International Research Journal of Finance and Economics
ISSN 1450-2887 Issue 124 June, 2014
http://www.internationalresearchjournaloffinanceandeconomics.com

Causal Relationship between Financial Development and International Trade: Evidence from Turkey

Gökhan Demirtaş
Afyon Kocatepe University, Faculty of Economics and Administrative Sciences, Afyonkarahisar, Turkey
E-mail: demirtas@aku.edu.tr

Oğuzhan Aydemir
Corresponding Author, Afyon Kocatepe University, Faculty of Economics and Administrative Sciences, Afyonkarahisar, Turkey
E-mail: aydemir69@gmail.com

Abstract

Over the past few decades, the links between financial development and international trade has preoccupied the minds of economists. However, the direction of causality still remains unresolved in both theory and empirics. In this paper we investigate the causal relationship between financial development and international trade with Toda Yamamoto, using data from 1961 to 2012 about Turkey. According to empirical findings, there is bidirectional causality between financial development and international trade. Also, financial development leads international trade indirectly through both economic growth and exchange rate. On the other hand, there is bidirectional causal relationship between economic growth and financial development.

Keywords: Financial Development, International Trade, Monetary Policy
Jel Classification: F43, F10, F14, G21

1. Introduction

The relationship between financial development and international trade has been investigated by economists since they both play important roles in influencing the development of a country's economy. Although trade finance is an important issue in international trade (Schmidt-Eisenlohr, 2013:106), the direction of causality still remains unresolved in both theory and empirics.

International trade is more risky and takes more time. Also there is a time gap between production and sale. Hence, exporter finance, importer finance and bank finance become more important to support international trade (Schmidt-Eisenlohr, 2013: 96).

According to literature, the trade–finance relations may be country-specific (Kim, Lin and Suen, 2010: 260). Recently, empirical literature indicates the negative effects of financial constraints in countries on the chance of their exporting (Goksel, 2012: 2222). Although countries with a better developed financial system and also a higher level of external finance should have a comparative advantage in international trade, the relations might be demand-driven. That is, increasing export shares may cause financial development (Beck, 2002:109).

When there is a positive correlation between financial development and international trade, it is generally assumed that financial development leads international trade. However, this correlation can imply reverse situation. In other words, increasing in international trade can stimulate the financial

development because of more demand for external finance. So, studying the direction of causality will give correct insight to policy makers (Kiendrebeogo, 2012).

Countries should be aware of the importance of financial sector policies that increase the access to finance for industries that are dependent on more outside finance since these policies may provide advantages to these industries in international trade (Schmidt-Eisenlohr, 2013:106; Kiendrebeogo, 2012). Therefore, studying the relationship between trade and financial development has some implications for policy makers. For example, possible causality from financial development to trade shows the importance of financial development in terms of trade balance and economic development. In this situation, countries should focus on financial sector reforms to have comparative advantage in international trade (Beck, 2002: 108).

According to some literature in international trade, financial sector development may promote the countries' comparative advantages in trade. Therefore, differences in financial development between countries can be the determinant of their international trade levels (Hur, Raj and Riyanto, 2006; Do and Levchenko, 2007). However, financial requirements in international trade may change in terms of goods exporting. Countries with comparative advantage in financially intensive goods need more external finance (Do and Levchenko, 2007: 796). Hence, financial policies, facilitating the access to finance for firms which produce financially intensive goods, especially manufactured goods, may increase the comparative advantage of firms in international scale (Kiendrebeogo, 2012).

While dominant theories of international trade don't take the role of finance into consideration as a source of comparative advantage, a vast empirical literature in finance literature has indicated the importance of financial development for industries which need more external finance. Nevertheless, the effects of finance in international trade are still unexplored in theory (Ju and Wei, 2011:179-186).

On the other side, some papers state that trade openness affects the financial sector. However the impact of trade on financial development is still indefinite since although trade openness can lead financial development in the long-run, it increases the risk in international competition and may cause crises in the short-run. For this reason, investigating short-run and long-run effects of trade on financial development separately can be more appropriate to understand relationships (Kim et al., 2010: 260).

While developing countries prefer to put some barriers to imports of foreign goods, they may try to remove obstacles related with exports and give some incentives to their firms. Also, in order to compete and have a comparative advantage in international area, domestic firms should get financial support. Financial constraints will affect the investments and productivity of firms. On the other hand, better access to finance gives pricing power to firms in international trade. So, financial structure of countries may affect their trade level. On the demand-driven side, international trade will stimulate the financial development (Mishkin, 2009: 166).

Turkish economy adopted export-oriented growth policies by leaving import substitution industrialization policies in 1980. Along with the January 24, 1980 Stability Decisions, in order to liberalize the financial sector and eliminate the barriers against foreign trade, several structural reforms were put into practice. Therefore, in this study, it is started to analysis with Zivot and Andrews (1992) unit root test, considering structural breaks. Also, sample covers long period. Because of these perspectives, this study is different from other studies about Turkey. On the other hand, since series have different stationary levels, Modified Wald (MWALD) test for granger causality, proposed by Toda and Yamamoto (1995), is applied.

