The Impact of Armenia's membership in the EAEU on the Country's Exports

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ABSTRACT

After Armenia's entrance into the Eurasian Economic Union (EAEU), a hot debate has been ongoing among both the advocates and the critics. While many argue that membership came at an unjustified cost of diverting from European integration, others claim that the benefits undoubtedly overweigh the costs. What's more; proponents argue that the substantial increase in exports that has been present after 2015 until now, can be readily attributed to Armenia's entrance into the Union. This research is aimed at shedding light on the economic impacts of Armenia's membership in the Eurasian Economic Union on the country's economy in general, and on its exports in particular. Interestingly, according to our findings, there is not enough evidence to conclude that the Eurasian Economic Union has had a positive or negative impact on Armenian exports. Moreover; the study concludes that the main factor driving the growth in Armenian exports may be the spike in World Copper price during the recent years.

Keywords: EAEU, exports, Armenia, Russia, ARDL, ARIMA

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First, I want to thank my thesis advisor: Professor Vardan Baghdasaryan. His support and patience were fundamental for this research. This work is dedicated to my friends and family, who have blessed me with their love and support every day for the past four years. All remaining errors are mine.

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1. Introduction

The emerging multipolar international system has prompted the creation of various counter- hegemonic projects, one of which is the Eurasian Economic Union, heretofore referred to as EAEU. The EAEU is of particular interest to us, as it has direct impact on Armenia and the country's economic as well as social landscape.

The EAEU was formed in January of 2015, building on the Customs Union between Russia, Belarus, and Kazakhstan and successfully extending membership to Armenia and Kyrgyzstan. In this regard, the Union is an international organization established by the Treaty on the Eurasian Economic Union and has international legal personality. Interestingly, the Union unites a market of over 182 million people and represents a firm step aimed at close regional integration and cooperation. EAEU provides for free movement of goods, services, capital and labor, and pursues coordinated, harmonized and single policy in the sectors stipulated in the Treaty and international agreements within the Union. Furthermore; it is worthwhile to mention that the industrial policy implemented in the Union is focused on joint development of new types of export- oriented products, import substitution, creation of new production chains and innovative industrial sectors, production modernization in traditional industries, and expansion of jointly manufactured high-tech products export. (Eurasian Economic Union, n.d.)

From the perspective of Armenia and its membership in the EAEU, popular opinion has been largely divided, as there have been rigorous critics and advocates arguing for both ends. One way of assessing the impact of the country's membership in the Union is by determining its influence on Armenian exports. It comes as no surprise that exports play an essential role in development, acting as a driving force for employment, economic growth, increased competitiveness in international markets, and improved balance of payments position. Hence; a positive impact on exports will essentially mean a positive impact on the economy in general. In this regard, we should state that determining the impact of such an economic integration project in its initial stages of development is no easy task, this being especially true for the EAEU with its relatively short track record. However, for the purposes of this article, and the research

question- what is the real impact of Armenia's membership in the EAEU on the country's exports? – the analytical framework becomes a lot clearer.

Hereof, there is a need to build an econometric model that can sufficiently explain the main factors influencing Armenian exports. Interestingly, the country's exports have been increasing since 2015. (See Appendix, Figure 1) However; this indicator needs to be understood in the context of volatile international circumstances, or otherwise it will offer little insight into the potential impact of the EAEU. In this sense, our analysis must take into consideration the rise in international commodity prices, the volatility of Armenian Dram (AMD), as well as the respective growth rates of the EU and Russia. Note, that a more thorough explanation follows in the empirical analysis part of the research paper, addressing the intuition behind selecting these particular factors to be incorporated in the model. Additionally, further in the paper, we will address previous research on this topic and will present the methodology that was found most suitable for the analysis. Lastly, the findings will be laid out and areas of further research will be highlighted.

2. Literature Review

The Eurasian Economic Union is by far the most ambitious step towards improving regional integration and cooperation since the European Union's (EU) eastern expansion in the early 2000s. Not surprisingly, there has been a well of excellent research on the topic of regional integration. In 1964, Haas and Schmitter developed a framework to project whether economic integration of a group of countries automatically engenders political unity. (Haas, Schmitter, 1964) In this analysis, the authors established key conditions underpinning successful implementation of economic unions. Among those conditions are the implementation of common trade policies, decision making procedure, power of the units etc.

Additionally, there is also a great deal of research on the Eurasian Economic Union, its development and prospects. Building on the research of Haas and Schmitter and adopting a revised framework, Blockmans and others have examined both the potential and the limits of Eurasian economic integration. Interestingly, they have come to a rather pessimistic conclusion stating an unfavorable outlook on Eurasian Economic Union as a viable vehicle for economic integration. (Blockmans et al, 2012) Notably, the former research was carried out before Armenia and Kyrgyzstan joined the Union. Furthermore; in his paper "Eurasian Economic Union: Prospects and Challenges for Development", Knobel attempts at incorporating exogenous factors in order to examine the potential positive economic effects of free trade with other countries and sheds light on some of the problems that the Union faces, proposing possible solutions. More specifically, he estimates the value of the oil and gas transfer from Russia to other EAEU members and the influence of the Russian tax maneuver on this transfer. (Knobel, 2015) He goes on to show the need in redistribution mechanism inside the EAEU as a necessary condition for getting the potential positive economic effects of free trade with other countries. Interestingly, the research by Vinokurov establishes that the EAEU is comparable to other general- purpose regional integration organizations, in particular customs unions or free trade areas — NAFTA, Cooperation Council for the Arab States of the Gulf, and the South African Customs Union. The author also addresses the prevalent trends in mutual trade within the EAEU. (Vinokurov, 2017)

It is worth mentioning, that these works provide an excellent framework for examining the EAEU as a regional economic integration mechanism in general. Baghdasaryan, on the other hand, addresses the very issue of the impact of EAEU membership on Armenia's exports. (Baghdasaryan, 2016) In the report, the author uses ARDL model to conclude, that given the relatively short time period under discussion, the impact of EAEU on Armenian exports is difficult to assess, but a positive effect is demonstrated in the form of smaller sensitivity towards negative shocks in the Russian economy. Moreover; Baghdasaryan incorporates factors other than the membership in the EAEU in order to differentiate the impact of the Union from that of other external factors. Notably, our research will adopt this ideology and try to

distinguish the various variables, among which the EAEU, that have significant influence on Armenian exports.

