Foreign Direct Investment Learning of the Productivity in Chinese Regional Economy

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Abstract

This paper examines the effect of learning by FDI on TFP using Chinese provinces dataset. The study employs endogenous growth model that takes place in the various capital goods including foreign capital goods as vehicle for the technology transfer. The study derives TFP as a function of FDI stock, indicating that its contribution is through the channel of technological progress, rather than capital accumulation in the hosting country. The theoretical prediction is that FDI learning has a negative level effect in the short run on the TFP, but has a positive rate effect in the long run. These predictions are empirically confirmed using a fixed effects panel model. Empirical findings show that the FDI learning plays an important role in the process of technology diffusion, controlling for other factors that may affect TFP. The study also discusses a policy implication of the FDI on the Chinese regional economic growth.

Key Words: FDI; Productivity; Chinese regional economy.
JEL classification: F2; O4

1.0 Introduction

The inflow of foreign direct investment (FDI) contributes to efficient resource reallocation and therefore, it is considered as one of the most important economic activities to explain the sustainable economic growth in the endogenous growth model. Most of the issues related FDI have been to examine the causality between FDI and economic growth and to verify whether and how the economic growth is caused by FDI in both theoretical and empirical research. Once the causality confirmed, other studies have focused on what factors can determine FDI inflows or whether FDI is a key factor in economic growth.

Principal beneficiaries receiving FDI have also been examined at the foreign-invested firms[1] or at the recipient countries including both developing and developed countries. Studies on FDI as the promoter of economic growth question whether and how FDI affects the economic growth of firms or host countries. One of the explanations is that FDI supplements the shortage of domestic investment for the economic development, and the other assertion is that FDI promotes economic growth as a conduit for technology transfer or technology spillover through the externalities.

FDI, as technology transmission, is suitable for explaining the sustainable economic growth. Until now, there have been a lot of studies to identify the effect of FDI on the economic growth in the level of country. However, various empirical results are controversial. Some of studies[2] found that FDI has a positive effect on growth regardless of the level of country development and time periods considered. But, others show that the effect of FDI on economic growth depends on the various factors such as the level of country development, the accumulation of human capital, trade policies, and institutional characteristics or is insignificant or negative.

Especially, Borensztein et al. (1998) tested the effect of FDI on economic growth using 69 developing countries. They found that FDI has a positive effect on economic growth only when a minimum level of human capital is reached. The result of De Mello(1999) shows that OECD countries have a weak positive effect of FDI on the economic growth, and FDI has a negative effect for non-OECD countries using 15 OECD and 17 non-OECD. Moreover, Bhagwati(1978) suggested that FDI would increase growth in export-promoting countries, while it would have no impact in a country with an import substitution trade policy. His hypothesis was tested by Balasubramanayam, Salisu and Sapsford(1996) and the outcome was mixed. Moreover, Blomstrom,

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[1] The relationship between FDI and growth in the firm level is excluded in this section because our study focuses on the regional level within a country.

[2] For detail, see Blomström (1986), Fry (1993), Kokko(1994), Blomström, Kokko and Zejan (1994), Balasubraman yam et al. (1996, 1999), Mody and Wang(1997), Oloffsdotter (1998), Nyatepe-Coo(1998), Bosworth and Collins(1999), Sjoholmn(1999a), Soto(2000), Alfaro et al. (2001), Nair-Reichert and Weinhold (2001), Lensink and Morrissey(2006), Reisen and Soto(2001), Campos and Kinoshita(2002), Wang(2002), Liu et al.(2002), Omran and Bolbol(2003), Alfaro et al.(2004), Nath(2004), Hansen and Rand(2004), Basu and Guariglia(2005), Li and Liu(2005)

Lipsey and Zejan(1994) found that FDI only promotes growth in higher-income developing countries.

Although Basu et al.(2003) suggested that there is a positive effect of FDI on growth, they argue that the effect of FDI on growth depends on trade openness. Busse and Groizard(2008) also suggest that the effect of FDI on growth depends on regulations and institutional framework. Moreover, many studies also show that there is no effect of FDI on economic growth, even the negative effects. (Saltz(1992), Carkovic and Levine(2002), Mencinger(2003), Hermes and Lensink(2003), Bacic et al(2005)).