This paper attempts to examine the relationship between financial development and international trade for Turkey over the period of 1961-2012. The paper is organized as follows: Section 2 and 3 contain the history of Turkish economy and a brief literature review. Empirical Model and Data Source, Methodology, and empirical results are presented in section 4, 5 and 6, respectively. Concluding remarks take place in section 7.

2. Overview of the Turkish Economy

In Turkey, import-substitution industrialization policies in company with state-led development plans were performed between 1960 and 1980 (Celasun and Rodrik, 1989). In this period, it was intended to provide foreign exchange savings by quantitative import restrictions. For this purpose, different rates were designated for foreign exchange and bank credits. Yet, oil shock in 1970s as well as failure in implementation made sustainability of aforementioned policies controversial in this period. Rent-seeking behavior of business world could be example to failure in implementation. According to Demir (2004:852), incentives provided by government in this period caused rent-seeking behavior of business world. On the other hand, besides failure, serious moral hazard in public and private sectors has emerged.

In table 1, growth, financial development and foreign trade data for this period are presented. Between 1960 and 1980, while targets of first five-year development plan were achieved mostly, other development plans were partially successful. On the other hand, fourth five-year development plan couldn't be put into practice.

Table 1: Turkish Economy's Data for 1961-2012 Periods

Period	Explanation	Growth Rate	Financial Development	Trade Openness
		Annual GDP growth	M2 / GDP	Trade / GDP
1963-1967	First Five-Year Development Plan	6.6	0.17	0.10
1968-1972	Second Five-Year Development Plan	5.4	0.22	0.11
1973-1977	Third Five-Year Development Plan	6.0	0.24	0.16
1961-1979	Import Substitution Period	5.2	0.20	0.12
1981-1993	Before 1994 Currency Crisis	5.1	0.26	0.31
1995-1999	Before 2000 and 2001 Financial Crisis	4.4	0.35	0.45
2002-2007	Before Global Financial Crisis	6.8	0.39	0.49
2010-2012	After Global Financial Crisis	6.7	0.55	0.54
1981-2012	Export-Oriented Growth	4.4	0.35	0.41

Turkey has gone to a major structural transformation along with the January 24, 1980 Decisions. On the one hand, export-oriented growth policies were adopted. On the other hand, financial markets have been liberalized. After this date, Turkey faced with two important financial crises, originated from its own financial structure in 1994 and 2000/2001. After capital account liberalization in 1980s, because of budget deficit and current deficit, Turkey faced with currency crisis in 1994. One of the most important reasons of this is to meet high level public domestic debt with monetization (Celasun, 1998).

In the beginning of 2000s, high inflation problem of Turkey pursued. In addition to this, there was severe internal debt problem. Under these circumstances, "Inflation Reduction Program", based on fixed exchange rate, was implemented. Akyüz and Boratav (2003) expressed that while this program was beginning, Turkish economy had structural problems and structural breaks with regards to public finance and banking sector. The income of the banking sector heavily depended on T-bills due to high interest rate. Failure in fighting against inflation made sustainability of stabilization program based on foreign exchange difficult in 2000. Together with the appreciation of the real exchange rate, current account deficit began to increase. In the meantime, along with increased demand for liquidity of the banking sector, Turkey experienced a financial crisis. According to Oniş (2003), after 2000/2001 crisis, the most optimistic development was structural reforms in banking sector. Thus, financial system strengthened. Aras (2010) stated that reforms about banking system strengthened the banking capital structure and thus banks in Turkey was affected less from 2008 global crisis.

Turkey has experienced remarkable economic growth performance between 2003 and 2014 except 2008 and 2009 due to global crisis. Growth performance of Turkey in the specific periods is listed in Table 1.Also, according to table 1, trade openness and financial development variables have been increasing in Turkey in the last 50 years.

3. Literature Review

Kiendrebeogo (2012) investigated the causal links between financial development and international trade for developed and developing countries over the period of 1961-2010. According to findings, although there is a bidirectional relationship between the levels of finance and trade, the causality varies between developed and developing countries since they have different levels of economic development. This result may imply that the causality between financial development and international trade is country specific. Moreover, the paper indicates that the level of financial development is more important for developing countries in the causal relationship.

Contrary to most studies investigating the contribution of financial development on international trade, Kim et al. (2010: 260) searched the impact of international trade on financial development. The findings of the paper show the importance of trade openness in determining the level of financial development. According to paper, the long-run and short-run effects of trade are different. While trade affects the financial development positively in the long-run, negative effects is valid in the short-run. That is, the contribution of international trade on financial development occurs in the long-run. These findings may give useful implications for policy makers who give short-run and long-run decisions.

Kim et al. (2010) investigated finance-trade relationships with classifying the countries according to the levels of income and inflation. They find that the level of economic development is one of the determinants of trade-finance link. Empirical results show that trade has positive long run and negative short run effects on financial development in relatively lower-income countries. On the other hand, trade openness tends to have negative long-run and insignificant short-run effects on financial development in high-income countries. These differences exist for countries with different inflation rates.

