Assessing the market potential of brandy produced in Armenia

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Abstract

The production of wine and processing it into brandy has been one of the main branches in the agriculture and food processing industry of Armenia in the past. Today production and consumption of brandy are facing difficulties because of an overall economic crisis and the transition process of the economy of Armenia.
Spatial equilibrium analysis is used to asses the market potential. A base model of inter-country trade of brandy was constructed, which is plausible and illustrates the real world picture of the world brandy market. Different scenarios were considered, assuming changes of several variables, which reflect various policy decisions and/or changes in the economic environment. The interpretation of the different scenarios leads to conclusions about policy implications, from which several recommendations to policy makers could be derived, with the aim to improve the Armenian economy.

1. Introduction

During the last 70 years of planned economy Armenia has always been a net importer of food and agricultural products. The share of agricultural production in GNP was less than 18%. At the same time, vegetables and fruit, mainly grapes, were exported in the form of fresh and processed produce, wines and brandies.
The production of wine and processing it into brandy has traditionally been an important economic activity in Armenia. Nowadays difficulties arise in production, as well as in marketing, partly because the overall economic crisis (malfunctioning industries, lack of energy, fuel, fertilizer, machinery) increases costs of production, and partly, because the transition of the Armenian planned economy to a market system changes the structure and quantity of demand, so that new marketing channels are needed**.**
The **hypothesis**, having been tested in the following research is that **there is a comparative advantage in producing brandy in Armenia.**
The overall **objective** of the research is **to assess the extent of market opportunities for Armenian brandy.**
The specific objectives include:
- analysis of production and demand within Armenia;
- investigation of the international market for young and old brandy;
- deriving information about alternative markets for Armenian brandies.
The **methodology** of Interregional Trade Modeling (ITM), using GAMS, is applied for evaluating the potential markets for Armenian brandies in the international market.
The base run shows, that Armenia is processing total of 117 000 HL (hekto-liter) raw spirit, of which 86 000 HL old brandy and 10 000 HL young brandy are produced. Consumption within

Armenia is 10 000 HL young brandy (10% of total brandy production and all of the young brandy production) and 5 000 HL old brandy (5% of total production and 6% of old brandy production). The excess quantities (80 000 HL of old brandy) are exported to CIS.
The base run is plausible and represents reality. Scenario analysis shows the effects of alternative polices and other changes in the world market of brandy.

2. Background Information and Problem Statement
2.1. Economic Situation in Armenia

Under the old central planning system, Armenia had built up an industrial sector, supplying machine building equipment, chemical products, textiles, and other manufactured goods to other USSR member republics in exchange for raw materials, energy resources, as well as food and other agricultural products.
The collapse of the USSR has damaged all the socio-economic relationships between the member republics and the country has found itself in a deep economic crises, being characterized with lack of raw materials for chemical and heavy industries and almost absolute absence of any kind of energy sources. The situation deteriorated because of the ongoing conflict with Azerbaijan: Azerbaijan and Turkey blockade all pipeline and railroad traffic to Armenia. Almost all industrial activity was negatively affected.
In such a situation for the country entering the transition period (from planned economy into free market relations) the relative importance of agriculture in the national economy increased. Even though levels of consumption are lower than before independence, the country has remained a net food importer. In 1990-1995 the country produced only about 20% of its grain and 30-35% of its dairy and meat products requirements (UNDP Armenia). At the same time, vegetables, grapes and fruit were exported in the form of fresh and processed produce, wines and brandies.

2.2. The Importance of Wine and Brandy Production for the Armenian Economy

Armenia is a country with a long standing grape growing and wine producing tradition. Archaeological excavations discovered in the south-western part of Yerevan, a site of an irrigated vineyard established at least 3,000 years ago. The excavations also unearthed seed of 3 different grape varieties, which are being widely cultivated to-date. These varieties are reported to produce even now high quality wines and serve as raw material for Armenian brandy.
Production of grapes for wine and distillation of wine into brandy is an important economic activity in Armenia. Grape production occurs in 15 districts, mostly in the Ararat valley and in the southern part of the country.
About 200,000 tons of grapes are produced annually, of which about 15,000 t are used for fresh markets domestically and for export; 5000 t are crushed for juice. Most of the balance is fermented for wine: 90% of the grapes grown are for industrial purposes and only 10% are table grapes.
There are 33 wineries and four wine bottling facilities in Armenia. The industry, reflecting the typical Soviet pattern of associations, is comprised of wineries, brandy factories, and sparkling wine makers. Over 50% of total wine production is utilized via brandy production. The brandy made in Armenia has a good reputation, especially within the former Soviet republics.

