Cointegration and Causality among Foreign Direct Investment in Tourism Sector, GDP, and Exchange Rate Volatility in Turkey

Sekmen, Fuat

January 2007

The Empirical Economics Letters, 6(1): (January 2007) ISSN 1681 8997

Cointegration and Causality among Foreign Direct Investment in Tourism Sector, GDP, and Exchange Rate Volatility in Turkey

Fuat Sekmen

Sakarya University, Department of Economics, Turkey

E-mail: sekmen@sakarya.edu.tr or fuatsekmen@gmail.com

Abstract: The Granger-causality (GC) and error correction (ECM) techniques were applied 1980-2005 data for Turkey to examine cointegration and causality among foreign direct investment (FDI) in tourism sector, overall GDP, and exchange rate volatility (EX). According to the ECM technique, the hypothesis that "no cointegration" was rejected for all three variables. The GC results detect causality runs from one-way from GDP to FDI, but the GC results detect bi-directional causality between GDP and EX suggesting that GDP and EX are jointly determined, but one way causality running from FDI to EX.

JEL classifications: C51; C41

Keywords: Cointegration; Causality; Vector Error Correction Model; Turkey.

1. Introduction

It is generally recognized that foreign direct investment (FDI) plays a significant role in economic development because it is accepted as an important vehicle for the transfer of technology, especially for developing countries, like Turkey. Barrell and Pain (1997) discuss the role of FDI in the diffusion and assimilation of technologies and ideas across borders. According to Barell and Pain, foreign investment can enhance the growth process and raise welfare in the home economy by providing additional flow of income which is crucial for investment in knowledge. Romer (1993) argues that FDI can ease the transfer of technological and business know-how to poorer countries. According to this view, the transfer of technology through FDI will have substantial spillover effects for all sectors in the economy. In contrast, some authors, like Haddad and Harrison (1993), find no evidence that FDI has spillover effects for the entire economy. Also, Bronsztein, De Gregorio, and Lee (1998) suggest that effect of FDI on economic growth depends on the certain conditions, such as highly educated workforce. Alfaro et al. (2003) find that the spillover effect of FDI for the entire economy requires sufficiently developed financial markets.

Whether the economic development takes precedence over FDI or whether FDI is a stimulus for economic development has motivated and interest among economists and policy analysts over the past decade to investigate the direction of causality between FI and GDP; for instance, Johan Ericsson and Manuchehr Irandoust 2001; Jong II Choe, 2003; Henrik Hansen and John Rand, 2006. Therefore, the direction of causality has significant policy implications. For example, the finding of causality running one-way from GDP to FDI signifies that this economy has to investigate to increase their GDP before attract foreign investment. This means that FDI needs sufficient conditions, such as political instability, developed financial markets, and highly educated workforce, to flow into a country.

Another variable examined in this paper is exchange rate volatility (EX) which has been attracted many economists' attention in international economics. Economists have investigated the relationship between exchange rate volatility and trade volume but they have not reached an agreement among themselves. For example, the argument that exchange rate volatility may impede the flow of international trade centers on the notion that exchange rate volatility represents uncertainty and imposes costs on risk-averse commodity traders. A number of scholars (such as Gagnon (1993), Ethier (1973), Broll (1994), Wolf (1995) and Hooper and Kohlhagen (1978)) illustrate that exchange rate volatility might *hinder* trade. Contrary to this view, Franke (1991), De Grauwe (1988), and Giovannini (1988) have developed models which show that exchange rate volatility or risk may actually *stimulate* trade flows. According to these latter authors, trade can be regarded as an option held by firms. Like any normal option, when exchange rate volatility increases, the value of trade also increases. Still other scholars, such as Caballero and Vittorio (1989) and Sercu and Uppal (1997), have presented models that show how underlying assumptions determine the negative or positive effect of exchange rate volatility on trade. Therefore, the impact of exchange rate volatility on trade volume is ambiguous from a theoretical point of view.

