Evaluating The Determinants Of International Trade: Case Study Of CIS Countries

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Abstract

In this paper we mainly concentrate on analysis of the determinants of international trade in CIS countries. Specifically, as a result of globalization, which enables free flow of goods and services along with labor and capital, international trade has been becoming one of the main drivers of economic development especially in emerging countries. According to the results of the study it is possible to emphasize that tariff rates, as expected, have more significant effect on international trade compared to exchange rates. Besides, we also included variables of agricultural sector due to the fact that most of the CIS countries mainly export agricultural products. Interestingly, share of arable lands in total surface along with employment in agricultural sector revealed to have significant and positive impact on both exports and imports. In particular, imports are highly influenced by share of arable lands compared to exports. Moreover, employment in industry and services highly effect on imports. This study provides policy recommendations with respect to strategic development of international trade in the region.

Keywords: international trade, exports, imports, economic growth.

I. Introduction

Thanks to the globalization and liberalization of mobility of goods and services as well as working class population and capital, majority of developing countries accelerated their economic growth trends over the past couple of decades. Most of the CIS countries, despite the fact of recently being independent, also have been achieving high rates of economic growth by increasing their international trade.

International trade is defined as the exports or imports of goods and services. In the continuing process of globalization trade is one of the fundamental factors, since people do not limit themselves by only the goods that are produced within borders of their countries'. Even though

there remains additional costs on cross border trade, such as tariffs, delays in borders, high transportation costs especially in locked and double-locked countries, nations still benefit from exports and imports. In particular, according to the comparative advantage and absolute advantage theories countries can increase their volume of production by optimally allocating their inputs of production into different sectors of the economy. This eventually leads to increased aggregate demand along with higher production, which also adds to national income. On top of that have several developing countries been experiencing positive externalities of international trade and globalization as well. Specifically, technological advancement in developed economies as well as modern methods

of management and production are being shared with the firms in emerging countries too. This is mainly due to the fact that most of the international corporations shifting their production to labor intensive developing countries relying on cheap labor.

It is also vital to be aware of the factors that can potentially influence on international trade. Initiation of different currencies almost in all countries made cross border exchange of goods and services easier compared to the old barter system. However, breakdown of the Bretton Woods pushed most of the countries to shift from fixed exchange regime to floating exchange regime, which in turn increased the risk of uncertainty especially to export oriented businesses and richer class of population who mainly consume imported goods and services. Hence, exchange rate or currency value plays an important role in the process of international trade in terms of either exports or imports. Tariff rates, on the other hand, by adding extra cost to the imports can also determine both the volume and unit value of imports and through this influence on international trade (Jinaxi, 2013). Basic measure of total output of the country, gross domestic product (GDP), also one of the key factors in the determination of international trade. Increase in country's income, which can be calculated with the help of the GDP growth, leads to higher level of international trade. Moreover, investment both domestic and foreign can enhance opportunities to new start-ups and as a result of this newly established firms may eventually increase the level of exports. We tried to measure investment with the help of the two variables, namely gross capital formation for domestic investment and inflows of foreign direct investment for external investment.

In this paper we also added variables of agricultural sector, such as share of employment in agricultural sector as well as percentage share of arable and agricultural lands as a potential drivers of international trade, since most of the CIS countries still highly dependent on agricultural sector. Besides, in the process of evaluating the determinants of imports we added share of employment in industry and services as well. In the following sections of the paper we focus on providing information regarding related literature (Section 2), data and methodology (Section 3), analysis of the findings (Section 4) and conclusions and recommendation (Section 5).

2. Literature review

Different economic theories use basic economic factors to explain why countries trade and how forms of trade develop. For example, in David theory, technological differences Ricardo's countries define between comparative advantages. In the Heckscher-Olin model, the relative supply of factors (labor, capital, and natural resources) determines the forms of trade. The new trade theory predicts that larger economies - as a result of increased wealth and income - will have an export advantage for relatively large amounts of consumer goods within the country. The "new" trade theory identifies trading costs as a major barrier to entry into trade. Others argue that the quality of a country's political and economic institutions can be a major source of comparative advantage. This section also looks at the feedback effect of trade. which in turn affects key economic factors that affect trade. Trade can lead to the proliferation of technology, for example, allowing countries with less technological experience to have muchneeded know-how. Participation in trade also helps strengthen political and economic institutions.

