Anthony Venables (1999), "Foreign direct investment as a catalyst for industrial development", *European Economic Review*, Vol. 43, pp.335-356.

McAleese, D. & McDonald, D. (1978), "Employment Growth and Development of Linkages in Foreign-owned and Domestic Manufacturing Enterprises", *Oxford Bulletin of Economics and Statistics*, Vol. 40, pp.321-339.

Melitz Marc J. (2003), "The impact of trade on intra-industry reallocations and aggregate industry productivity", *Econometrica*, Vol. 71 (6), p1695-1725

Moran, Theodore (2001), "Parental Supervision: The New Paradigm for Foreign Direct Investment and Development", Washington DC: Institute for

International Economics.

Morrison, A.J. and Roth, K. (1992), "A taxonomy of business-level strategies in global industries", *Strategic Management Journal*, 13, 399-418.

Moulton, Brent R. (1990), "An Illustration of a Pitfall in Estimating the Effects of Aggregate Variables on Micro Units," *Review of Economics and Statistics*, 72(2): 334-338.

Mucchielli, Jean-Louis and Liza Jabbour (2004), "Technology Transfer through Backward Linkages: The Case of the Spanish Manufacturing Industry", *ETSG working paper*.

Naughton, Barry (1995), "*Growing out of the plan. Chinese economic reform, 1978-1993*". Cambridge and New York: Cambridge University Press.

Naughton, Barry (1996), "China's Emergence and Prospects as a Trading Nation." *Brookings Papers on Economic Activity* 2: 273 – 344.

NDRC (2004), "China Investment Report 2004", National development and reform commission of China.

Nijman, T. and Verbeek, M. (1992), "Nonresponse in panel data: the impact on estimates of a life cycle consumption function", *Journal of applied econometrics*, 7, 243-257.

Nohria, N. & Carlos, G.P. (1991), "Global Strategic Linkages and Industry Structure", *Strategic Management Journal*, 12 (Special issue), pp.105-124.

O'Farrell, P.N. & O'Loughlin, B. (1981), "New Industry Input Linkages in Ireland: An Econometric Analysis", *Environment and Planning A*, 13(3), pp.285-308.

OECD (1996), *Technology and Industrial Performance: Technology Diffusion, Productivity, Employment and Skills, International Competitiveness*. OECD: Paris.

Olley S and A Pakes (1996), "The dynamics of productivity in the telecommunications equipment industry", *Econometrica*, Vol.64, pp.1263-1297.

O'Loughlin, B. and P.N. O'Farrell (1980), "Foreign Direct Investment in Ireland: Empirical Evidence and Theoretical Implications," *The Economic and Social Review* 11, 155-185.

Overman, H., S. Redding and A. Venables (2001), *The Economic Geography of Trade, Production and Income: A Survey of Empirics*, CEPR Discussion Paper No. 2978.

Pack, H. (1997), "The Role of Exports in Asian Development," in Nancy Birdsall and Frederick Jaspersen, ed., *Pathways to Growth: Comparing East Asia and Latin American*. Washington D.C.: Inter-American Development Bank

Pack, Howard and Kamal Saggi (2001), "Vertical technology transfer via

international outsourcing”, *Journal of development economics*, Vol.65, pp.389-415.

Pangestu, M., H. Soesastro, & M. Ahmad. (1992). A new look at intra-ASEAN economic co-operation. *ASEAN Economic Bulletin*, 8(3): 333-52.

Pavcnik, Nina (2002), "Trade Liberalization, Exit, and Productivity Improvements: Evidence from Chilean Plants", *The Review of Economic Studies*, Vol.69, pp.245-276.

Perez, T. (1997), "Multinational Enterprises and Technological Spillovers: an Evolutionary Model", *Journal of Evolutionary Economics* Vol. 7: 169 - 192.

Phelps, N.A. (1996), "Collaborative Buyer-supplier Relations and the Formation of Centralised Networks", *Ceoforum*, Vol.27, pp.393-407.

Phelps, N.A. (1997), *Multinationals and European Integration, Trade, Investment and Regional Development*, London, Jessica Kingsley and Regional Studies Association.

Porter, M.E. (1990), *The Competitive Advantage of Nations*, London, Macmillan.

Rasiah, R. (1995). Malaysia. In Supapol, A.B., *Transnational Corporations and Backward Linkages in Asian Electronics Industries: UN/ESCAP*.

Rauch, J.E. & Watson, J. (1996), "Starting Small in an Unfamiliar Environmen", *Department of Economics Discussion Paper 96-28*, California,

San Diego.

Reid, N. (1995), "Just-in-time Inventory Control and the Economic Integration of Japanese-owned Manufacturing Plants with the Country, State and National Economies of the United States", *Regional Studies*, Vol.29, pp.345-356.

Reuber, G. L., with Crookell, H., Emerson, M. and Gallais-Hamonno, G, (1973), *Private Foreign Investment in Development*, Oxford: Clarendon Press.

