



**TECHNOLOGY SPILLOVER THROUGH FOREIGN DIRECT INVESTMENT IN
DEVELOPING COUNTRIES: EVIDENCE FROM PATENT APPLICATIONS**

GELİŞMEKTE OLAN ÜLKELERDE DOĞRUDAN YABANCI YATIRIMLAR ARACILIĞI İLE
TEKNOLOJİ YAYILIMI: PATENT BAŞVURULARINDAN BULGULAR

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ÖZ

Doğrudan yabancı yatırımların (DYY) sürdürülebilir büyümedeki rolü, DYY'nin teknoloji transferini kolaylaştırması, istihdamı ve verimliliği artırması ve fiziksel ve beşeri sermaye birikimine yardım etmesi gibi pozitif dışsallıklarından dolayı yıllardır genişçe tartışılmıştır. Yine de, DYY yayılımlarını inceleyen çalışmalar; çalışmanın, örneklemelerin ve tahmin yöntemlerinin özelliklerine bağlı olan farklı sonuçlar sunmaktadır. Bu çalışmada, gelişmekte olan ülkelerde DYY aracılığı ile teknoloji yayılımı, 1996-2016 yıllarını kapsayan yıllık veriler kullanarak incelenmiştir. Ülkelerin kendilerine has özellikleri olduğu ve etkisini modele dahil etmek uygun görüldüğü için panel veri tekniklerinden sabit etkiler modeli bu çalışmada kullanılmıştır. DYY'nin ev sahibi ülkelerdeki teknolojik yayılımının temsili olarak yerel patent başvuru sayıları kullanılmıştır. Ayrıca massetme kapasitesi olarak da bilinen beşeri sermaye, ticarete açıklık ve finansal gelişmişlik gibi ev sahibi ülkelerin kabiliyetleri de DYY ve bu kabiliyetlerin ortak etkisini görebilme adına incelenmiştir. Ampirik bulgular, DYY'nin gelişmekte olan ülkelerde teknoloji yayılımı bakımından pozitif dışsallığa sahip olduğunu önermektedir. Bununla birlikte massetme kapasiteleri dikkate alındığında, DYY'nin beşeri sermaye ve finansal gelişmişlik ile olan ortak etkisi negatif bulunmuştur. Bu da ülkelerin DYY yayılımlarından pozitif bir şekilde yararlanabilmeleri için aşmaları gereken bir eşik seviyesinin varlığını göstermektedir.

Anahtar Kelimeler: Doğrudan Yabancı Yatırımlar, Teknoloji Yayılımı, Massetme Kapasitesi, Patent.

ABSTRACT

The role of foreign direct investment (FDI) in sustainable development has been widely debated for years since FDI is considered as a vehicle producing positive externalities such as easing technology transfer, increasing employment and productivity in local firms, and helping physical and human capital accumulation. Yet, studies analyzing FDI spillovers provide different results that rely on the characteristics of the studies, samples or estimation methodologies. In this study, technology spillover through FDI is examined in developing countries by utilizing annual data covering the period 1996-2016. Among panel data techniques fixed effects model is used in the study because country specific effects exist and it is favored to include these effects in model. Domestic patent applications are used as proxy of FDI spillover in host countries. Also, abilities of host countries such as human capital, trade openness and financial development, also known as absorptive capacities, are analyzed to see the simultaneous effect of FDI and these abilities. Empirical findings suggest that FDI has positive externalities in terms of technology diffusion in developing countries. When accounting for absorptive capacities, however, simultaneous effect of FDI - human capital and FDI - financial development is found negative. These circumstances refer to a threshold level that countries need to exceed to benefit from FDI spillovers positively.

Key Words: Foreign Direct Investment, Technology Spillover, Absorptive Capacity, Patent.