Empirically, the general consensus has been that the effect of FDI on economic growth depends on the economic level of country, the government policy relating to exporting, and the absorptive capability of host country. Studies have found that the effect of FDI contributes to economic growth if the country's economic level is high, if the host country has a policy promoting export, and the country has a minimum level of human capital.

But there is the problem which the previous studies did not consider. They ignore that learning by FDI, such as technology transfer and spillover, human capital (knowledge and skill) enhancement, and so on, is a costly activity.[3] From the viewpoint that learning by FDI is a costly activity this study can explain why the past empirical results are mixed as follows. First, the advanced countries cost less relatively comparing to the less developed and developing countries because of the lower marginal cost to adapt the new technology and skill. Second, firms of host country can acquire skills or knowledge in the lower cost with the government support when export-promoting policy is enforced. Finally, countries with human capital above a certain level could pay lower cost to embody the new technology and skill caused by FDI. Thus, it is natural that the previous studies without considering the cost for learning by FDI have the mixed empirical results for the effect of FDI on economic growth.

The above problem of the previous studies leads to questions as follows: 1) how would the stock of FDI affects TFP as the engine of economic growth considering learning cost? 2) what is the effect of stock of FDI affect the level and rate on TFP?

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[3] Although Liu (2008) has already considered Foreign direct investment (FDI) as the costly activity and showed how FDI generates externalities in the form of technology transfer in the Chinese firm level, our research is focusing on the level of region rather than the firms.

This study contributes to the literature by answering the above questions using Chinese regional dataset.[4] Although this study asks a same question that has been asked by in previous research, the results show the new mechanism for how FDI affects the economic growth in both theoretical and empirical analysis. This is the main contribution to the literature.

Organization of the paper is as follows. In the next section this study simply derive a theoretical explanation of the FDI learning effects on the productivity and economic growth in Chinese regional economy using the model presented in Liu (2008). Section III empirically tests the theoretical prediction and section IV concludes.

2.0 Theoretical Analysis using Endogenous Growth Model

The model in this study is similar to the endogenous growth model with externality developed by Ehrlich et al. (1994), Liu (2008) and Jung and Lee (2014). The characteristics of this model is to focus on technology spillover to the region through FDI in the region instead of firm or industry. If FDI brings superior technology and other non-tangible productive assets to the specific region, it needs the additional cost to acquire the above benefits, and then can enjoy the above benefits in the long run.

In the theoretical framework, as in the previous studies, the study assumes that technology is to be separable from valued-added and intermediate goods, the market is to be imperfect, and real value of factor price is to be constant at a steady state. The specification of the province's production function is as follows:

$$Q_t = A_t L_t^{\alpha} K_t^{\beta} [H_t M_t]^{\gamma}, \text{ for } \alpha + \beta + \gamma < 1, \quad (1)$$

where A_t represents exogenous, common technical factors in the regional level; L_t and K_t are labor and capital inputs in the regional level, respectively; H_t denotes the stock of province-specific capital; M_t is the fraction of managerial time devoted to current production; and the subscript t denotes time. Managerial time is

[4] There are two reasons why China is chosen to confirm the effect of FDI on economic growth. First, China is the world's second largest recipient of FDI, a record US$ 142 bn worth, in 2018, and has experienced rapid economic growth and a sudden influx of FDI at the same time. Second, it is appropriate to apply panel regression analysis methodology, considering the administrative districts of China.

normalized to one because the interest is in the allocation ratio of managerial time between the current production and the accumulation of province-specific capital.

To focus on the determinants of province-specific productivity growth, A_t is treated as a constant and L_t and K_t are defined in efficiency units that can be purchased in perfect rental markets at price ω and c, respectively.

The production of province-specific capital requires the inputs of managerial time as the allocation ratio, $(1 - M_t)$ and knowledge from two sources. The first factor $(1 - M_t)$ is the portion of managerial time devoted to accumulating province-specific capital. The first source of knowledge is the current stock of province-specific capital (H_t). The second source (F_t) denotes public knowledge associated with the stock of FDI in the province. Therefore, the accumulation of province-specific capital is defined as follows:

$$\dot{H} = rH_t[1 - M_t]^{\delta}[F_t\ ]^{\varphi}, \tag{2}$$

where r is either an efficiency parameter of the production or a learning productivity parameter, and $0 < \delta \leq 1$ indicates whether managerial inputs are subject to diminishing returns. F denotes the ratio of FDI stock to GDP for each province, while $\varphi \geq 0$ represents the intensity of learning from FDI stock.

