

Analyzing the Financial Aspect of Globalization from the Point of Public Expenditures: The Case of Turkey

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Abstract

In this article, the relationship between globalization and the size of the government has been tested for the period of 2006 to 2012 in the case of Turkey. In this context, the relationship between foreign direct investments and disaggregated public expenditures under the economic classification of public expenditures has been addressed under the Granger causality and VAR model. As the result of an estimation made using monthly data, it has been concluded that there is a positive, unilateral causal relationship from foreign direct investments to capital transfers and current transfers included in the economic classification. It is concluded that the relationship between globalization and the size of the supports the compensation hypothesis.

Keywords: globalization, government size, economic classification of public expenditures, causality, compensation hypothesis

1. Introduction

In the world economy today, the global economy, which may be called a market where goods, services and assets flow across national borders without friction, promises greater prosperity through division of labor and specialization based on comparative advantage with a global enlargement of markets, and becomes an important target for developing countries by providing access to modern technology and cheap capital goods in the world markets (Rodrick, 2007, pp. 201–203). In this context, globalization, based on the free movement of the factors of production with economic, political and social obstacles coming down to a minimum or completely disappearing, affects not only the economic but also social, political and, of course, financial structures of countries. In this study, the impacts of globalization on the size of the government and its financial structures will be evaluated from the point of public expenditures.

Countries adopt different policies to adapt in the economic aspect to the multi-dimensional process of globalization, and this leads to differences in terms of the interaction between globalization and the size of the government or, in other words, public sector activities. Such differentiation faces us in the form of two basic hypotheses in the literature. Of these hypotheses, the first one is the efficiency hypothesis, which holds that public sector activities become more limited as economies become more open to the outside. According to this hypothesis, public expenditures aimed at welfare growth, production of public goods, will lower the efficiency of countries because they will adversely affect the competitiveness of national producers in the international markets of goods and services while raising the level of taxation. On the other hand, globalization creates a pressure for greater efficiency to increase competition among economies (Tanzi, 2004, pp. 9, Garrett, 2001, pp. 4–5).

The other hypothesis is the compensation hypothesis, based on David Cameron's study in 1978. Cameron (1978) finds that in the process of globalization, the size of the public sector increases in countries that have a high degree of openness to the outside. In this study, Cameron relates the growth of public expenditures as an indicator of the size of the public sector to openness in the international markets and argues that the variation in the size of the public sector between countries that are equally rich can be explained by the importance given to trade in the economies of those countries (Rodrick, 2011, pp. 15). In this relationship, Cameron explains the hypothesis that public expenditures increase with the increasing openness of an economy by the tendency of the industrial concentration in an open economy to promote unionization and collective bargaining. Rodrick's 1998 study testing the relationship between globalization and the size of the government finds that there is a positive

relationship between the degree of openness of economies and the relative growth of public expenditures and determines the cause of the relationship as the increase in external risks due to globalization in economies opening to the outside and a parallel increase in public expenditures due to the function of the government to provide insurance against those risks. Rodrick's study (1998) is based on certain basic hypotheses. The first one is that the increase in external risks will lead to greater volatility in domestic consumption and income. This increase in volatility can be reduced by increasing the share of public purchases of goods and services in GDP. Since the risk-lowering role of government expenditures will be seen particularly in social security and welfare expenditures, there will consequently be a causal relationship from the external shock to public expenditures (Rodrick, 1998, pp. 998–999). Thus, as Tanzi states in his 2004 study, the economic and protective aspect of the government will grow further in countries that are more open or, in other words, globalized.

The conclusion reached by Rodrick in his 1998 study that there is a causal relationship from the external shock to public expenditures has been tested by many scholars for different countries and periods through different econometric methods. When the studies made are examined, it is observed that the results obtained vary according to the method of estimation used. For this reason, categorizing the studies made according to the econometric methods used will be appropriate also in terms of identifying the contributions this study is intended to provide to the literature. Accordingly, in the second part of this study, the relevant literature will be surveyed first and the novelties to be provided by the study to the literature will be identified. In the third part, the econometric estimation method and the findings obtained will be mentioned and the study will be completed with the conclusion part.

