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Impact of spatial effect on volatility of trade

Mansour Zarra-Nezhad
Professor; Department of Economics, Shahid Chamran University, Ahvaz, Iran

Amin Mansouri
PhD. Student; Department of Economics; Shahid Chamran University, Ahvaz, Iran

Abstract

The main objective of this study is to evaluate the spatial volatility of trade based on the Spatial Panel data Econometric Method and Wavelet Smoothing. The negative spatial dependents are estimated. So that, an increase by one percent in trade volatility and unknown volatility in neighboring countries causes 2.1, 0.55 percent increase in trade volatility of each country in the reverse direction, respectively. Evaluation of results of spillover elasticity of trade volatility suggests that volatility in the prices, growth rate and GDP in neighboring countries causes an increase in trade volatility in the opposite direction and other variables increase in the same direction. Based on these results, the growth rate volatility in the opposite direction and geographical concentration in the same direction plays the greatest impact in the trade volatility. Therefore, the estimation results of OLS without spatial effects are biased.

Keywords: Trade volatility, biorthogonal wavelet, spatial interaction, spatial Durbin model

Introduction

International trade is regarded as the main source of foreign exchange earnings for investment and attraction new technology in order to increase domestic economic productivity (Krugman, 1980). Although trade is considered as part of GDP, but since early 1990s, the level of world trade is positioned beyond GDP (UNCTAD, 2012). Similar to other economic issues and in particular on the international trade the issue of "stability" is of the highest importance. Research in the context of the volatility in international trade and the factors influencing on it, backs to Coppock (1978) publication. Coppock (1978) in his book "International Trade Volatility" believed that since the economic activities are using variable resources, all variations cannot be considered undesirable and unintended. For this reason, he believes that there must be distinctions between volatility useful and problematic volatility. He argues that volatility shouldn't be defined as any deviation from fixed route, but excess deviations from normal–which normal values are usually trend- are under consideration. Such his claim specifies that an accurate definition of vitality requires a correct verdict about words like an extravagance, wastage and normal form which often researchers used it for topics related to volatility. Historically, the fact that the volatility of the trade is primarily resulted from what factors, has

Corresponding author's
Name: Amin Mansouri
Email address: Sa.mansouri81@gmail.com

caused; First, the type of trade (intra- or inter industry), second, the factors affecting on each type of trade and third spatial effect result of neighboring. Certainly in today's world three types of trade occur and in this case, the factors affecting trade will be effective on volatility in the trade. Meanwhile, the internal situation in the neighboring countries has mutual effects on each other. Most of research conducted in this area, have addressed the impact of exchange rate volatility, geographic concentration and commodity concentration on trade volatility.

The studies of Hooper and Kohlhagen (1978), Cushman (1983), Peree & Steinherr (1989), Bahmani-Oskooee & Latifa (1992), Yousefi (2000), Vergil (2002), Bahmani-Oskooee (2007), Hondroyiannis *et al*. (2008), Trinh (2012) examines effect exchange rate volatility on international trade. Research results show that increase in instability of exchange rate is effective on international trade instability. Also, the studies of Michaely (1962), Macbean (1966), Massell (1970), Naya (1973), Souter (1977), Love (1987 & 1992), Tariq & Najeeb (1995), Tegen (2000), Sileshi (2003), Xin & Liu (2008) and Çakir and Kabundi (2011) in the case of commodity and geographic concentration show that commodity and geographic concentration can cause international trade instability.

This study uses a wavelet smoothing method to investigate the factors affecting the volatility of trade from the viewpoint of intra- and inter- industry trade variable and interactions due to neighborhood using data from the 34 most-important countries which account for 80% of world trade and the period of 1980-2010 are investigated through Spatial Model and Maximum likelihood Estimation method (ML). While spatial effects using bilateral trade matrix which is weighted by standardized geographical distance weight matrix, are evaluated.