Local researchers (Tursunov B., 2022), (Saidova, M.,2021) and others re-searched features of industrial production dynamics in the research of textile enterprises' financial security and analysis of business processes in digital era. Issues of agriculture in the Republic of Uzbekistan were investigated by (Yuldashev N.K.,2020), human capital researched by (Abdurakhmanova G.,2022) and (Sharipov, K.A.,2021).

The world's population and composition are changing dramatically. This is the result of a process called "demographic transition" - a process that involves first a decline in mortality and then a decline in fertility. Countries are at different stages of demographic transition. As Lee (2003) explains, a country's demographic transition process takes place in four stages. In the first stage, the mortality rate begins to decline, while the birth rate remains high. The reduction in mortality at this stage mainly affects the pediatric population and is mainly associated with a reduction in airborne or waterborne infections, as well as an improvement in nutrition. As mortality decreases, the population increases and becomes relatively younger. The second phase of the transition is characterized by a decrease in the birth rate and an increase in the

Figure I

working-age population as young people reach puberty. An increase in the labor force and savings at this stage could create "demographic dividends" and stimulate economic growth. This can be illustrated by the population pyramid (Figure 1), in which the demographic structure of Uzbekistan is expected to change from the pyramids of 1987 and 2019 to bars by 2050 and even shrink by 2100¹.



As can be seen from Figure 1, the number of people over the age of 65 is growing rapidly, posing a problem for the labor force. In particular, as mentioned above, the more retirees there are, the greater the demand for pension funds and the lower the incentive to work as a result of taxation for employees. Ultimately, this will have a negative impact on foreign trade.

The accumulation of physical capital can affect the nature of international trade in a variety of public Increasing investment wavs. in infrastructure, for example, can make it easier for a country to participate in world markets by reducing trade costs and consequently increasing production capacity. Thus, such investments in physical capital could lead to the emergence of "new players" in international trade. Investing in roads, ports and other transport infrastructure can also boost regional trade, while investing in information and communication technology (ICT) infrastructure will help more countries participate in the ever-expanding international trade in services. Over time, depending on the growth rate of capital accumulation relative to the growth rate of the labor force, investments in infrastructure and non-infrastructure physical capital (e.g., plants, machinery and equipment) have a comparative advantage in international trade. may change in the participating states.

Investing in physical capital, such as roads, ports, and ICT infrastructure, reduces trade costs and therefore increases countries 'participation in trade. Thus, capital accumulation can help emerge as "new players" in world trade. This is especially important in the context of global supply chains where firms based in developed countries impose certain end product functions on developing countries. The minimum level and quality of infrastructure created through investments in physical capital can also play an important role (Baldwin and Lopez-Gonzalez, 2012; Kimura, 2009; Hew et al., 2009).

In empirical studies, numerous scholars analyzed the impact of several factors on international trade. According to Frankel et al. (1995) and Egger and Pfaffermayr (2004) relative factor endowments are key factor in the differentiation

of trade flows of various countries. Besides, Frankel (1997) along with Frankel and Rose (2002) argue concerning importance of economic development in the development process of international trade, while Coe and Hoffmaister (1999), Wilson et al. (2003) and Longo and Sekkart (2004) believe that political factors are key determining variables of different levels of international trade in different countries. Moreover, based on studies of Frenkel and Wei (1993) and Klein (2002) it is possible to mention that currency risk or exchange rate is the major factor affecting international trade. Furthermore different group of scientists argue regarding various determinants of trade flows, such as historical or colonial ties (e.g. Frankel and Wei, 1995; Feenstra et al. 2001; Frankel and Rose, 2002; de Groot et al. 2003), landlocked or island effects along with availability of infrastructure (e.g. Rose, 2000; Frankel and Rose, 2002; Wilson et al. 2003; Longo and Sekkart, 2004; Rose, 2004), border effects (e.g. Aitken, 1973; Frankel and Wei, 1995; Frankel and Rose 2002; de Groot et al. 2003; Rose, 2004). According to the theories of trade based on Hechsher-Ohlin economy and imperfect competition, core indicators of macroeconomics namely income, unemployment, inflation as well as distance are main determinants of international trade.

3. Data and methodology

Data regarding dependent and independent variables are obtained from World Development Indicators (WDI) database of World Bank for the period from 1990 to 2021 for the panel of 10 postsoviet countries. Besides, data regarding exchange rate is obtained from International Financial Statistics database of IMF for all countries. We intentionally choose the group of homogenous countries to our research, since it will be possible to compare several macroeconomic indicator. This is due to the fact that these countries are similar in terms of their history and culture along with infrastructure and other political and social indicators. Summary statistics of the variables are provided in the Table 1.