2. Related Literature

As briefly mentioned in the previous part, Rodrick proved his hypothesis published in 1998 that there is a positive and robust relationship between openness and public expenditures through a cross-country data survey covering 23 OECD countries. Later, Rodrick's hypothesis became the subject of different studies, testing it for different periods and countries through different econometric methods. In the studies undertaken to test Rodrick's hypothesis, estimations were first made using the cross sectional technique. Garrett (2001) obtained results in support of the compensation hypothesis. Again, Martinez Mongay (2002) covering OECD countries between 1960 and 1999 and Epifani and Gancia (2008) covering 143 countries reached conclusions in support of the positive relationship between globalization and the size of the government. In a study covering 100 countries between 1970 and 2000, Shelton (2007) reached the conclusion that central government expenditures are related with openness particularly in less-developed countries. Apart from these studies which support the compensation hypothesis, Alesina and Wacziarg (1998) and Garen and Trask (2005), using cross-sectional data, examined the relationship between the size of the government and commercial openness but, unlike the other studies, concluded that small countries are commercially more open.

These studies, which obtained different results, were followed by studies using panel data analysis, again including a large number of countries. Ram (2009) found a positive relationship between openness and public expenditures while Kimakova (2009) concluded that there is a statistically significant and robust relationship between the size of the public sector and openness. Again using panel data analysis, Dreher, Sturm and Ursprung (2006) concluded that there is no impact between globalization and public expenditures. It is observed that different conclusions were reached in the studies made using panel data analysis as in the studies using the cross sectional technique.

Results differ again in estimations undertaken to test Rodrick's hypothesis and using time series instead of panel data analysis. In a Bound test made using time series, Islam (2004) in his estimation covering 6 countries reached the conclusion that the relationship between the size of the government and commercial openness is idiosyncratic. Liberati (2007) identified a negative relationship between openness and the size of the government, and the conclusion was found to be in support of the efficiency hypothesis. In their VAR analysis covering 23 OECD countries for the period of 1948 to 1998, again using time series, Molana, Montagna and Violato (2004) reached conclusions rejecting the positive causal relationship between the public sector and openness. Another study using time series analysis but different from other studies due to its individual country application is the study undertaken by Saenz, Sabate and Gadeain (2010). Covering the years 1960 to 2000, this study was conducted only for Spain and it was concluded that there is a long-term positive relationship between openness and public expenditures. Benarroch and Pandey (2012) tested the relationship between commercial openness and the size of the government through the case of 119 countries for the period of 1972 to 2000 and concluded that there is a causal relationship for education expenditures alone.

As is seen, in the studies undertaken to test the compensation hypothesis, which we have categorized according

to the estimation method applied, although the conclusions are sometimes parallel to Rodrick's hypothesis, even the studies using the same method can often reach different conclusions. The main reason for this differentiation may be the difference in the variables used in the estimations. The studies reviewed mostly use aggregate central government expenditures as the variable that indicates the size of the government (see Islam, 2004; Rodrick, 1998; Garrett, 2001; Molana, Montagna, & Violato, 2004; Saenz, Sabate, & Gadea, 2010). However, as mentioned in the first part, one of the basic hypotheses in Rodrick (1998) is that the increasing external risk will lead to greater volatility in domestic consumption and income and that this increase in volatility can be reduced by increasing the share of public purchases of goods and services in GDP. Since the risk-lowering role of government expenditures will be seen particularly in social security and welfare expenditures, there will consequently be a causal relationship from the external shock to public expenditures (Rodrick, 1998, pp. 998–999). In my opinion, this raises the use of disaggregated rather than aggregate public expenditures. In fact, Benarroch and Pandey (2012) also argue that the use of aggregate data in analyses can hide important details. The main studies using disaggregated public expenditures are Alesina and Wacziarg (1998), Dreher, Sturm and Ursprung (2006), Shelton (2007), Benarroch and Pandey (2012). Basically, all these studies used the share of public expenditures in GDP in parallel to functional classifications. Benarroch and Pandey (2012) found a statistically significant positive causal relationship between social security expenditures and openness in low-income countries. Dreher, Sturm and Ursprung (2006) concluded that globalization has no effect on the composition of public expenditures. Shelton (2007) concluded that openness leads to an increase in education expenditures in less-developed countries.

In the present study, the relationship between the size of the government and globalization will be tested for the first time for Turkey as an individual country application under the multi-variable Granger causality and vector auto regression (VAR) analysis.