Samba and Yan (2009) in their empirical study found similar results in accordance with Kim et al. (2010). They investigated the causal relations between financial development and international trade for selected East Asian Countries. According to results, international trade leads financial development in most of the countries in the sample.

Beck (2002) investigated the relationships between the level of financial development and the structure of international trade for different sectors of 65 countries. The paper states that the sector with high scale economies gets more benefits from a higher level of financial development. Therefore, the role of financial development is crucial for the comparative advantages of sectors with high scale economies. Also, higher level of financial development results in higher shares of manufactured exports in GDP and in total merchandise exports and higher trade balance in manufactured goods.

Similarly, Susanto et al. (2011) investigated the impacts of financial development on both agriculture and manufactured goods empirically for 49 countries between 1980 and 2008. The empirical findings show the positive effect of financial development on bilateral trade flows, especially for the manufacturing sector with relatively large economies of scale. Moreover, according to results of the study, financial development affects exports of developing countries more than that of developed countries.

Goksel (2012: 2225) indicates that differences in financial structures between countries affect the bilateral trade. Empirical findings in his study show that financial development encourages the amounts of firms' and accordingly countries' exports since firms need credits to cover their costs. Therefore, trade volume between countries that have relatively healthier financial markets will be higher.

Hur et al. (2006: 1728) investigate the financial development and international trade relations for 27 industries in 42 countries according to level of intangible and tangible assets. According to results, the level of financial development leads export and trade-balance more in industries with more intangible assets. It means that financial development is much more important for industries with more intangible assets and generates comparative advantages in these industries. Demir and Dahi (2011) found similar results. They also indicate that well- developed financial sectors have more and positive impacts on exports of higher value added and external finance-dependent manufactured goods.

Coulibaly et al. (2013: 25) investigated the effects of availability of external finance on the amount of sales during the 2008–09 global financial crisis using firm level data from six emerging market economies in Asia. They state that since financial conditions adversely affected sales during the crisis, domestic-oriented firms relied more on trade credit as an alternative source of finance to decrease the effects of worsening financial condition. That is, as long as firms replace external finance with trade credit, they have better sales during the crisis. On the other hand, sales of export-intensive firms decline more than that of domestic-oriented firms because they rely less on trade credit. Also, although crisis originated in the advanced economies, emerging market economies were affected more than advanced economies. One of the reasons of this is the lack of the external finance in emerging market economies during the crisis.

Feng and Lin (2013) examined the impacts of financial constraints on export-oriented firms. Findings show that since export oriented firms face larger fixed costs in production, they rely more on external finance. Also, they should sell more than domestic oriented firms to cover these high fixed costs. Therefore, worsening financial conditions affect export oriented firms adversely and more than domestic oriented firms.

Bordo and Rousseau (2012) investigated the relationship between financial development and trade and also their impact on economic growth for a group of now-developed Atlantic economies since 1880. The empirical findings indicate that existing relations between finance and trade before Second World War disappeared. Also, while there is strong relationship between financial development and economic growth during the period, the relationships between trade and economic growth appeared only after 1945.

Chor and Manova (2012) investigated the effects of changes in the cost of external finance and the availability of external finance on the amount of firms' exports to the United States during the 2008-2009 global financial crisis. According to empirical findings, firms having financial constraints and with higher cost of borrowing exported less to the US during the crisis. These effects were so significant in sectors that rely more on external finance, have not enough collateralizable assets and have lack of trade credit. That is, financially sensitive sectors were affected more during the crisis.

Bojanic (2012) searched the impact of trade openness and financial development on the economic growth of Bolivia over the period of 1940-2010. According to empirical findings, there is a unidirectional Granger causality from financial development and trade openness to economic growth. Also, there is a long-run relationship between economic growth, financial development and trade openness. This result is consistent with the findings of Katircioglu et al. (2007) that investigated the relationships between financial development, trade and growth for India.

Although most of the empirical studies exhibited the importance of financial development for trade, Awojobi (2013) found that financial development doesn't lead trade in Greece. On the other hand, there is a unidirectional causality from trade openness to financial development. According to findings, the relationships between financial development and trade are demand-driven. However, financial development can spur trade indirectly since financial development leads economic growth and economic growth causes trade openness.

Kar et al. (2013) investigated the direction of causality between trade liberalization, financial development, and economic growth in Turkey for the period of 1989-2007. According to results, while there is bidirectional causality between economic growth and trade openness, there is one-way causality from economic growth to financial development and financial development to trade liberalization. These results are not consistent with our results. In this study, we found bidirectional causality between financial development and trade and also between economic growth and financial development.