Consider a representative province, the region decides the amount of managerial time and effort to devote to current production (M^*). Then $1 - M^*$ is the portion of managerial time and effort to accumulate province-specific capital and to determine the amounts of labor and capital to hire so that the region maximizes the present values of the objective function specified below over an infinite horizon. The model assumes $\delta = 1$ for closed-form dynamic solutions without the distortion of generality. From the first-order optimal conditions for an interior solution, in the steady-state, the growth rate relations are $\widehat{Q} = \widehat{L}$, $\widehat{Q} = \widehat{K}$, $\widehat{Q} - \widehat{H} - \widehat{\lambda} = 0$ and $\frac{\dot{\lambda}}{\lambda} = \widehat{\lambda} = \rho - r(F_t^{\varphi})$, where ρ is the discount factor, and λ denotes the time derivative of the shadow price of province-specific capital. Since $\widehat{Q} = \alpha\widehat{L} + \beta\widehat{K} + \gamma\widehat{H}$

follows from equation (1), the growth rate of province-specific capital equation is the following:

$$V_t = A_t L_t^{\alpha} K_t^{\beta} [H_t M_t]^{\gamma} - \omega L_t - cK_t + \lambda r H_t [1 - M_t]^{\delta} [F_t\ ]^{\varphi}, \tag{3}$$

$$\widehat{H} = \frac{(r[F_t\ ]^{\varphi} - \rho)(1-\alpha-\beta)}{(1-\alpha-\beta-\gamma)}. \tag{4}$$

With equations (2) and (4), the optimal managerial time and effort devoted to the current steady-state production is solved as follows:

$$M_t = \frac{-\gamma}{(1-\alpha-\beta-\gamma)} + \frac{\rho(1-\alpha-\beta)}{(1-\alpha-\beta-\gamma) r[F_t\ ]^{\varphi}}. \tag{5}$$

To identify the level and rate effects separately by FDI stock the study conducts a comparative analysis for the level and rate of province-specific capital ($\widehat{H}$ and M_t) with the technological knowledge due to the increase of FDI stock ratio. The above results show that at steady state, the amount of managerial time devoted to current production is negatively related to F but that the growth rate of firm-specific capital is positively related to F, where F represents the ratio of FDI stock to GDP used as technology and management methods related to FDI stock. In addition, the province's total factor productivity (TFP) is $TFP_t = A_t[H_t M_t]^{\gamma}$ from equation (1) and its growth rate is $\widehat{TFP} = \widehat{A} + \gamma\widehat{H}$, which is a positive linear combination of the steady state growth rates of technical change and province-specific capital. The higher the F is, the higher the slope of productivity growth would be through its positive effect on the accumulation of province-specific capital. However, the increase in F is negatively associated with the productivity level in the short term.

The theoretical model presented here has important implications. There is a negative level effect in the short term and a positive rate effect in the long run of the province-specific capital generated by the FDI stock. The positive rate effect could dominate the level effect in the long run because a small increase in the rate of productivity growth will be translated into a large gain in the level of productivity in the future. Therefore, an empirical model that allows for the separation of the level effect from the rate effect of FDI stock must be specified.

3.0 Empirical Analysis

3.1 Empirical methodology

While the empirical work does not directly estimate analytical model presented in this paper, it estimates a derived model that specifies TFP as a function of T, F, $\mathrm{T} * \mathrm{F}$ as follows. That is,

While the empirical work does not directly estimate analytical model presented in this paper, it estimates a derived model that specifies TFP as a function of T, F, $\mathrm{T} * \mathrm{F}$ as follows. That is,

$$LTFP_{it} = \alpha_0 + \alpha_1 T + \alpha_2 F_{it} + \alpha_3 T * F_{it} + \alpha_4 X_{it} + u_i + e_i, \quad (6)$$

where u_i denotes the unobservable province-specific effect, and e_i denotes the remainder stochastic disturbance. Equation (6) means that the logarithm of province's productivity ($LTFP_i$) depends on the FDI learning (F_i), a time trend (T), and an interaction term between time trend (T) and the FDI learning (F_i), and other relevant control variables (X_i). The main purpose of our empirical model is to capture the important implication of the theoretical model that FDI learning has a negative level effect in the short run and a positive rate effect in the long run on TFP.

