TÁC ĐỘNG CỦA CHỈ SỐ NHẬN THỨC THAM NHŨNG (CPI) ĐỐI VỚI DÒNG VỐN ĐẦU TƯ TRỰC TIẾP NƯỚC NGOÀI (FDI) VÀO CÁC NƯỚC ASEAN: BẰNG CHỨNG TỪ PHÂN TÍCH DỮ LIỆU BẢNG

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Tóm tắt

Nghiên cứu này xây dựng một bộ dữ liệu bảng cân đối được thu thập từ các nước ASEAN trong giai đoạn 2012-2015 để xem xét tác động của Chỉ số Nhận thức Tham nhũng (CPI) đối với dòng vốn đầu tư trực tiếp nước ngoài (FDI). Kết quả từ mô hình Hiệu ứng ngẫu nhiên (RE) cho thấy tác động của CPI đối với dòng vốn FDI là thuận chiều và có ý nghĩa thống kê ở mức một phần trăm. Điều này chỉ ra rằng một quốc gia ít tham nhũng sẽ có thể thu hút nhiều vốn FDI hơn. Ngoài ra, tác động của dân số và lạm phát đối với dòng vốn FDI là thuận chiều và lần lượt có ý nghĩa thống kê ở mức một và mười phần trăm. Ngược lại, thất nghiệp có tác động ngược chiều đối với dòng vốn FDI và có ý nghĩa thống kê ở mức mười phần trăm.

Từ khóa: *Chỉ số nhận thức tham nhũng, đầu tư trực tiếp nước ngoài, ASEAN, hiệu ứng ngẫu nhiên*

THE IMPACT OF CORRUPTION PERCEPTION INDEX ON FOREIGN DIRECT INVESTMENT INFLOWS IN ASEAN COUNTRIES: EVIDENCE FROM A PANEL DATA ANALYSIS

Abstract

The current study constructs a balanced panel-data set collected from ASEAN countries during the period from 2012 to 2015 to examine the impact of Corruption Perception Index (CPI) on foreign direct investment inflows (FDI). Results from a Random-Effects model (RE) show that the impact of CPI on FDI inflows is positive and significant at one per cent level. This indicates that a country with less corruption will be able to attract more FDI inflows. In addition, the impacts of population and inflation on FDI inflows are positive and significant at one and ten per cent level, respectively. In contrast, the impact of unemployment on FDI inflows is negative and significant at ten per cent level.

Keywords: *Corruption perception index, foreign direct investment, ASEAN, random-effects.*
JEL classification: E, F, F21.

1. Introduction

Foreign Direct Investment (FDI) is one of the important financial sources for economic growth, especially for developing countries like ASEAN (Tsai 1994, Barrell and Pain 1997, Makki and Somwaru 2004, Adams 2009). There are a number of factors that can influence FDI inflows into a country, and Corruption Perception Index (CPI) is one of those. It is interested to ask if a country with less corruption can attract more FDI than that with severe corruption.

The current study contributes to literature in a number of ways as follows: it constructs a balanced panel-data set on ASEAN countries for an analysis. It is the first study to examine the impact of CPI scores on FDI inflows after the methods to calculate the scores have changed since 2012.

The structure of the current study is organised as follows: Section 2 reviews related studies on the impact of CPI on FDI inflows in ASEAN countries. Section 3 discusses methodology, data, and variable selection. Econometric results and discussions are presented in Section 4. Section 5 concludes.

2. Literature review

There have been a number of studies in the global context to examine the impact of corruption or proxies like CPI on economic growth or proxies like FDI inflows. The studies are briefly reviewed as follows. Despite considerable efforts, the author has not been able to find more studies on the topic.

Mauro (1995) selected nine out of 56 of the country risk factors, which were published by the Business International, to analyse the impact of corruption (represented by bureaucratic efficiency) on investment rate (measured by the ratio of total investment over GDP) in 68 countries. The results produced by the Ordinary Least Squares and Two-State Least Squares methods showed that corruption had a negative and significant impact on investment rate. For example, a one standard deviation increase in the corruption index was significantly associated with an increase of 2.9 per cent in investment rate.