3. Empirical Analysis

In this section of the research paper, the general methodology will be presented, including data selection, data transformation, the choice of the appropriate models to be built, and the regression results.

1) Data

The data incorporates quarterly statistics for our dependent variable, total export, and the independent variables, of which one is a dummy variable. What's more; it covers the time period from the first quarter of 2006 to the first quarter of 2017. The data for our dependent variable is represented in thousands of US dollars and is taken from the Statistical Committee of the Republic of Armenia.

Additionally, data for the following variables was collected from the Saint Louis Federal Reserve database. EU GDP Growth shows the percentage growth in the Gross Domestic product of the European Union. This variable is believed to have an impact on Armenian exports, since the EU is the top regional export destination of Armenia. For the same reason, percentage growth of Russian GDP was also incorporated into the data. Next, we incorporated Gold and Copper prices, as these two commodities comprise a large share of Armenian exports. Furthermore; data on the real effective exchange rate (REER) of Armenian dram against several currencies was gathered from the Armenian Statistical Office. Note that the advantage of working with REER instead of nominal exchange rates lies in the fact that REER deals with the problem of inflation. Additionally, a dummy variable of Eurasian Union was added, that takes a value of 1, if at the given time Armenia was a member of the Union. Summary information on the data can be found in Table 1. (See Appendix)

2) Descriptive Analysis

As our variable of interest is total export, it is extremely important to get valuable insights into its peculiarities. From Figure 1, we can observe the historic developments of Armenian exports from the beginning of 2006 to 2017. Initially, the first thing that we notice is the long term upward trend in the exports since 2009, indicating that exports have been steadily growing. Nevertheless, we can also observe that the value of exports experienced sharp decline in the end of 2014 up until 2015, when it experienced a turnaround and started to increase again. This part is particularly interesting, since it has been subject of many speculations. Interestingly, 2015 is also the year when Armenia became member of the EAEU and hence many people argue that it was the effect of the latter, that boosted Armenian exports. In this regard, our research has the purpose of assessing the economic impact that EAEU has had on the export growth.

All in all, these descriptive statistics give us valuable insights and point out to the relevance of our research question. Notably, it is interesting to look closer into our main variable: total exports. Figure 2 gives a detailed picture of what type of products Armenia exports. We can see, that copper ore, gold, diamonds, and hard liquor are among the largest categories. Additionally, you can find the top export destinations of Armenia in Table 1. (See Appendix) Russia was the top destination in 2016, having 21% of the pie.

3) Regression Results

The research implies building models and making relevant inferences based on them. But first of all, there is a need to transform the data into an appropriate form. In this sense, it is necessary to make a log transformation of the data, which enables us to get more logical and easily interpretable estimates. Moreover; while working with time series, the data needs to be stationary in order to serve as valid input for regression analysis. One of the biggest problems associated with non-stationary data is the spurious regression (one that provides misleading statistical evidence of a linear relationship between independent non-stationary variables). For this reason, we have checked our data for stationarity with the Augmented

Dickey-Fuller Test, which failed to reject the nonstationary nature of all the variables, except the dummy variable, which was not tested. Hence, the respective variables were transformed into stationary variables by first order differencing method, which represents the unit change of each observation from that of the previous quarter.

With all the changes in the initial data obtained, one not less important issue still remained. The issue of seasonality is quite important and it is essential to deal with it before building any models. For this purpose, the seasonal adjustment software developed by the Unites States Census was used. (Introduction to Seasonal R-Interface, n.d.) After obtaining the stationary and seasonally adjusted data, we proceeded with the creation of the models.

In this regard, two model types were considered, namely ARIMA and ARDL.

Firstly; let us investigate the ARIMA Time Series Model, which incorporates autoregressive, integration, and moving average parameters. Note, that the "I" stands for integration, which means that the data values are replaced with the difference between their values and the previous values, if necessary. Also, AR stands for Auto Regression, when the independent variable is regressed on its previous values. Additionally, it is crucial to estimate the "p" order, which represents the number of lags taken in order to calculate the Y_i. Furthermore; "MA" stands for moving- average and implies that the output variable depends linearly on the current and various past values of a stochastic term. It is worth noting, that in this part, it is again important to estimate the value of "q", or the order of the MA model.

At the same time, we have included in the ARIMA model other regressors, that were listed in the data part of this section.

The final version of the model took the following form:

$$Y_i = c + \sum_{i=1}^{p} \varphi_i Y_{i-1} + \sum_{j=1}^{q} \theta_j \varepsilon_{t-j} + \sum_{k=1}^{7} \beta_k * X_k + \varepsilon_t$$

Where k is the number of dependent variables.

The set of p and q parameters was obtained to minimize the Akaike Information Criterion. Note, that the following results were obtained: for the change in total export variable, p is equal to 0, d is also equal to 0, and q is equal to 1. Notably, this value of p indicates that the values of previous quarters bear no influence on the current values of change in total export variable. Table 3 (See Appendix) presents summary statistics on the model. We can see, that the only variable, that is significant and has strong impact on Armenian Exports is the Copper Price. Most importantly, our variable of interest, membership in the EAEU is not statistically significant and hence is irrelevant. This finding is somewhat surprising, as one would assume that membership in the Union would somewhat boost the exports. Nevertheless; the empirical evidence does not support this hypothesis. You can find the plot of actual versus fitted values of the Armenian Exports in Figure 3. (See Appendix)

From here, it is beneficial to construct a new ARIMA model, with only one independent variable: Copper Price. Table 3 (See Appendix) provides summary on this model as well. Note, that the values of p and q remain the same, as they are influenced by the Total Export variable, which also stays constant. From these findings, we can conclude that a 1% increase in Copper price, holding all other things constant, is predicted to increase the change in Armenian exports in the next from that of the previous year, same quarter, by 0.45%. Additionally, Figure 4 (See Appendix) presents the plot of fitted values against actual ones and is useful in identifying the validity of the model.