4. Empirical Model and Data Source

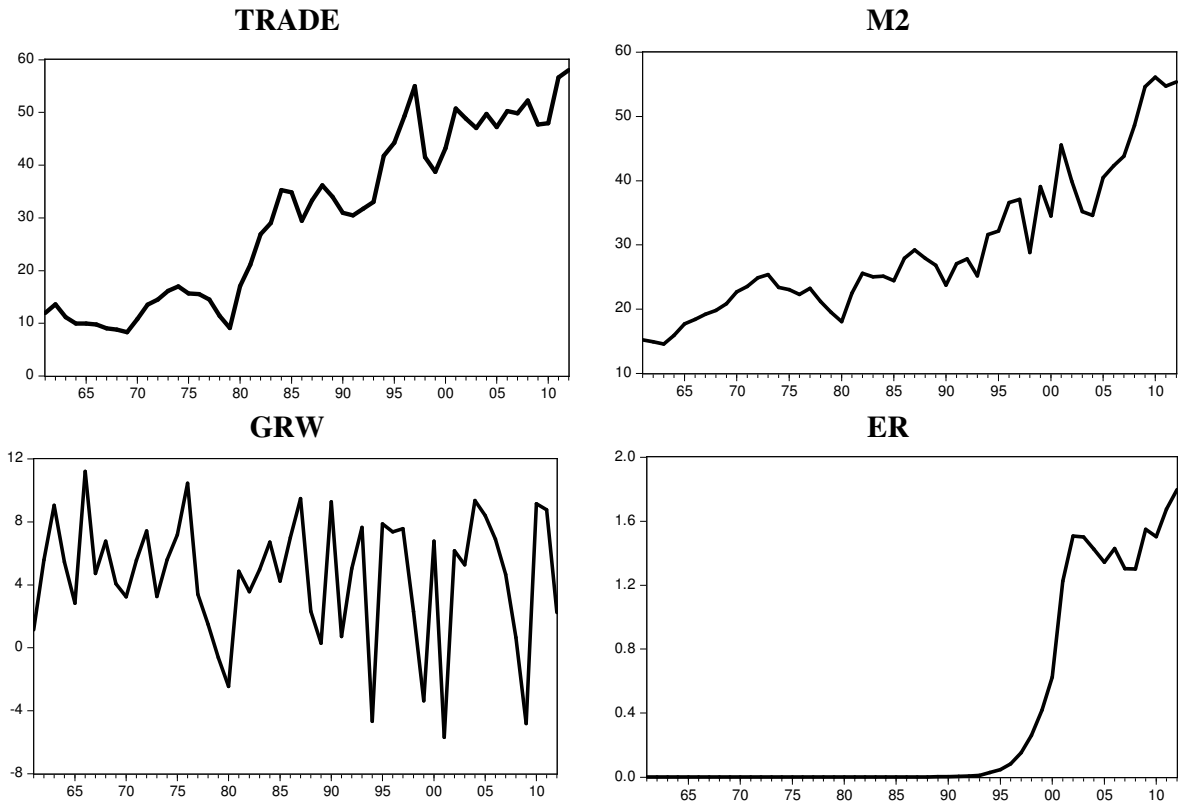
In this paper, the studies of Gries et al. (2009) and Kiendrebeogo (2012) are taken as reference to form equation (1). Similar equation was used by Kar et al. (2013). In the equation (1) given below, TRADE

is the sum of exports and imports of goods and services measured as a percentage of gross domestic product (GDP). M2denotes money and quasi money as percentage of GDP and is taken as an indicator of financial development. GRW, annual GDP growth, and ER, official exchange rate (LCU per US$, period average) are taken as control variables in the equation.

$$TRADE_t = f(M2_t, GRW_t, ER_t) \quad (1)$$

Data, related with all variables in the model is taken from World Development Indicators data base, prepared by World Bank. The period of the study covers the years between 1961 and 2012 for Turkey. Graphs related with series used in the model are shown in figure 1 below.

Figure 1: The graphs of variables used in the model



According to figure 1, M2, TRADE and ER variables except GRW present upward trends. Table 2 shows the descriptive statistics and correlation matrix related with variables used in the model.

Table 2: Descriptive statistics and correlation matrix

Descriptive Statistics				
	TRADE	**M2**	**GRW**	**ER**
Mean	30.272	29.491	4.548	0.369
Median	31.340	25.488	5.151	0,0007
Maximum	57.995	56.122	11.212	1,796
Minimum	8.333	14.597	-5.697	0.9e-5
Std. Dev.	16.261	11.122	4.008	0,619
Correlation Matrix				
	TRADE	**M2**	**GRW**	**ER**
TRADE	1	-	-	-
M2	0.825	1	-	-
GRW	-0.046	-0.119	1	-
ER	0.739	0.816	-0.041	1

5. Methodology and Data

Determination of the methods to be used in time series studies is directly related with the stationary properties of the series. In order to search the stationary levels of series, Augmented Dickey-Fuller (ADF) unit root test developed by Dickey and Fuller (1979, 1981) and unit root test (ZA) developed by Zivot and Andrews (1992) are employed. The null hypothesis of ADF and ZA unit root tests indicates that series has a unit root and is not stationary. Equation (2) is estimated for ADF test (with constant term). y is used in the equation to represent the variables used in the study.