Variable	Mean	Std.Dev.	Min	Max	Obse	rvations
trade ~P overall	87.623	34,117	-1.672	278,741	N =	310
between	19.345	53.779	124	.780	n =	10
within	28.742	1.626	275	.302	T =	31
******	20.7 12	1.020	270		•	51
export~P overall	41.102	17.791	0.035	146.224	N =	310
between	9.829	28.312	60.2	709	n =	10
within	15.143	3.999	138.	.940	Τ =	31
import~P overall	46.521	20.188	-24.726	132.517	N =	310
between	12.948	22.777	64.0	071	n =	10
within	16.006	-18.624	136.	.362	Τ =	31
agricu~t overall	54.254	19.309	13.156	82.138	N =	310
between	20.111	13.244	79.	975	n =	10
within	2.770	41.850	63.2	220	T =	31
employ~y overall	23.368	7.795	10.350	41.020	N =	310
between	7.712	12.880	36.4	492	n =	10
within	2.658	14.330	34.:	550	Τ =	31
fertil~e overall	2.343	0.889	1.078	5.225	N =	310
between	0.852	1.375	3.9	68	n =	10
within	0.368	1.720	3.7	26	Τ =	31
g~dom_~P	23.084	20.795	-29.915	117.257	N =	310
overall						
between	13.995	1.185	44.0	604	n =	10
within	15.987	-19.439	110.	.468	Τ =	31
emplo~ce overall	45.889	10.395	21.960	67.450	N =	310
between	9.369	28.883	59.2	210	n =	10
within	5.367	32.359	58.9	999	Τ =	31
arable~t overall	16.866	15.248	2.743	57.682	N =	310
between	16.026	3.966	56.	634	n =	10
within	0.768	14.570	19.3	828	T =	31
1	20 5 4 4	10 555	- - - - - - - - - -	50 520		210
emplo~re overall	30.744	13.556	5.780	59.720	N =	310
between	12.957	10.407	53.0	635	n =	10
within	5.673	12.218	47.0	088	T =	31
11	07.014	10 702	0.002	100 400	NI	210
gross overall	27.014	10.792	-0.693	102.490	IN =	510
between	5.824	21.643	34.	313 957	n =	10
within	10.162	0.931	98.	85/	1 =	31
life a v avanali	60 120	2 2 4 7	50 104	75 000	N	210
hotwaan	00.430	3.347 65.042	30.104	13.229	n =	10
Detween	2.119	05.045	12.	024	п =	10

Table 1: Summary statistics

within	2.674	61.491	74.	702	T =	31
rural_~t overall	45.311	14.814	20.517	73.499	N =	310
between	15.444	26.334	72.	510	n =	10
within	2.025	38.307	51.	809	T =	31
TR_sim~l overall	7.056	4.832	0	29.425	N =	310
between	3.234	3.046	10.	916	n =	10
within	3.729	-3.860	25.	565	T =	31
unempl~O overall	7.939	4.100	-1.900	24.400	N =	310
between	1.918	6.105	12.	294	n =	10
within	3.673	-2.955	23.	832	T =	31
exchan~e overall	654.186	1644.463	0	10054.260	N =	310
between	1332.165	0.568	4091	1.012	n =	10
within	1049.710	-3436.827	8881	1.977	T =	31

The model In our study we employed three models in order to analyze determinants of (1) international trade, (2) exports and (3) imports. The models are as follows:

$$Tr_GDP_t = \beta_0 + \sum_{i=1}^{11} \beta_i * X_{it} + u_t$$
(1)

Where,

Tr_GDP – International trade (exports+imports) as a share of GDP

 β_0 – intercept of the regression function

 β_i – vector of regression coefficients of respective independent variables

Xit - vector of independent variables

u_t – error term

$$X_{GDP_{t}} = \alpha_{0} + \sum_{i=1}^{11} \alpha_{i} * Z_{it} + e_{t}$$
(2)

Where,

X_GDP – Exports as a share of GDP

 α_0 – intercept of the regression function

 α_i – vector of regression coefficients of respective independent variables

Zit - vector of independent variables

 $e_t - error term$

$$\begin{split} M_GDP_t &= \gamma_0 + \\ \sum_{i=1}^{11} \gamma_i * Q_{it} + c_t \end{split}$$

(2)

Where,

M_GDP - Exports as a share of GDP

 γ_0 – intercept of the regression function

 γ_i – vector of regression coefficients of respective independent variables

Qit - vector of independent variables

c_t – error term

It is also important to mention that, correlation matrix and graph matrix of the variables are provided in the appendices, which is important in the process of empirical studies. In the regression analysis we employed ordinary least squares (OLS) method along with fixed effects and random effects methods for the panel data. Results of the regression analyses are provided in the following section of the paper.