In the present study, in which the relationship between the size of the government and globalization will be tested for Turkey, the size of the government will be examined through the variable of disaggregated public expenditures under the economic classification, and globalization through the variable of foreign direct investments. While globalization is defined as commercial and financial openness in its basic expression form the literature, these concepts are expressed through the variables of import/export ratios and foreign direct investments, respectively. In the present study, globalization will be included in the analysis through the variable of foreign direct investments, based on the concept of financial openness. Foreign direct investments are preferred due to the fact that this variable is highly correlated with capital flights, as noted by Kant (1996) and Liberatti (2007).

Public expenditures, the other variable in the analysis, are included in the estimation as disaggregated. Unlike other studies using disaggregated public expenditures, this study uses the variables of public expenditures in line with the economic classification for the first time. The main reason for using this classification is the fact that this type of classification is intended to measure the effects of government activities on National Income and the market economy. Secondly, unlike the other studies, the present study will investigate the relationship between public expenditures and foreign direct investments on the basis of the growth rates of the variables or, in other words, the change in the performance of the variable in comparison with the previous period. In other words, the effect of the growth rate (change) of foreign investments on the growth rate of functional public expenditures will be addressed in this estimation and, in this way, it will be examined through the Granger causality test whether the change in the variable representing globalization, which is not a stationary process, causes a change in public expenditures.

Finally, when the literature on globalization and the size of the government is reviewed considering the time interval used in the estimation, it is noted that the studies are limited to a period up to the year 2000. On the other hand, the present study takes up the period of 2006 to 2013, when globalization had an impact on the budget process in Turkey through a change directly in the budget system. 2006 is the year in which Act No. 5018 Concerning Public Financial Management and Control, providing for Turkey's harmonization with the new economic order brought by the process of globalization, was put into effect, reshaping the budget, an important instrument of public financial management in Turkey, and the concept of budgeting. In the framework of the principles it introduced, the Act includes provisions to implement financial discipline, financial transparency and performance-based budgeting. 2008 is the year when the global financial crisis occurred in both the Turkish and world economy. Covering the year 2008 in the study has made it possible to include in the analysis also the external risk which occurred in that period. After this stage, the study will move on to the application part and test the relationship between globalization and public expenditures through the multi-variable vector auto regression (VAR) and Granger causality test.

3. Data and Methodology

In this study on the relationship between the size of the government and globalization, the size of the government will be examined through the variable of disaggregated public expenditures under the economic classification, and globalization through the variable of foreign direct investments on the basis of Rodrick's (2007) definition of globalization as increasing commercial and financial integration. In our study, the relationship between central budget total spending under the economic classification of public expenditures, namely transfers to social security institutions (sst), purchases of goods and services (egs), interest expenditures (inv), current transfers (ct), personnel expenditure (pe) and capital transfers (cat), central government expenditure (cge), on the one hand, and foreign direct investments (fdi), on the other, will be analyzed in the framework of the Granger causality test and VAR analysis. The monthly series of the specified public expenditures were obtained from the monthly actual budget results of the Directorate-General of Budget and Financial Control, the Ministry of Finance, the Republic of Turkey, and the foreign direct investments data from the data of the Ministry of Economy, the Republic of Turkey. I calculated the growth rates (the change over the previous period) of all the series and turned them into the logarithmic scale. (The E-views 6 program was used in the econometric estimations.)

Since many monthly and quarterly economic time series will exhibit regular seasonal oscillation, it is often preferred to separate time series from the seasonal factor or component to be able to concentrate on other components such as trend in time series (Gujarati, 2003, pp. 312). Different methods can be used while making seasonal adjustments to eliminate the seasonal effects of using monthly series. In our study, the series were seasonally adjusted with the Census X12 method (After this procedure the series are referred to as *lnact_sa*, *lncege_sa*, *lnct_sa*, *lnegs_sa*, *lninv_sa*, *lnsst_sa*, *lnpe_sa*, *lnfdi_sa*).

At the next stage, it was investigated first whether the variables included unit roots. Many macroeconomic time series include unit roots (Nelson & Plosser, 1982). Series that include unit roots cease to be stationary, and non-stationary series can have a negative effect on the results of estimations made. In this context, whether series include unit roots or not is important for being able to make a healthy estimation. In this respect, the Augmented Dickey Fuller (ADF) and Phillips-Perron Tests will be applied for the unit root analysis in our study.

