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Foreign Direct Investment, Trade and Economic Growth in Taiwan

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ABSTRACT

Taiwan is the capital-open region. To understand the FDI, trade and economic growth should be one of the worthy studies on the question. This paper uses the data from 1978 to 2009 in Taiwan, and uses the VECM model to analyze the impact of foreign direct investment on economic growth in Taiwan. The results of the VECM model for FDI and economic growth in Taiwan have both the long-term existence of the cointegration relations and the reverse relationship.

KEYWORDS

1. Introduction

For policymakers, how to promote foreign trade and foreign investors for its direct investment to enhance rapid economic growth in home country, has been ruled by those who care about the important issues, due to the fact that foreign technological transfers bring technological diffusion and generate technological spillovers for local firms, and foreign investment is expected to increase and improve the existing stock of knowledge in the recipient economy through labor's human capital, skill acquisition and diffusion (Din [1]; Balasubramanyam *et al.* [2]; Borensztein *et al.* [3]).

With globalization spreads throughout the world, the foreign direct investment becomes more popular for multinational enterprises. In traditional and new economic theory, most governments have referred to incentives to create a suitable investment environment to attract foreign investment; the government's view is based on the amount of foreign investment to improve home country's employment, making the domestic labor income increase, thereby enhancing economic growth (Blomstrom, *et al.* [4]; Wacziarg [5]).

However, Taiwan is part of the global inter-regional capital openness. Understanding of the complex relationships on foreign investment, trade and economic growth is a topic worthy of study. Moreover, since its adoption of the policy relaxing and trade liberalization had been taken in the mid-1970s, after that, Taiwan's trade and FDI have been expanded at even higher rates. The advance literatures of endogenous growth models considered FDI that would contribute significantly to economic growth. On the other hand, the FDI maybe causes a negative impact on economic growth in developing countries, because FDI always induces more and more income inequality (Mansfield and Romeo [6]; Saltz [7]; Haddad and Harrison [8]; Eric and Joseph [9]).

This paper studies the dynamic relationship between export, FDI and economic growth in a time-series framework from 1978 to 2009. It is also important to highlight that the interaction among these variables is complex and each variable (GDP, labor, the stock of capital, net export and FDI) has a plausible theoretical foundation to affect the other variables. Without knowing the direction and pattern of mechanisms among these variables, it is important to investigate the relationship between these variables to correctly formulate policies in Taiwan. More generally, we seek to establish the causal link between FDI and economic growth, which might suggest important implications for development strategies for Taiwan.

The rest of the paper is organized as follows. Section 2 describes data and methodology adopted in this study. Section 3 discusses the empirical results. And finally Section 4 concludes.

2. Data and Results

This paper explores the causal relationship between labor, capital, net export, FDI and GDP in both the short run and long run. The dataset consists of Taiwan observations on real GDP, the quantities of labor (L), gross capital formation as proxy for capital (K), net export (NX) – the total volume of export minus total volume of import, and foreign direct investment (FDI). The data set is yearly and covers the periods 1978 to 2009. All data series are obtained from the Chinese National Statistics database[1].

2.1. Stationary Tests

The descriptive statistics are presented in **Table 1**. Time series univariate properties were examined using unit root tests: augmented Dickey and Fuller (ADF) test. In **Table 2**, although the ADF test suggests the presence of unit roots in levels, all the variables are stationary after first differencing. The choice of the lagged period, we follow the Akaike information criterion (AIC) test results suggest using a lag length of one[2].

2.2. Cointegration Test

The cointegration analysis captures the dynamic relationship among the five variables. The multivariate cointegration test based on Johansen-Juselius's model is used to determine the long run relationship. **Table 3** presents the Johansen cointegration test results among the variables with linear deterministic trend and one lag. The maximum eigenvalue test and trace test to establish the number of cointegrating vectors is reported in **Table 3**.

2.3. Granger-Causality Test

According to representation theorem, if two variables are cointegrated then the Granger causality must exist in at least one direction. Results of Granger causality tests reported in **Table 4** indicates that log (GDP) *Granger causes* log (FDI) from the Taiwanese data.

3. Empirical Results

Using a VECM for the period 1978 through 2009, the

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[1]The Chinese National Statistics database website: http://ebas1.ebas.gov.tw/pxweb/Dialog/statfile1L.asp?lang=1&strList=L.

[2]In order to choose the lagged period, we use the Akaike information criterion (AIC) and Schwartz's Bayesian Information Criterion (BIC) tests. The AIC suggest the using a lag length of one and the BIC suggest the using a lag length of two.