Based on the theoretical model, the coefficient of the FDI learning (F_i) is expected to be negative and the coefficient of an interaction term between time trend (T) and the FDI learning (F_i), which capture the rate effect to be positive.

3.2 Data and definitions of Key variables used

Using the Chinese province data[5] from National Bureau of Statistics of China for the period 1981-2008, this study constructs the panel dataset with various information of 31 provincial administrative districts in China. The panel dataset includes real gross regional product (GRP), nominal GRP, foreign direct investment, gross capital formation, local government expenditure, total imports and export, total deposits and loans, total number of employed person and so on, suitable for empirical analysis that distinguish the level and rate effect

[5] The dataset source is 60 years of New China provided by State Statistical Bureau.

of FDI learning on TFP. All variables are transformed from nominal to real by GRP deflator extracted from the nominal and real GRP in constant (1952). In constructing the real capital and FDI stock[6] series, the real investment and FDI flow are accumulated, assuming the first value of each series is the initial value. Also, TFP, one of the most important variables in our empirical analysis, was estimated by Olley and Pakes (1996) to overcome simultaneity bias caused by the endogeneity of input. FDI learning is measured by the ratio of real FDI stock to real GRP. Table 1 below gives a brief description of the key variables used in this study.

Table 1:The definition and summary statistics of variables used

Variables	**Definition**	**Obs**	**Mean (standard deviation)**
Output (100 million yuan)	Gross Regional Product in constant price	870	675.3 (925.2)
Labor (10,000 persons)	Total number of employed persons	863	2053.2 (1345.1)
Capital (100 million yuan)	Real value of capital stock	870	2682.4 (3703.7)
Log(total factor productivity)	Log of total factor productivity by Olley and Pakes (1996)	863	0.8916 (0.5820)
Foreign Direct Investment (FDI) (USD 10,000)	Real value of FDI stock	870	244571.4 (591582.3)
Trade Liberalization (USD 10,000)	The ratio of exports and imports to GRP	844	408.8 (1145.7)
Government expenditure (100 million yuan)	Local government budgetary expenditure	856	0.1408 (0.0619)
Financial depth (10,000 yuan)	The ratio of deposits to GRP	863	7897.3 (5831.8)

Note: The sample size of the variable for each region is different because the start year differs depending on the region.

3.3 Empirical Results

There are two parts to the main empirical results. One shows the regression result obtained by using the econometric strategy in the previous studies to estimate the effect of FDI on TFP, and the

[6] The perpetual inventory method is used to obtain the real capital and FDI stock in year t and the rate of depreciation is assumed to 0. Even if we consider the different rate of depreciation, our results are robust.

other is the most important empirical analysis of this study of estimating the combined level and rate effect of FDI on TFP as shown in the theory of the present study.

The basic structure of regression analysis is as follows. The dependent variable in all regression is log of total factor productivity, and all independent variables are lagged to mitigate the simultaneity issue. Also, the dummy variable for each province is considered in all regression as the fixed effect to take into accounts unobservable factors, which may affect the total factor productivity of each province. Some factors that can affect the productivity of each province to isolate the effect of FDI on the productivity are considered as the control variables[7], such as trade liberalization, government expenditure, and financial depth.

Table 2 and 3 show the regression result with the effect of FDI on the productivity level estimated by the existing methodology. In table 2, using full sample, the coefficient of FDI learning is positive and statistically significant at the one percent level. This result is robust when additional control variables that can affect the local productivity are controlled[8]. The result of Table 2 show that the effect of FDI on the level of TFP is positive. However, the regression results by region[9] of China are different from the result of using the whole China. From Tables 3 all coefficients of FDI learning in both East and West are insignificant and have an inconsistent direction. Even the central region in column 3, 4 of Table 3 have a negative sign, which is statistically significant at the 1 percent level, meaning that the increase in FDI lowers the level of productivity. Only in 3 Northeast provinces, as in the whole sample of China, the regression result shows that FDI has a positive effect on the level of productivity.

From the above results, it cannot be concluded clearly that the effect of FDI on the level of productivity in the province units. The

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[7] Trade liberalization, government expenditure, and financial depth are measured by the share of the sum of export and import, local government expenditure and deposit to GRP respectively.