1. INTRODUCTION

Because of weak human and physical capital and poor technological knowhow, developing countries are generally not capable of benefiting from their natural resources. Hence, such international sources as development aid, portfolio flows, and foreign investment may make these countries enable to utilize their sources. In comparison with other international sources, foreign direct investment (FDI) may be more advantageous, since it provides the host country with a relatively more stable flow of funds, helps capacity augmentation, and increases employment and trade. It is also believed that FDI produces externalities in the form of technology transfers and spillovers and it may ease the transfer of technological and business knowhow to host countries. Thus, foreign investment may raise the productivity of all firms via transfers that may have substantial spillover effects for the entire economy (Zhao and Du, 2007: 71; Iamsiraroj and Ulubaşoğlu, 2015: 200; Carkovic and Levine, 2002: 1).

In this sense, especially developing countries have tried to attract FDI as a development strategy and impact of FDI on the host economy has become an important fact to be investigated by researchers. These investigations can be divided into two main categories as direct approach and indirect approach. Studies analyzing economic issues of FDI such as financial resources, capital formation, and tax relief are assessed in direct approach. In indirect approach, studies often concentrate on the interaction between foreign enterprises and host country abilities such as technology transfer and capability building, human resource development, monetary externalities (Salim et al. 2017: 207).

The idea suggesting that FDI has spillovers on host country is based on that foreign firms are technologically more superior than local firms are. The knowledge in foreign firms is transferred through their relations with local firms then productivity of local firms improves (Newman, 2015: 168).

In literature, there are several studies providing different results of the existence, the sign, and the magnitude of FDI externalities although the theoretical arguments are well established. Channels (also known as absorptive capacities) may cause these mixed results. These abilities of host country may have different impact, scopes, or link influencing local firms. An averaged impact of various channels and dimensions may scarcely reveal the underlying mechanism of spillovers from FDI (Lin and Kwan, 2016: 258; Masron et al., 2012: 1206).

Hence, it is worthwhile to analyze technology diffused by foreign investors especially in developing countries. However, FDI effects and spillovers rely on the some factors also known as absorptive capacities of host countries. Therefore, in this study, it is aimed to examine technology diffusion of FDI in developing countries by taking account of host countries' absorptive capacities such as human capital, trade openness, and financial development.

1.1. Spillovers From FDI

Developing countries strive for encouraging multinational enterprises (MNEs) to invest since they hope to generate technology externalities from FDI transfers. Technology is transferred across countries in several ways. For instance, new varieties of differentiated products or capital goods and equipment comprise international trade transfers. Also agreements, like licensing, may transfer technology by trade in intellectual property. Another kind of transfer is carried out by FDI via knowledge transfer from a foreign firm to a local partner. Of these possibilities, FDI is often considered to be the most attractive since it eases transfers of technologies that are otherwise difficult to obtain. From the MNE's perspective, the features of the technology itself and the characteristics of the host country such as education level of the workforce, labor skills, technology transfer requirements and competition specifies its prefer. MNEs prefer to keep an implicit technology in itself or it transfers sophisticated technology to an allied company rather than to another one. However, codifiability and teachability develop the feasibility of licensing. Hence, FDI is the preferred mode of transfer if firms attempt to extract rents from their technologies (Sinani and Meyer, 2004: 447).

The channels through which FDI spillovers can occur may be explained by five topics as demonstration/imitation, labor mobility, exports, competition, and backward and forward linkages with domestic firms (Crespo and Fontoura, 2007: 411).

First channel works as demonstration of foreign investor or imitation of domestic firms. Foreign investors may make domestic firms enable to imitate a new process or develop the quality of their products. Also, local firms may benefit from new professional services or suppliers that are conducted to by foreign firm entry (Gorodnichenko et al., 2014:955).

The second channel is mobility of workers. An employee who worked in foreign firm previously have the knowledge and experience of the technology of foreign firms. Domestic firms may hire this kind of worker being able to apply his/her experience in the domestic firms (Glass and Saggi, 2002: 496). Nonetheless, if foreign firms hire the best workers from domestic firms by offering higher wages a possible negative effect arises through this channel (Sinani and Meyer, 2004: 450).