As mentioned above, Autoregressive Distributed Lag Model (ARDL) models were also built. What is more; in the general form, with p lags of dependent variable and q lags of independent variables, the model can be written as the following:

$$Y_i = \delta + \theta_1 y_{t-1} + \cdots + \theta_p y_{t-p} + \delta_0 x_t + \delta_1 x_{t-1} + \cdots + \delta_q x_{t-q} + v_t$$

The AR component of the name ARDL comes from the regression of y on lagged values of itself, the DL component comes from the distributed lag effect of the lagged x's.

The parameters for the optimal model were again obtained in order to minimize the Akaike Information Criterion. Firstly, a model incorporating all the initial independent variables was built. Table 4 summarizes the regression results. As it can be noted, the independent variables that are significant are Copper Price (99.9%), EU GDP Growth (90%) and its first lag (95%), as well as the first lag of Russian GDP Growth (95%). Figure 5 plots the fitted values against the actual ones. (See Appendix)

In this sense, it is also worth mentioning, that membership in the Eurasian Economic Union is again insignificant and hence there is not enough evidence to support the claim that it has actually had a positive\negative impact on the growth of Armenian exports.

Additionally, the fact that the GDP growth in EU and in Russia influence Armenian exports in the next period is quite intuitive. It implies that when incomes rise, people and companies do not immediately alter their buying behaviors and it takes time for the demand to adjust. Interestingly, EU imports manufactured goods, crude materials, miscellaneous manufactured articles, beverages and tobacco. (Armenia-Trade, n.d.) Moreover; top Armenian exports to Russia include hard liquor, diamonds, and agricultural products. (Products, n.d.)

What is more, the Copper Price variable is also significant, indicating that with 1% increase in copper price, the difference in Total Exports from the previous period is expected to rise by 0.77%. Given the high significance level and impact of copper price on total exports, it is relevant to build a model that comprises only the latter as the independent variable. Table 2 summarizes the regression results. It can be seen that copper price is again significant at 99% and has great impact on total exports. Interestingly, when comparing the two models, we see that the R-squared adjusted values do not differ greatly and are respectively 85% and 83%. This indicates that copper price alone has huge explanatory power over total

exports. Hence; copper, having a large share in total exports, has the power of influencing Armenian exports the most out of all the variables discussed. You can refer to Figure 6 for the plot of fitted vs actual values. (See Appendix)

From here, one question begs an answer. What would be the picture if we had not considered commodity prices at all. For this purpose, an ARDL model was built with the initial explanatory variables, except the Copper and Gold prices. Table 5 (See Appendix) presents the results. Interestingly, if we ignore the impact of commodity prices, EU GDP Growth and its first lag, Russia GDP Growth's first lag, Real effective exchange rate's first and second lags, and membership in the EAEU become significant. Note, that assuming there is no correlation between copper and gold prices and the other variables, our new estimates are not biased. Only the predictive power of the model suffers, which is demonstrated in the new R squared adjusted value of a mere 0.6. You can find the plot of fitted vs actual values in Figure 7. (See Appendix)

All in all, several inferences can be made from here. Firstly, it can be argued that EU GDP Growth is a robustly positive factor influencing Armenian exports, as it consistently demonstrates positive significant estimates. This cannot be readily stated about the growth rate of Russian GDP, as it demonstrates different results on different models. Hence; growth in the European economy is expected to positively mirror into the Armenian economy via increased exports. We also see that REER is predicted to have a negative impact on exports after the first and second periods. Hence, the assumption that time is needed to adjust holds here as well. Interestingly, Eurasian Economic Union appears to have a slight positive impact on the exports, if we do not take into account the commodity prices. A further research is necessary to investigate the reason behind this phenomenon. It could be beneficial to scrutinize several other factors, such as the export of services in addition to goods, possible implications of the EAEU on the tourism sector and other relevant indicators. These questions represent excellent area of further research. However; given our study constraint, there is no convincing evidence to conclude a positive relationship between change in total export and EAEU membership.

Additionally, within the scope of this research, it is interesting to unveil the reasons behind the growth in Armenian exports after 2015. As it was previously mentioned, there is no evidence to conclude that the country's membership in the Eurasian Economic Union was the reason behind this phenomenon. Interestingly; it can be argued from our research results that this growth may be readily attributed to the spike in the price of copper. Figure 8 shows the evolution of copper price with time. (See Appendix) It can be seen, that after the second quarter of 2015, copper price has experienced significant growth. Furthermore; according to Figure 9, Armenian exports of copper and copper made products have also increased starting from the fourth quarter of 2015. (See Appendix) This again strongly supports the hypothesis, that copper price may have played a monumental role in the rise of total exports.

4. Conclusion

Regional economic integration projects entail great potential for development, especially for small countries like Armenia. Nevertheless; since Armenia has joined the Eurasian Economic Union, many people have argued that the former is yet another political tool aimed at Russian hegemony in the region. From this perspective, it has been interesting to review the relevant literature and elaborate on the issue. From another perspective, the EAEU's ability to deliver the promise of economic development for member states (Armenia in our case) has been scrutinized through the employment of econometric tools and research. Our research concludes, that there is not enough statistical evidence to conclude positive\negative impact that the EAEU might have played on Armenian exports. Therefore; the demonstrated increase in total exports from Armenia cannot be viably attributed to the country's membership in the Eurasian Economic Union. Rather, other factors, among which the rise of copper prices and increase in exports of this good may be considered when explaining this phenomenon.

