

## THE ECONOMETRIC ANALYSIS OF THE EXPORTS AND FOREIGN EXCHANGE RATES IMPACT ON WINE PRODUCTION: THE CASE OF ARMENIAN WINE INDUSTRY

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### Abstract

*This article uncovers relationships between the wine export and production in Armenia. Wine industry is a strategically important economic sector in Armenian. The importance of its development is strongly supported by the fact that alcoholic beverages from grape processing are products with high customs value exported from Armenia (in 2020 the share of alcoholic beverages in the entire export structure was about 8.4%). Within the framework of this study, a detailed analysis of the wine production was performed. By applying econometric analysis, we assessed the impact that the increase of wine export has on wine production. Also, the empirical analysis of the impact of USD and RUB exchange rates on wine industry was performed. Overall, the econometric analysis indicated that export volumes and USD exchange rate significantly affect Armenian wine industry. This study provides enough evidence for us to conclude that the export of Armenian wine must be heavily promoted by Government policies and the same time the export directions must be diversified. The results of this study can be basis for scientific substantiation of sectorial strategies developed by the Government of Armenia.*

**Key words:** winemaking, viticulture, commodity exports, quantitative analysis, statistics

### INTRODUCTION

Scannell [28] observed that, in Armenia, the winemaking is one of the iconic economic sectors. Wine is one of the most popular alcoholic drinks in Armenia. Besides large-scale, traditional wineries there are many small wine producers, which produce wine not only from grapes but also from various fruits. Also, it is emphasized the fact that winemaking is a closed related with the history of Armenia, where struggle for survival was a constant.

It can be stated that winemaking in Armenia has a very long history. It was practiced there more than 6,000 years ago. According to National Geographic [23], the oldest winery in the world dates back to 6100 years ago and

is located in the village of Areni, Republic of Armenia (RA). Viticulture and winemaking gained industrial importance in RA starting from the 20th century. Around 1920, the private farms of the Soviet Republic of Armenia were dissolved and integrated into the wine trust called “Ararat wine trust”. Then in the scope of this trust a net of wine processing farms was created within Russia and Ukraine [17]. The further development of viticulture and connected economic branches was damaged due to the anti-hard-drinks “Prohibition Laws” introduced in 1985. The fight against hard drinking caused a destruction of a large area of vineyards including old and young vineyards. During the final decade of the Soviet period, viticulture development and the planning of

winemaking regulation were carried out by the Ministry of Agriculture and the Ministry of Food Industry [28]. According to experts' estimations, due to the anti-hard-drinks policy, the wine and vodka production volumes were reduced 12-13 times, the champagne wines production volumes decreased 3-5 times, while the brandy production suffered a 4-5 times reduction in volume [16].

According to Hanf [17], the winemaking sector registered a moderate expansion at the beginning of the new millennium. However, brandy manufacturing was primarily the sector's main driver. The majority of the grapes grown in Armenia are converted into brandy. According to USAID [16], Armenian brandy accounts for a significant portion of the country's exports, which account for 80% of its "processed exports".

During early 2000-s the sector started to grow slowly. However the main driver of the sector was mainly brandy production. Around 90% of the grapes produced in Armenia are processed to brandy. The Armenian brandy is of worldwide high reputation and has great shares of the exports that make 80% of the 'processed exports' [35].

On the same trend as brandy and wine sectors' development, grape producing too recorded some growth in gross grape output, which is due to higher yield per hectare [6]. The higher yields were mainly provided thanks to improvement of cultivation processes, usage of new agriculture machinery, the increased use of technology, but not only. It is noteworthy, though, that grape production in Armenia cannot be definitely described as steadily developing. The dynamics of the indicator of vineyard areas has an oscillating nature over past 30 years. This means that grape growers stop producing grape, demolish their vineyards, and then start to producing wine again. So, there is a gap between the development of grape production and wine production [5]. As the head of the Union of Winemakers of the RA Avag Harutyunyan awareness, in the country is to be expected a shortage of grapes due the fact that the development of the winemaking sector is faster than the development of viticulture [19].