Table 1. Descriptive statistics.

	GDP	L	K	NX	FDI
Mean	9830.563	8829.125	1516835	0.872887	3293104
Median	11530.50	8977.500	1662122	0.835897	2360036
Std Dev.	5370.371	1365.360	872873.5	0.133343	3623575
Skewness	−0.243576	−0.270196	−0.019827	1.151969	2.026481
Kurtosis	1.553719	1.976627	1.465336	3.770533	6.919643
No	32	32	32	32	32

Table 2. Unit root tests with ADF in logarithm form (with trend and intercept).

Variables	No. of Lagged Differences	Test Statistic	5% Critical Value	1% Critical Value
Log(GDP)	1	−4.168	−3.568	−4.296
Log(L)	1	−4.116	−3.568	−4.296
Log(K)	1	−3.811	−3.568	−4.296
Log(NX)	1	−5.020	−3.568	−4.296
Log(FDI)	1	−5.056	−3.595	−4.356

Table 3. Trace/maximum eigenvalue tests.

NullHypothesis	Trace test	Maximal eigenvalue test
None*	95.65	41.80
At most 1*	53.85	28.25
At most 2	25.59	17.05

Notes: *denotes 5% levels of significance respectively.

Table 4. Granger causality test among log (GDP) and log (FDI).

	F-Statistics	Probability
Log(FDI) does not Granger Cause Log(GDP)	0.47112	0.49812
Log(GDP) does not Granger Cause Log(FDI)	4.37693	0.04562

estimated results shown in **Table 5**, suggest that the long-run elasticity of the GDP to the labor is almost 1.54. In other words, a one percent deviation in the labor increases the GDP by 1.54%. Accordingly, a one percent deviation in the capital increases the GDP by 1.14%; a one percent deviation in the net export decreases the GDP by 0.405% and a one percent deviation in the FDI decreases the GDP by 0.144%.

The variance decomposition technique for a period of 10 months ahead, presented in **Table 6** indicates that the Taiwan economic growth is mainly affected by capital stock; almost 18% of its changes can be attributed to capital by the end of the period. The role of labor increases from 0.98% in the beginning of the period to

Table 5. Vector error correction estimates: one lagged period.

CointegratingEq:	CointEq1
Log(GDP)(−1)	1.000
Log(L)(−1)	−1.54
	[−2.64465]
Log(K)(−1)	−1.14
	[−10.2192]
Log(NX)(−1)	0.405
	[2.82709]
Log(FDI)(−1)	0.144
	[2.29078]
C	19.069

[ ] represents t-statistics.

Table 6. Variance decomposition of GDP.

Period	Log(K)	Log(L)	Log(NX)	Log(FDI)
1	0.000000	0.000000	0.000000	0.000000
2	0.073501	0.981505	0.252318	0.103572
3	0.539861	2.764573	0.297183	0.348448
4	2.562617	4.658351	0.371477	1.176564
5	5.344570	6.637387	0.458806	2.167369
6	8.244582	8.598057	0.536627	3.136633
7	10.99610	10.40226	0.599489	4.026049
8	13.47663	11.98447	0.649193	4.807004
9	15.64412	13.34225	0.688571	5.473990
10	17.50822	14.49779	0.719864	6.037133

14.5% at the end of the period. However, the contribution of NX increases from 0.25% in the first month to 0.71% at the end of the period. Finally, the contribution of FDI increases from 0.10% in the first month to 6.03% at the end of the period.

4. Conclusions

The study has used annual data from 1978 to 2009 to examine the impact of FDI on economic growth in Taiwan. In order to understand the relationship among FDI, trade and economic growth, we adopt a time-series framework, including 1) the long-run association between FDI and economic growth and Taiwan's fundamentals through cointegration technique, 2) causality test among the FDI and economic growth rate, and 3) estimation of the long-run and short-run elasticity of the Taiwanese economic growth in response to deviation in labor, capital, net export, and FDI.

The cointegration analysis reveals the existence of

long-run relationship between FDI and economic growth. The empirical results suggest that the model is cointegrated and at least one cointegration vector exists among the Taiwan. The Granger Causality test indicates that the causality runs from the GDP to FDI. Moreover, according to the conclusions of VECM model, there is nothing that exists between FDI and economic growth in an inverse relationship.

Accordingly, for host government, in order to enhance Taiwan's economic growth, the primary purpose is not to improve the proportion of foreign investment, but for the local manufacturers to enhance the incentives for capital investment (for example: investment subsidies rises, loan rates declines and so on).

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