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6. Appendix

Figure 1: Export dynamics

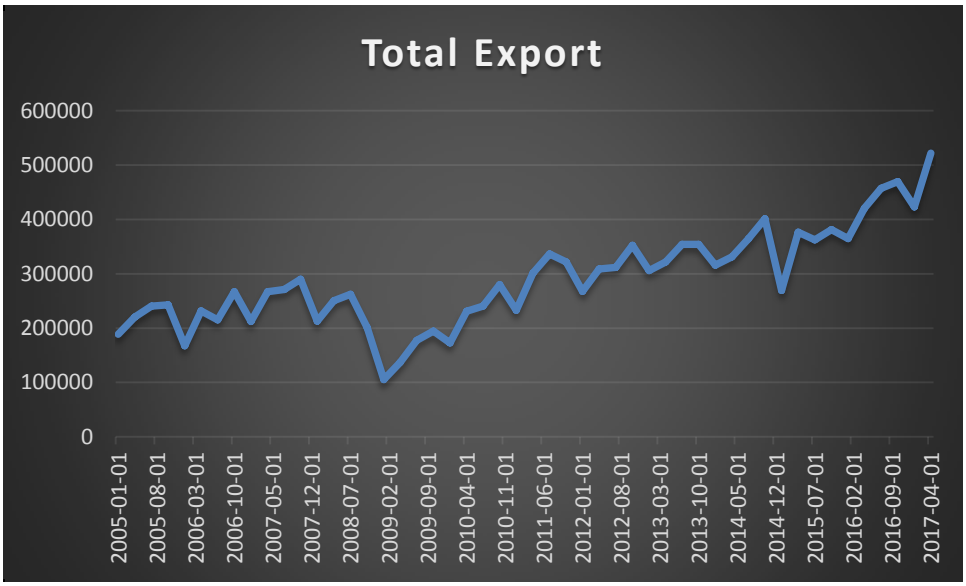


Table 1: Top 8 export destinations of Armenia

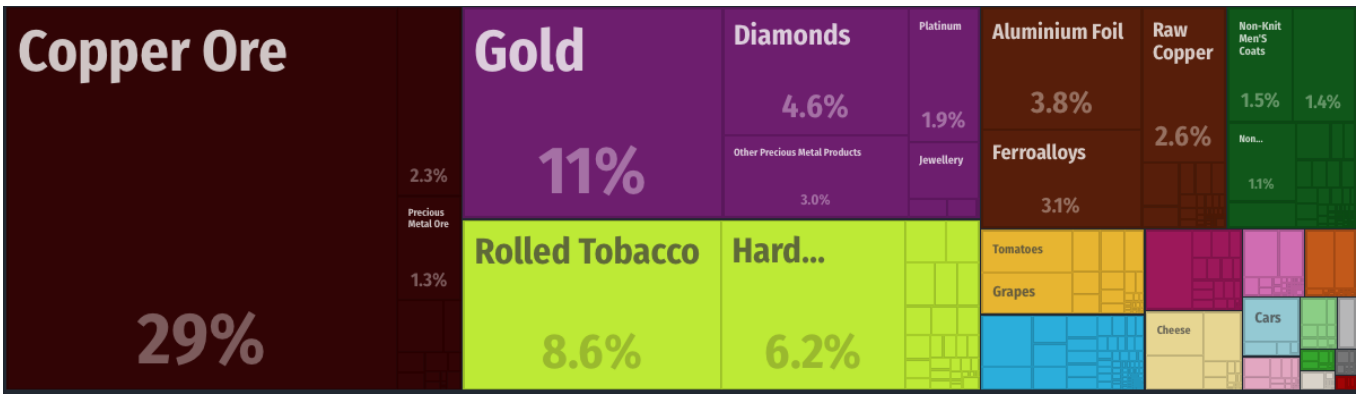
Top 8 export destinations (2016)	
Russia	21,0%
Bulgaria	9,1%
Georgia	7,9%
Iraq	7,9%
Germany	7,6%
Canada	7,5%
China	5,6%
Swizerland	5,3%

Retrieved from: https://atlas.media.mit.edu/en/profile/country/arm/#Exports

Table 2: Summary of the Data

Total.Export	EU.GDP.Growth...	Russia.GDP.Growth...	Copper.Price	Gold.Price	Eurasion.Union	REER
Min. :105261	Min. :-2.6200	Min. :-3.5300	Min. :3265	Min. :13740	Min. :0.0	Min. :104.2
1st Qu.:230908	1st Qu.: 0.1650	1st Qu.: 0.0125	1st Qu.:5271	1st Qu.:26170	1st Qu.:0.0	1st Qu.:122.0
Median :275237	Median : 0.4900	Median : 0.8450	Median :7028	Median :38405	Median :0.0	Median :129.2
Mean :290105	Mean : 0.3126	Mean : 0.6726	Mean :6515	Mean :35393	Mean :0.2	Mean :128.4
3rd Qu.:353543	3rd Qu.: 0.6675	3rd Qu.: 1.6925	3rd Qu.:7678	3rd Qu.:42374	3rd Qu.:0.0	3rd Qu.:136.0
Max. :522202	Max. : 0.9900	Max. : 3.1900	Max. :9639	Max. :55357	Max. :1.0	Max. :147.8

Figure 2: Statistics on Armenian Exports



Retrieved from: https://atlas.media.mit.edu/en/profile/country/arm/#Exports

Table 3: ARIMA Model Statistics

	Model 1 , ARIMA			Model 2, ARIMA		
	Estimator	S.E.	AIC	Estimator	S.E.	AIC
Copper Price	0.45	0.03		0.45	0.03	
Gold Price	-0.21	0.1	-	-	-	-
REER	0.1	0.24	-	-	-	-
EU GDP Growth	-0.002	0.01	-	-	-	-
Russia GDP Growth	0.02	0.01	-	-	-	-
EAEU	0.01	0.03	-	-	-	-
AIC			-113			-113