Mo (2001) constructed a panel-data set on 54 countries from the National Bureau of Economic Research – NBER and used the Ordinary Lest Squares method to examine the impact of CPI (obtained from https://www.transparency.org/) on

economic growth (represented by the real GDP growth rate) during 1970-1985. The results showed that a one per cent increase in the corruption scores was associated with a reduction of almost 0.55 in economic growth, significant at ten per cent level. Corruption also had a negative impact on human capital and private investment.

Al-Sadig (2009) used data collected from 117 countries during 1984-2004 to examine the impact of corruption (represented by the International Country Risk Guide – ICRG) and quality of institutions (represented by law – Law and Order Index, and democracy – Democracy Index) on FDI inflows (log of FDI per capita). Two major methods were used in this study: an analysis using Ordinary Least Square models with cross-sectional data were conducted. Results showed a negative impact of corruption on FDI inflows. For example, a one-point increase in corruption scores was associated with 20 per cent decrease in FDI inflows, significant at ten per cent level. Results produced by the fixed-effects model showed that the impact of corruption on FDI inflows was not statistically significant, but that of institutional quality was significant at 10 per cent level. Therefore, the author concluded that foreign investors were more interested on the quality of the institutions than on corruption level. However, it is argued that a correlation between these two variables may exist as corruption is less likely to happen in a country with high quality of institutions.

In the national context, very few studies on the impact of CPI on FDI inflows have been conducted. For example, Vo and Nguyen (2015) constructed a panel-data set and used fixed-effects method to examine the impact of CPI on FDI inflows into 30 Asian countries. The results show that a one-score increase in CPI (less corruption) was associated with 24% increase in FDI inflows, significant at 10 per cent. As described in Section 3.2 below, CPI scores have been calculated differently since 2012 onward. Therefore, the scores in the data set in 2012 and 2013 may not be comparable with those before those years.

In conclusion, previous studies in both international and national context showed that corruption (represented by bureaucratic efficiency, country risk factors and CPI) discouraged investors (represented by FDI) and slow down the economy (represented by GDP). The most common methods are OLS or 2SLS due to lack of panel data. As addressed previously, the way the CPI is calculated has been changed since 2012, it would be interesting to investigate if such change makes any difference from what Vo and Nguyen (2015) found.

3. Methodology, data and variable selection

3.1. Methodology and model

The current study takes the advantage of the panel data availability and is inspired by previous studies to apply the following model to examine the impact of CPI on FDI:

$$FDI_{it} = \beta_{ot}\beta_1 CPI_{it} + \beta_2 Une_{it} + \beta_3 Inf_{it} + \beta_4 Pop_{it} + \varepsilon_{it} \quad (1)$$

Where: FDI_{it} represents FDI capital in year t for country i, (i=1, 2, …, n). CPI_{it} is CPI scores in year t (t=2012, 2013, 2014 and 2015) for country i. The impact of this variable on FDI is expected to be negative. Une_{it} is unemployment rate (in per cent) in year t for country i. The sign of this coefficient can be either negative or positive, depending on the demands. Inf_{it} is inflation rate (in per cent). The impact of this variable on FDI can be either negative or positive, depending on the magnitude of inflation. Pop_{it} represents population in year t for country i. The sign of this coefficient is expected positive.

A number of methods can be used with the availability of panel data, such as fixed-effects model (FEM) or random effect model (REM) or instrumental variable methods (IV). The instrumental variable approach can solve the problem caused by unobserved variables. However, a good IV is not easy to find in reality. In addition, when the correlation between the IV and the endogenous regressor that it represents is not sufficiently strong, the estimates may not be consistent (Bound, Jaeger, & Baker, 1995). FEM method controls for time-invariant differences between individuals or countries and remove any unobserved characteristics, hence, biased issues can be minimised. However, if time-invariant characteristics are necessary to include in the model, FEM is not suitable. In contrast, time-invariant variables can be added to FEM model (Wooldridge, 2012). However, in REM, the variation across the countries is assumed to be random and not correlated with the predictor/s or regressors.

To determine which model (FEM or REM) better suits for the current study, Hausman tests are conducted and the results are shown in Table A.1 in the Appendix. Since the Prob>chi2 = 0.3646, which is greater than 0.05, RE is applied to the current study (Torres-Reyna, 2007).