In addition to previous studies, this paper examines the direction of causality among foreign direct investment in tourism sector, exchange rate volatility, and overall GDP. The direction of causality between EX and GDP signifies important policy implications, like FDI and GDP. For example, the finding of bi-directional causality

between EX and GDP suggesting that EX and GDP are jointly determined. The direction of causality running from EX to GDP means that exchange rate volatility may stimulate trade flows, which in turn, increase GDP. In this case, exchange rate volatility can be thought as an option held by firms. Therefore, exchange rate volatility may increase trade volume and GDP. Also, the direction of causality running from GDP to EX signifies that other factors are more important than exchange rate volatility for Turkish exporters.[1]

The rest of the paper is organized as follows: Section 2 presents empirical findings and Section 3 presents a summary and conclusions.

2. Results and Discussions

2.1. Results of the Unit Roots Tests

The results of the Augmented Dicky Fuller (ADF) test are presented in Table 1. The above table shows that the τ statistics for FDI and GDP are grater than the critical values at, 1%, 5%, and 10% levels from ADF test. But, the τ statistic for EX variable is not greater than the critical values at, respectively, 1%, 5%, and 10% levels from ADF. Thus, the results show that the null unit roots hypothesis cannot be rejected for FDI and GDP variables, meaning that these variables are nonstationary in their level forms.

Table 1: Results of the ADF test

	Variable			Critical Values		
	FI	GDP	EX	1%	5%	10%
Level form	-3.22	0.67	-14.91	-3.73	-2.99	-2.64
First Difference	-6.11	-4.65	-15.1	-3.81	-3.03	-2.65

The results of the first differenced variables (FDI and GDP) show that the ADF test statistics for all the variables are less than the critical values at 1%, 5%, and 10% level. The results show that all the variables are stationary after differencing once, suggesting that FDI and GDP variables are integrated of order I(1).

[1] Oksuzler (2003) supports this idea that Turkish exporters give more importance to other factors, such as marketing, taxes, technical difficulties (such as transportation), and export incentives, rather than exchange rate risk.

2.2. Results of the Vector Error Correction Mechanism (ECM)

In the Table 2, the (normalized) cointegrating vector is displayed and, the ECMs involving ΔFI_t, ΔGDP_t, and ΔEX_t as "dependent" variables are shown. On the right-hand side of the equation appears the cointegrating regression (Coint Eq) and the coefficient attached to it is the "adjustment parameter". Here the adjustment coefficient associated with the ΔFDI_t equation is negative (-0.788711) and it is also significant (t-statistic = 2.42938). This is sufficient to reject any "no cointegration" hypothesis. Also, the other two adjustment factors are significant at the 1% level. These results suggest that "no cointegration" hypothesis is rejected.

Table 2: Vector Error Correction Estimates

	ΔFDI_t	ΔGDP	ΔEX
Cointegrating Equation	-0.788711	14778829	394
	(-2.42938)	(-3.98941)	(5.01556)
R-Squared	0.82	0.73	0.76
Adjusted R-square	0.72	0.59	0.64
F-statistic	8.26	5.098	

2.3. Causality Results from the Standard Granger-Causality (GC) Methodology

The results of the GC test, given in Table 3, show that it cannot be rejected the hypothesis that FDI does not Granger Cause GDP at 5 % level, but it can be rejected the hypothesis that GDP does not Granger Cause FDI. Therefore, Granger causality runs from one-way from GDP to FDI. Another result of GC test is for EX and FDI. The null-hypothesis, EX does not Granger Cause FDI, cannot be rejected but the hypothesis, FDI does not Granger cause EX, is rejected. Therefore, causality runs one-way from FDI to EX and not the other way.

Table 3: Granger Causality Test (GC)

Direction of causality			*F-statistic*	*Probability*
GDP	$\Rightarrow$	FDI	3.77	0.044
FDI	$\Rightarrow$	GDP	1.56	0.238
EX	$\Rightarrow$	FDI	0.74	0.49
FDI	$\Rightarrow$	EX	2.19	0.14
EX	$\Rightarrow$	GDP	2.69	0.09
GDP	$\Rightarrow$	EX	2.42	0.12

The last GC test results for the EX and GDP. Here, the null hypothesis is rejected and it is accepted that there are bi-directional causality between EX and GDP.