Data description and variables

In this study, 34 major countries in world trade, including Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Finland, France, Germany, India, Iran, Indonesia, Italy, Japan, Korea, Malaysia, Mexico, Netherlands, New Zealand, Norway, Peru, Philippines, South Africa, Saudi Arabia, Singapore, Spain, Sweden, Switzerland, Thailand, Turkey, Britain and US which account for more than 80 percent of world trade are selected for the period 1980 to 2010. Given the literature review and theoretical framework, the data used for the model are presented as follows:

- Total value of exports in current local currency: (clx);
- Total value of imports in current local currency: (clm);
- Total value of GDP in current local currency: (cly);
- Population in terms of persons: (pop);
- Nominal bilateral dollar exchange rate: (nex)
- Consumer price index in constant prices in the year 2000: (cpi);
- Share of exports of agricultural and food of total exports: (sfx);
- Share of raw and intermediate goods import of total import: (srm);
- Trade matrix include exports and imports (c.i.f.): (Wt);
- Geographical distance matrix as the spatial distance between the two countries in terms of miles: (Wd).

Required data of clx, clm, cly, pop, nex, cpi, sfx, srx, srm were collected of World Bank and trade matrix data IFS DOT statistics were used. If a variable was with missing data, were modified based on the data interpolation method by using Eviews 7 Software. Thus, variables used in the model estimation are defined as follows:

Dependent variable

- Total value of trade in current US$: $cust = \frac{clx + clm}{nex}$;

Independent variables

- Production variables:

1- Growth rate of GDP in constant local currency: $gr = d\log(\frac{cly}{cpi})$;

2- Total value of GDP in current US$: $cusy = \frac{cly}{nex}$;

3- GDP Per capita in current US$ per persons: $cusyp = \frac{cusy}{pop}$;

- Commodity concentration indexes:

1- Share of raw and intermediate goods import of total import: srm;
2- Share of exports of agricultural and food of total exports: sfx;

- Geographic concentration index based on the Gini coefficient Hirschman (1964): $geo_i = \sqrt{\sum_{\substack{i=1 \\ j=1}}^{n} (w_{ij})^2}, i, j = 1,...,n$, where $w_{ij} = \frac{T_{ij}}{\sum_{\substack{i=1 \\ j=1}}^{n} T_{ij}}$ share of trade country i with country j and T_{ij} is trade rate of country i with country j; is computed through trade matrix
- Nominal bilateral dollar exchange rate: (nex);
- Consumer price index in constant prices in the year 2000: (cpi).

Spatial weight matrix

In this study, the geographical distance and bilateral trade matrix has been used to survey the spatial effects. Since, in the trade it is possible for two countries with far geographical distances, there is a lot of trade, or two countries with little geographical distance in between or neighbor countries have not any trade with each other. For this purpose, using standardized geographical distance weight matrix (SWd) and multiplied by the trade matrix (Wt), adjusted matrix-trade based on geographical distance (Wtd) will be obtained. This adjustment is applied as follows:

$$wtd_{ij} = wt_{ij} \cdot \frac{d_{ij}}{\sum d_{ij}} \qquad \text{--------------------------- (1)}$$

Where wtd_{ij} is an element by row i and column j in adjusted matrix-trade based on the geographical distance, wt_{ij} by row i and column j is trade-weighted matrix and $\frac{d_{ij}}{\sum d_{ij}}$ is an element at row i and column j in row-standardized weighted matrix of geographical distance.

Methodology

Model specification

Generally, there are three methods to consider spatial effects through spatial lag operation on the dependent, independent variables and the error terms (Anselin, 1988, LeSage, 2009). In this research, Fixed- Effect of Spatial Models of $SAR, SLX, SEM, SDM, SDEM, SAC$, is estimated. *General Nesting Spatial Model (GNSM)* that imposes spatial lag on the dependent, independent and error term variables are as follows:

$$y = \rho Wy + \alpha I_n + X\beta + WX\gamma + \varepsilon; \qquad \text{---------------------------- (2)}$$
$$\varepsilon = \theta W\varepsilon + u$$

Where ρ is auto-regressive spatial coefficient, γ similar to β representing a $K \times 1$ vector of independent variable parameters and W is a $N \times N$ *spatial* matrix. In this equation Wy refers to the endogenous interactions among the dependent variables, WX refers to the interactions exogenous among the independent variables and $W\varepsilon$ refers to the interactions exogenous among the independent variables in different units (Elhorst, 2014).