Exports are a third channel. Foreign subsidiaries, which are a part of multinational enterprises, may have easier access to information on foreign markets. Such requirements as establishment of distribution networks, creation of transport infrastructures, and investment in advertising to gain public exposure, research about the foreign market to gain intelligence on consumers' tastes are considered a part of the cost of the exporting. These costs will be lower for multinational enterprises as they already have knowledge and experience of operating in foreign markets and can benefit from network economies and know-how of managing the international marketing, distribution and servicing of their products. Knowledge spilling out from multinational enterprises to domestic firms would constitute an information spillover (Greenaway et al., 2004: 1030).

The enhanced competition induced by foreign firms is a fourth channel of FDI spillovers. Domestic firms may utilize their resources and technology efficiently under the presence of competition in the domestic economy between foreign and domestic firms although this may restrict the market power of domestic firms. If foreign firms push the domestic firms to operate on a less efficient scale, efficiency of domestic firms may be influenced negatively through this channel (Crespo and Fontoura, 2007: 412).

A final channel considers two types of spillovers. One takes place through backward linkages once suppliers of intermediate inputs used by foreign invested firms are local firms. The other occurs via forward linkages where foreign invested firms sell intermediate inputs to domestic firms (Liu, 2008: 181).

2. DETERMINANT FACTORS OF FDI SPILLOVERS

At both microeconomic level and macroeconomic level, the concept of absorptive capacity has been expressed. The existence, sign, and magnitude of FDI externalities to domestic firms depend on various factors. These factors may be consisted of the characteristics of the foreign investment and the features of the host countries, sectors, and firms (Crespo and Fontoura, 2007: 412). Among these factors, the effects of some of the host country abilities are explained.

In principle, the level of human capital may have a substantial role on the technology spillover because it can ease the absorption of foreign technology. Common practice of technological spillovers through trade is reverse engineering. A high human capital stock may help local firms take advantage of the technological spillovers spilling out from foreign firm (Ruiz, 2007: 9).

In terms of support infrastructures, financial development may also be regarded as absorptive capacity. For instance, a well-developed financial system decreases the risks immanent in the investment made by domestic firms looking for imitating technologies of foreign firms. This may enable FDI spillovers to occur (Crespo and Fontoura, 2007: 413).

Trade policy of countries also affects avails from FDI. Much more FDI is attracted by an outward oriented regime, because the size of the domestic market is not a constraint. By making analogy, FDI spillovers may be negative under an import substitution regime (Crespo and Fontoura, 2007: 415).

3. LITERATURE REVIEW

Technology externalities are assessed at both micro and macro level and a precise result cannot be realized. In this regard, selected papers are provided in this section.

As an illustration of micro level study, Liu (2008) examines the technology diffusion of FDI on Chinese manufacturing firms. By utilizing data of 17,675 firms between 1995 and 1999, Liu finds that FDI spillovers decrease short-term productivity and increases long-term productivity of domestic firms.

Another firm level study conducted by Branstetter (2006) who tests whether FDI is a channel of knowledge spillovers for Japanese multinationals undertaking direct investments in the United State. Findings provided by firm level panel data set on Japanese firms' FDI and innovative activity suggest that FDI increases the flow of knowledge spillovers both from and to the investing Japanese firms.

However, the study carried out by Kinoshita (2000), may be an example of absence of FDI diffusion. Kinoshita explores R&D (innovation and learning) and technology spillovers from FDI on Czech manufacturing firms

by employing firm-level panel data covering the period 1995-1998. According to the results, evidence of technology spillovers to local firms from having a foreign joint venture partner is not found.

Sinani and Meyer (2004), explore the technology diffusion from FDI in Estonia between 1994 and 1999. Their findings suggest that the magnitude of the spillover effect depends on the characteristics of incoming FDI and of the recipient local firm. More specifically, spillovers vary with the measure of foreign presence used and are influenced by the recipient firm's size, its ownership structure, and its trade orientation.

With regard to macro or aggregate level studies, similar mixed results are available. For instance, Fujimori and Sato (2015) investigate the spillover effects from FDI in the Indian manufacturing industries by using aggregated panel data covering the period 1995–2004. Their findings report that the FDI stock increases the total factor productivity, especially through inter-industry effect.