Marquardt and Hanf [18] studied the development of the Armenian wine and brandy business and the influence that foreign investors have taken in this development concluding that wine production and consumption have increased since the start of the economic and financial crisis. Also, they affirm that the level of industry competitiveness has increased, which has improved product quality, but, in the same time, as the rivalry increased, so did innovation and the use of new technology in the industry. They estimate that the wine and brandy industry receive a higher amount of foreign direct investment (FDI) than other agricultural and agro-processing industries, and Armenian diaspora investors account for the majority of these investments. Finally, they observed that wine producers employ both trust-based contracts and contracts that are revised annually for the purchase of grapes.

So basically, several researchers agree in that record that the grape sales to the wineries are regulated either by oral agreements or contracts based on trust [17, 10].

The main finding from studies [10] on the Armenian wine market is that there are some peculiarities, including low levels of competition on the domestic market, the absence of substitute products as a threat to the domestic wine industry, and low bargaining power of grape growers relative to other suppliers (technology, machinery, etc.) and high bargaining power of other suppliers relative to wine producers.

Despite the steady growth of the wine making in Armenia there are also some obstacles that hinder the capacity of wine producers in achieving higher sales volumes and quality excellence. According to surveys carried out among Armenian wine producers [36] such obstacles are: need for financial means, lack of technical solutions availability, unpredictability of legislative and tax on field, lack of skilled labor, and, finally, barriers to entry into the market.

There are problems in macro level too. For example, the lack of appropriate branding of Armenian wines is major issue that must be addressed. Armenia has a large potential of

having its own unique wine brand, with its long and rich history. That is why state regulation and marketing strategy in wine industry must have crucial role in coming years [3].

### **Literature review**

The increase of export volumes of Armenian wine provides favorable environment for further development and expansion of wine industry. The relationships between export and GDP growth, productivity, efficiency is constant topic for studies. Many scholars have addressed the impact that export can have on production development of any kind of product. In economic literature this is described as export-led growth hypothesis. Many studies support the relevance of this hypothesis for different countries. For example, the trajectories of economic growth of Bangladesh, Jordan, Chilly, Brazil, India, Republic of South Africa, sub-Saharan Africa countries are examples of export-led growth [14, 4, 1, 29, 26].

It was revealed that both outward-oriented and inward-oriented economies benefit from export-led growth [38]. The economies of East Asian countries are well known examples that represent the economic miracles that export-oriented economy can achieve [20].

It is important to note that export-led growth hypothesis has its limits, because some studies show that developed countries are less impacted from export-led growth, and this hypothesis is more descriptive for fast developing countries [39]. The researches of Thangavelu and Rajaguru [32] further solidify the notion that export has bigger impact on productivity growth in developing countries that in developed ones. For example, among the East Asian countries, only Singapore has experienced export-led productivity growth over the long-run. The rest of studied countries (Hong Kong, Indonesia, Japan, Thailand and Taiwan) shifted to import-led productivity growth over long-run.

Exporting and productivity levels have positive correlation in US manufacturing sector. But in this case, it is export that is conditioned by productivity and only then the other way around. So basically, high productive companies are more likely to enter

foreign markets and export, and then exporting level increase will result the growth of productivity [8]. Studies show that companies which are export-oriented display a higher level of productivity than those which are domestic-market oriented. Both Pack [24] and Aw [7] support the idea that between the companies that sell similar products the ones that are exporters have higher level of productivity than those sell primarily in domestic markets. Similar patterns are found in sub-Saharan Africa [37]. Exporters of sub-Saharan Africa show higher productivity levels than domestically oriented firms. African exporters improve their economics performance after entering foreign markets.

Export plays as a driving force for adopting innovations and further insertion of newest technologies. In France particularly, the studies show that export has a more positive effect on innovation in high productivity firms, whereas it may negatively affect innovation in low productivity firms [2]. Bustos [12] states the research' results suggests that increased export opportunities may enhance company performance.

So, in one hand export-conditioned revenue growth provides ground for investing in new technologies and in the other hand expanding of export leads to an increase of farms economics performance. This situation can play in other way round as in case of Germany manufacturing firms. Firms with good economic performance in Germany most certainly become exporters [9]. German exporters are larger, more capital-intensive, and more productive than non-exporters. Studies carried out amongst Romanian wine firms revealed that profitability of wine makers is positively impacted by exports and a high level of exports is associated with better financial performance [21]. Similarly in Chinese firms the growth of export brings the increase of productivity, sales and return on assets [25].