4. Analysis of the findings

As it mentioned above we evaluated the determinants of international trade using three different models for total trade, exports and imports. This section of the paper consists of three parts respectively. In order to examine the determinates of international trade in the case of CIS countries for the period from 1990 to 2021 we utilized aforementioned models and result of regression analysis are provided in the Tables 2 to 4.

Total trade

It is evident from the Table 3 that agricultural variables, namely share of arable lands along with percentage share of employment in agricultural sector have significant effect on international trade in CIS countries. Specifically, one percent increase in share of arable lands in total surface result in 1.13 percent higher international trade in terms of GDP. However, it is also noteworthy

point to include here is that higher employment in agriculture tends to have negative impact on Moreover. volume of international trade. demographic variables revealed to have significant but small in magnitude effect on international trade. Tariff rate, on the other hand, negative affects international trade as expected according to the OLS and FE/RE methods. Finally, it is also crutial to state that exchange rate revealed to have insignificant effect on international trade in CIS countries. Overall Rsquared is equal to approximately 37 percent, and this is due to the fact that R-squared between panels is comparatively low. This indicated regarding poor explanation of differences in international trade between countries. However, the model best fits for within panel explanation or dynamics of international trade in each country. Hausman specification test for choosing between FE and RE models suggest regarding appropriateness of the results of fixed effects.

VARIABLES	(1) (2) BLES OLS Fix effe		(3) Random effects	(4) Fixed effects Robust standard error	(5) Random effects Robust standard error	(6) Fixed effects Adj. for serial correlatio	(7)Random effectsAdj. for serial correlatio	
						n	n	
agricultutal_land_percen t	-0.478***	-2.213***	-0.478***	-2.213	-0.478***	-2.572*	-2.572*	
	(0.122)	(0.839)	(0.122)	(1.415)	(0.147)	(1.549)	(1.549)	
arable_land_percent	1.137***	1.309	1.137***	1.309	1.137***	-0.864	-0.864	
	(0.311)	(2.248)	(0.311)	(3.571)	(0.269)	(4.251)	(4.251)	
employment_in_agricult ure	-1.047***	0.491	-1.047***	0.491	-1.047**	-0.365	-0.365	
	(0.229)	(0.433)	(0.229)	(1.079)	(0.432)	(0.692)	(0.692)	
gross_cap_formation_pe rcent_GDP	0.508***	0.686***	0.508***	0.686	0.508	0.537***	0.537***	
	(0.160)	(0.172)	(0.160)	(0.512)	(0.592)	(0.161)	(0.161)	
land_area	5.57e- 06**	0.00147	5.57e- 06**	0.00147	5.57e- 06***	0.00116	0.00116	
	(2.40e-06)	(0.000902)	(2.40e- 06)	(0.000896)	(1.67e- 06)	(0.000829	(0.000829	
life_expectancy	-3.116***	0.182	-3.116***	0.182	-3.116***	-2.996*	-2.996*	
	(0.597)	(0.921)	(0.597)	(1.258)	(0.743)	(1.767)	(1.767)	
population_total	-1.11e-	-3.62e-	-1.11e-	-3.62e-	-1.11e-	-2.75e-06	-2.75e-06	
	06***	06***	06***	06***	06***			
	(2.43e-07)	(1.17e-06)	(2.43e-	(6.55e-	(1.23e-	(2.94e-	(2.94e-	
munol nonvolation noncont	0 5 40**	1 160	U/) 0.540**	0/)	0/) 0.540*	06) 5.624*	06) 5.624*	
rural_population_percent	(0.340^{**})	1.109	(0.340^{**})	1.109	(0.340°)	5.024°	5.024^{*}	
TP simple mean all	(0.244)	(1.003)	(0.244)	(1.709) 0.016**	(0.200)	(2.999)	(2.999)	
TK_Shipic_mean_an	(0.385)	(0.475)	(0.385)	(0.364)	(0.102)	(0.815)	(0.815)	
unemployment II O	0.853**	1 650***	0.853**	1 650	(0.172) 0.853	-1 129	-1 129	
unemployment_IEO	(0.055)	(0.553)	(0.055)	(1.585)	(1.115)	(0.715)	(0.715)	
exchange rate	-0.00171	-0.00226	-0.00171	-0.00226	-0.00171*	-0.00224	-0.00224	
exenange_rate	(0.00137)	(0.00220)	(0.00137)	(0.00220)	(0.000966	(0.00221)	(0.00221)	
	(0.00157)	(0.00203)	(0.00157)	(0.00515))	(0.002)1)	(0.002)1)	
Constant	323.4***	-2,943	323.4***	-2,943	323.4***	-2,168***	-2,168***	
	(52.56)	(1,914)	(52.56)	(1,941)	(77.50)	(338.4)	(338.4)	
Observations R-squared	310 0 367	310 0 199	310	310 0 199	310	300	300	
Number of country id	0.507	10	10	10	10	10	10	
ramber of country_fu		Snec	ification test	s	10	10	10	
		opee						