In order to investigate the factors affecting international trade volatility using the logarithmic form of data and Panel model of SDM, the following model is specified:

$$ulcust = f(W*clust, X, W*X, W*\varepsilon) \qquad \text{---------------------------- (3)}$$
$$X = g(ugr, ulcusy, ulcusyp, ulcpi, ulnex, ulgeo, ulsfx, ulfrm)$$

Where $ulcust$ is trade volatility index, X refers to the matrix of independent variables, W refers to the spatial effects, ugr is volatility growth rate index, $ulcusy$ is GDP volatility index, $ulcusyp$ is GDP per capita volatility index, $ulcpi$ price volatility index, $ulnex$ is exchange rates volatility index, $ulgeo$ geographically concentration volatility index, $ulsfx$ is volatility index of exports of food and agricultural materials and $ulfrm$ is imported raw materials volatility index.

Accordingly, all variables in the model are defined as $ulcust, ugr, ulcusy, ulcusyp, ulcpi, ulnex, ulgeo, ulsfx, ulfrm$ for non-spatial variables and $W*ulcust, W*ugr, W*ulcusy, W*ulcusyp, W*ulcpi, W*ulnex, W*ulgeo, W*ulsfx, W*ulfrm$ for spatial variables.

Also, after examining wavelets and different wavelengths, finally the third level of $bior2.2$ wavelet *was* selected. In order to create an index of volatility, which is carried out by $Matlab, R2013a$, at first, logarithm values were taken from independent and dependent variables and then using the third level wavelet $bior2.2$ will be decomposed.

Stationary test

One of the main provisions in order to verify the results of time-series and combined methods, is the Stationary test. In spatial models, there is unit root problem not only dependent and independent variables, but also the issue of spatial operations that can be imposed on the dependent variable and the independent variables.

According to study results of Kelejian and Prucha (1998, 1999), Lee (2004) and LeSage and Pace (2009) if the variable be static and the spatial weight matrix be symmetric, the spatial variable is not unit root and with the asymmetric spatial weight matrix , spatial variable is stable if the sum of rows and columns of the matrix are close together or when the N (regions) tends to infinity, they get closer together, or in other words, become converging. Regarding that the under consideration matrix in this study is bilateral trade weighted matrix, that is classified as matrix asymmetric, in this study using matrix multiplication in the independent and dependent variables via software MATLAB, at first spatial variables are created and then using *Levin and Lin* (LL) (1992), *Breitung* (B) (2000), *Im, Pesaran, Shin* (IPS) (2003) and *Augmented Dickey-Fuller* (ADF) and *Phillips-Perron* (PP) by using *Eviews*7 Software, the Stationary test is performed on all (spatial and non-spatial) variables. Also determination of the optimal lag length is done automatically and based on Schwartz Info Criterion (SIC). Stationary test results for relationship with individual intercept and the trend in level, are shown in 0.