So, the situation with exports and economic performance can be described as double-aged sword, where better performance is a major precondition for export and export leads further enhancing of economic performance.

These two economic phenomena are interconnected and condition each other.

Thus, literature findings provide evidence that export is one of the main economic conditions that can positively affect on further development of Armenian wine industry. Armenia is a developing country with lots of potential in wine industry that can be translated into steady growth and expansion in foreign markets. So, we state the importance of increase of exporting of Armenian wines. Studies carried out by native researchers also justify this approach. According to the product mapping method, alcoholic beverages (wine, brandy etc.) are classified in group A, which means these products have a competitive advantage in international trade and provide a flow of foreign currency to the Republic of Armenia [22].

In this context, the purpose of the paper to assess the impact of the increase in wine export on wine production using an econometric analysis and also to evaluate the impact of USD and RUB exchange rates on wine industry.

## MATERIALS AND METHODS

### Data collection

Data for our study is provided by Statistical committee of the RA, from the publications “Main Indicators of Industrial Organizations by Economic Activities (five-digit code), for January-December (Armenian)” (2001-2021) [30]. These publications provide data about wine production volumes, number of employees in winemaking companies.

Monthly values of exports of wine and countries of exports were retrieved from the UN Comrade Database [34].

The data of monthly average exchange rates were retrieved from Exchange rates archive of Central Bank of Armenia [13].

### Methodological aspects

The impact of changes in real exports (net weight) and foreign exchange rates (USD, EUR, RUB) on the wine production was estimated using monthly data spanning from June 2016 to December 2021 and by utilizing the ordinary least squares (OLS) estimation

method. The original dataset included 67 observations.

The data seasonality was adjusted using the Moving average method, and then took the natural log of all variables of interest.

The Augmented Dickey-Fuller test was performed on the variables and the evidence on non-stationarity was found. So, to solve the problem we took the first difference.

After testing the existence of multicollinearity and it was found that there is multicollinearity problem between USD and EUR.

The correlation among USD and EUR was rather high; therefore, EUR was excluded as a variable and left only USD.

Then, it was estimated the following equation (1) by incorporating lagged variables using the OLS method.

$$DLPORDWSAt = \alpha_0 + \alpha_1 * DLEXPWSAt + \alpha_2 * DLEXRDt-3 + \alpha_3 * DLEXRRt + \varepsilon_t \dots\dots\dots(1)$$

where:

DLPORDWSAt is the value of the wine production in period t (first difference of logged value).

DLEXPWSAt is the value of the wine exports (first difference of logged value).

DLEXRDt-3 is the value of the USD exchange rate in period t-3 (first difference of logged value).

DLEXRRt is the value of the RUB exchange rate in period t (first difference of logged value).

$\alpha_0, \alpha_1, \alpha_2, \alpha_3$  are model unknown parameters.

$\varepsilon_t$  is the error term in period t.

The test to check the evidence of autocorrelation was performed, and included respective orders (AR – that involves regressing the variable on its own lagged and MA – that involves modeling the error term as a linear combination of error terms occurring contemporaneously and at various times in the pas) processes to deal with the problem.

It was not found the evidence of heteroscedasticity.

The residuals are distributed normally, and no specification error was identified.

## RESULTS AND DISCUSSIONS

### Current State of Armenian Wine Industry

The development of winemaking in the Republic of Armenia is supported by such strategic documents as “Republic of Armenia 2014-2025 Strategic Program of Prospective Development” [27] and “The Strategy of Export-Led Industrial Policy of Republic of Armenia” [33].

Winemaking in the Republic of Armenia is a type of activity subject to notification; that notification procedure is regulated by relevant legislative documents. No license is required to produce wine, just state registration is done and state annual fee of 25,000 AMD is paid, which is equivalent of 60.15 USD.