Zhang (2017) uses 30 China provinces' data covering the period 2004-2012 to analyze spillover effects of FDI. Zhang finds that spillovers from foreign investment contribute positively to the performance of overall research activities although the productivity effects vary across regions.

Ruiz (2007) uses patent citations to measure technological diffusion and estimates the technology transfer made by US multinational enterprises to a set of eight particular countries over the period 1983-1997. Results indicate that FDI always generate positive technological spillovers in the host country, but the scope of these technological spillovers will be highly determined by the stock of human capital available in the economy.

Cheung and Lin (2004) carry out another article using patent applications as a measure of technology diffusion. They use provincial data from 1995 to 2000 to analyze the technology diffusion from FDI in China. According to their results, FDI has positive effects on the domestic patent applications in China. Moreover, their findings are robust under both different kind of estimation methods and different types of patent applications.

However, the study conducted by Salim et al. (2017) is contrast to these studies. They investigate the effect of technological capabilities of foreign firms on the relationship between FDI and technology spillover channels such as demonstration effect, training effect, collaboration effect, linkage effect and worker turnover by using a survey data, which was completed by 100 subsidiary units, based in Iran. The results of running logistic regression model on data from questionnaires show that FDI cannot affect spillover channels directly.

Among the studies analyzing the technology or knowledge diffusion from FDI, there are papers accounting for spatial impacts. For example, Lin and Kwan (2016) investigate the geographic extent of FDI technology diffusion and associated spatial diffusion in China by using a spatiotemporal autoregressive panel model. They report that the direct impacts of FDI presence to a specific location itself are likely to be negative. Domestic firms mainly benefit from FDI presence in their neighboring regions through knowledge spillovers that have wider geographic scope.

Iwasaki and Tokunga (2016), conduct a meta-analysis to examine the microeconomic impacts of FDI in Central and Eastern Europe and the former Soviet Union. Their findings reveal that both the effect size and the statistical significance of the productivity spillover effect of FDI are obviously lower than those of the direct effect caused by foreign participation in company management through ownership.

4. METHODOLOGY AND DATA

In this part of the study, data and econometric models used in the empirical analysis are introduced. Panel data estimations are conducted since different individuals exist in the same period.

To understand the effect of FDI on technology diffusion the following benchmark model is estimated.

$$\log(\text{patent})_{it} = \beta_0 + \beta_1 FDI_{it} + \theta AC_{it} + \alpha_i + \varepsilon_{it} \quad (1)$$

where for country i and time t , $\log(\text{patent})$ represents logarithm of domestic patent applications, FDI stands for the net FDI flows over GDP of host country, AC (absorptive capacities) is control variables matrix, α is country specific effect and ε is the error term. The control variable matrix AC is consisted of financial development, trade openness, and human capital due to the matters explained in section 2. Direct effect of FDI on patent applications is given by $\frac{\partial \log(\text{patent})}{\partial FDI} = \beta_1$ and this effect is expected to be greater than zero.

Cheung and Lin (2004) and Munteanu (2015) use patent applications as a proxy of knowledge and R&D spillover. Also as Cheung and Lin (2004), mention technology and knowledge spillovers are documented as R&D spillovers in the literature. So domestic patent applications are used as proxy of technology diffusion. By following the way of Al-Sadig (2013), broad money supply is used as financial development. Also, human

capital is represented by secondary schooling. All annual data covering the period 1996-2016 are collected from the World Bank.

Data used in this study, their descriptions and sources are reported in Table 1.

Table 1. Descriptions of Variables

Variable name	Variable Description
Patent	Domestic patent applications
FDI	Net FDI inflows as a percentage of host country GDP
Secondary schooling	Net rate of secondary school enrolment
Trade openness	The sum of exports and imports of goods and services measured as a percentage of GDP.
Financial development	Broad money supply as a percentage to GDP.

Source: <https://data.worldbank.org/>

Summary statistics of these variables are provided in Table 2.

Table 2. Summary Statistics of Variables

Variables	N	mean	sd	min	max
Log(patent)	1,924	5.590	2.685	0	13.78
FDI	3,791	5.652	17.44	-82.89	466.6
Secondary schooling	1,628	69.73	25.09	2.684	217
Trade openness	3,876	91.16	58.04	0.0269	860.8
Financial development	2,574	67.38	504.7	1.6172	18,347

Source: Author's own computation.