Table 1: Results of stationary tests of model variables

Variable	*LL*	*B*	*IPS*	*ADF*	*PP*
ugr (*prob*)	-16.5 (0.00)	-11.3 (0.00)	-21.2 (0.00)	461.7 (0.00)	1073.7 (0.00)
ulcpi (*prob*)	-14.4 (0.00)	-3.3 (0.00)	-27.7 (0.00)	621.7 (0.00)	3574.7 (0.00)
ulcust (*prob*)	-18.7 (0.00)	-6.02 (0.00)	-21.3 (0.00)	455.6 (0.00)	1180.3 (0.00)
ulcusy (*prob*)	-15.4 (0.00)	0.1 (0.5)	-16.4 (0.00)	341.6 (0.00)	441.1 (0.00)
ulcusyp (*prob*)	-16.8 (0.00)	-25.7 (0.00)	-20.7 (0.00)	444.5 (0.00)	649.8 (0.00)
ulgeo (*prob*)	-17.6 (0.00)	-14.4 (0.00)	-26.1 (0.00)	571.7 (0.00)	582.6 (0.00)
ulnex (*prob*)	-26.9 (0.00)	-23.2 (0.00)	-22.5 (0.00)	483.7 (0.00)	1512.9 (0.00)
ulsfx (*prob*)	-12.8 (0.00)	-17.2 (0.00)	-19.4 (0.00)	415.2 (0.00)	461.2 (0.00)
ulsrm (*prob*)	-21.5 (0.00)	-16.9 (0.00)	-21.1 (0.00)	455.7 (0.00)	1301.6 (0.00)
*W *ugr* (*prob*)	-17.7 (0.00)	-1.9 (0.02)	-16.0 (0.00)	358.0 (0.00)	542.3 (0.00)
*W *ulcpi* (*prob*)	-23.7 (0.00)	-8.1 (0.00)	-24.2 (0.00)	527.5 (0.00)	622.7 (0.00)
*W *ulcust* (*prob*)	-20.2 (0.00)	-3.8 (0.00)	-17.4 (0.00)	361.5 (0.00)	357.6 (0.00)
*W *ulcusy* (*prob*)	-24.8 (0.00)	-19.7 (0.00)	-19.7 (0.00)	415.3 (0.00)	424.5 (0.00)
*W *ulcusyp* (*prob*)	-19.6 (0.00)	-6.4 (0.00)	-17.3 (0.00)	362.7 (0.00)	358.4 (0.00)
*W *ulgeo* (*prob*)	-29.5 (0.00)	-15.5 (0.00)	-24.0 (0.00)	519.3 (0.00)	576.7 (0.00)
*W *ulnex* (*prob*)	-21.0 (0.00)	-2.0 (0.02)	-24.6 (0.00)	566.2 (0.00)	1622.2 (0.00)
*W *ulsfx* (*prob*)	-20.3 (0.00)	-5.8 (0.00)	-19.1 (0.00)	402.7 (0.00)	409.9 (0.00)
*W *ulsrm* (*prob*)	-27.0 (0.00)	-9.0 (0.00)	-24.4 (0.00)	533.4 (0.00)	549.0 (0.00)

Source: Research results.

As can be seen from the above results, the variables are integrated at the zero level and so there is no unit root problem.

Empirical analysis

Step 1: Model comparison and selection

0 shows the estimation results of Fixed-Effect Spatial Model with Maximum Likelihood (ML) estimator. This step has been carried out using Elhorst's (2003) codes, models of *SAR*,*SEM* ,*SDM* ,*SDEM* and the Debarsy and Arthur's (2010) codes, SAC model and use of this code and replacing matrix [X WX] Instead X, Specification of MATLAB codes for models of *SLX* ,*GNSM* by the author .

After estimation and before interpretation of coefficients, diagnostic test is performed. Using Lagrange multiplier (LM) test and Likelihood Ratio (LR), type of Spatial Panel Model is selected. In this step based on the hypotheses that test combined spatial model in mutually put together manner, the model type is selected. 0 shows the results of this test hypotheses.