The wine in Armenia is mainly produced by large companies, which do the grape processing and further manufacturing processes. Of course, there are many households that produce wine at home, but they do not play a significant role in the market, as they have very small production volumes and are on an amateur level. But at a same time, especially in Tavush and Vayoc Dzor regions, small households produce more wine than in the rest of regions, and this strongly decreases the commodity levels of wine grape [31].

Armenian wine industry is described as oligopolistic, as only a few wine producers dominate the market and industry rivalry is low due to expanding market capacity. At the same time the entry barriers for new competitors are low. The Armenian wine market is increasing in size; this leads to an increase in attractiveness of market and creates a high threat of new entrants [11].

There is no common, unified approach to the purchase of raw materials in the field of winemaking. Some manufacturers carry out the process on the basis of pre-signed contracts. Many people have a verbal agreement when the grape growers just know that they will sell the grapes in a specific factory after the harvest. There is also no common approach to pricing raw materials. Payments are usually made within three business days of purchase, usually non-cash. Contracts often do not have a purchase price,

sometimes just a minimum price. There are many cases when the prices are reduced by the wine producers during the actual procurement, even below the minimum price specified in the contract. Grape growers have no choice but to agree to such procurement conditions. In some years, when an unprecedented grape harvest was registered, the purchasers took advantage of the situation and drastically worsened the procurement conditions: price reduction, quality deductions from the payment amount, concessions in the weight of purchased grapes to the detriment of grape growers, delays in payments for purchased grapes, unreasonable delays, etc. All the listed activities have a very negative impact on the development of viticulture. Such actions by procurement companies create a state of uncertainty, in which case farmers interested in viticulture do not decide whether to engage in such activities or not. So basically, the bargaining power of grape suppliers is low and as wine producers purchase grapes from many suppliers, they are not dependent on a specific farmer and it makes bargaining power of wine producers greater [11].

Despite the similar problems, it should be noted that the practice of concluding contracts is developing year by year. This is mutually beneficial for both suppliers and growers.

Over the past decade, the number of wine companies has increased significantly from 21 to 31 (Table 1).

Table 1. The number of winemaking organizations and its employees in 2010-2021

Indicator Year	Number of organizations	Number of employees
2010	21	453
2011	22	549
2012	21	956
2013	21	824
2014	24	888
2015	25	706
2016	25	713
2017	29	847
2018	36	1,029
2019	40	1,090
2020	40	1,002
2021	31	1,023

Source: Statistical committee of the RA, from the publications “Main Indicators of Industrial Organizations by Economic Activities (five-digit code), for January-December (Armenian)” (2001-2021) [30].

As shown in Table 1, the average list of industrial staff has become more than doubled (if in 2010 this figure was only 453 people, in 2020 it reached 1,002). Such a situation reflects an increase in the level of economic activity in the wine industry

The development trend of the wine industry is positive. Wine production volumes increased by 87.6% in 2021 compared to 2001. The same picture was observed in terms of exports. The growth of exports has higher temps: compared to 2001, wine exports in 2021 increased by 95.4%. It should be noted that until 2015, including the volume of wine production, exports also had a downward

trend, and in some years recorded a negative growth.

However, since 2016, wine production and exports have grown steadily. At the same time, it should be noted that even in 2020, in the conditions of the coronavirus pandemic the development of the industry was not disrupted. The current situation is logically supplemented by the increase in the number of wineries and the number of employees.

Armenian wines are sold both in domestic and in foreign markets. More than 50% of produced wines are purchased in domestic market and the export volumes are still behind domestic sales (Table 2).

Table 2. The structure of wine exports from Armenia

Rank	2017	2018	2019	2020	2021
1 <sup>st</sup>	Russia 79.7 %	Russia 69.9 %	Russia 68.3 %	Russia 54.6 %	Russia 46.0 %
2 <sup>nd</sup>	US, 5.1 %	US, 8.9 %	US, 8.9 %	US, 13.3 %	US, 17.2 %
3 <sup>rd</sup>	China 1.1 %	Switzerland 2.3 %	China 2.1 %	Ukraine 4.4 %	Ukraine 6.0 %
4 <sup>th</sup>	Lithuania 1.0 %	France, 2.0 %	France, 2.0 %	Belgium 3.7 %	Switzerland 4.6 %
5 <sup>th</sup>	Switzerland 1.0 %	Italy 1.6 %	Switzerland 1.6 %	Switzerland, 2.8 %	France 3.2 %

Note: this table does not include the share of exports of countries identified as non-recognized territories.