The objective of this study is to reveal the channels through which FDI externalities occur. Durham (2004) and Mingyong et al. (2006), added multiplication of FDI and absorptive capacity which they analyzed in order to examine simultaneous effect of FDI and related absorptive capacity variable. So to see the simultaneous effect of absorptive capacities (AC) and FDI, benchmark model is extended to the following equation by adding interaction terms.

$$\log(\text{patent})_{it} = \beta_0 + \beta_1 FDI_{it} + \gamma_1 AC_{it} + \gamma_2 AC_{it}^k * FDI_{it} + \alpha_i + \varepsilon_{it} \quad (2)$$

where for country i and time t, log(patent) displays logarithm of domestic patent applications, FDI stands for the net FDI flows over GDP of host country, AC is a matrix of absorptive capacity, α is country specific effect and ε is the error term. AC includes financial development, trade openness, and secondary schooling as human capital. Finally, k represents which AC is included to the model.

In this case, effect of FDI on domestic patent applications is given by $\frac{\partial \log(\text{patent})}{\partial FDI} = \beta_1 + \gamma_2 AC^k$. Moreover, as Cheung and Lin (2004) implement, one period lagged value of FDI is included to the model 1 and 2. So, following models are also estimated.

$$\log(\text{patent})_{it} = \beta_0 + \beta_1 FDI_{it-1} + \theta AC_{it} + \alpha_i + \varepsilon_{it} \quad (3)$$

$$\log(\text{patent})_{it} = \beta_0 + \beta_1 FDI_{it-1} + \gamma_1 AC_{it} + \gamma_2 AC_{it}^k * FDI_{it-1} + \alpha_i + \varepsilon_{it} \quad (4)$$

5. EMPIRICAL RESULTS

Estimation results report only fixed effects regressions since it includes country specific effects and this is an important fact in the estimation.

Model 1 and 2 are run for developing countries and results are shown in Table 3.

Table 3. Fixed Effects Estimation Results of Benchmark and Extended Models

VARIABLES	(1)	(2)	(3)	(4)
	Dependent variable: log(patent)			
FDI	0.0133* (0.00751)	0.0348*** (0.0133)	0.0215* (0.0114)	0.0233** (0.0100)
Human Capital	0.0182*** (0.00577)	0.0177*** (0.00575)	0.0173*** (0.00585)	0.0168*** (0.00584)
Trade Openness	-0.00494** (0.00227)	-0.00463** (0.00227)	-0.00423* (0.00239)	-0.00458** (0.00228)
Financial Development	0.00686** (0.00310)	0.00866*** (0.00322)	0.00824** (0.00342)	0.00926*** (0.00349)
FDI* Human Capital		-0.000391* (0.000201)		
FDI*Trade Openness			-4.60e-05 (4.81e-05)	
FDI*Financial Development				-6.92e-05 (4.65e-05)
Constant	3.382*** (0.351)	3.288*** (0.353)	3.282*** (0.367)	3.272*** (0.358)
Observations	380	380	380	380
R-squared	0.091	0.102	0.094	0.097

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Source: Author's own computation.

Table 3 reports estimation results of model 1 and 2. Results are close to theoretical expectations. FDI has a positive and statistically significant impact at conventional levels on patent applications. In addition, this effect is larger once FDI and AC's are interacted. Similar to FDI, human capital influences patent variable positively and statistically significant at 1%. Financial development also has positive and significant effect on patent applications. However, the impact of trade openness is significant but negative interestingly.

In terms of interaction terms or absorptive capacities, only the simultaneous effect of FDI and human capital is statistically significant yet it has negative effect. Other two interaction terms have insignificant negative effect.

Estimation results of model 3 and 4 are reported in Table 4.