Table 2: Estimation results of spatial fixed effect

Variable	*SAR*	*SLX*	*SEM*	*SAC*	*SDM*	*SDEM*	*GNSM*
*W *ulcust* (*prob*)	-0.1** (0.04)	--------	--------	0.006 (0.8)	-0.62* (0.00)	--------	-2.1* (0.00)
ugr (*prob*)	0.16* (0.00)	0.16* (0.00)	0.14* (0.00)	0.14** (0.02)	0.13** (0.02)	0.14** (0.02)	0.08 (0.14)
ulcpi (*prob*)	-0.01* (0.00)	-0.01* (0.00)	-0.01* (0.00)	-0.01* (0.00)	-0.01* (0.00)	-0.01* (0.00)	-0.02* (0.00)
ulcusy (*prob*)	0.7* (0.00)	0.7* (0.00)	0.7* (0.00)	0.7* (0.00)	0.69* (0.00)	0.7* (0.00)	0.7* (0.00)
ulcusyp (*prob*)	0.08* (0.00)	0.08* (0.00)	0.09* (0.00)	0.09* (0.00)	0.09* (0.00)	0.09* (0.00)	0.1* (0.00)
ulgeo (*prob*)	0.34* (0.00)	0.37* (0.00)	0.35* (0.00)	0.35* (0.00)	0.35* (0.00)	0.35* (0.00)	0.34* (0.00)
ulnex (*prob*)	0.02* (0.00)	0.02* (0.00)	0.02* (0.00)	0.02* (0.00)	0.02* (0.00)	0.02* (0.00)	0.02* (0.00)
ulsfx (*prob*)	-0.24* (0.00)	-0.24* (0.00)	-0.24* (0.00)	-0.24* (0.00)	-0.24* (0.00)	-0.24* (0.00)	-0.23* (0.00)
ulsrm (*prob*)	0.04** (0.02)	0.05** (0.02)	0.05* (0.00)	0.05* (0.00)	0.05* (0.00)	0.05* (0.01)	0.06* (0.00)
*W *ugr* (*prob*)	--------	-0.4 (0.2)	--------	--------	-0.55** (0.04)	-0.37** (0.05)	-0.75*** (0.08)
*W *ulcpi* (*prob*)	--------	-0.05** (0.04)	--------	--------	-0.04*** (0.08)	0.02 (0.4)	-0.06** (0.04)
*W *ulcusy* (*prob*)	--------	-0.1 (0.4)	--------	--------	0.33* (0.01)	-0.06 (0.5)	1.4* (0.00)
*W *ulcusyp* (*prob*)	--------	0.2 (0.3)	--------	--------	0.25 (0.1)	0.1 (0.4)	0.5* (0.00)
*W *ulgeo* (*prob*)	--------	0.2 (0.6)	--------	--------	0.01 (0.9)	-0.23 (0.4)	0.11 (0.8)
*W *ulnex* (*prob*)	--------	0.02 (0.2)	--------	--------	0.04* (0.00)	0.02 (0.1)	0.11* (0.00)
*W *ulsfx* (*prob*)	--------	0.1*** (0.07)	--------	--------	-0.1*** (0.06)	-0.007 (0.9)	-0.48* (0.00)

$W*ulsrm$ $(prob)$	--------	0.07 (0.4)	--------	--------	0.16** (0.04)	0.06 (0.3)	0.3* (0.00)
$W*\varepsilon$ $(prob)$	--------	--------	-0.36* (0.00)	-0.38* (0.00)	--------	-0.6* (0.00)	-0.55* (0.00)
R^2	0.98	0.82	0.98	0.98	0.98	0.98	0.98
σ^2	0.02	0.02	0.02	0.02	0.02	0.02	0.02
$LogL$	597	585	584	549	597	593	573

Source: Research results.
Notes: For above estimated coefficients * indicates statistically significance of coefficient up to 1% percent level, ** up to 5% level and *** up to 10%.

Table 3: Results of hypotheses tests for determining the type of spatial panel model