Breusch-Pagan / Cook-Weisberg test for 45.02

(0.0000)

heteroskedasticity

Ramsey RESET test for omitted variable	10.76 (0.0000)						
VIF for multicollinearity	11.19 (mean)						
Cameron & Trivedi's	277.75						
decomposition of IM-test	(0.0000)						
Shapiro-Wilk W test for normal data	6.903 (0.0000)						
Skewness/Kurtosis tests for Normality	73.47 (0.0000)						
Modified Wald test for groupwise heteroskedasticity		266.45 (0.0000)					
Wooldridge test for autocorrelation in panel data	37.861 (0.0002)						

Table 2: regression results of the 1st model

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Exports

According to the Table 3, it is possible to emphasize that agricultural sector variables along with demographic variables found out to have significant impact on dynamics of exports in CIS countries from the period from 1990 to 2021. In particular, one percent increase in share of arable lands rise the share of exports in GDP on average by

 Table 3: regression results of the 2nd model

approximately 0.4 percent. As expected most of the demographic factors have negative effect on exports. Gross domestic saving, on the other hand, reveled positive impact. This is probably due to the fact that higher saving increase investment and lead to more firms to be established including export oriented ones as well. finally, both exchange rate and tariff rate negatively influenced on exports in CIS countries over the specified period of time. According to the results of Hausman test it is important to mention that fixed effects preferred more relative to random effects method.

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	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	OLS	Fixed	Random	Fixed	Random	Fixed	Random
		effects	effects	effects	effects	effects	effects
				Robust	Robust	Adj. for	Adj. for
				standard	standard	serial	serial
				error	error	correlation	correlation
agricultutal_land_percent	-0.144**	-0.284	-0.144**	-0.284	-0.144*	-1.058	0.0670
	(0.0685)	(0.428)	(0.0685)	(0.493)	(0.0781)	(0.815)	(0.168)
arable_land_percent	0.405**	0.486	0.405**	0.486	0.405**	-0.308	0.738*
	(0.177)	(1.224)	(0.177)	(1.413)	(0.182)	(2.218)	(0.439)
employment_in_agricultur	-0.543***	0.245	-0.543***	0.245	-0.543**	0.0766	0.0321
e							
	(0.124)	(0.260)	(0.124)	(0.639)	(0.214)	(0.378)	(0.282)
fertility_rate	-6.581**	-3.484	-6.581**	-3.484	-6.581	13.54**	-4.823
	(2.581)	(3.189)	(2.581)	(7.242)	(4.317)	(5.323)	(4.356)
gross_dom_saving_percen t_GDP	0.277***	0.203***	0.277***	0.203	0.277**	0.444***	0.330***
	(0.0580)	(0.0622)	(0.0580)	(0.131)	(0.138)	(0.0661)	(0.0658)
land_area	2.57e-06*	0.000904*	2.57e-06*	0.000904	2.57e-06**	0.000650	6.39e-06*
	(1.34e-06)	(0.000495)	(1.34e-06)	(0.000616)	(1.25e-06)	(0.000445)	(3.42e-06)
life expectancy	-1.903***	-0.255	-1.903***	-0.255	-1.903***	-1.366	-0.321
- 1 9	(0.357)	(0.523)	(0.357)	(0.885)	(0.607)	(0.922)	(0.753)
population total	-5.17e-	-1.65e-	-5.17e-	-1.65e-06*	-5.17e-	-1.47e-06	-7.85e-
F - F	07***	06**	07***		07***		07**
	(1.33e-07)	(6.41e-07)	(1.33e-07)	(7.33e-07)	(9.57e-08)	(1.49e-06)	(3.51e-07)
rural population percent	0.389**	0.309	0.389**	0.309	0.389*	1.504	0.289
—	(0.166)	(0.604)	(0.166)	(1.006)	(0.213)	(1.488)	(0.378)
TR simple mean all	-0.627***	-0.504*	-0.627***	-0.504	-0.627**	-0.306	-0.287
Inc_ship to_moun_un	(0.241)	(0.274)	(0.241)	(0.305)	(0.272)	(0.431)	(0.408)
exchange rate	-	-0.00187*	-	-0.00187	-0.00152*	-0.00194	-0.000566
exenange_rate	0.00152**	0.00107	0.00152**	0.00107	0.00152	0.00171	0.000200
	(0.000739)	(0.00111)	(0.000739)	(0.00209)	(0.000813)	(0.00153)	(0.00136)
Constant	194 6***	-1 819*	194 6***	-1 819	194 6***	-1 244***	46 19
Constant	(31.23)	(1.046)	(31.23)	(1,280)	(50.94)	(192.4)	(66.06)
	(31.23)	(1,010)	(31.23)	(1,200)	(30.51)	(1)2.1)	(00.00)
Observations	310	310	310	310	310	300	310
R-squared	0 329	0 154	010	0 154	010	200	010
Number of country id	0.327	10	10	10	10	10	10
rumber of country_id		10	10	10	10	10	10
		Spe	cification test	S			
Breusch-Pagan / Cook-	23.85						
Weisberg test for	(0.0000)						
heteroskedasticity							
Ramsey RESET test for	6.70						
omitted variable	(0.0002)						