Rhee, Jong Wong and Therese Belot. (1990), "Export Catalysts in Low-Income Countries: A Review of Eleven Success Stories," World Bank Discussion Paper No. 72, Washington, DC.

Rhee, Y., Ross-Larson, B., Pursell, G. (1984), "Korea's Competitive Edge: Managing Entry into World Markets", Johns Hopkins Univ. Press, Baltimore.

Ritchie, B., Zhuang, L. and Whitworth, T. (2001), "Experiences of JV Companies in China: Management and Operational issues", in Thorp, R. and Little, S., *Global Change: The Impact of Asia in the 21st century*.

Rivera-Batiz, F. and L. Rivera-Batiz. (1990), "The effects of direct foreign investment in the presence of increasing returns due to specialization," *Journal of Economic Development*, 34(2): 287-307.

Rodriguez-Clare, A. (1993), *The Division of Labor, Agglomeration Economies and Economic Development*, Ph. D. Dissertation, Stanford University.

Rodriguez-Clare, Andres (1996), "Multinationals, linkages, and Economic

Development", *American Economic Review*, Vol.86, pp.852-873.

Rodrik, D. (1995), "Getting Interventions Right: How South Korea and Taiwan Grew Rich," *Economic Policy* 0, 53-97.

Rodrik, Dani (1999), *Making openness work: The new global economy and developing countries*, Washington DC: Overseas Development Council.

Rodrik, Dani. (1999), "The new global economy and developing countries: making openness work", Policy Essay nr. 24, Overseas Development Council; John Hopkins Univ. Press, Washington DC.

Rojec, M., J.P. Damijan, and B. Majcen (2000), "Export propensity of foreign subsidiaries in Slovenian manufacturing sector", IER working paper 9/2001.

Romer, P. M. (1990), "Endogenous Technological Change," *Journal of Political Economy* 98, S71-102.

Rousseeuw, P. J. and A. M. Leroy (1987): *Robust Regression and Outlier Detection*, John Wiley, New York

Rugman, A.M., Lecraw, D. J. & Booth, L.D. (1998), *International Business: Firms and Environment*, Singapore, McGraw-Hill Book Company.

Ruigrok, W. & Van, T.R. (1995), *The Logic of International Restructuring*, London, Routledge.

Ruigrok, W. & Van, T.R. (1995), *The Logic of International Restructuring*,

London, Routledge.

Saggi, K. (2002), "Trade, Foreign Direct Investment and International Technology Transfer: A Survey," *The World Bank Research Observer* 17, 191-235.

Saggi, Kamal (2001), "Trade, foreign direct investment, and international technology transfer: a survey", *World bank research observer*, Vol.17, pp.191-235.

Saggi, Kamal (2002): "Backward Linkages under foreign direct investment", Mimeo, Southern Methodist University.

Schachmann, K. & Fallis, P. (1989), "External Control and Regional Development within the Federal Republic of Germany", *International Regional Science Review*, Vol.12, pp.245-261.

Schmidt, Peter (1985), "Frontier production functions: a review", *Econometric Review*, 4, 353-355

Schoors, Koen and Bartoldus van der Tol (2001), "The productivity effect of foreign ownership on domestic firms in Hungary", mimeo, University of Gent.

Scott, K.J. & Enderwick, P. (2001), *The Degree of Linkage of Foreign Direct Investment in New Zealand Industry*, Wellington, Victoria University of Wellington.

Shirk, Susan L (1994), *How China Opened its Door: The Political Success of the*

PRC's Foreign Trade and Investment Reforms", Washington D.C.: The Brookings Institution.

Sivalingam, G. & S.P. Yong. (1993), TNCs and industrialization in Malaysia: organizational behaviour and local and regional impacts. *Regional Development Dialogue*, 14(4): 40-63.

Sjoholm, F. (1999), "Technology Gap, Competition and Spillovers from Direct Foreign Investment: Evidence from Establishment Data," *Journal of Development Studies* 36, 53-73.

Smarzynska-Javorcik, Beata and Mariana Spatareanu (2003), "To share or not to share: Does local participation matter for spillover from foreign direct investment?", World bank policy research working paper 3118.

Smarzynska-Javorcik, Beata K. (2004), "Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers through Backward Linkages", *American Economic Review*, Vol. 94, p.605.

Spar, D. (1998), "Attracting High Technology Investment: Intel's Costa Rica Plant," World Bank Occasional Paper 11.

Sung, Yun-Wing, "Costs and benefits of export-oriented foreign investment: The case of China"

Supapol, A .B. (1995). *Transnational Corporations and Backward Linkages in Asian Electronics Industries*. New York: UNESCAP: United Nations

Conference on Trade and Development, Economic and Social Commission for Asia and the Pacific. Monograph No. 5.

Tavares, Ana Teresa & Stephen Young. (2002). Sourcing patterns of multinational subsidiaries in Europe: testing the determinants. Paper presented at UK Academy of International Business Conference Proceedings, University of Central Lancashire, UK.