[8] Trade liberalization and government expenditure have a significant and positive effect on the productivity while the coefficient of financial depth is insignificant and negative.

[9] As in most studies on China, China is divided into 4 regions, such as (1) East (Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Hainan), (2) Central (Shanxi, Anhui, Jiangxi, Henan, Hubei, Hunan), (3) West (Neimenggu, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Xizang, Shanxi, Gansu, Qinghai, Ningxia, Xin-jiang), (4) Three Northeast (Liaoning, Jilin, Heilongjiang).

argument would be that this ambiguous effect of FDI on the level of productivity is due to the mixture between level and rate effect of FDI on the productivity and calls for the separation of level and rate effect from the effects of FDI on the productivity.

The level and rate effects of FDI on the productivity are distinguished in Table 4 and 5. From regression result in Table 4 using the whole sample, a new insight from the theoretical framework can be confirmed that there is a negative level effect in the short run and a positive rate effect in the long run of FDI on the productivity. The negative coefficient sign of FDI learning, which is statistically significant at the 1 percent level, in column 2 of Table 4 indicates that an increase in FDI at the province level lowers the short-term productivity but the significant and positive coefficient of the interaction between FDI learning and year represents that the expansion of FDI raises the long-term rate of productivity at the province level. Moreover, in contrast to the analysis of the effect of FDI on the level of productivity, each regression result[10] obtained by dividing China into four regions is very consistent with the results from the whole sample of China that the short-term level effect of FDI learning has a statistically significant negative coefficient while its long-term rate effect is significantly positive. Also, it can be observed from the magnitude of the coefficient values of both FDI learning and the interaction between FDI learning and year at both the level and rate effects of FDI learning on the productivity differ depending on the region. These results indicate that FDI learning has significant and different effects on the short-term level and the long-term rate of the productivity growth and plays a significant role in explaining productivity growth in Chinese regional economy as the theoretical model predicts.

The specification also considers openness, the ratio of government expenditure to GDP and financial depth as other sources of productivity advantages in effort to isolate the effect of FDI learning on productivity. The coefficients of openness measured by trade volume (total of exports and imports) over GDP is overall statistically significant and positive as anticipated although the central and 3 north eastern provinces have no significant or negative effects. The government expenditure over GDP has a positive effect on the productivity in the whole sample, but it has different effects in different

[10] The case in the West is an exception, but not significant.

regions. The results also show that financial depth plays a negative role in explaining Chinese regional economic growth except for the central region[11].

Table 2: Estimating the level effect (Full Sample): Dependent variable: ln(TFP)

	(1)	(2)
FDI learning (F)	0.000191***	0.000217***
	(0.0000293)	(0.0000293)
Year (T)	0.0440***	0.0448***
	(0.000629)	(0.000884)
Trade Liberalization		0.0000168***
		(0.00000455)
Government expenditure		0.553***
		(0.113)
Financial Depth		-0.00000196
		(0.00000190)
Region dummy	Yes	Yes
N	836	816
R2	0.968	0.969

Standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01

Table 3: Estimating the level effect by region: Dependent variable: ln (TFP)

	(1) East	(2) East	(3) Central	(4) Central
FDI learning (F)	0.0000277	0.0000228	-0.000923***	-0.000580***
	(0.0000388)	(0.0000345)	(0.000173)	(0.000191)
Year (T)	0.0535***	0.0581***	0.0516***	0.0430***
	(0.00134)	(0.00146)	(0.00181)	(0.00251)
Trade Liberalization		0.0000169***		0.000254
		(0.00000381)		(0.000210)
Government expenditure		-0.353		0.910***
		(0.265)		(0.289)
Financial Depth		-0.00000847***		0.0000184***
		(0.00000239)		(0.00000419)
Region dummy	Yes	Yes	Yes	Yes
N	261	257	232	225
R2	0.967	0.975	0.923	0.928

Standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01

[11] The relationship between financial depth and economic growth depends on various factors such as the level of income of the region and the status of resource export and so on. For the detailed explanation, see Guariglia and Poncet (2008), Lu and Yao (2009), and Chen et. al. (2012) etc.