VIF for multicollinearity	12.84						
	(mean)						
Cameron & Trivedi's	245.45						
decomposition of IM-test	(0.0000)						
Shapiro-Wilk W test for	7.509						
normal data	(0.0000)						
Skewness/Kurtosis tests	73.47						
for Normality	(0.0000)						
Modified Wald test for		273.07					
groupwise heteroskedasticity		(0.0000)					
Wooldridge test for	43.868	43.868	43.868	43.868	43.868	43.868	43.868
autocorrelation in panel	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
data	()	()	()	()	()	()	(

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Imports

It is evident from the Table 4 that key determinants of imports in CIS countries are share of employment in industry and service sectors along with tariff rate and demographic factors. To be more specific, one percent increase in industry and service sectors rise share of imports in GDP on average by almost 0.7 and 0.5 percent respectively. Interestingly, share of rural population represented positive effect on imports indicating that the more population in rural areas, the more imports will be in CIS countries. In other words, it is also possible to interpret that shifting population from urban to rural areas push them to import more goods and services. Along with OLS method we also utilized random effects and fixed effects methods as well. According to the Hausman specification test results of random effects model is preferred compared to the results of fixed effects method. According to the results of random effects method only unemployment found out to less significant effect on imports among other determinants.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
WADIADI ES		(2) Eived offects	(J) Dondom	(4) Eived	(J) Dondom	(U) Eired	(/) Dondom
VARIADLES	OLS	Fixed effects	Random	offects	Alluolli	offooto	Andoni
			effects	Pobust	Pobust	Adi for	Adi for
				standard	standard	Auj. 101	Auj. 101
				error	error	correlation	correlation
				enor	enor	conclation	correlation
agricultutal_land_pe rcent	-0.351***	-1.266***	-0.351***	-1.266	-0.351***	-1.818**	-0.206
	(0.0600)	(0.438)	(0.0600)	(0.907)	(0.0944)	(0.817)	(0.162)
arable_land_percent	0.689***	0.701	0.689***	0.701	0.689***	0.177	0.624*
-	(0.146)	(1.246)	(0.146)	(2.163)	(0.184)	(2.239)	(0.371)
employment_in_ind ustry	0.482***	-0.280	0.482***	-0.280	0.482***	0.398	-0.251
	(0.130)	(0.337)	(0.130)	(0.643)	(0.170)	(0.624)	(0.313)
employment_in_serv	0.629***	0.00598	0.629***	0.00598	0.629*	0.0235	0.202
ice	(0, 1, 0)	(0.200)	(0, 1, c0)	(0.501)	(0.221)	(0.570)	(0.077)
	(0.169)	(0.308)	(0.169)	(0.581)	(0.331)	(0.572)	(0.377)
gross_cap_formation _percent_GDP	0.735***	0.803***	0.735***	0.803**	0.735**	0.622***	0.683***
	(0.0912)	(0.0946)	(0.0912)	(0.298)	(0.303)	(0.0860)	(0.0870)
gross_dom_saving_ percent_GDP	-0.373***	-0.321***	-0.373***	-0.321	-0.373***	-0.199***	-0.262***
	(0.0601)	(0.0643)	(0.0601)	(0.181)	(0.144)	(0.0680)	(0.0685)
labor_force_total	-1.32e-	-2.86e-	-1.32e-	-2.86e-06	-1.32e-	5.03e-07	-9.95e-07
	06***	06***	06***		06***		
	(2.60e-07)	(9.51e-07)	(2.60e-07)	(1.86e-06)	(2.14e-07)	(1.45e-06)	(6.59e-07)
land_area	3.51e-06***	6.80e-05	3.51e-06***	6.80e-05	3.51e-06**	0.000218	3.02e-06
	(1.32e-06)	(0.000396)	(1.32e-06)	(0.000259)	(1.50e-06)	(0.000443)	(3.24e-06)
life_expectancy	-1.807***	-0.459	-1.807***	-0.459	-1.807***	-1.579	-0.852
	(0.399)	(0.578)	(0.399)	(0.752)	(0.519)	(1.042)	(0.818)