Toth, Istvan Janos and Andras Semjen (1999), "Market Links and Growth Capacity of Enterprises in A Transforming Economy: The Case of Hungary," in Istvan Janos Toth and Andras Semjen Market Links, Tax Environment and Financial Discipline of Hungarian Enterprises, Institute of Economics, Hungarian Academy of Sciences, Budapest.

Turok, I. (1993), "Inward Investment and Local Linkages: How Deeply Embedded is 'Silicon Glen'?", *Regional Studies*, Vol.27, pp.401-17.

Tybout, J. R. and D. M. Westbrook (1995), "Trade Liberalization and the Dimensions of Efficiency Change in Mexican Manufacturing Industries," *Journal of International Economics* 39, 53-78.

Tybout, J. (2001), "Plant and Firm Level evidence on "New" Trade Theories," NBER Working Paper 8418.

UNCTAD (1999), *World investment Report 1999: Foreign direct investment and the challenge of development*, United Nations: New York and Geneva.

UNCTAD (2000a), *The Competitiveness Challenge: Transnational Corporations and Industrial Restructuring in Developing Countries*, United Nations Publication, United Nations: New York and Geneva.

UNCTAD (2000b), *TNC-SME linkages for development: issues-experiences-best practices* (New York and Geneva: United Nations), United Nations publication, UNCTAD/ITE/TEB/1.

UNCTAD (2000c), *Investment Policy Review: Peru*, United Nations Publication, United Nations, New York and Geneva.

UNCTAD (2001a), *World Investment Report 2001: Promoting Linkages*, United Nations Publication, United Nations: New York and Geneva.

UNCTAD (2001b), *Trade and Investment Report*. New York: The United Nations.

UNCTAD (2005), *World investment report 2005: Transnational Corporations and the internationalisation of R&D*, New York and Geneva

UNCTAD (1981), *Transnational Corporation Linkages in Developing Countries: the Case of Backward Linkages via Subcontracting*, United Nations Centre on Transnational Corporation, New York.

Venables, A. J. (1996) 'Equilibrium Locations of Vertical Linked Industries', *International Economic Review*, 37: 314-59.

Weatherspoon, D. D. and Reardon, T. (2003), "The Rise of Supermarkets in

Africa: Implications for Agri-food Systems and the Rural Poor”, *Development Policy Review*, Vol. 21(3): 333-356.

Wei, Y. and Liu, X. (2001), *Foreign Direct Investment in China: Determinants and Impact*, Edward Elgar.

Wells, L. T. Jr. and A. Wint (2000), *Marketing a Country: Promotion as a Tool for Attracting Foreign Investment*, Foreign Investment Advisory Service, Occasional Paper No. 13, International Finance Corporation/Multilateral Investment Guarantee Agency, Washington, D.C.

White, H. (1980), “A Heteroscedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity”, *Econometrica*, 48, pp.817-838.

Williams, R. L. (2000): "A note on robust variance estimation for cluster-correlated data", *Biometrics*, Vol. 56, pp. 645-646.

Williamson, Oliver E. (1985). *The Economic Institutions of Capitalism*. New York: Free Press.

Williamson, Oliver E. (1991). *Comparative Economic Organization: The Analysis of Discrete Structural Alternatives*. *Administrative Science Quarterly*, 26: 269-96.

Wolff, Editors, *Convergence of Productivity: Cross-national Studies and Historical Evidence*, Oxford: Oxford University Press.

Wong, P.K. (1991). Technological Development through Subcontracting Linkages - A Case Study: Asian Productivity Organization, Faculty of Business Administration, National University of Singapore.

Wong, Poh-Kam. (1997). Creation of a Regional Hub for Flexible Production: the Case of the Hard Disk Drive Industry in Singapore. *Industry and Innovation*, 4(2): 183-206.

Wooldridge, Jeffrey M. (2002), *Econometric Analysis of Cross Section and Panel Data*, Cambridge (MA): The MIT Press.

World Bank (1992), "*China Strategies for Reducing Poverty in the 1990s*", Washington D.C.: World Bank.

World Bank (1994), "*China Foreign Trade Reform*", Washington D.C.: World Bank.

World Bank (1995), "The World Bank Development Report 1995, Workers in an Integrating World", Washington D.C., Oxford University Press, The World Bank.

Xia, Youfu and Lu, Yuebing (2001), "FDI and host country linkages: assessing the effectiveness and development impact of the policy measures: the case of the automobile industry in China", paper prepared for UNCTAD (Geneva:UNCTAD), mimeo

Xu, B. (2000), "Multinational enterprises, technology diffusion, and host

country productivity growth", Journal of development economics, Vol.62, pp.477-493.

Yoon, Heon-Deck (1994), "An evaluation of the contribution of transnational corporations to the development of backward linkages in the Korean electrical and electronics industries", Public Enterprise, 14,3-4, pp. 379-403.