Table 1

Model	1	2	3	4	5	6	7	8
Method	OLS	Poisson	NLS	OLS	Poisson	NLS	OLS	Poisson
Hand_side	0.203 (0.084)**	0.04 (0.014)***	0.210 (0.084)**	0.362 (0.083)***	0.064 (0.014)***	0.357 (0.084)***	0.497 (0.117)***	0.09 (0.020)***
Log exporter's production of cars **lnprod_exp**	0.805 (0.025)***	0.140 (0.005)***	0.802 (0.025)***	0.731 (0.025)***	0.128 (0.004)***	0.724 (0.025)***	0.772 (0.035)***	0.134 (0.006)***
Log importer's GDP per capita **lnGDP_imp**	0.756 (0.029)***	0.130 (0.005)***	0.752 (0.028)***	0.739 (0.030)***	0.127 (0.005)***	0.746 (0.028)***	0.714 (0.043)***	0.120 (0.007)***
Log importer's population **lnpop**	0.585 (0.025)***	0.098 (0.004)***	0.587 (0.023)***	0.617 (0.025)***	0.104 (0.004)***	0.603 (0.024)***	0.586 (0.036)***	0.101 (0.006)***
Log of distance from exporting country to the importing **ln_dist**	-1.008 (0.038)***	-0.161 (0.007)***						
γ			-1.045 (0.054)***					
Distance from exporting to importing country by land **Dist_land**			1.121 (0.119)***					
Log of total costs of transportation **lncost**				-0.763 (0.032)***	-0.122 (0.006)***		-0.577 (0.058)***	-0.098 (0.011)***
ω						-0.728 (0.044)***		
Costs for import (by sea) **Cost_imp**						0.551 (0.134)***		
Costs for transportation by road **roadhaluage**						0.697 (0.130)***		
Custom duties **duty**							-0.017 (0.004)***	-0.003 (0.001)***
Constant	-8.853 (0.616)***	-0.918 (0.103)***	-8.434 (0.715)***	-12.103 (0.573)***	-1.435 (0.097)***	-12.355 (0.062)***	-13.157 (0.822)***	-1.564 (0.141)***
N (sample size)	3404	3404	3404	3404	3404	3404	2269	2269
R-squared	0.4120		0.4125	0.4014		0.4035	0.3684	
***,**,* denote significance at the 1%, 5% and 10% respectively								

There is no common opinion as to which side of the road to drive cars. Each country says whether traffic will keep on the right-hand or left-hand side of the road. According with the side of the road on which cars are driven, there are motor vehicles with right or left hand drive. A right-hand drive vehicle has its steering wheel on the right side, and left-hand drive vehicle has its steering wheel on the left side. Right-hand side vehicles are designed to drive in countries where people drive on the left side of the road, and left-hand side vehicles, in contrast, are designed to drive in countries where people drive on the right side of the road. These simple rules are used in accordance with safety regulations, when steering wheel is located nearer to the canter of the road. Today, about 65% of the world's population lives in countries with right-hand traffic and the other 35% lives with left-hand traffic. In this research work, we will evaluate how location of the steering wheel influence on the volume of trade of vehicles exported from one country to another. Does the same location of the steering wheel in vehicles in two countries (both on the right-hand side, or both on the left-hand side) give trade benefit in cars between them? Or in other words, does the fact that location of steering wheel does not match in two trading countries is a strong barrier which decreases the unit of cars exporting from one country to another? Answers to these questions will be given in the research.

This problem is very important and actual in our days both from a practical and scientific point of view, as accurate assessment of the impact of the steering wheel arrangement will enable the authorities to increase the efficiency of trade and industrial policy.

To evaluate effect of the location of steering wheel in motor transport vehicles we will use gravity model. According to the research of Alan Deardorff (1984) gravity models explain very well trade relationships between two economic objects (cities, countries and etc.).

Data:

Data on international trade of cars between countries were taken from the database on trade from the United Nations (UN) website, https://comtrade.un.org/data. The period considered is 2015. The code of commodity for data is 8703 – motor cars and other motor vehicles, principally designed for the transport of person. As exporting countries, the first 50 countries with the highest level of production of cars for 2015 were selected. The number of cars produced per year by exporting countries, were taken from the website of International Organization of Motor Vehicle Manufacturers (OICA) http://www.oica.net/. GDP per capita in US$ and population of importing countries were taken from World Bank. The main variable which determine the effect of arrangement of steering wheel in vehicles is hand_side, which is equal to 1 if arrangement is the same for two countries (both drives on vehicles

with right hand-side, or both with left) and equal to 0 if arrangement of steering wheel is different in two trading countries. So the data about the side of road on which cars are driven in countries are taken from the site of United Nations.

The main hypothesis of this research is that we expect that the effect of arrangement of steering wheel in vehicles significantly and positively affect the volume of trade of vehicles exporting from one country and importing to another.