rural_population_per cent	0.376***	0.726	0.376***	0.726	0.376**	3.877**	0.189
	(0.119)	(0.567)	(0.119)	(1.178)	(0.163)	(1.602)	(0.310)
TR_simple_mean_al 1	-0.621***	-0.484**	-0.621***	-0.484**	-0.621***	-0.729*	-0.607
	(0.209)	(0.239)	(0.209)	(0.203)	(0.198)	(0.419)	(0.373)
unemployment_ILO	0.432*	0.794**	0.432*	0.794	0.432	-0.585	-0.0505
	(0.222)	(0.315)	(0.222)	(0.977)	(0.551)	(0.378)	(0.330)
Constant	120.2***	-15.27	120.2***	-15.27	120.2***	-404.2**	90.74
	(28.42)	(840.0)	(28.42)	(560.8)	(36.32)	(175.1)	(59.82)
Observations	310	310	310	310	310	300	310
R-squared	0 551	0 346	510	0 346	510	500	510
Number of	0.001	10	10	10	10	10	10
country_id		10	10	10	10	10	10

	Specification tests													
Breusch-Pagan / Cook-	23.44													
Weisberg test for	(0.0000)													
heteroskedasticity														
Ramsey RESET test for	0.74													
omitted variable	(0.5263)													
VIF for multicollinearity	12.24													
	(mean)													
Cameron & Trivedi's	289.14													
decomposition of IM-test	(0.0000)													
Chaping Wills W toot for	5 202													
Snapiro-wilk w test for	5.282													
normal data	(0.0000)													
Skewness/Kurtosis tests for	33.22													
Normality	(0.0000)													
Modified Wald test for		124 79												
groupwise		(0,0000)												
heteroskedasticity		(0.0000)												
Wooldridge test for	33.901	33.901	33.901	33.901	33.901	33.901	33.901							
autocorrelation in panel	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)							
data														

Table 4: regression results of 3rd model

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

In summary it is evident from the results that agricultural sector variables are key determinants of international trade in CIS countries, since most of the post-soviet countries highly rely on export of agricultural products in the process of achieving their targeted level of economic growth. Specifically, share of arable lands is significantly influencing factor in all three models, while employment in agricultural sector can influence on exports and total trade only. On the other hand, imports are highly affected by mostly demographic factors, such as share of rural population, along with tariff rate and exchange rate as exports and total trade flows.

5. Conclusion and recommendations

To conclude with it is vital point to emphasize that there several factors that can explain dynamics of international trade. Moreover, these factors vary by country groups as well. For instance, political and demographic factors along with exchange rate and tariff rate are key determinants of international trade almost in all countries according to the literature. However, there still remain some other factors such as agricultural sector variables that can only explain the fluctuation in international trade in specific group of countries. For example, both exports and imports of CIS countries are highly affected by share of arable lands and employment in agricultural sector. Hence, it is recommended that these countries need to pay more attention on agricultural sector by improving its management and financing in order to increase their trade with other countries which may eventually lead them to export-led growth. Besides, it is also possible to improve the quality of drought land and use them in agricultural sector, since it may help them to increase their trade.