2.3. Problem Statement

The production of brandy is facing difficulties, partly because an overall economic crisis increases of costs of production, and partly, because the transition process requires new markets. Part of the support, supply, procurement institutions, and the agro-processing industry, remain to be privatized, while the land privatization had already made substantial progress. Problems and bottlenecks in supply of grapes for further processing (lack of fertilizer, fuel, machinery), as well as in marketing of the products affect the wine processing industry. These negative developments reduced not only the production of brandy, but also its consumption within the country and abroad.

The Table 1. and Figure 1. demonstrate the level of use of productive capacities and the dynamics of brandy production in Armenia during the years of economic crisis.

Table 1. The actual use of production facilities

Years	1988	1990	1991	1992	1993	1994	1995
The existing productive facilities (1000HL)	154,5	154,5	154,5	154,5	154,5	154,5	154,5
Actual production (1000HL)	150	60,2	52,0	42,07	42,3	53,92	55,3
The utilization of production capacities (%)	97%	39	33,6	27,2	27,3	34,8	35,8

Source: Author
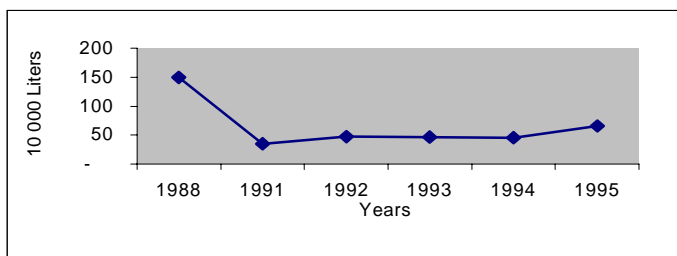
Source: Author
Figure 1. Processing of brandy spirit (1988-1995)

A viticulture-group, known as the Ararat Association, which consists of 17 wineries, three brandy distilleries, a sparkling wine facility, and some facilities in Moscow, St. Petersburg, and Saratow, grouped together, organizing an association, makes attempts to undertake some measures to improve the situation. Yet the association achieves only less than 24% utilization of all its capacities, utilization of independent plants ranges from 47% of capacity to as low as 1 to 2%.

The table2 shows the brandy consumption decline in Armenia in the last several years.

Table 2. Brandy consumption in Armenia 1991-1995

Year	Brandy with mark (10 000 l)	ordinary brandy (10 000 l)
1991	113.6	308.8
1992	85.9	286.6
1993	88.8	320.6
1994	63.4	204.5
1995	79.7	179.6

Source: Author

3. Methodology And Required Data
3.1. Method of Interregional Trade Modeling (ITM)

The ITM applied for this research work is a standard spatial equilibrium model, based on the concept of maximizing the net social welfare. Using non-linear programming techniques the ITM, determines the optimal quantities supplied, demanded and traded, together with the accompanying prices. The general form of the net welfare function (the objective function), for a commodity or a group of commodities, to be maximized is determined by the sum of the line integrals of the demand functions $D_j(Y_j)$ and the negative line integrals of the regional supply functions $S_i(X_i)$ over the appropriate quantity domains and negative sum of unit costs of transport T_{ij} multiplied by the transported quantities X_{ij} of the commodity, where the subscripts i and j represent supply and demand regions respectively.
The economic surplus, consisting of consumer's and producer's surplus, can be used as a tool for measuring the benefit of market changes
The spatial equilibrium models methodology has been constantly developed in the works of **BAWDEN (1964), TAKAYAMA and JUDGE (1964** and **1971)**, **VON OPPEN** and **SCOTT(1976)**, **VON OPPEN** and **MAISCH(1990)** and others.

3.2. Model Specifications

The supply countries were Armenia, Commonwealth Independent States (CIS), France, Germany, UK, USA, Canada and Mexico. The demand countries were Armenia, CIS, France, Germany, UK, USA, Canada , Mexico and China. Two groups of Brandies, which are being produced in Armenia, have been selected for analysis in the model. We consider the grape-brandies, which could be divided into old and young brandies, which are the two commodities of the model.
The brandy spirit, serving as raw material of both old and young brandies, is being stored in oak barrels, where it matures, getting its specific flavor, color and aroma. As soon as it is filled in glass bottles it stops maturing. We assume, that the young brandy as one of the commodities of the model, is made of brandy spirit, having been stored in oak containers less than 5 years, while the old brandy is considered in our case the one which has been matured for more than 5 years. The conversion ratio of spirit into old and young brandies has been calculated based upon the evaporation losses during the maturity period.