3.2. Data description

3.2.1. Data sources

Corruption Perception Index scores used for the current study are obtained from International

Transparent (Transparency International, 2017). The current study uses CPI score from 2012 to 2015 as before 2012, the scores are calculated differently. Data on CPI of Brunei are not available in 2014 and 2015 and those of East Timor are not available in the study period, hence these two countries/territories are excluded from the study. Therefore, the current study covers nine ASEAN countries. In addition, data on a number of variables that were used in previously studies, for some countries are not available in 2016. Therefore 2016 is not included in the current study. Data on other variables such as FDI, GDP per capita (represents economic growth), unemployment rate, population and inflation rate are obtained from the World Bank (The World Bank, 2017).

3.2.2. Variable description

3.2.2.1. Dependent variable

Foreign Direct Investment inflows in a country can be represented by the number of FDI projects or FDI capital. The current study follows literature to adopt FDI inflows (in current USD) as the dependent variable. A natural log form is applied to this variable.

3.2.2.2. Independent variables

The main interest explanatory variable in the current study is CPI. The selection of controlled variables is motivated by existing studies and the availability of data. To identify whether or not the correlation among regressors exists, the multicollinearity tests are conducted. Results of the tests are presented in the Appendix.

Corruption Perceptions Index (scores)

The Corruption Perceptions Index (CPI) was first introduced in 1995 as an aggregate indicator used to measure perceptions of corruption level in the public sector in different countries around the global. The index is calculated in four steps as follows, firstly data from a number of different sources (for example, CPI in 2016, data are collected from 13 different sources in 12 different institutions), that provide perceptions of business people and country experts of the level of corruption in the public sector, are aggregated. Secondly, the data will be standardised to a scale of 0-100. Then an average CPI for each country will be calculated. Finally, a report of a measure of uncertainty will be made. During the study period, CPI of a country is calculated and presented in two ways as (1) CPI rank: list all countries participate in the assessment in order from least corruption (rank 1) to severe corruption (rank n), and (2) CPI scores: shows the scores that a country achieves in a particular year. The higher the score the less corruption the country is. This variable is more stable than the former. For this reason, the current study selects it as the dependent variable.

Population (measured in persons)

Population in the host country can provide labour and consumers to FDI projects. Therefore, a country with larger population can gravitate to foreign investors (Al-Sadig, 2009). A natural log form is applied to this variable.

Unemployment (per cent of total labour force, modelled ILO estimate)

Labour force in the host country plays an important role in attracting FDI projects. It can be attractive in two ways: cheap or high quality, depending on the demands. Therefore, the impact of this variable is uncertain.

Inflation (GDP deflator, annual per cent)

Drabek and Payne (2002), Azam (2010), and Barro (2013) argued that high inflation could reduce return on investment, hence had a negative impact on attracting FDI. However, it has been observed that slight or moderate inflation indicates the economy is growing, hence can attract FDI inflows (Mallik & Chowdhury, 2001). Investors, including foreign investors often look for growing economies to invest. GDP is a one of the signals to show that the economy of a country is growing or not (Drabek & Payne, 2002; Vo & Nguyen, 2015). However, this variable is highly correlated with CPI (see Table A.2, A.3 and A.5 in the Appendix for more details), it is not included in the model. 3.3. Descriptive statistics

Descriptive statistics of the selected variables are presented in Table 1.

Table 1: *Descriptive Statistics*

Variable	Obs[a]	Mean	S.D[b].	Min	Max
FDI ($1,000)[c]	27	14,100,000.00	19,200,000.00	294,000.00	68,500,000.00
CPI score (scores)	27	37.56	19.45	15.00	87.00
Population (1,000 persons)	27	68,800.00	73,900.00	5,312.44	258,000.00
Unemployment (per cent)	27	2.59	2.25	0.10	7.10
Inflation (per cent)	27	117.20	10.38	104.90	144.91

Source. Author's calculations

Note. [a]Observations, [b]Standard Deviation, [c]Current USD,.