The Dickey Fuller Test forms the basis of unit root tests, but it is insufficient where error terms include autocorrelation; in other words, the existence of autocorrelation in the error term in an autoregressive model prevents the efficient use of the DF test (Maddala & Kim, 1998, pp. 75–76). This deficiency of the Dickey Fuller unit root test can be removed by the use of the Augmented Dickey Fuller test. In cases where autocorrelation exists in error terms, autocorrelation can be eliminated with the help of the lagged values of the time series. In this regard, the Augmented Dickey Fuller test was developed by including in the model the lagged values of the dependent variable in the Dickey and Fuller unit root test.

The following equations are used for the Augmented Dickey Fuller test.

$$\begin{aligned}\Delta Y_t &= \phi Y_{t-1} + \sum_{i=1}^n \psi \Delta Y_{t-i} + \varepsilon_t \\ \Delta Y_t &= \alpha_0 + \phi Y_{t-1} + \sum_{i=1}^n \psi \Delta Y_{t-i} + \varepsilon_t \\ \Delta Y_t &= \alpha_0 + \alpha_1 t + \phi Y_{t-1} + \sum_{i=1}^n \psi \Delta Y_{t-i} + \varepsilon_t\end{aligned}\quad (1)$$

The number of lags n in the equations is determined using different information criteria, and the t -statistics critical values calculated for the Dickey Fuller unit root tests are used in the ADF tests containing the n number of lagged autoregressive processes. In our study, the Phillips-Perron unit root test as well as the ADF test is included in the unit root tests of the variables.

In the ADF test, lagged values are added to the model to solve the problem of autocorrelation in error terms, while a non-parametric approach is used in the Phillips-Perron (1988) unit root test. The equation used in the Phillips-Perron unit root test is as follows.

$$Y_t = \alpha + \phi Y_{t-1} + \varepsilon_t \quad (2)$$

Table 1 shows the test results of the briefly mentioned unit root tests on the variables used in our study.

Table 1. ADF and Phillips-Perron (PP) Unit Root Tests

Variable	ADF Statistics (level)	MacKinnon%5 Critical Value	PP statistics (level)	MacKinnon %5 CriticalValue
Lncat_sa	-9.770307*	-2.898623	-19.29059*	-2.897223
Lncge_sa	-18.07227*	-2.897223	-19.15455*	-2.897223
Lnct_sa	-8.923602*	-2.898623	-33.40880*	-2.897223
Lnega_sa	-15.89437*	-2.897223	-41.30816*	-2.897223
Lninv_sa	-8.302072*	-2.898623	-36.75595*	-2.897223
Lnsst_sa	-14.49733*	-2.897223	-15.18797*	-2.897223
Lnpe_sa	-12.01788*	-2.897678	-37.63591*	-2.897223
Lnfdi_sa	-15.01297*	2.897678	-16.31712*	-2.897223

Note. Critical Values are from Mackinnon (1996). * indicates significance at the 1% level.

As stated in Table 1, all the variables are stationary at the significance level of 1 %. In other words, the null hypothesis is rejected for all variables and that the variables are not stationary. At the next stage, the relationship between the series, determined to be stationary, will be investigated using the VAR model, which is used mainly to investigate the relationships between macroeconomic variables and the dynamic effect of random shocks on the system of variables (Enders, 2004, pp. 294–296). In this model, a variable is shown with the past or lagged values of itself and all the other variables in the model (Gujarati, 2003, p. 865). While the VAR model introduces a systemic approach to bring out the dynamics in multi-variable time series analysis, it is also notable as it is statistically easy to use. In contrast to other econometric models, the VAR models also enable the reciprocal effects of shocks on variables to be investigated (Enders, 2004, pp. 294–295).