Hypothesis	$H_0 \vee H_1$	LR	LM	*Result*
1	$OLS \vee SEM$	$LR = 14.02$, $prob = 0.00$	$LM = 9.90$, $prob = 0.00$	SEM
2	$OLS \vee SAR$	$LR = 5.06$, $prob = 0.02$	$LM = 5.39$, $prob = 0.00$	SAR
3	$OLS \vee SAC$	$LR = 14.05$, $prob = 0.00$	$LM = 10.39$, $prob = 0.00$	SAC
4	$SEM \vee SAC$	$LR = 0.02$, $prob = 0.88$	$LM = 4.19$, $prob = 0.04$	SAC
5	$SAR \vee SAC$	$LR = 8.98$, $prob = 0.00$	$LM = 3.51$, $prob = 0.06$	SAC
6	$SLX \vee SDEM$	$LR = 17.11$, $prob = 0.00$	$LM = 5.12$, $prob = 0.02$	$SDEM$
7	$SLX \vee SDM$	$LR = 24.71$, $prob = 0.00$	$LM = 10.32$, $prob = 0.00$	SDM
8	$SLX \vee GNSM$	$LR = 48.54$, $prob = 0.00$	$LM = 49.97$, $prob = 0.00$	$GNSM$
9	$SEM \vee SDEM$	$LR = 18.74$, $prob = 0.02$	$-----$	$SDEM$
10	$SDEM \vee GNSM$	$LR = 31.44$, $prob = 0.00$	$LM = 615.3$, $prob = 0.00$	$GNSM$
11	$SEM \vee SDM$	$LR = 26.58$, $prob = 0.00$	$-----$	SDM
12	$SAR \vee SDM$	$LR = 35.84$, $prob = 0.00$	$-----$	SDM
13	$SDM \vee GNSM$	$LR = 23.83$, $prob = 0.00$	$LM = 593.5$, $prob = 0.00$	$GNSM$
14	$SAC \vee GNSM$	$LR = 49.53$, $prob = 0.00$	$-----$	$GNSM$

Source: Research results

Based on the results shown above, GNSM model is confirmed. Based on results, the neighborhood spatial effects on variables are confirmed. The negative spatial dependent and error coefficients are estimated. So that, an increase by one percent in trade volatility and unknown volatility in neighboring countries causes 2.1, 0.55 percent increase in trade volatility of each country in the reverse direction, respectively.

Step 3: Direct, indirect and total effects

Table 4 shows direct and indirect (spillovers) spatial effects of Fixed Effect GNSM (SDM)[2] model, together with the results of the Spatial Fixed Effects OLS model (for comparison purpose). Estimation results are of highly significant direct and indirect effects. Based on these results, direct volatility semi-elasticity in trade relative to volatility in growth rate of GDP is amounts to 0.1 and indirect semi-elasticity due to neighboring trade countries (spillover effect) is equal to -1.98. Note that a positive or negative sign in estimated elasticity's indicates a change in volatility direction. In other words, spillover effects resulting from a 1% abrupt change in the growth rates at neighboring countries in opposite direction is more than abrupt changes in the growth rate of the country itself, in which total result is the 1.88% volatility in trade in opposite direction. Based on these results, the growth rate volatility plays the greatest impact on the opposite direction in trade volatility.

Table 4: Direct and indirect (spillovers) spatial effects

Variable	*Dirrect*	*Indirrect*	*Total GNSM*	*OLS*
ugr (*prob*)	0.1*** (0.09)	-1.98* (0.01)	-1.88* (0.01)	0.18* (0.00)
ulcpi (*prob*)	-0.01* (0.00)	-0.21* (0.00)	-0.22* (0.00)	-0.01* (0.00)
ulcusy (*prob*)	0.69* (0.00)	-0.1 (0.5)	0.59* (0.00)	0.69* (0.00)
ulcusyp (*prob*)	0.1* (0.00)	0.52* (0.00)	0.62* (0.00)	0.09* (0.00)
ulgeo (*prob*)	0.34* (0.00)	0.63 (0.2)	0.97*** (0.09)	0.32* (0.00)
ulnex (*prob*)	0.02* (0.00)	0.21* (0.00)	0.23* (0.00)	0.02* (0.00)
ulsfx (*prob*)	-0.23* (0.00)	0.31* (0.01)	0.08 (0.5)	-0.24* (0.00)
ulsrm (*prob*)	0.07* (0.00)	0.54 (0.00)	0.61* (0.00)	0.04* (0.02)