$$\Delta_t = \alpha_0 + \alpha_1 y_{t-1} + \sum_{t=1}^{p} \theta_i \Delta y_{t-1} + \varepsilon_t \quad (2)$$

Furthermore, the results of unit root test (ZA) are presented to be able to determine the impact of any structural breaks in the estimation period. There are 3 different models underlying of ZA unit root test. These are:

$$\text{Model A: } y_t = \mu + \theta DU_t(\lambda) + \beta t + \rho y_{t-1} + \sum_{j=1}^{k} c_j \Delta y_{t-j} + \varepsilon_t \quad (3)$$

$$\text{Model B: } y_t = \mu + \theta DT_t(\lambda) + \beta t + \rho y_{t-1} + \sum_{j=1}^{k} c_j \Delta y_{t-j} + \varepsilon_t \quad (4)$$

$$\text{Model C: } y_t = \mu + \theta DU_t(\lambda) + \varnothing DT_t(\lambda) + \beta t + \rho y_{t-1} + \sum_{j=1}^{k} c_j \Delta y_{t-j} + \varepsilon_t \quad (5)$$

$$DU_t \begin{cases} 1 \; Eğert > TB \\ 0 \; Diğer \end{cases} \qquad DT_t \begin{cases} t - TB \; Eğert > TB \\ 0 \; Diğer \end{cases}$$

In the equations, DT_t and DU_t represent dummy variables for structural break in the trend and mean, respectively. Also, λ= TB/T and TB are used for break period. Break period is the date which gives the least t statistics in the model. In case, estimated t statistics is bigger than Zivot-Andrews (1992) table critical value, the null hypothesis that series contains unit root is rejected. Model A, Model B and Model C before mentioned reveal the structural breaks in the mean, trend, and both mean and trend, respectively.

Stationary properties of series determine the method of causality analysis to be used. In case, variables taken in the same model are stationary in their levels, standard Granger Causality test developed by Granger (1969) is applied. If variables are non-stationary in their levels, whether there is a long-run relationship between series or not should be analyzed. For this purpose, cointegration test, proposed by Johansen (1988) and Johansen and Juselius (1990), is used. When series has a long-run relationship, Engle and Granger (1987) and Granger (1988) causality analyses should be performed by means of Vector Error Correction Model.

In order to determine the method to be used in the study, ADF and ZA unit root tests are applied and the results of tests are presented in Table 3. The null hypothesis of both tests indicates that series contains unit root. For ZA test, Model C, considering the breaks in the mean and trend, is estimated. According to table 3, ADF and ZA unit root test results state that variables used in the model are integrated in different orders. According to both test results, TRADE and GRW variables are stationary in their levels. While ADF test results state that M2 and ER variables are stationary in their first differences, according to ZA unit root test result, M2 variable is stationary in second differences.

Table 3: Unit Root Test Results

Variables	ADF Test Statistics		ZA Test Statistics			
	Level	First Differences	Level	First Differences	Second Differences	Break Period
TRADE	-4.02(1)[b]		-5,24(1)[b]			1982

Table 3: Unit Root Test Results - continued

M2	-1.51(1)	-9.63(0)[a]	-3.48(1)	-3.62(4)	-8.01(3)[a]	1981
GRW	-7.26(0)[a]		-7.60(0)[a]			2003
ER	-1.30(1)	-4.12(0)[a]	-5.04(1)	-5.17(0)[b]		2003

[a] and [b] indicate significance at the 1% and 5%level, respectively.
Values in the parenthesis indicate lag lengths.
AIC is used for ADF test and max lag length is determined as 4.
For ZA test, Model C is estimated, considering breaks in the mean and trend.

In case, series have different stationary levels, in order to employ causality test, modified Wald test, proposed by Toda and Yamamoto (1995), is applied. This test ignores the possible stationary and cointegration problems related with ordinary Granger Test. Because Toda and Yamamoto (1995) approach is minimized the risks related with misspecification of the order of integration of the series, it is proper to establish VAR model in variables levels (Mavrotas and Kelly, 2001).

While Toda and Yamamoto (1995) is applied, VAR order (k) and the maximum order of integration of variables (d_{max}) are determined. Then, (k+ d_{max}) lagged VAR model stated below is estimated. However, the coefficient of last lag (d_{max} vector) is ignored in causality analysis. Toda and Yamamoto (1995) long-run causality test ensures that the test statistics for Granger causality has chi-square asymptotic distribution consistent with degrees of freedom.