When we openly write the said VAR equations,

$$y_t = a_{10} + a_{11}y_{t-1} + a_{12}z_{t-1} + e_{1t} \quad (3)$$

we obtain the result:

$$z_t = a_{20} + a_{21}y_{t-1} + a_{22}z_{t-1} + e_{2t} \quad (4)$$

In this context, the vector autoregressive (VAR) model mentioned below will be used to investigate the relationship between foreign direct investments and public expenditures. In the model, Lnfdi_sa represents foreign direct investments and Lnpe_sa separate public expenditures under the economic classification.

$$\begin{aligned} \text{Lnpe_sa}_t &= \alpha_2 + \sum_{i=1}^k \beta_{1i} \text{Lnpe_sa}_{t-i} + \sum_{i=1}^k \gamma_{1i} \text{Lnfdi_sa}_{t-i} + u_{1t} \\ \text{Lnfdi_sa}_t &= \alpha_1 + \sum_{i=1}^k \beta_{2i} \text{Lnfdi_sa}_{t-i} + \sum_{i=1}^k \gamma_{2i} \text{Lnpe_sa}_{t-i} + u_{2t} \end{aligned} \quad (5)$$

One of the important steps in estimations made using the VAR model is to estimate the lag duration. The optimal lag duration for the VAR model can be determined with the help of different criteria. Some of these criteria are the AkaikeInformation Criterion (AIC), the SchwarzCriterion (SC) and Hannan Quinn (HQ). The VAR model lag length is chosen as the lag length that minimizes the critical values. In addition to these criteria, the lag length that does not involve autocorrelation will also be used in our estimation.

The Granger causality test, another stage of the estimation, may be defined in most general terms through an example to be created on the basis of the relationship between two variables such as X and Y. If the variable X is the Granger cause of the variable Y, changes in X will lead to changes in Y. In this way, If the estimation significantly improves when the past or lagged values of the variable X are included in the regression of Y against other variables (containing their own past values), then it may be said that X is the Granger cause of Y (Gujarati, 2004, p. 697).

The selection of lag length mentioned above is of separate importance especially for the Granger causality test. Autoregressive models involving a lag, raise the concept of causality in economic variables. In this respect, the Granger causality test is quite sensitive to the choice of lag length (Gujarati, 2003, p. 703). The Granger causality between the lag length chosen in view of such sensitivity and the variables was tested. In the estimation of the causal relationship between globalization and public expenditure, the lag length was found to be 4.

Table 2. Results of the granger causality test

Sample: 2006M01 2012M12			
Lags: 4			
NullHypothesis:	Obs	F-Statistic	Prob.
LNINV_SA does not GrangerCause LNFDI_SA	79	0.28784	0.8849
LNFDI_SA does not GrangerCause LNINV_SA		0.35758	0.8379
LNPE_SA does not GrangerCause LNFDI_SA	79	0.94482	0.4434
LNFDI_SA does not GrangerCause LNPE_SA		0.20959	0.9323
LNEGS_SA does not GrangerCause LNFDI_SA	79	3.44359	**0.0126
LNFDI_SA does not GrangerCause LNEGS_SA		1.24795	0.2988
LNCT_SA does not GrangerCause LNFDI_SA	79	0.51643	0.7239
LNFDI_SA does not GrangerCause LNCT_SA		3.70908	*0.0085
LNCGE_SA does not GrangerCause LNFDI_SA	79	0.79119	0.5348
LNFDI_SA does not GrangerCause LNCGE_SA		0.68806	0.6026
LNCAT_SA does not GrangerCause LNFDI_SA	79	0.12596	0.9726
LNFDI_SA does not GrangerCause LNCAT_SA		3.05953	**0.0221
LNSST_SA does not GrangerCause LNFDI_SA	79	3.14559	**0.0195
LNFDI_SA does not GrangerCause LNSST_SA		0.83528	0.5074

Note. ** and * indicate significance at the 5% and 1% level, respectively. All causality test results are presented in Table 3a in the Appendix.

According to the results of the causality test in Table 2, there is a unilateral positive causal relationship between the growth rate of goods and services purchasing expenditures and the growth rate of foreign direct investments, and again a unilateral positive causal relationship from the change in social security transfers to the growth rate of foreign direct investments. Apart from these results, it was concluded in our study that there is a unilateral positive causal relationship from the growth rate of foreign direct investments to capital transfers and current transfers. In the light of the above results, whether or not the estimated VAR model includes a structural problem is determined using, Serial Correlation LM Tests, and White Heteroscedasticity Tests. It is observed that there is no autocorrelation or heteroscedasticity problem (Note 1).