Table 4. Fixed Effects Estimation Results of Benchmark and Extended Models with Lagged FDI

VARIABLES	(1)	(2)	(3)	(4)
	Dependent variable: log(patent)			
L.FDI	0.0119* (0.00714)	0.0419*** (0.0129)	0.0240** (0.0114)	0.0272*** (0.00984)
Human Capital	0.0178*** (0.00579)	0.0178*** (0.00573)	0.0168*** (0.00584)	0.0161*** (0.00581)
Trade Openness	-0.00419* (0.00218)	-0.00416* (0.00216)	-0.00311 (0.00232)	-0.00374* (0.00218)
Financial Development	0.00729** (0.00307)	0.00954*** (0.00314)	0.00895*** (0.00330)	0.0106*** (0.00338)
L.FDI* Human Capital		-0.000589*** (0.000212)		
L.FDI*Trade Openness			-7.44e-05 (5.50e-05)	
L.FDI*Financial Development				-0.000122** (5.46e-05)
Constant	3.323*** (0.345)	3.208*** (0.344)	3.179*** (0.361)	3.170*** (0.350)
Observations	380	380	380	380
R-squared	0.090	0.111	0.095	0.104

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Source: Author's own computation.

Findings reported in Table 4 are close to those in Table 3. One period lagged FDI affects patent positively and significantly. In addition, this effect is greater when FDI and AC's are interacted. Human capital and financial development have still positive and statistically significant effect. On the other hand, negative impact of trade openness remains.

Among the interaction terms, simultaneous impact of lagged FDI - human capital and lagged FDI - financial development are statistically significant but negative. The joint effect of lagged FDI and trade openness on patent applications is negative but insignificant.

6. CONCLUSION

The externalities of FDI have been widely studied for years. FDI is thought to be a substantial source in terms of human and physical capital accumulation for the host economy since it creates positive spillovers, enhances local firm productivity via labor training, and disseminates the transfer of technology and organizational knowhow to host country. Empirical literature analyzing the FDI spillovers provides mixed findings. Therefore, the diffusion of FDI needs to be examined since it may depend on other conditions.

In this work, technology spillover of FDI in developing countries is analyzed with control variables, which are financial development, trade openness, and human capital. Data covering the period 1996-2016 are collected from World Bank. First, a benchmark model is specified. Then extended model is constructed by adding interaction terms of FDI and AC variables. In contemplation of late impact of FDI, one period lagged FDI is also used in benchmark and extended models.

Furthermore, this article examines the channels through which FDI spillovers carry out. So, the aim of constructing extended model by adding interaction terms to benchmark model is to see the simultaneous effect of FDI and ACs rather than direct effect of FDI. Fixed effect estimation results are reported to keep the country specific effects.

Empirical results of benchmark model in which both FDI and L.FDI are used, report that FDI has statistically significant and positive effect on patent applications and this effect is growing when interaction terms are accounted for. Human capital and financial development have positive effect as expected. However, trade openness has significant but negative impact. Trade policy of some countries may be the cause of this result. Under an import substitution regime, countries may not benefit from foreign investors' technology.

According to the results of the extended model, simultaneous effect of FDI and human capital is negative. Moreover, extended model modified by lagged FDI reports that simultaneous effect of lagged FDI - human capital and lagged FDI - financial development are negative. These results show that threshold levels exist for human capital and financial development and countries can benefit from the positive externalities of FDI when these levels are exceeded.

These findings support our theoretical expectations and reveal that FDI has positive externalities in terms of diffusing technology in developing countries. However, technology spillovers through FDI may be carried out substantially by improving human capital and financial development. Although there are other factors affecting technological know-how FDI has important and noticeable role on technology spillover across countries.

REFERENCES

- Al-Sadig, A. J. (2013). "Outward Foreign Direct Investment and Domestic Investment: The Case of Developing Countries", IMF Working Paper, No: 13/52.
- Branstetter, L. (2006). "Is Foreign Direct Investment a Channel of Knowledge Spillovers? Evidence from Japan's FDI in the United States, *Journal of International Economics*, 68:325 – 344.
- Carkovic, M. & Levine, R. (2002). "Does Foreign Direct Investment Accelerate Economic Growth?", Department of Finance, University of Minnesota.
- Cheung, K. & Lin, P. (2004). "Spillover Effects of FDI on Innovation in China: Evidence from the Provincial Data", *China Economic Review*, 15:25– 44.
- Crespo, N. & Fontoura, M.P. (2007). "Determinant Factors of FDI Spillovers – What Do We Really Know?", *World Development*, 35(3):410–425.
- Durham, J. B. (2004). "Absorptive Capacity and the Effects of Foreign Direct Investment and Equity Foreign Portfolio Investment on Economic Growth", *European Economic Review*, 48: 285 – 306.