Source: Author's own calculations based on the data from [34].

Russia has the largest share in the structure of wine exports. In other words, Armenian wines are mainly sold in Russia. However, compared to 2017, the share of Russia in the structure of exports in 2021 has significantly decreased from 79.9% to 46%. This situation is not due to the reduction of total wine exports, but to the increase of specific weights in the structure of exports. Anyway, such changes in export structure indicate the intensification of export diversification. Such dependence from exports to Russia bears very dangerous economic consequences. Because of such undiversified wine export approach, economic shocks happening in the Russia can directly affect Armenian wine exports. For example, the devaluation of the RUB back in 2014 resulted in a large decrease of Armenian wine exports (up to – 40% in one year) [15]. The United States is the second largest exporter in terms of exports, with the share of exports in this area increased from 5.1% to

17.2%. Other countries that have a significant share in the structure of exports are China, Switzerland, France, Ukraine and Belgium. It is very likely that the diversification of export directions will deepen along with the increase of export volumes.

Increasing exports to different countries diversifies potential risks, reduces the dependence of wine exports on the economic situation of different countries, fluctuations in exchange rates. The latter has a positive effect on the sustainable development of wine industry.

Thus, summarizing the dynamics of the indicators characterizing the RA wine industry, we prove that the industry has a tendency of sustainable development. Production volumes and export volumes have increased. The structure of exports has improved and the number of companies involved in the industry has increased. In other words, the branch contributes to the

increase of the general economic activity of the Republic of Armenia, as it will also have a positive impact on the development of viticulture.

Taking into account the fact that the increase of export volumes can have a significant impact on the further development of winemaking in Armenia and the domestic market of the Republic of Armenia is limited; the increase of the production volumes of the sphere can be imagined only in the context of the continuous increase of the export. Also, it is very important to take into account the impact that exchange rates of USD, EUR and RUB can have on Armenian wine industry.

That is why we consider it relevant to develop an econometric assessment of the situation.

### The impact of exports on wine production based on the econometric analysis

Regarding the wine exports it is observed that an increase in the exports of wine by 10% could cause a 2% statistically significant increase in the wine production. This further solidifies the notion that exports have positive impact on production growth (Table 3).

Table 3. Estimated Model

Dependent variable: DLPORDWSA <sub>t</sub>	Estimation 1: Sample: 2016M06 2021M12
DLEXPWSA <sub>t</sub>	<b>0.205124</b> (2.367980)**
DLEXRD <sub>t-3</sub>	<b>4.239482</b> (2.649571)**
DLEXRR <sub>t</sub>	0.381426 (0.639690)
Constant	0.005986 (0.954094)
AR(1)	-0.805680 (-8.210657)***
MA(2)	-0.581020 (-4.026717)***
R-squared	0.399162
Adjusted R-squared	0.349913
Included Observations	67

Note: value of t statistics in parentheses. \*\* significant at 5%; \*\*\* significant at 1%.

Source: Authors' own calculations.

### Impact of USD and RUB exchange rates on wine industry

On the exchange rate of USD, it is shown that depreciation of the AMD against the USD lagged 3 periods by 1% could cause a 4.2%

statistically significant increase in wine production. This situation is not only conditioned by the fact that second largest share in wine exports is the US market, but also by the fact that large sum of foreign monetary transactions of Armenian wine producers are performed by USD. During last couple of months USD depreciated against AMD created difficulties for Armenian exporters. The dram appreciation and the dollar depreciation in Armenia are affecting exporters as the contracts for export are mostly signed in USD.

The incomes of Armenian exporters, including winemakers that export, suffer from the drop of USD's exchange rate. Armenian experts insist that Central bank of Armenia must pay special attention to USD depreciation and adjust its monetary policy in a way that will lower the negative effects of AMD appreciation on exporters. This situation not only includes wine industry but Armenian economy as a whole.