Equation 6, 7, 8 and 9 are used to apply Toda and Yamamoto Granger causality test by estimating four-variate VAR model. While models are estimated, Seemingly Unrelated Regression (SUR) estimation method is implemented by following Rambaldi and Doran (1996). According to authors, SUR method increases the efficiency of MWald test that is applied for Granger causality test.

$$TRADE_t = \alpha_1 + \sum_{i=1}^{k+d_{max}} \beta_{1i} TRADE_{t-i} + \sum_{i=1}^{k+d_{max}} \theta_{1i} M2_{t-i} + \sum_{i=1}^{k+d_{max}} \lambda_{1i} GRW_{t-i} + \sum_{i=1}^{k+d_{max}} \gamma_{1i} ER_{t-i} + \delta_1 D_1 + \vartheta_1 D_2 + \varphi_1 D_3 + \mu_{1t} \quad (6)$$

$$M2_t = \alpha_2 + \sum_{i=1}^{k+d_{max}} \beta_{2i} TRADE_{t-i} + \sum_{i=1}^{k+d_{max}} \theta_{2i} M2_{t-i} + \sum_{i=1}^{k+d_{max}} \lambda_{2i} GRW_{t-i} + \sum_{i=1}^{k+d_{max}} \gamma_{2i} ER_{t-i} + \delta_2 D_1 + \vartheta_2 D_2 + \varphi_2 D_3 + \mu_{2t} \quad (7)$$

$$GRW_t = \alpha_3 + \sum_{i=1}^{k+d_{max}} \beta_{3i} TRADE_{t-i} + \sum_{i=1}^{k+d_{max}} \theta_{3i} M2_{t-i} + \sum_{i=1}^{k+d_{max}} \lambda_{3i} GRW_{t-i} + \sum_{i=1}^{k+d_{max}} \gamma_{3i} ER_{t-i} + \delta_3 D_1 + \vartheta_3 D_2 + \varphi_3 D_3 + \mu_{3t} \quad (8)$$

$$ER_t = \alpha_4 + \sum_{i=1}^{k+d_{max}} \beta_{4i} TRADE_{t-i} + \sum_{i=1}^{k+d_{max}} \theta_{4i} M2_{t-i} + \sum_{i=1}^{k+d_{max}} \lambda_{4i} GRW_{t-i} + \sum_{i=1}^{k+d_{max}} \gamma_{4i} ER_{t-i} + \delta_4 D_1 + \vartheta_4 D_2 + \varphi_4 D_3 + \mu_{4t} \quad (9)$$

According to ZA unit root test results, D_1 dummy variable is included to model above. The results of ZA unit root test indicate that there are structural breaks in 1981 and 1982. This refers to economic transformation in Turkey along with the January 24, 1980 Stability Decisions. In this time, leaving the import substitution policies and transition to export-based economy was an important structural change. Moreover, along with these decisions, some steps have been taken towards liberalization of financial markets. Also, D_2, showing the effects of 1994, 2000, 2001 crises arising

from its own financial structure of Turkey, and D_3 dummy variable, pointing to 2008 global crisis, are included to the equation.

6. Empirical Results

In order to implement Granger causality analysis based on Toda and Yamamoto (1995) approach, the maximum order of integration of variables (d_{max}) should be determined as a first step. According to the results of ZA unit root test, within the variables in the model, since M2 variable is stationary in second differences, d_{max}=2 is determined. Second step is to detect lag order (k) related with VAR model. Statistics with regard to criteria used to determine the maximum lag length are given in Table 4. In order to detect maximum lag length, AIC is used. k=3 is determined as lag length at which AIC value is the lowest. In stated lag length, null hypothesis based on the presence of autocorrelation is rejected. This result shows that there is no autocorrelations in the error terms.

Table 4: Lag Order Selection under different criteria for VAR Model

Lag	LR	FPE	AIC	SC	HQ
0	NA	8249.9	20.36	20.99	20.60
1	282.81	13.81	13.96	15.21*	14.43
2	33.41	10.96	13.70	15.57	14.41
3	35.15*	7.58*	13.27*	15.76	14.21*
4	14.89	9.67	13.40	16.52	14.58

* indicates lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion

Table 5 gives the results of four-variate Granger causality procedure developed by Toda-Yamamoto. In the table, optimal lag length (k), and MWald statistics with p-values and direction of causality, determined based on VAR order are presented. According to findings, there is a bidirectional causal relationship between M2 and TRADE. Both null hypothesis, "Granger non-causality from M2 to TRADE" and "Granger non-causality from TRADE to M2", are rejected. Secondly, there is indirect causality between M2 and TRADE through both GRW and ER variables.

Table 5: Toda and Yamamoto Causality Test Results

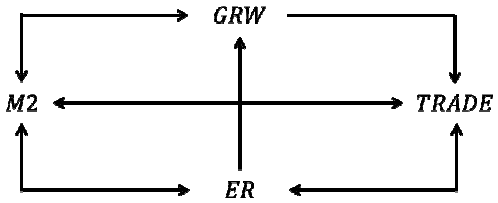
Null Hypothesis	*k*	d_{max}	MWald Statistics	p-values	Direction of Causality
M2 does not Granger cause TRADE	3	2	11.729[b]	0.019	M2↔TRADE
TRADE does not Granger cause M2			8.793[c]	0.066	
GRW does not Granger cause TRADE	3	2	14.646[a]	0.005	GRW↔TRADE
TRADE does not Granger cause GRW			4.536	0.338	
ER does not Granger cause TRADE	3	2	13.573[a]	0.008	ER↔TRADE
TRADE does not Granger cause ER			9.054[c]	0.059	
M2 does not Granger cause GRW	3	2	11.896[b]	0.018	M2↔GRW
GRW does not Granger cause M2			16.493[a]	0.002	
M2 does not Granger cause ER	3	2	9.309[c]	0.053	M2↔ER
ER does not Granger cause M2			8.538[c]	0.073	
GRW does not Granger cause ER	3	2	1.367	0.849	ER↔GRW
ER does not Granger cause GRW			8.419[c]	0.077	

[a], [b], [c] indicate significance at the 1%, 5% and 10% level, respectively.