Figure 3: Model 1 ARIMA (With all the initial variables), Fitted vs Actual Values

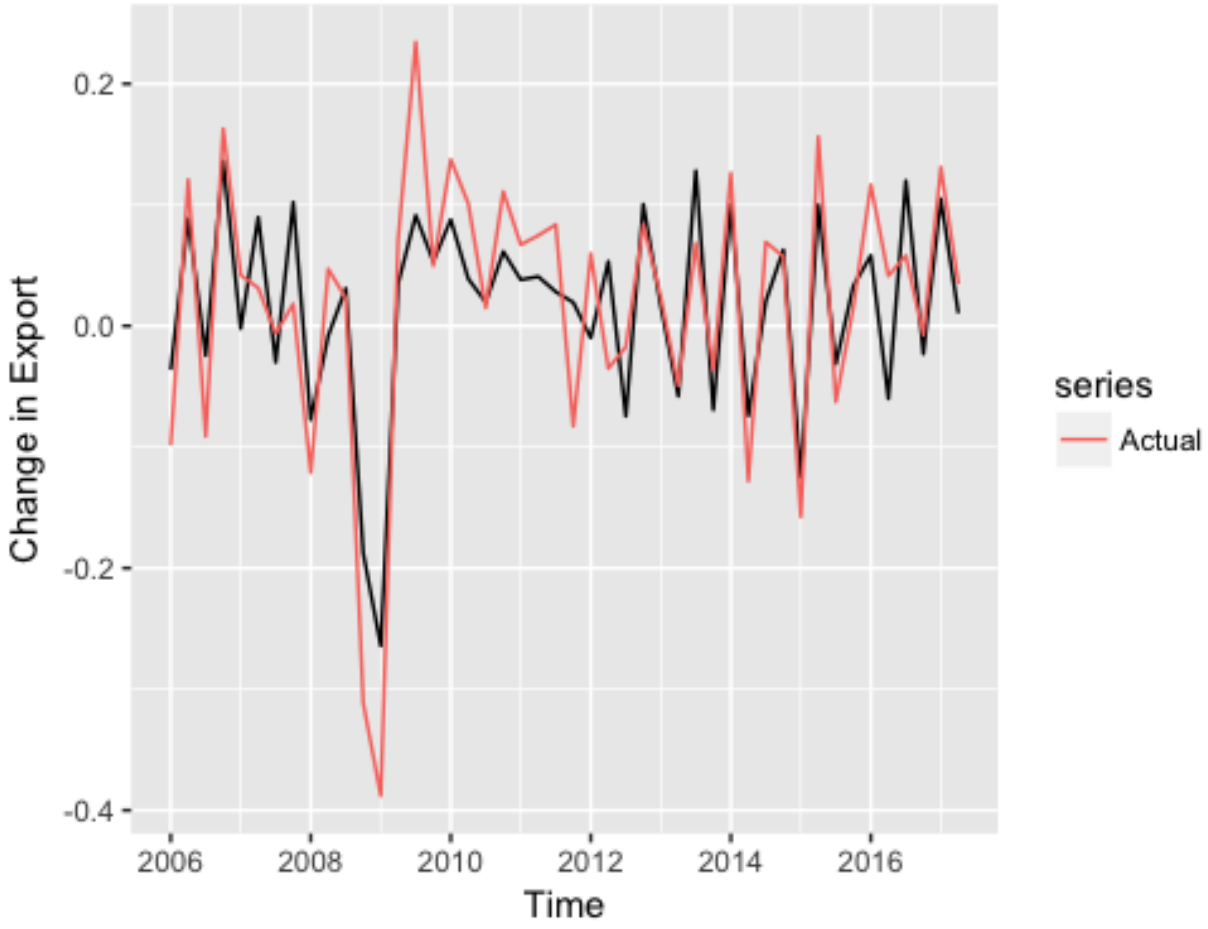
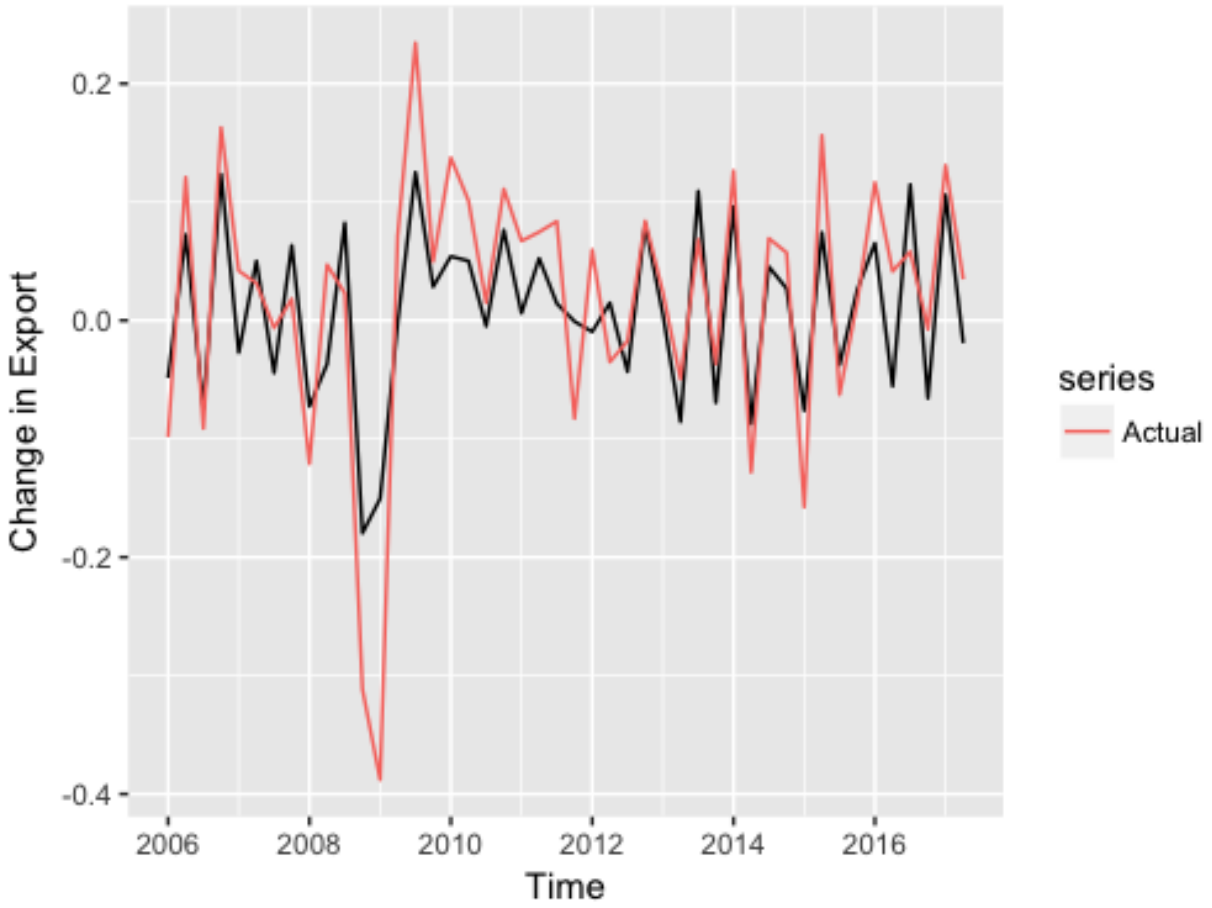