Analyzing of the exchange rate of RUB, we found that the changes in RUB exchange rate do not have statistically significant impact on Armenian wine production. The value of t-Statistics indicates that the impact of DLEXRR<sub>t</sub> on dependent variable is not statistically significant. These results contradict the situation of the 2014, when the devaluation of the RUB resulted in a large decrease of Armenian wine exports. This is partially due the fact that in comparison to 2014 when Russia had lion's share in export structure RUB devaluation had a very strong negative impact on Armenian wine industry.

Adjusted R-squared has a value of 0.349913, which means that independent variables included in our model describe the variation of dependent variable by nearly 35%.

The change of wine production volumes in Armenia are conditioned by export volumes, USD and RUB rate fluctuations by nearly 35%, the other 65% is described by other variables which are not included in our study, namely the domestic demand (as the major market). One of those main variables is domestic consumption volumes, because as we mentioned above, more than half of Armenian wines is purchased within domestic

market, hence the export volumes have relatively little impact in overall performance. As a result of the studies carried out within the framework of the research, it became clear that winemaking is one of the most important and rapidly developing branches of the RA economy. Over the past ten years, the volume of wine production in RA has registered an increasing trend, the number of winemaking organizations and the annual average number of employees in them has increased.

In addition, the work productivity of winemaking organizations has also increased, that is wine producing companies' economic performance has been improved. The lion's share of the produced wine is sold in the domestic markets. However, over the past ten years, a significant increase in the volume of wine exports has been recorded. The main export destinations of wine from Armenia are Russia, USA, China etc.

As mentioned before, researchers who studied Armenian wine industry, conclude that wine industry is rapidly and steadily developing, while the Armenian wine has a potential of expansion in foreign markets.

At a same time, wine industry has some obstacles on its path of development that must be addressed. The lack of wine grape varieties, weak legal regulation, and scarcity of financial means for producers are crucial points that must be studied and solved. In our estimation the further development of wine industry must be ensured by increasing exports.

Many foreign researchers support the export-led growth hypothesis, which ensures the economic growth by the further increase of exports and expansions in foreign markets. Armenian wines are the kind of domestic products that have competitive advantage in international markets and provide a flow of foreign currency to the RA.

So, all these findings provide enough ground for us to conclude that the main driving force behind wine industry development must be the export growth. Taking into account the importance of the effect of export on the volume of wine production, an econometric analysis was carried out, as a result of which it became clear that an increase in the volume of

wine export by 10 % leads to an increase in the volume of production by 2 %. But the highlight of the research was the fact that USD rate changes have greater impact on wine production. 1% appreciation of USD leads to an increase in wine production with 4.2% after three months.

This is very important conjuncture that Armenian Government and industry representatives must take into account. We suggest that wine industry further development must not only be ensured by export promoting policies but also special attention must be paid to the monetary policy regarding USD exchange rate. Specifically, the Central Bank of Armenia must lead the kind of monetary policy that will soften possible negative effects of USD depreciation, because export promotion is pointless if the exchange rates fluctuations jeopardize exporters' incomes.

## CONCLUSIONS

In general, it can be stated that winemaking in RA has a great potential for further development. The increase of the production volumes is already an objective reality, but the further growth must be provided by increasing export.

So, we recommend the state regulation policies that are export-oriented and the introduction of foreign wine production experiences in terms of solving marketing and sales issues in RA wine industry. The countries neighboring Georgia, France, USA and many other countries have their own approaches to winemaking. Therefore, we suggest that as a result of combining these different approaches and experiences in RA, a single Armenian wine-making culture must be formed, which will become the business card of Armenian wines in international markets.

Wine tourism is another topic of discussion in the context of wine industry development. In par with winemaking sector development wine tourism also has developed quite a bit in RA, but official statistics are still missing in this regard, so we could not give precise assessment in that regard. Therefore, we cannot make any concrete analyses.



Various wine festivals and similar events are held in RA, but it is desirable that they be supported at the governmental level and an attempt is made to ensure the participation of well-known foreign winemaking brands. This is very important for increasing the visibility of Armenian wine in foreign markets and further enhancing exports.

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