	(5) West	(6) West	(7) 3 Northeast	(8) 3 Northeast
FDI learning (F)	-0.0000977	0.000166	0.000299**	0.000380**
	(0.000130)	(0.000147)	(0.000134)	(0.000163)
Year (T)	0.0449***	0.0493***	0.0372***	0.0380***
	(0.00105)	(0.00157)	(0.00252)	(0.00301)
Trade Liberalization		0.000296**		-0.0000555
		(0.000135)		(0.0000418)
Government expenditure		0.721***		1.118***
		(0.110)		(0.349)
Financial Depth		-0.0000143***		-0.00000819
		(0.00000343)		(0.00000945)
Region dummy	Yes	Yes	Yes	Yes
N	256	247	87	87
R2	0.967	0.975	0.974	0.977

Standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01

Table 4: Estimating the level and rate effects (Full sample): Dependent variable: ln(TFP)

	(1)	(2)
FDI learning F)	-0.0458***	-0.0371***
	(0.00618)	(0.00663)
FDI learning*Year (F*T)	0.0000230***	0.0000186***
	(0.00000309)	(0.00000331)
Year (T)	0.0433***	0.0442***
	(0.000617)	(0.000873)
Trade Liberalization		0.0000130***
		(0.00000452)
Government expenditure		0.345***
		(0.117)
Financial Depth		-0.00000249
		(0.00000186)
Region dummy	Yes	Yes
N	836	816
R2	0.970	0.971

Standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01

Table 5: Estimating the level and rate effects by region: Dependent variable: ln(TFP)

	(1) East	(2) East	(3) Central	(4) Central
FDI learning (F)	-0.0210***	-0.0225***	-0.147***	-0.191***
	(0.00637)	(0.00615)	(0.0280)	(0.0372)
FDI learning*Year (F*T)	0.0000105***	0.0000112***	0.0000728***	0.0000951***
	(0.00000318)	(0.00000307)	(0.0000140)	(0.0000186)
Year (T)	0.0522***	0.0564***	0.0502***	0.0422***
	(0.00137)	(0.00150)	(0.00173)	(0.00238)
Trade Liberalization		0.0000149***		0.000181
		(0.00000376)		(0.000199)
Government expenditure		-0.729***		-0.405
		(0.278)		(0.375)
Financial Depth		-0.00000780***		0.0000169***
		(0.00000234)		(0.00000398)
Region dummy	Yes	Yes	Yes	Yes
N	261	257	232	225
R2	0.969	0.977	0.931	0.936

Standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01

	(5) West	(6) West	(7) 3 Northeast	(8) 3 Northeast
FDI learning (F)	-0.0796***	0.00897	-0.105***	-0.134***
	(0.0266)	(0.0295)	(0.0144)	(0.0180)
FDI learning*Year (F*T)	0.0000398***	-0.00000440	0.0000528***	0.0000669***
	(0.0000133)	(0.0000148)	(0.00000721)	(0.00000900)
Year (T)	0.0438***	0.0494***	0.0347***	0.0357***
	(0.00109)	(0.00164)	(0.00200)	(0.00234)
Trade Liberalization		0.000294**		-0.000119***
		(0.000136)		(0.0000333)
Government expenditure		0.743***		-0.499
		(0.132)		(0.346)
Financial Depth		-0.0000143***		-0.00000523
		(0.00000344)		(0.00000729)
Region dummy	Yes	Yes	Yes	Yes
N	256	247	87	87
R2	0.969	0.975	0.984	0.987

Standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01

4.0 Conclusion

The objective of this study is to provide an explanation for how the FDI learning improves the productivity of an economy using endogenous economic growth framework. The theoretical

examination suggests that FDI learning decreases the level of productivity in the short term but increase the growth rate of productivity of an economy in the long term. The negative effect of FDI learning on TFP of Chinese regional economy indicates that technology transfer is a costly learning process.

The study distinguishes the level effect from the rate effects of FDI learning on the productivity in the region to demonstrate what the theory predicts. The empirical evidence with a large panel dataset of Chinese province is generally consistent with the theoretical predictions that the level effects and rate effects of FDI learning proceeds in different directions. The results of the empirical analysis are robust.

The study concludes that FDI has a positive effect on the Chinese economy in that it increases the productivity in the long run since the results show, both theoretically and empirically, that there is a negative effect on the productivity level and a positive effect on the productivity rate of FDI in all regions of China. However, the magnitude of the effects varies depending on the region. This has an important policy implication that effective policies for FDI should be implemented at the regional level.

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