Table 2: *The Impact of CPI on FDI Inflows in ASEAN Countries: Random-Effects*

FDI (natural log)	Coef[a].	S.E[b].	*p-values*
CPI score (scores)	0.0772	0.0080	0.0000
Unemployment (per cent)	-0.0013	0.0007	0.0920
Inflation (per cent)	0.0139	0.0080	0.0830
Population (natural log)	0.7822	0.1487	0.0000
Constant	4.7084	2.6125	0.0720

Source. Author's calculation

Note. [a]Coefficient, [b]Standard Error.

4. Results and discussion

4.1. Results

Since fixed-effects method is not appropriate for the current analysis, only results from random-effect model are presented in Table 2.

As expected, the impact of CPI on FDI is positive significant at one per cent level. This finding implies that a country with less corruption will be able to attract more FDI inflows. In particular, one score increase in CPI is associated with almost eight per cent increase in FDI inflows. Compared to the results of Vo, results produced by the current study are more significant. Perhaps, CPI scores in the current data set are more comparable than those used by Vo. In addition, the method used in the study of Vo (FE) is different from that used in the current study (RE).

The impact of unemployment on FDI is negative, significant at 10 per cent level. For example, a one percentage point increase in unemployment is associated with 0.1 per cent decrease in FDI inflows. This finding is in line with that found by Aqil, Qureshi et al. (2014). However, Strat, Davidescu et al. (2015) found mixed causality relationship between these two factors. Dinga and Münich (2010) even found opposite results. Perhaps, more studies to examine the relationship between these two factors are necessary.

Inflation has a positive impact on FDI and its impact significant is at 10 per cent. Particularly, a one percentage point increase in inflation is associated with almost 1.4 per cent increase in FDI inflows. As shown in Table 1, the annual inflation rate of ASEAN countries during the study period is 17.2, which is greater that moderate inflation, its impact on FDI inflows is expected to be negative, but it is not. More studies to examine the impact of inflation on FDI inflows is necessary, especially the level of inflation at which its impact on FDI inflows changes direction.

As expected, the impact of population on FDI is positive and significant at one per cent level. In particular, a one per cent increase in population is associated with almost eight per cent increase in FDI inflows.

5. Conclusion

The current study constructs a panel-data set from ASEAN countries in three years and uses random-effect approach to examine the impact of CPI on FDI inflows. The results show that a country with less corruption will be able to attract more FDI inflows, significant at one per cent level. The impact of other variables is as expected. For example, slight inflation has a positive effect on FDI inflows, significant at 10 per cent. In addition, a country with a larger population can attract more FDI inflows that that with less population, significant at one per cent. Although economic theory says that moderate inflation can help boost economic growth, but at which it can help is not identified. More studies to test the impact of different inflation rates on economic growth would be necessary. In addition, more studies using data collected in a longer time frame may show if CPI needs more time to take effect.

Appendix

Table A.1. Hausman Tests

	Coef.		(b-B)	sqrt(diag(V_b-V_B))
	(b)	(B)		
	fixed	random	Difference	S.E[a].
CPI score	0.0116	0.0772	-0.0657	0.0413
Unemployment (per cent)	-0.0001	-0.0013	0.0012	0.0026
Inflation (per cent)	0.0143	0.0139	0.0004	0.0178
Population (natural log)	6.1575	0.7822	5.3753	6.5696
Prob>chi2	**0.3646**			

Source. Author's calculation

Note. [a]Standard Error.

Table A.2. Multicollinearity Tests without GDP Per Capital

	FDI	CPI score	Unemployment	Inflation	Population
FDI	1				
CPI score	0.7754	1			
Unemployment	0.3617	0.1924	1		
Inflation	0.0132	-0.2376	-0.0188	1	
Population	0.2067	-0.3765	0.5181	0.2428	1

Source. Author's calculation

Table A.3. Multicollinearity Tests with GDP Per Capital

	FDI	CPI score	GDP/capita	Unemployment	Population	Inflation
FDI	1					
CPI score	0.7754	1				
GDP per capita	0.8022	0.9661	1			
Unemployment	0.3617	0.1924	0.1988	1		
Population	0.2067	-0.3765	-0.2815	0.5181	1	
Inflation	0.0132	-0.2376	-0.3367	-0.0188	0.2428	1

Source. Author's calculation

Table A. 4. Variance Inflation Factors without GDP Per Capita

Variable	VIF[a]	1/VIF
Population	2.1	0.476167
Unemployment	1.82	0.549805
CPI score	1.54	0.647651
Inflation	1.1	0.905046
Mean VIF	1.64	

Source. Author's calculation

Note. [a]Variance Inflation Factor.