The Direction of causality between variables is given in figure 2. According to this figure, besides direct and bidirectional causality, there is indirect causality between M2 and TRADE. Firstly,

there is bidirectional causality between GRW and M2. However, there is a unidirectional causality between GRW and TRADE and the direction of causality is from GRW to TRADE. These results indicate that there is indirect and unidirectional causality from M2 to TRADE via GRW. On the other hand, there is bidirectional causality between ER and both M2 and TRADE. This finding indicates indirect and bidirectional causality between M2 and TRADE via ER.

Figure 2: Direction of Causality Between Variables



7. Concluding Remarks

Economists have tried to explain financial development-international trade nexus for a long time. There have been many empirical and theoretical studies to define the direction of causality between these two variables. However, the direction of causality still remains unresolved. Moreover, the direction of causality may be country-specific and may change according to proxies used in the study.

In this study, we investigate the causal relationship between financial development and international trade, using data from 1961 to 2012 about Turkey. This period included January 24, 1980 Decisions, causing radical structural reforms in Turkish economy. Therefore, Zivot and Andrews test was used for unit root test of series. Since series have different stationary levels, in order to employ causality test, modified Wald test, proposed by Toda and Yamamoto (1995), is applied.

There are three important findings of the study. Firstly, there is bidirectional causality between financial development and international trade. Secondly, there is indirect causality from financial development to international trade through both economic growth and exchange rate. Finally, according to findings, there is indirect causality only from international trade to financial development via exchange rate.

When the results of causality analysis are interpreted in terms of economic growth, there are some important implications. There is bidirectional causal relationship between economic growth and financial development in Turkey. In addition to this, there is a unidirectional causality from economic growth to international trade. Consequently, findings show that there are both direct and indirect relations between financial development and international trade. Also, trade leads economic growth via financial development.

References

[1] **Akyüz, Y. and Boratav, K.** (2003), "The Making of the Turkish Financial Crisis", *World Development*, 31(9), pp. 1549-1566.

[2] **Aras, O. N.** (2010), "Effects of the Global Economic Crisis on Turkish Banking Sector", *International Journal of Economics and Finance Studies*, 2(1), pp. 113-120.

[3] **Awojobi, O.** (2013), "Does Trade Openness and Financial Liberalization Foster Growth: An Empirical Study of Greek Economy", International Journal of Social Economics, 40 (6), pp.537-555.

[4] **Beck, T.** (2002), "Financial development and international trade Is there a link?", *Journal of International Economics*, 57, pp. 107–131.

[5] **Bojanic, A. N.** (2012), "The Impact of Financial Development and Trade on the Economic Growth of Bolivia", *Journal of Applied Economics*, Vol. XV, No. 1, pp. 51-70.

[6] **Bordo, M. D. and Rousseau, P. L.** (2012), "Historical evidence on the finance-trade-growth nexus", *Journal of Banking & Finance*, 36, pp. 1236–1243.

[7] **Celasun, M. and Rodrik, D.** (1989), Debt, adjustment, and growth: Turkey.(Eds. Sachs, J.D.,Collins, S.M.), Developing Country Debt and Economic Performance: Country Studies, University of Chicago Press.

[8] **Celasun, O.** (1998), "The 1994 Currency Crisis in Turkey", *Policy Research Working Paper Series*, No: 1913, Development Research Department, The World Bank.

[9] **Chor, D. and Manova, K.** (2012), "Off the cliff and back? Credit conditions and international trade during the global financial crisis", *Journal of International Economics*, 87, pp. 117–133.

[10] **Coulibaly, B., Sapriza, H. and Zlate, A.** (2013), "Financial frictions, trade credit, and the 2008–09 global financial crisis", *International Review of Economics and Finance*, 26, pp. 25–38.

[11] **Demir, F.** (2004). "A Failure Story: Politics and Financial Liberalization in Turkey, Revisiting the Revolving Door Hypothesis", *World Development*, 32(5), pp. 851-869.

[12] **Demir, F. and Dahi, O. S.** (2011), "Asymmetric effects of financial development on South–South and South–North trade: Panel data evidence from emerging markets", *Journal of Development Economics*, 94, pp. 139–149.

[13] **Dickey, D. A. and Fuller, W. A.** (1979), "Distribution of the estimators for autoregressive time series with a unit root", *Journal of the American Statistical Association*, 74, pp. 427−431.

[14] **Dickey, D. A. and Fuller, W. A.** (1981), "Likelihood ratio statistics for autoregressive time series with a unit root", *Econometrica,* 49, pp. 1057−1072.