One of the main hypotheses used in Rodrick (1998) while defining the relationship between globalization and the size of the government is that the increased external risk will lead to greater volatility in domestic consumption and income. This increase in volatility can be reduced by increasing the share of public purchases of goods and services in GDP. This risk-lowering role of government expenditures will create a causal relationship from the external shock to public expenditures. When, among the basic variables used in my study, capital transfers are defined as gratuitous payments made from the central government budget to outside the budget for the purpose of capital accumulation or gratuitous payments made for the purpose of financing capital goods and services, and current transfers as gratuitous payments not aimed at capital accumulation and made for the purpose of financing purchases of current goods and services, it is found that the growth rate of foreign direct investments is the Granger cause of the growth rate of capital transfers and current transfers as a reflection of the risk-lowering role of government expenditures and increasing the share of public purchases of goods and services due to the increase in volatility caused by the external risk, and it is concluded that this relationship supports the compensation hypothesis.

4. Conclusion

In this study, where the relationship between globalization and the size of the government is addressed in the case of Turkey as an individual country, the period of 2006 to 2012 has been investigated using monthly data. The selected period is important because, on the one hand, it is a period when economic developments experienced in parallel to globalization were reflected in budgetary practices and, on the other hand, it is a period including the world economic crisis of 2008. In this study, the relationship between globalization and the size of the government has been investigated considering the growth rate of foreign direct investments and the growth rate of public expenditures under the economic classification. A unilateral positive causal relationship has been found between the growth rate of goods and services purchasing expenditures and the growth rate of foreign direct expenditures and from the change in social security transfers to the growth rate of foreign direct investments, and again a unilateral positive causal relationship from the growth rate of foreign direct investments to capital transfers and current transfers.

While explaining the compensation hypothesis, Rodrick (1998, 2011) links the existence of a robust and positive

correlation between government size and international trade to the element of social insurance. Underlying this link is the fact that people demand risk cover when their economies are exposed to international economic forces and that the governments respond to such demand by weaving more extensive safety nets through social programs or public employment. Starting from this assumption, it might be argued that the compensation hypothesis does not apply to Turkey in the period under investigation because no causal relationship has been found in this study between social security transfers and personnel expenditures under the economic classification and foreign direct investments.

However, starting from the main hypothesis that the increased external risk will lead to greater volatility in domestic consumption and income and this increase in volatility can be reduced by increasing the share of public purchases of goods and services in GDP and that, as a result, this risk-lowering role of government expenditures will create a causal relationship from the external shock to public expenditures, it is concluded that the relationship between globalization and the size of the government taken up by Rodrick in his 1998 study supports the compensation hypothesis since it is compatible with my conclusion here that the growth rate of foreign direct investments is the Granger cause of the growth rate of capital transfers and current transfers.

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Note

Note 1. The results are presented in Table 1a and 2a in the Appendix.

Appendix A

Table A1. VAR residual serial correlation LM tests

H0: no serial correlation at lag order h

Sample: 2006M01 2012M12		
Included observations: 79		
Lags	LM-Stat	Prob
1	81.66672	0.0675
2	59.56451	0.6339
3	70.12911	0.2797
4	74.31307	0.1775
5	62.29096	0.5372
6	68.61386	0.3238
7	44.95766	0.9661
8	53.99609	0.8093
9	51.12405	0.8780
10	70.09480	0.2806
11	71.72649	0.2371
12	75.34988	0.1568

Table A2. VAR residual heteroskedasticity tests: no cross terms (only levels and squares)

VAR Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)		
Sample: 2006M01 2012M12		
Included observations: 79		
Joint test:		
Chi-sq	df	Prob.
2275.666	2304	0.6588