3.3. The Required Data

The data required for the model come from secondary as well as primary sources. The data on production, consumption, export, import and on respective prices of two kinds of brandies were generated from the statistical and other competent organizations of the respective countries (see Attachment 1).
Another source of information used for also the cross-checking purpose was our own investigation of the brandy market of Germany, taking Stuttgart as a typical representative of the west European market.
The transportation costs (air transport) were generated from different sources (see Attachment 1).

4. Model Application and Empirical Results
4.1. Model and Scenarios

The spatial equilibrium model allows the analyst to change the values of one or more variables in the model and to trace through the effects of such changes. The base run of the international trade model for brandies considers free movements of products between all the countries of the model at actual transport costs. It is designed to depict the actual flows of products among the countries and the corresponding price levels. Thus the base run is important as it forms a basis for comparison with other model versions involving various changes. Based on the graphical and algebraic interpretation of the model's logic the variable changes have been done in two main directions, and the scenarios have been classified into two main groups accordingly. In the first group of scenarios only those variables are altered, which concern Armenia and in the second group of scenarios the variables concerning other countries of the world are manipulated. (Table 3).The consequences of the proposed changes are assessed.

Table 3. Description of model scenarios

Specifications		Armenia	World
Production and demand 100%		base run	*
Production 150%	Demand 100%	Scenario 1	*
	Demand of China 150%	*	Scenario 2

*- not included in this Paper
Source: Author

It is not possible to present all of the considered scenarios within the frames of this paper. Rather an example from each of the above mentioned scenario-groups are demonstrated. The conclusions, however are derived based on the holistic analysis of various other scenarios, not included in this paper. Scenario analysis shows the effects of alternative polices and other changes in the world market of brandy. However, due to incompleteness of the real world picture being presented by the base model and the problem of lack of or unreliable statistics in some cases, it is not intended to yield exact prediction from this analysis. The aim is an

investigation of the general directions and magnitudes of economic changes that may arise from certain polices, rather than a precise prediction of such changes.

4.2. Empirical Results

The base run shows, that Armenia is processing a total of 117 000 HL (hekto-liter) raw spirit, of which 86 000 HL old brandy and 10 000 HL young brandy are produced. Consumption within Armenia will be 10 000 HL young brandy (10% of total brandy production and all of the young brandy production) and 5 000 HL old brandy (5% of total production and 6% of old brandy production). The excess quantities (80 000 HL of old brandies) will be exported to CIS. The shares of production amounts of total brandy, as well as of old brandy of every country expressed in percent (according to the base run results) are constructed graphically in Figure 2.
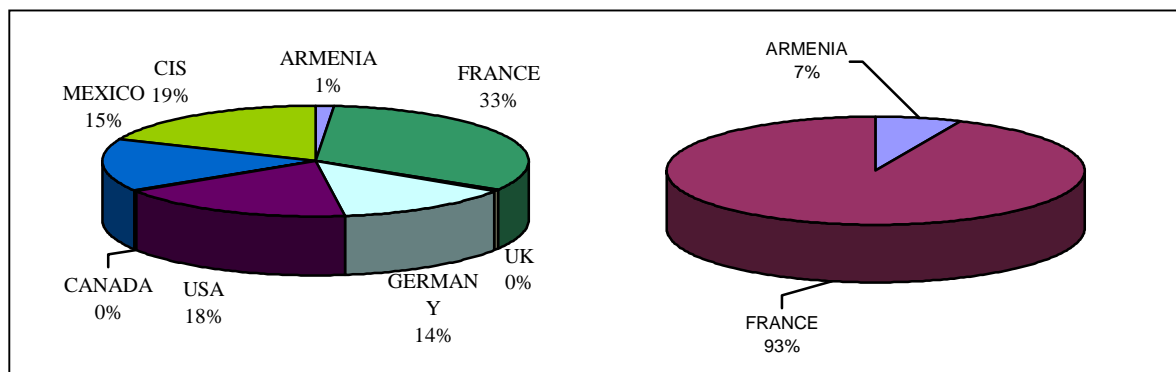