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Appendices

Appendix I: Correlation matrix

	trade_~P	export~P	import~P	agricu~t	employ~y	fertil~e	g~dom_~P
trade_perc~P	1.0000						
export_per~P	0.8838	1.0000					
imports pe~P	0.9111	0.6124	1.0000				
agricultut~t	0.1152	0.1641	0.0500	1.0000			
employment~y	-0.0137	0.1129	-0.1227	-0.0684	1.0000		
fertility_~e	0.0926	-0.0526	0.2029	0.0726	-0.1325	1.0000	
gross_dom_~P	-0.0830	0.2293	-0.3424	0.1294	0.4004	0.0452	1.0000
employmen~ce	-0.1563	-0.0100	-0.2553	-0.1360	0.0923	-0.7410	0.0339
labor_forc~l	-0.3455	-0.1753	-0.4293	-0.5839	0.3146	-0.4354	0.1534
arable_lan~t	0.1530	0.2040	0.0787	0.2590	0.0513	-0.5863	-0.0340
employmen~re	0.1277	-0.0572	0.2663	0.1436	-0.6458	0.6444	-0.2562
gross_cap_~P	0.1633	0.0529	0.2293	0.1120	0.2189	0.2547	0.4356
land_area	-0.3311	-0.1682	-0.4113	-0.6300	0.2885	-0.3279	0.1652
life_expec~y	-0.1352	-0.1633	-0.0846	0.0174	-0.1136	-0.4921	-0.2298
popul~_total	-0.3508	-0.1840	-0.4307	-0.5814	0.3200	-0.4233	0.1516
rural_popu~t	0.1013	-0.0873	0.2482	0.1269	-0.3675	0.8697	-0.1778
TR_simple_~l	-0.2441	-0.0720	-0.3491	-0.0836	0.2958	-0.1413	0.4250
unemployme~0	0.0993	-0.0297	0.1939	-0.0841	-0.1899	-0.1812	-0.4264
exchange_r~e	-0.1931	-0.1481	-0.1958	0.2841	0.3735	0.1549	0.2699
	emplo~ce	labor_~1	arable~t	emplo~re	gross	land_a~a	life_e~y
employmen~ce	1.0000						
labor_forc~l	0.5286	1.0000					
arable_lan~t	0.3732	0.0343	1.0000				
employmen~re	-0.8199	-0.5862	-0.3157	1.0000			
gross_cap_~P	-0.1626	-0.1502	-0.1445	-0.0012	1.0000		
land_area	0.4604	0.9548	-0.2094	-0.5190	-0.1152	1.0000	
life_expec~y	0.6288	0.0119	0.2685	-0.4169	-0.0609	-0.0474	1.0000
popul~_total	0.5101	0.9984	0.0394	-0.5752	-0.1488	0.9475	0.0008
rural_popu~t	-0.7377	-0.5220	-0.5167	0.7770	0.0774	-0.4407	-0.4011
TR_simple_~l	0.1047	0.1216	-0.0248	-0.2504	-0.0089	0.0897	0.0112
unemployme~0	-0.0825	-0.0916	0.0112	0.1725	-0.2723	-0.0710	0.0344
exchange_r~e	-0.2177	-0.1467	-0.2690	-0.0479	0.1793	-0.1299	-0.0734
	p~_total	rural_~t	TR_sim~l	unemp1~0	exchan~e		
popul~_total	1.0000						
rural_popu~t	-0.5076	1.0000					
TR_simple ~1	0.1301	-0.1225	1.0000				
unemployme~0	-0.0888	0.0257	-0.0931	1.0000			
exchange_r~e	-0.1368	0.1249	0.3947	-0.0956	1.0000		

Appendix 2: Graph matrix

	0 60 100 1	50	20 40 60 6	0	0 2 4 6		20 40 60		0 20 40	60	0 50 10	0	60 66 20 2	5	20 40 60 8		0 10 20 8	0	
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Appendix 3: kernel density plot of the Ist model



Appendix 4: Rvf-plot of the 1st model



Appendix 5: Kernel density plot of the 2nd model



Appendix 6: Rvf plot of the 2nd model



Appendix 7: Kernel density plot of the 3rd model



Appendix 8: Rvf plot of the 3rd model