Figure **4: Model 2 ARIMA (Only Copper Price Independent Variable), Fitted vs Actual Values**



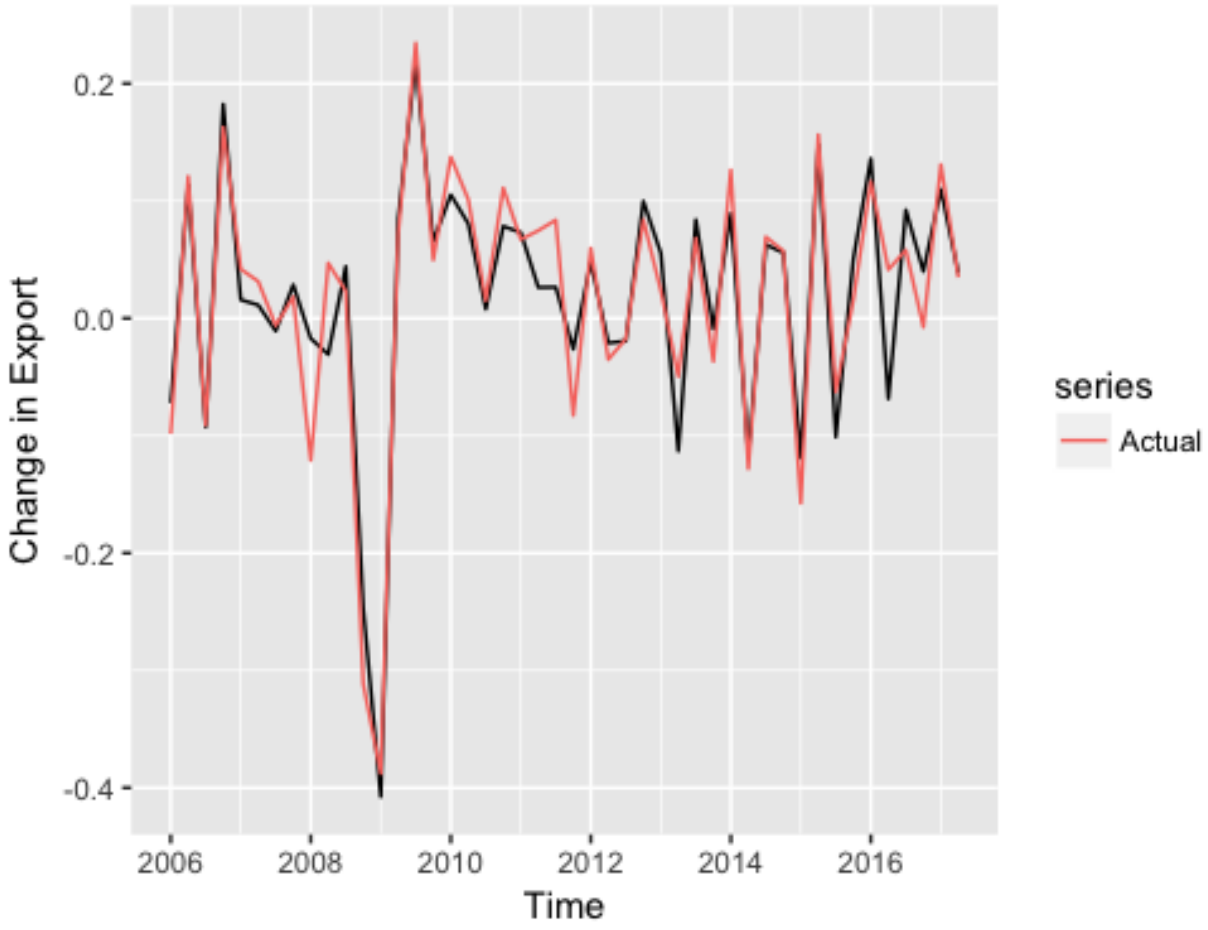
Note: Red line - actual values, Black line - fitted values