The basic equation of the gravity model in our case will look like this (model 1 in Table1):

$$\ln Q=\beta_0+\beta_1* \text{Hand\_side}+\beta_2* \ln\text{prod\_exp} +\beta_3* \ln\text{GDP\_imp} +\beta_4*\ln\text{pop} +\beta_5* \ln\text{dist} \quad (1)$$

where

- Q reflects the volume of trade in cars between the exporting and importing countries, measured in the number of units of cars exported from one country to another per year;
- Hand_side is dummy variable that equals to 1 if steering wheel arrangement is similar in 2 trading countries (both on the right hand-side, or both on the left hand-side) and equals to 0 if steering wheel arrangement is different in 2 trading countries;
- lnprod_exp is a logarithm of number of cars produced per year by the exporting country;
- lnGDP_imp represents logarithm of GDP per capita of the importing country;
- lnpop is a logarithm of population of importing country;
- lndist is a logarithm of distance between capitals of exporting and importing countries;

The results of this regression (1) are presented in Table 1 (model 1).

We also took into account mode of transportation of vehicles from exporting to importing countries. There are two ways of transportation: through sea by containership and by the road by truck. Therefore, there is another nonlinear regression built, which helps us to identify the difference in the ways of transportation:

$$\ln Q= \beta_0+\beta_1* \text{Hand\_side}+\beta_2* \ln\text{prod\_exp} +\beta_3* \ln\text{GDP\_imp} +\beta_4*\ln\text{pop} +\gamma*\ln(\text{dist\_sea}+\beta_6*dist\_\text{land}) \quad (3)$$

where dist_sea is the distance from exporting country to importing country while transportation through sea (by containership); dist_land is the distance between exporting and importing countries, while transportation by the road. So there are several ways to measure distance. Variable dist_land equals to the distance from the capital of exporting country to the capital of importing country if transportation of new vehicle is done only by road. If it is transported through the sea, variable dist_land is the sum of distances from the capital of exporting country to the port of exporting country and from the port of importing country to the capital of importing country. Variable dist_sea measures the distance from the port of exporting country to the port of importing country by containership. So nonlinear regression (3) allows us to measure the difference in transportation of new cars by sea and by road. The results of this regression (3) are presented in Table 1 (model 3).

We also measured costs of transportation as important factor for determining dependent variable:

$$\ln Q=\beta_0+\beta_1* \text{Hand\_side}+\beta_2* \ln\text{prod\_exp} +\beta_3* \ln\text{GDP\_imp} +\beta_4*\ln\text{pop} +\beta_7* ln\text{costs} \quad (4)$$

where lncosts are total costs of transportation of new cars from the capital of exporting country to the capital of importing country. The results of this regression are presented in Table 1 (model 4).

Besides that, the source searates.com allows us compare costs of transportation by the road by truck and through the sea by containership. Nonlinear regression is presented by next equation:

$$\ln Q=\beta_0+\beta_1* \text{Hand\_side}+\beta_2* \ln\text{prod\_exp} +\beta_3* \ln\text{GDP\_imp} +\beta_4*\ln\text{pop} +\omega*\ln(\text{cost\_exp}+ \beta_8*\text{cost\_imp}+ \beta_9*\text{roadhaluage}) \quad (6)$$

where cost_exp and cost_imp are costs for export and import respectively while transportation by sea by containership; roadhaluage is costs of transportation by road by truck.

The results of nonlinear regression with components of costs are presented in Table 1(model 6).

We added customs duties for the model 4 to explain it better:

$$\ln Q=\beta_0+\beta_1* \text{Hand\_side}+\beta_2* \ln\text{prod\_exp} +\beta_3* \ln\text{GDP\_imp} +\beta_4*\ln\text{pop} +\beta_7* ln\text{costs}+ \beta_{10}* \text{duty} \quad (7)$$

where variable duty shows customs duties for importing new motor vehicles in countries.

The results if this regression are presented in Table 1 (model 7).

According to the results (Table 1) our main hypothesis is confirmed that identical steering wheel position in the car (both on the right-hand side or both on the left-hand side) increases the volume of cars exported from one country and imported to another. Identical steering wheel position in the car increases the volume of trade of cars between countries to 22.5%, 43.6% and 64.4% in Models 1, 4 and 7 respectively using OLS method. Besides that, our results about other explanatory factors are consistent with conclusions of other researches in gravity models: GDP per capita, population of importing country, production of cars per year of exporting country increases the volume of international trade of cars, while distance, costs and duties decreases it. Therefore, results are absolutely logic and conduct our theoretical hypothesis. But J. M. C. Santos Silva and Silvana Tenreyro in their paper "Log of gravity" (2006) argue that log-linearization of the empirical model due to heteroscedasticity leads to inconsistent estimates. To resolve this problem they propose a simple Poisson pseudo-maximum-likelihood method. We also estimated our models using Poisson method. Models 2, 5 and 8 in Table 1 are based on the equations 1, 4 and 7 respectively but only using Poisson method. Coefficient estimates of models using Poisson method are lower than those using OLS method, and such results were confirmed not only by Santos Silva and Silvana Tenreyro research but also by Inmaculada Martínez-Zarzoso (2013) in work "The log of gravity revisited". Furthermore, we can suppose that the effect of the location of steering wheel in vehicles is partly due to colonial link between countries. For example, according to history many countries today drives on the left side of the road as they were old British colonies. That is why, we have checked correlation between variable hand_side and variable colony, which equal to 1 if two considered countries have ever had a colonial link. Correlation between these variables equal to 0.0206, and it is very low, so we can conclude that our results are consistent, and hand-side significantly influence the volume of trade of vehicles between two countries.