- Fujimori, A. & Sato, T. (2015). "Productivity and Technology Diffusion in India: The Spillover Effects from Foreign Direct Investment", *Journal of Policy Modeling*, 37:630–651.
- Glass, A.J. & Saggi, K. (2002). "Multinational Firms and Technology Transfer", *Scandinavian Journal of Economics*, 104(4):495–513.
- Gorodnichenko, Y.; Svejnar, J. & Terrell, K. (2014). "When Does FDI Have Positive Spillovers? Evidence from 17 Transition Market Economies", *Journal of Comparative Economics*, 42: 954–969.
- Greenaway, D.; Sousa, N. & Wakelin, K. (2004). "Do Domestic Firms Learn to Export from Multinationals?", *European Journal of Political Economy*, 20:1027 – 1043.
- Iamsiraroj, S., & Ulubaşoğlu, M. A. (2015). "Foreign Direct Investment and Economic Growth: A Real Relationship or Wishful Thinking?", *Economic Modelling*, 51: 200–213.
- Iwasaki, I. & Tokunga, M. (2016). "Technology Transfer and Spillovers from FDI in Transition Economies: A Meta-Analysis", *Journal of Comparative Economics*, 44:1086–1114.
- Kinoshita, Y. (2000). "R&D and Technology Spillovers via FDI: Innovation and Absorptive Capacity", William Davidson Institute, University of Michigan Business School, Working Paper No: 349.
- Lin, M. & Kwan, Y.K. (2016). "FDI Technology Spillovers, Geography, and Spatial Diffusion", *International Review of Economics and Finance*, 43:257–274.
- Liu, Z. (2008). "Foreign Direct Investment and Technology Spillovers: Theory and Evidence", *Journal of Development Economics*, 85:179-193.
- Masron, T.A.; Zulkafli, A.H. & Ibrahim, H. (2012). "Spillover Effects of FDI within Manufacturing Sector in Malaysia", *Procedia - Social and Behavioral Sciences*, 58:1204 – 1211.
- Mingyong, L.; Shuijun, P. & Qun, B. (2006). "Technology Spillovers, Absorptive Capacity and Economic Growth", *China Economic Review*, 17: 300–320.
- Munteanu, A.C. (2015). "Knowledge Spillovers of FDI", *Procedia Economics and Finance*, 32:1093 – 1099.
- Newman, C.; Rand, J.; Talbot, T. & Tarp, F. (2015). "Technology Transfers, Foreign Investment and Productivity Spillovers", *European Economic Review*, 76:168–187.
- Ruiz, A.N. (2007). "Does FDI Generate Technological Spillovers in the Host Country? Evidence from Patent Citations", CESifo Economic Studies Conference on Productivity and Growth.
- Salim, A.; Razavi, M.R. & Afshari-Mofrad, M. (2017). "Foreign Direct Investment and Technology Spillover in Iran: The Role of Technological Capabilities of Subsidiaries", *Technological Forecasting & Social Change*, 122:207–214.
- Sinani, E. & Meyer, K.E. (2004). "Spillovers of Technology Transfer from FDI: The Case of Estonia", *Journal of Comparative Economics*, 32:445–466.
- World Bank Database, World Development Indicators, <http://www.worldbank.org>
- Zhang, L. (2017). "The Knowledge Spillover Effects of FDI on the Productivity and Efficiency of Research Activities in China", *China Economic Review*, 42:1–14.
- Zhao, C. & Du, J. (2007). "Causality between FDI and Economic Growth in China", *Chinese Economy*, 40 (6): 68–82.