Table A3. Granger causality test results

PairwiseGrangerCausalityTests			
Sample: 2006M01 2012M12			
Lags: 4			
NullHypothesis:	Obs	F-Statistic	Prob.
LNINV_SA does not GrangerCause LNFDI_SA	79	0.28784	0.8849
LNFDI_SA does not GrangerCause LNINV_SA		0.35758	0.8379
LNPE_SA does not GrangerCause LNFDI_SA	79	0.94482	0.4434
LNFDI_SA does not GrangerCause LNPE_SA		0.20959	0.9323
LNESGS_SA does not GrangerCause LNFDI_SA	79	3.44359	0.0126
LNFDI_SA does not GrangerCause LNESGS_SA		1.24795	0.2988
LNCT_SA does not GrangerCause LNFDI_SA	79	0.51643	0.7239
LNFDI_SA does not GrangerCause LNCT_SA		3.70908	0.0085
LNCGE_SA does not GrangerCause LNFDI_SA	79	0.79119	0.5348
LNFDI_SA does not GrangerCause LNCGE_SA		0.68806	0.6026
LNCAT_SA does not GrangerCause LNFDI_SA	79	0.12596	0.9726
LNFDI_SA does not GrangerCause LNCAT_SA		3.05953	0.0221
LNSST_SA does not GrangerCause LNFDI_SA	79	3.14559	0.0195
LNFDI_SA does not GrangerCause LNSST_SA		0.83528	0.5074
LNPE_SA does not GrangerCause LNINV_SA	79	0.37273	0.8273
LNINV_SA does not GrangerCause LNPE_SA		1.86236	0.1267
LNESGS_SA does not GrangerCause LNINV_SA	79	1.82019	0.1346
LNINV_SA does not GrangerCause LNESGS_SA		2.61697	0.0423
LNCT_SA does not GrangerCause LNINV_SA	79	1.46334	0.2226
LNINV_SA does not GrangerCause LNCT_SA		0.75095	0.5607
LNCGE_SA does not GrangerCause LNINV_SA	79	0.88208	0.4793
LNINV_SA does not GrangerCause LNCGE_SA		0.64845	0.6299
LNCAT_SA does not GrangerCause LNINV_SA	79	0.67266	0.6132
LNINV_SA does not GrangerCause LNCAT_SA		1.41266	0.2388
LNSST_SA does not GrangerCause LNINV_SA	79	0.65697	0.6239
LNINV_SA does not GrangerCause LNSST_SA		0.54271	0.7049
LNESGS_SA does not GrangerCause LNPE_SA	79	0.71231	0.5863
LNPE_SA does not GrangerCause LNESGS_SA		0.38034	0.8220
LNCT_SA does not GrangerCause LNPE_SA	79	0.73902	0.5685
LNPE_SA does not GrangerCause LNCT_SA		1.28115	0.2857
LNCGE_SA does not GrangerCause LNPE_SA	79	0.11333	0.9774
LNPE_SA does not GrangerCause LNCGE_SA		0.05042	0.9951
LNCAT_SA does not GrangerCause LNPE_SA	79	0.53456	0.7108
LNPE_SA does not GrangerCause LNCAT_SA		0.50335	0.7334
LNSST_SA does not GrangerCause LNPE_SA	79	0.41037	0.8006
LNPE_SA does not GrangerCause LNSST_SA		0.53839	0.7080
LNCT_SA does not GrangerCause LNESGS_SA	79	1.56928	0.1921
LNESGS_SA does not GrangerCause LNCT_SA		4.73011	0.0020
LNCGE_SA does not GrangerCause LNESGS_SA	79	8.00026	2.E-05
LNESGS_SA does not GrangerCause LNCGE_SA		0.11592	0.9765
LNCAT_SA does not GrangerCause LNESGS_SA	79	0.87650	0.4826
LNESGS_SA does not GrangerCause LNCAT_SA		0.45079	0.7715
LNSST_SA does not GrangerCause LNESGS_SA	79	0.47644	0.7529
LNESGS_SA does not GrangerCause LNSST_SA		0.06406	0.9923
LNCGE_SA does not GrangerCause LNCT_SA	79	0.24654	0.9108
LNCT_SA does not GrangerCause LNCGE_SA		1.69112	0.1618
LNCAT_SA does not GrangerCause LNCT_SA	79	0.38070	0.8217
LNCT_SA does not GrangerCause LNCAT_SA		0.76525	0.5514
LNSST_SA does not GrangerCause LNCT_SA	79	0.84074	0.5040
LNCT_SA does not GrangerCause LNSST_SA		0.69428	0.5984
LNCAT_SA does not GrangerCause LNCGE_SA	79	0.40950	0.8012

LNCGE_SA does not GrangerCause LNCAT_SA		5.25249	0.0009
LNSST_SA does not GrangerCause LNCGE_SA	79	1.12543	0.3516
LNCGE_SA does not GrangerCause LNSST_SA		4.95866	0.0014
LNSST_SA does not GrangerCause LNCAT_SA	79	0.58119	0.6772
LNCAT_SA does not GrangerCause LNSST_SA		0.32575	0.8598

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