Table 4: ARDL Model Statistics

	Model 1, ARDL				Model 2, ARDL			
	Estimator	S.E.	t value	P value	Estimator	S.E.	t value	P value
Intercept	-0.004	0.01	-0.5	0.61	0.002	0.01	0.3	0.73
Total.Export, lag1	0.69***	0.01	-0.51	2.472E-08	0.83***	0.08	10.4	1.92E-13
Copper Price	0.77***	0.06	12.45	1.29E-14	0.84***	0.06	15	2E-16
EU GDP Growth	0.03.	0.01	1.8	0.079	-	-	-	-
EU GDP Growth, lag 1	0.04*	0.02	2.34	0.024	-	-	-	-
Russia GDP Growth	-0.02	0.01	-1.47	0.14	-	-	-	-
Russia GDP Growth, lag 1	0.03*	0.01	2.44	0.019	-	-	-	-
EAEU	0.02	0.02	1.1	0.27	-	-	-	-
REER	-0.17	0.23	-0.75	0.45	-	-	-	-
Gold Price	-0.15	0.1	-1.4	0.167	-	-	-	-
Gold Price, lag 1	0.16	0.1	1.53	0.13	-	-	-	-
R Squared Adjusted				**0.8572**				**0.8313**

Note: Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Figure 5: ARDL Model 1



(With all the independent variables): Fitted vs Actual Values

Figure 6: ARDL Model 2 (With only Copper Price independent variable): Fitted vs Actual Values

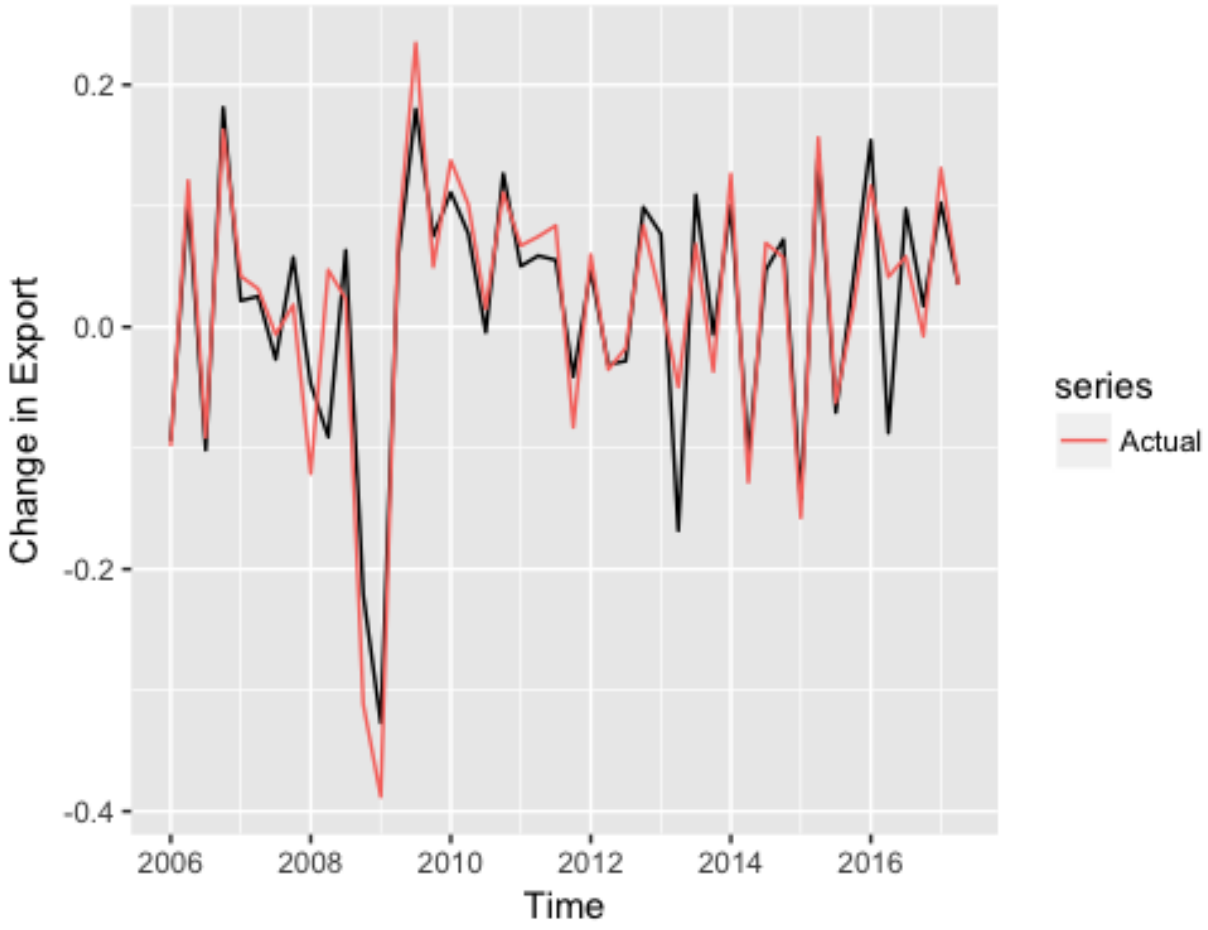
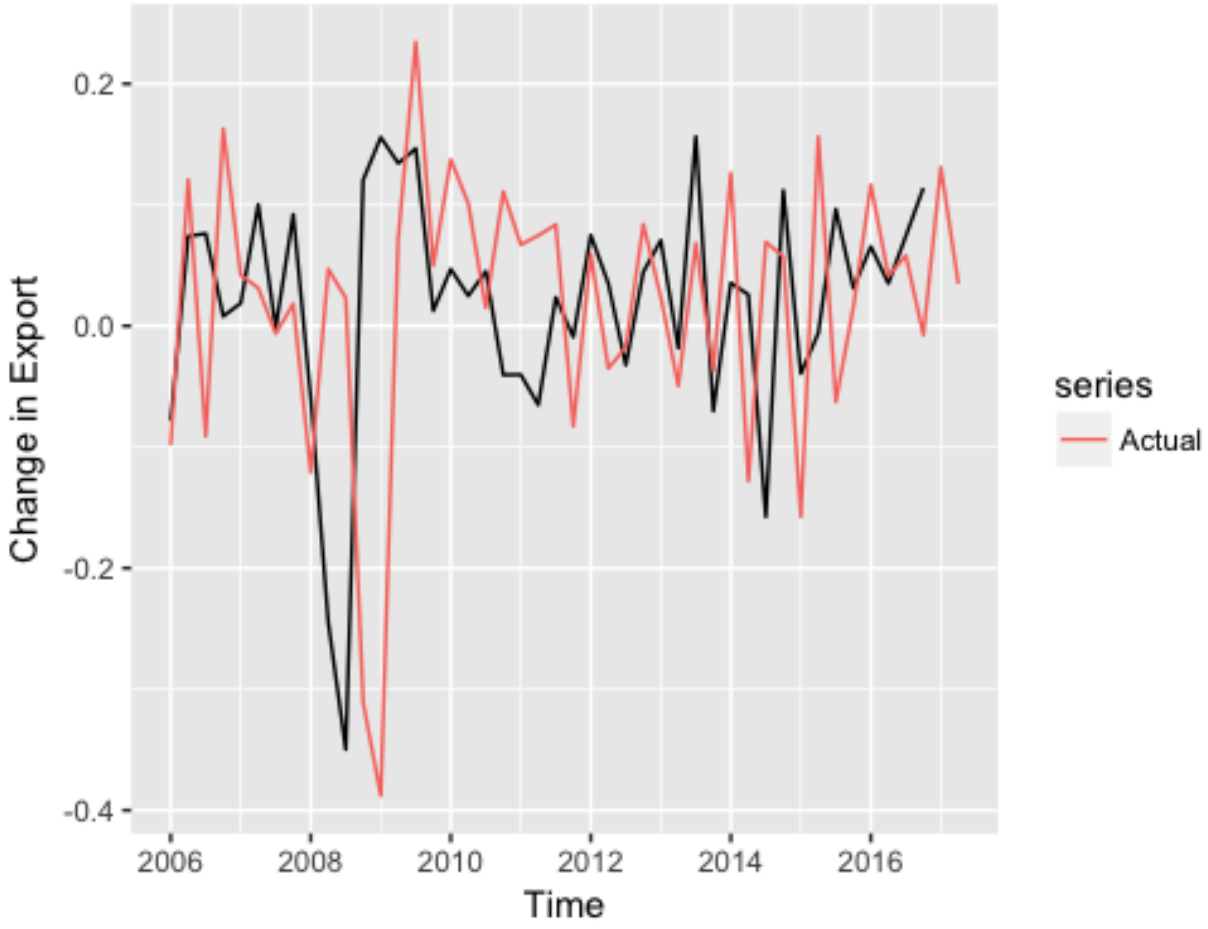