Figure 2. The shares of total contribution (the chart on the left) and old brandy contribution (the chart on the right) of each country to the world brandy market (according to the base run results)

The base run is plausible and to a certain extent, represents the reality.
All the proposed changes have a logical base, and are plausible in view of statistical data observations and market investigations, as well as in the light of experts prognoses on the brandy market's further development.
The figure below demonstrates the brandy export quantities of each country (base run output data), according to which Armenia exports 80 000 HL old brandy to CIS. All the other countries meet their demand of old brandy from France and about 40% of the countries import young brandy from France.
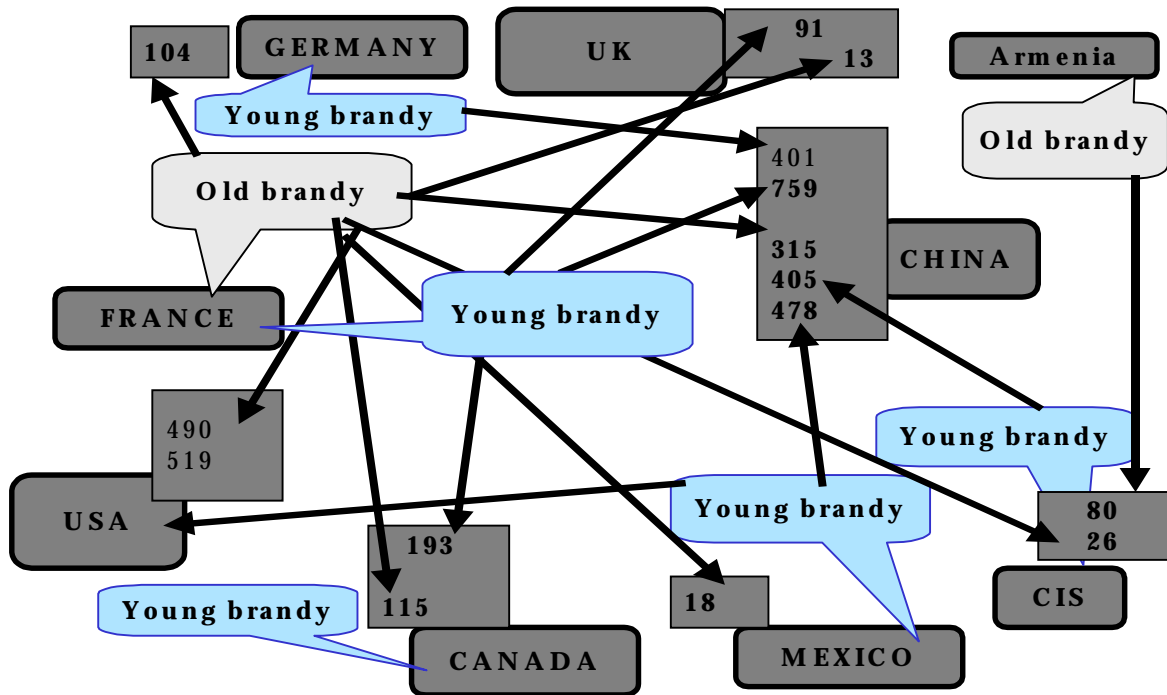
Figure 3. Product Shipments (base run results) in 1000HL

Scenario 1 presents the model version of 150% production capacity in Armenia (Table 3). Considering the fact, that the present use of production facilities in Armenia is no more than 36% (Table 1), it would seem appropriate to study the probable changes, if Armenia has a chance to increase its production by 50%. This will cause a 1% decrease in the equilibrium price for all the countries (Table 4), there will be a slight increase in consumer surplus and the export from Armenia will be increased by 133% (Table 5).

Table 4. Comparison of results of scenario 1 with base run: equilibrium price ($/100L) changes

Model name	Base run		Scenario 1		% change	
Product Country	Young brandy	Old brandy	Young brandy	Old brandy	Young brandy	Old brandy
Armenia	1,191	1,489	1,176	1,470	(1.2)	(1.2)
France	1,143	1,524	1,133	1,512	(0.8)	(0.8)
Germany	1,143	1,524	1,133	1,512	(0.8)	(0.8)
UK	1,249	1,532	1,239	1,520	(0.8)	(0.8)
USA	1,287	1,620	1,277	1,608	(0.7)	(0.7)
Canada	1,338	1,621	1,328	1,609	(0.8)	(0.7)
Mexico	1,148	1,637	1,138	1,625	(0.8)	(0.7)
CIS	1, 176	1,569	1,166	1,550	(0.8)	(1.2)
China	1,286	1,569	1,276	1,557	(0.7)	(0.8)