[15] **Do, Q-T. and Levchenko, A. A.** (2007), "Comparative advantage, demand for external finance, and financial development", *Journal of Financial Economics*, 86, pp. 796–834.

[16] **Engle, R. F. and Granger, C. W. J.** (1987), "Cointegration and Error Correction: Representation, Estimation, and Testing", *Econometrica,* 55, pp. 251-276.

[17] **Feng, L. and Lin, C-Y.** (2013), "Financial shocks and exports", *International Review of Economics and Finance*, 26, pp. 39–55.

[18] **Goksel, T.** (2012), "Financial constraints and international trade patterns", *Economic Modelling,* 29, pp. 2222–2225.

[19] **Granger, C. W. J.** (1969), "Investigating Causal Relations by Econometric Models and Cross-spectral Methods", *Econometrica,* 37 (3): 424–438. doi:10.2307/1912791.

[20] **Granger, C.W.J.** (1988), "Some recent developments in the concept of causality", *Journal of Econometrics,* 39, pp. 199-211.

[21] **Gries, T., Kraft, M. and Meierrieks, D.** (2009), "Linkages between financial deepening, trade openness, and economic development: Causality evidence from Sub-Saharan Africa", *World Development*, 37(12), pp.1849-1860.

[22] **Hur, J., Raj, M. and Riyanto, Y. E.** (2006), "Finance and Trade: A Cross-Country Empirical Analysis on the Impact of Financial Development and Asset Tangibility on International Trade", *World Development,* Vol. 34, No. 10, pp. 1728–1741.

[23] **Johansen, S.** (1988), "Statistical Analysis of Cointegration Vectors", *Journal of Economic Dynamics and Control*, 12 (2-3), pp. 231-254.

[24] **Johansen, S. and Juselius, K.** (1990), "Maximum Likelihood Estimation and Inference on Cointegration-with Applications to the Demand for Money", *Oxford Bulletin of Economics and Statistics*, 52, pp. 169-210.

[25] **Ju, J. and Wei, S-J.** (2011), "When is quality of financial system a source of comparative advantage?", *Journal of International Economics*, 84, pp. 178–187.

[26] **Kar, M., Nazlıoglu, S. and Agır, H.** (2013), "Trade Openness, Financial Development, and Economic Growth in Turkey: Linear and Nonlinear Causality Analysis", International Conference on Eurasian Economies, 17-18 September 2013, pp. 133-143, St. Petersburg, RUSSIA.

[27] **Katircioglu, S. T., Kahyalar, N. and Benar, H.** (2007), "Financial Development, Trade and Growth Triangle: the Case of India", International Journal of Social Economics, 34 (9), pp. 586-598.

[28] **Kiendrebeogo, Y.** (2012), "Understanding the Causal Links between Financial Development and International Trade", *Etudes et Documents*, no 34, CERDI.

[29] **Kim, D-H., Lin, S-C. and Suen, Y-B.**(2010), "Dynamic effects of trade openness on financial development", *Economic Modelling*, 27, pp. 254–261.

[30] **Mavrotas, G. and Kelly, R.** (2001), "Old Wine in New Bottles: Testing Causality between Savings and Growth", *The Manchester School Issue Supplement*, 69(1): pp. 97-105 DOI: 10.1111/1467-9957.69.s1.6.

[31] **Mishkin, F. S.** (2009), "Globalization and financial development", *Journal of Development Economics*, 89, pp. 164–169.

[32] **Oniş, Z.** (2003)."Domestic Politics versus Global Dynamics: Towards a Political Economy of the 2000 and 2001 Financial Crises in Turkey, Turkish Studies, 4(2), pp. 1-30.

[33] **Rambaldi, A. N. and Doran, H.** (1996), "Testing for Granger non-causality in cointegrated systems made easy", *Econometrics and Applied Statistics*, Working Paper No: 88, Department of Econometrics, University of England.

[34] **Samba, M. C. and Yan, Y. (2009),** "Financial Development and International Trade in Manufactures: An Evaluation of the Relation in Some Selected Asian Countries", *International Journal of Business and Management*, Vol. 4 (12), pp. 52-69.

[35] **Schmidt-Eisenlohr, T.** (2013), "Towards a theory of trade finance", *Journal of International Economics*, 91, pp. 96–112.

[36] **Susanto, D., Rosson, C. P. and Costa, R.** (2011), "Financial Development and International Trade: Regional and Sectoral Analysis", Agricultural & Applied Economics Association 2011 AAEA&NAREA Joint Annual Meeting, Pittsburgh, Pennsylvania.

[37] **Toda, H. Y. and Yamamoto, T.** (1995), "Statistical inference in vector autoregressions with possibly integrated processes", *Journal of Econometrics*, 66(1-2): pp. 225–250.

[38] **Zivot, E. and Andrews, D. W. K.** (1992), "Further Evidence on the Great Crash, the Oil-Price Shock, and the Unit-Root Hypothesis", *Journal of Business & Economic Statistics*, 10(3), pp. 251-270.