Table 5: ARDL Model (Without Commodity Prices) Statistics

	Model 3, ARDL			
	Estimator	**S.E.**	**t value**	**P value**
Intercept	-0.0007	0.01	-0.05	0.96
Total Export, lag 1	-0.21	0.13	-1.6	0.11
EU GDP Growth	0.13**	0.03	3.4	0.001
EU GDP Growth, lag 1	0.11*	0.04	2.5	0.016
EU GDP Growth, lag 2	0.067	0.03	1.8	0.007
EU GDP Growth, lag 3	0.03	0.02	1.01	0.31
Russia GDP Growth	-0.02	0.01	-1.02	0.31
Russia GDP Growth, lag 1	0.01	0.02	0.4	0.68
Russia GDP Growth, lag 2	0.06*	0.03	2.5	0.01
Russia GDP Growth, lag 3	-0.03	0.03	-1.1	0.27
REER	-0.27	0,43	-0.6	0.53
REER, lag 1	-0.82.	0.42	-1.9	0.058
REER, lag 2	0.93.	0.46	2.02	0.05
EAEU	-0.13	0.08	-1.5	0.13
EAEU, lag 1	0.18 *	0.09	2.1	0.036
R Squared Adjusted				**0.6083**

Figure 7: ARDL Model (Without Commodity Prices), Fitted vs Actual values



Note: Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Figure 8: Armenian exports of copper and copper based products, tons

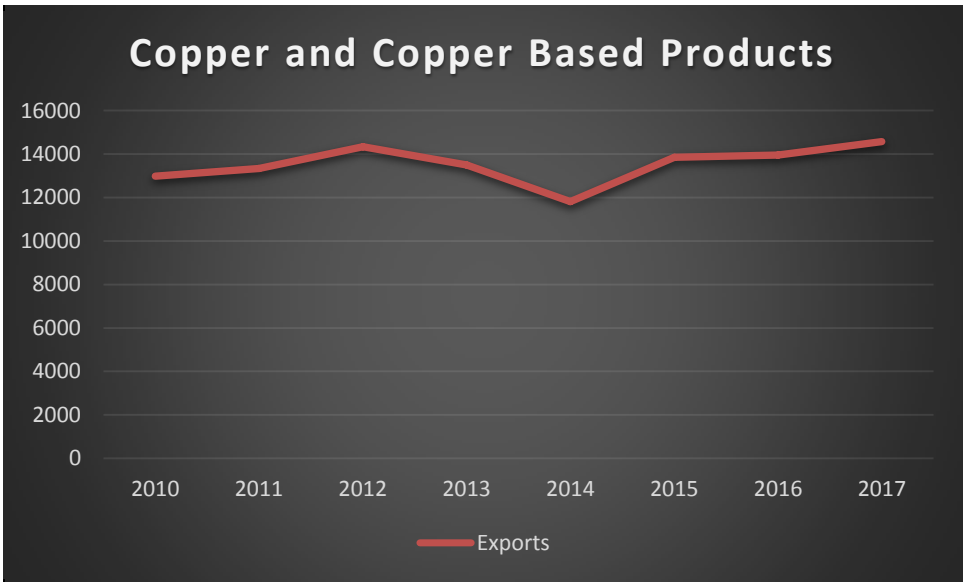


Figure 9: Historic Copper Price per metric ton