Source: Research results

Elasticity of the volatility of the trade related to price volatility index directly and indirectly has been calculated as -0.01 and -0.21, respectively. Therefore, spillover effects resulting from 1% abrupt change in prices in neighboring countries is more than direct own effect, albeit co-directed and negative, which its total result is 0.22 percent volatility in trade in opposite direction. Elasticity of the volatility in trade relative to volatility in GDP directly and indirectly has been calculated as 0.69 and -0.1, respectively. In other words, spillover effects resulting from an abrupt changes in the GDP of neighboring countries is more than a GDP abrupt changes in the country itself which it's total result is 0.59 percent volatility in trade. Elasticity of the volatility in trade relative to GDP per capita volatility directly and indirectly are calculated as 0.52 and 0.1, respectively. In another words, spillover effects due to 1% abrupt changes in GDP per capita in

[2] Direct and indirect (spillovers) spatial effects are same in SDM and GNSM.

neighboring countries is more than direct effects due to own country, albeit co-directed and positive, which its total result is 0.62 percent volatility in trade. Volatility Elasticity in trade with respect to volatility in geographical concentration directly and indirectly are calculated as 0.63 and 0.34, respectively. In another words, spillover effects from 1% changes in geographical concentration in neighboring countries is less than direct effects from own countries, albeit in the same direction and positive, which its total result is 0.97 percent volatility in trade. Elasticity of the volatility of trade than the nominal exchange rate volatility directly and indirectly are calculated as 0.21 and 0.02, respectively. In another words, spillover effects from 1% changes in nominal exchange rate in neighboring countries is less than direct effects from own countries, albeit in the same direction and positive, which its total result is 0.23 percent volatility in trade. Volatility elasticity in trade with respect to food and agricultural export volatility directly is low elasticity and equals to 0.31 and indirectly is less elasticity and equals to -0.23. In other words, spillover effects resulting from an abrupt changes in food and agricultural exports of neighboring countries is more than a food and agricultural exports abrupt changes in the country itself which it's total result is 0.08 percent volatility in trade. Elasticity of the volatility in trade relative to the volatility of raw materials and intermediate goods imports directly and indirectly are calculated as 0.54 and 0.07, respectively. In another words, spillover effects from 1% changes in raw materials and intermediate goods imports in neighboring countries is less than direct effects from own countries, albeit in the same direction and positive, which its total result is 0.61 percent volatility in trade. Although the overall impact this case has not been confirmed.

Conclusion

The main objective of this study was to evaluate the spatial volatility of trade based on the Spatial Panel data Econometric Method and Wavelet Smoothing. The negative spatial dependent and error coefficients are estimated. So that, an increase by one percent in trade volatility and unknown volatility in neighboring countries causes 2.1, 0.55 percent increase in trade volatility of each country in the reverse direction, respectively. Evaluation of results of direct elasticity of trade volatility suggests that volatility in the domestic prices and the share of agricultural and food exports from total exports in own countries causes increase in trade volatility in the opposite direction and other variables increase in the same direction. In other words, an abrupt increase in domestic prices and the share of agricultural and food exports from total exports and an abrupt reduction in economic growth, GDP, GDP per capita, nominal exchange rate, share of raw materials and intermediate goods imports from total import and geographical concentration causes abrupt decrease in trade. However, evaluation of results of spillover elasticity of trade volatility suggest that volatility in the prices, growth rate and GDP in neighboring countries causes increase in trade volatility in the opposite direction and other variables increase in the same direction. In other words, an abrupt increase in prices, growth rate, and GDP and an abrupt reduction in GDP per capita, the nominal exchange rate, the share of raw and intermediate imports from total imports, the share of exports agricultural and food and geographical concentration in neighboring countries causes abrupt decrease in trade. Based on these results, the growth rate volatility in the opposite direction and geographical concentration in the same direction plays the greatest impact in the trade volatility. Therefore, the estimation results of OLS without spatial effects are biased.

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