Table A. 5. Variance Inflation Factors with GDP Per Capita

Variable	VIF	1/VIF
CPI score	29.58	0.033809
GDP per capita	26.82	0.037292
Population	3.06	0.327298
Unemployment	2.08	0.48113
Inflation	1.64	0.609262
Mean VIF	12.63	

Source. Author's calculation

Note. [a]Variance Inflation Factor.

REFERENCES

[1]. Adams, S. (2009). Foreign Direct Investment, Domestic Investment, and Economic Growth in Sub-Saharan Africa. *Journal of policy modeling* 31(6): 939-949.

[2]. Al-Sadig, A. (2009). The Effects of Corruption on FDI Inflows. *Cato J., 29*, 267.

[3]. Aqil, M., et al. (2014). "Determinants of Unemployment in Pakistan." *International Journal of Physical and Social Sciences* 4(4): 676-682.

[4]. Azam, M. (2010). Economic Determinants of Foreign Direct Investment in Armenia, Kyrgyz Republic and Turkmenistan: Theory and Evidence. *Eurasian Journal of Business and Economics, 3*(6), 27-40.

[5]. Barrell, R. and N. Pain (1997). "Foreign Direct Investment, Technological Change, and Economic Growth within Europe." *The economic journal* 107(445): 1770-1786.

[6]. Barro, R. J. (2013). Inflation and Economic Growth. *Annals of Economics & Finance, 14*(1).

[7]. Bound, J., Jaeger, D. A., & Baker, R. M. (1995). Problems with Instrumental Variables Estimation When The Correlation between The Instruments and The Endogenous Explanatory Variable Is Weak. *Journal of the American statistical association, 90*(430), 443-450.

[8]. Drabek, Z., & Payne, W. (2002). The Impact of Transparency on Foreign Direct Investment. *Journal of Economic Integration*, 777-810.
[9]. Dinga, M. and D. Münich (2010). "The Impact of Territorially Concentrated FDI on Local Labor Markets: Evidence from the Czech Republic." *Labour Economics* 17(2): 354-367.
[10]. Makki, S. S. and A. Somwaru (2004). "Impact of Foreign Direct Investment and Trade on Economic Growth: Evidence from Developing Countries." *American Journal of Agricultural Economics* 86(3): 795-801.
[11]. Mallik, G., & Chowdhury, A. (2001). Inflation and Economic Growth: Evidence from Four South Asian Countries. *Asia-Pacific Development Journal, 8*(1), 123-135.
[12]. Mauro, P. (1995). Corruption and Growth. *The Quarterly Journal of Economics, 110*(3), 681-712.
[13]. Mo, P. H. (2001). Corruption and Economic Growth. *Journal of Comparative Economics, 29*(1), 66-79.
[14]. Strat, V. A., et al. (2015). "FDI and The Unemployment - A Causality Analysis for The Latest EU Members." *Procedia Economics and Finance* 23(2015): 635-643.
[15]. The World Bank. (2017). World Bank Open Data. Retrieved from https://data.worldbank.org/
[16]. Torres-Reyna, O. (2007). Panel Data Analysis Fixed and Random Effects Using Stata. *Data & Statistical Services, Priceton University, 4.2*, 1-40.
[17]. Transparency International. (2017). Corruption Perception Index. Retrieved from https://www.transparency.org/
[18]. Tsai, P.-L. (1994). "Determinants of Foreign Direct Investment and Its Impact on Economic Growth." *Journal of economic development* 19(1): 137-163.
[19]. Vo, D. V., & Nguyen, N. T. P. (2015). The Impact of CPI on FDI Inflows into Asian Coutries. *Science Journal of Can Tho University, 6*, 44-54.
[20]. Wooldridge, J. (2012). *Introductory Econometrics: A modern Approach*: Michigan State University.

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