3. Summary and conclusions

This paper examined cointegration and causality among foreign direct investment in tourism sector, overall GDP, and exchange rate volatility using Turkish data for 1980-2005 period published by Turkish Treasury and Turkish Central Bank. The ECM present that it is sufficient to reject the "no cointegration" hypothesis for all variables. The Granger-causality test was used to examine causality between FDI and GDP, EX and FDI, and EX and GDP. The GC results show a unidirectional causality between GDP and FI, but a bi-directional causality between EX and GDP. Also, the direction of causality between FDI and EX was found that causality was running one-way from FDI to EX and this result is consistent with one-way causality from GDP to FDI. Thus, Turkish economy should motive to improve its some conditions, such as educated labor, developed financial system, and political instability, before having foreign investment.

Overall, the result of the GC better reflects the Turkish economy that of being less affected from exchange rate volatility. Another meaningful result coming from the GC is one-way causality from GDP to FDI since foreign direct investment is intended for short-term goals; for example, to obtain profits from short term interest rates.

References

Alfaro, L., Chanda, A., Sebnem, K. O, and Selin, S, 2003, FDI and Economic Growth: The Role of Local Financial Markets, Journal of International Economics, Vol. 61, no. 1, 512-53.

Barrell, R., Nigel, P., 1997, Foreign Direct Investment, Technological Change, and Economic Growth Within Europe, The Economic Journal, Vol. 107, no. 445, 1770-1786.

Broll, U, 1994, Foreign Production and Forward Markets, Australian Economic Papers, 33 (62), 1-6.

Bronsztein, E., J. De Gregorio, and J. W. Lee, 1998, How Does Foreign Direct Investment Affect Economic Growth, Journal of International Economics, Vol.45, 115-172.

Caballero, R.J., Vittorio, C, 1989, The Effect of Real Exchange Rate Uncertainty on Exports: Empirical evidence, The World Bank Economic Review, 3, 263-278.

De Grauwe, P, 1988, Exchange Rate Variability and the Slowdown in the Growth of International Trade, IMF Staff Papers 35, 63-84

Ericsson, J and M. Irandoust, 2001, On the Causality Between Foreign Direct Investment and Output: A Comparative Study, The International Trade Journal, 15, 1-26.

Ethier, W, 1973, International Trade and the Forward Exchange Market, American Economic Reivew, 63 (3), 494-503.

Franke, G, 1991, Exchange Rate Volatility and International Trade Strategy. Journal of International Money and Finance 10, 269-287.

Gagnon, J. E, 1993, Exchange Rate Variability and the Level of International Trade. Journal of International Economics, 34, 269-287.

Giovannini, A, 1988, Exchange Rate and Traded Goods Prices, Journal of International Economics, 24 45-68.

Hansen, H., Rand, J, 2006, On the Causal Links Between FDI and Growth in Developing Countries, World Economy, 29, 21-41.

Hooper, P., Kohlhagen, S. W, 1978, The Effects of Exchange Rate Uncertainty on the Prices and Volume of International Trade, Journal of International Economics 8, 483-511.

Jong, II. C, 2003, Do Foreign Direct Investment and Gross Domestic Investment Promote Economic Growth, Review of Development Economics, 7, 44-57.

Oksuzler, O, 2003, Exchange Rate Volatility and Trade Flows: Evidence from Turkey, Doctoral Dissertation, George Mason University, Fairfax, VA.

Romer, P, 1993, Idea Gaps and Object Gaps in Economic Development, Journal of Monetary Economics, 32, 543-573.

Sercu, P., Uppal, R, 1998, Exchange Rate Volatility and International Trade: A Case for Agnosticism, in Exchange Rate Volatility, Trade, Capital Flows, and Alternative Exchange Rate Regimes, Sanwa Foundation Monography in International Finance, Chp. 6.

Wolf, A, 1995, Import and Hedging Uncertainty in International Trade, Journal of Future Markets 15, 101-110.