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Table 5. Comparison of results of scenario 1 with base run: main indicators

Indicator		Base run	Scenario 1
Consumer surplus (1 000 000 $)		4,041	4,820
Producer surplus (1 000 000 $)		4,047	4,057
Total production (1 000 HL)	World	7,550	7,590
	Armenia	96	202
Total export Armenia (1 000 HL)		80	186

Scenario 2 as a representative of the second group of scenarios shows the performance of the model with 50% increased production of all the countries and 50% growth in the demand of China (as rapidly growing market and one of the main consumers of French brandy today). The results are presented in the tables 6 and 7, which include an average of 6% improved equilibrium prices, 45% growth in consumer surplus, 53% in producer surplus and 38% in world brandy production. The impact of the changes on Armenia is 16% growth in production and 19% increase in exports.

Table 6. Equilibrium price ($/100L) changes in the scenario 2

Model name	Base run		Scenario 2		% change	
Product / Country	Young brandy	Old brandy	Young brandy	Old brandy	Young brandy	Old brandy
Armenia	1,191	1,489	1,117	1,396	(6.2)	(6.2)
France	1,143	1,524	1,058	1,322	(6.5)	(6.5)
Germany	1,143	1,524	1,069	1,431	(6.5)	(6.1)
UK	1,249	1,532	1,175	1,439	(5.9)	(6.0)
USA	1,287	1,620	1,213	1,527	(5.7)	(5.7)
Canada	1,338	1,621	1,264	1,528	(5.5)	(5.7)
Mexico	1,148	1,637	1,074	1,544	(6.4)	(5.6)
CIS	1, 176	1,569	1,102	1,476	(6.3)	(5.9)
China	1,286	1,569	1,212	1,476	(5.8)	(5.9)

Table 7. Comparison of main indicators of Scenario 2 with the Base run

Indicator		Base run	Scenario 2	% change
Consumer surplus (1 000 000 $)		4,041	5,880	45%
Producer surplus (1 000 000 $)		4,047	6,211	53%
Total production (1 000 HL)	World	7,550	10,450	38%
	Armenia	96	111	16%
Total export Armenia (1 000 HL)		80	95	19%

5. Summary and Conclusions

5.1 Summary

The problem of a decreased production of brandy and of a decline in Armenia's market share, lead to test the hypotheses that Armenia has a comparative advantage in the world in producing brandy. With the help of ITM methodology the base model of inter-country trade of brandy was built, illustrating to a certain extent the real world picture of the world brandy market. Changing of some model variables based on justifiable assumptions, several scenarios, helped to study the reaction of market indicators towards the changes.

5.2. Conclusions and recommendations

Relying on the holistic analysis of various other scenarios (not discussed in this paper), we can consider that
1. Armenia has a comparative advantage in the world market in producing brandy;
2. with increased production scales the costs of production decrease as the effect of economies of scale;
3. there are potential markets for Armenian old and young brandies.

The recommendations and policy implications are based on the above stated conclusions:
1. Make use of the comparative advantage encouraging investment in brandy production and supporting the vineyards;
2. expand production of both old and young brandies;
3. encourage market promotion for entering new markets for not only old but also young brandy (China, Canada) and expand and diversify the existing ones (CIS).

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Attachment 1

List of statistical organizations

1. Statistical office of Germany in Wiesbaden,
2. "Bundesverband der Deutschen Spirituosen-Industrie",
3. "Informationsbuero von Brandy de Jerez",
4   "Centre d´Ínfotmation du Cognac" in Hamburg,
4. Agricultural Trade organization in Hamburg,
5. Offices of Agricultural Affairs at the U.S. Embassy in London and in Bonn,
6. Overseas Trade Statistics of the UK,
7. Wine Institute of California in Netherlands,
9.   "Bureau National Interprofrssionnel Du Cognac" in France,
10. American Brandy Association in USA,
11. Business Information Service for the Newly Independent States in Washington,
12. Ministry of Agriculture of Armenia,
13. State Statistics Office of Armenia,
14. Armenian Brandy Association

List of transport organizations

1. DHL,
2. DPD (Deutsche Paketdieanst),
3. Jordan and Jordan,
4. Merchant Shippers Association,
5. Air –Sea Forwarders,
6. Sovtransservice.