

WEST VS EAST: HOW DIFFERENT IS PERFORMANCE IN EUROPEAN WINEMAKING

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Abstract

This paper aims to find out how much the performance of winemaking has changed during the last decade and what are the main differences of winemaking productivity in the East and West of Europe. Using a sample of Spanish and Ukrainian wineries between 2008 and 2016, the authors estimated productivity change and its decomposition into efficiency change and technological change using Malmquist total factor productivity indices and DEA. Generally, results show a slight increase in total factor productivity in both countries, which is more dynamic in Ukraine. Furthermore, this growth is explained by the confluence of two factors acting with contrary signs. On the one hand, a decrease in wineries' efficiency derived from their wrong management. On the other hand, a positive improvement in productivity as a consequence of a frontier shift, which is interpreted as technical change. Despite the huge gap in living standards and economic development between Western and Eastern Europe, authors found a shrinking gap in the capital productivity in winemaking of Spain and Ukraine. Together with the positive technological changes this gives hope on improving investment attractiveness of winemaking business in Eastern Europe, but also leaves Spain good chances on further efficient development of winemaking.

Keywords: performance, productivity, efficiency, winemaking, technological change, Spain, Ukraine

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Introduction

European winemaking is traditional and has a multi-millennial history (Goncharuk, 2018). However, increasing competition with the New World countries in recent decades makes European winemakers think about strategies in order to maintain their dominant position in the world wine market, which is no longer so obvious. Despite the fact that in 2016 the total market share of France, Italy and Spain was 50 percent, the USA (9%), China (5%), Australia (4%), South Africa (4%), Chile (4%), Argentina (4%) breathe in their backs and take places from 4 to 9 in the world wine production ranking (OIV, 2017).

Among the main reasons of weakening the international competitiveness of European winemakers during the last decade, several researchers (Balogh and Jámor, 2017) have pointed out to the wine common market organisation (CMO) reform provided by the European Union (EU) in 2008. Having the superb goals to make EU

wine producers more competitive and the market-management rules simpler, clearer and more effective (EU, 2008), the EU seems to have missed responding to the new global challenges (Goncharuk, 2017b), like the emergence of New World wine exporters, climate change, changing agricultural and food prices or changing consumer preferences for wines by concentrating on the restructuring of vineyards and planting rights (Balogh and Jámor, 2017).

The other important global reason for toughening competition in the world wine market is a reduction in wine consumption. Comparing the trends of world wine production and consumption (Figure 1), we can see that since 2010 they began to converge, and the five-year moving average of consumption decreased from 2009. Hence growing production against a falling consumption intensifies competition for a wine consumer.

In this sense, growing competition among wineries and the globalization of the wine market have given rise to an economic environment in which it is becoming increasingly difficult for companies to survive (Sellers-Rubio et al., 2016).

Unlike many European winemakers, wine companies of New World countries use modern production techniques and up-to-date marketing strategies. Chambolle and Giraud-Héraud (2003) highlighted those companies base their strategies on strong branding and relatively homogeneous, high-quality and competitively priced products, and reinforce these strategies with significant investments in promotion, technology and innovation (Campbell and Gilbert, 2006; Hussain et al., 2008).

In this context, productivity becomes a critical issue for wine business managers in Europe, since they play a key role in the winemaking management, providing important information to make various decisions. However, improving the productivity of wine business can be hard to achieve due to the circumstances, which restrict opportunity to measure productivity in wine sector. The heterogeneity of the wines (many kinds with a wide price levels) complicates the measurement of productivity. Besides, it is important both quantity and quality of wine, and also the ability of winery to sell it at a viable price.

Besides, despite the unity of the European continent, every country faces intrinsic local factors that contribute or hinder to the growth of winemaking productivity. These factors include differences in legislation, wine infrastructure, national traditions, orientation and development of the local market, among others. For example, the European wine CMO reform mentioned above has not affected wine-producing countries that are not members of the EU, e.g. Ukraine, Serbia, Moldova, or Georgia. But even within the EU there are winemaking countries that are focused on wine exports (e.g. Spain, France, Italy), and those that import more wine than the wine they produce (e.g. Germany, UK). Besides, variety in wine traditions can be attractive for tourism, but in the context of underdeveloped infrastructure, it will not contribute to the growth of winemaking productivity.

Thus, the goal of this paper is to compare winemaking productivity in two European wine-growing countries which have absolutely different conditions for the development of winemaking, not counting global challenges. Particularly, we have considered Spain, that is the world's largest wine exporter located in Western Europe with a fairly developed infrastructure, and Ukraine, that is the largest Eastern European country with a weak wine infrastructure and orientation to the domestic market. Comparing so different wine-producing countries will enable us to figure out the

degree of exposure of European winemaking to the global factors, i.e. the greater the difference, the greater the influence of local factors on the productivity of winemaking.

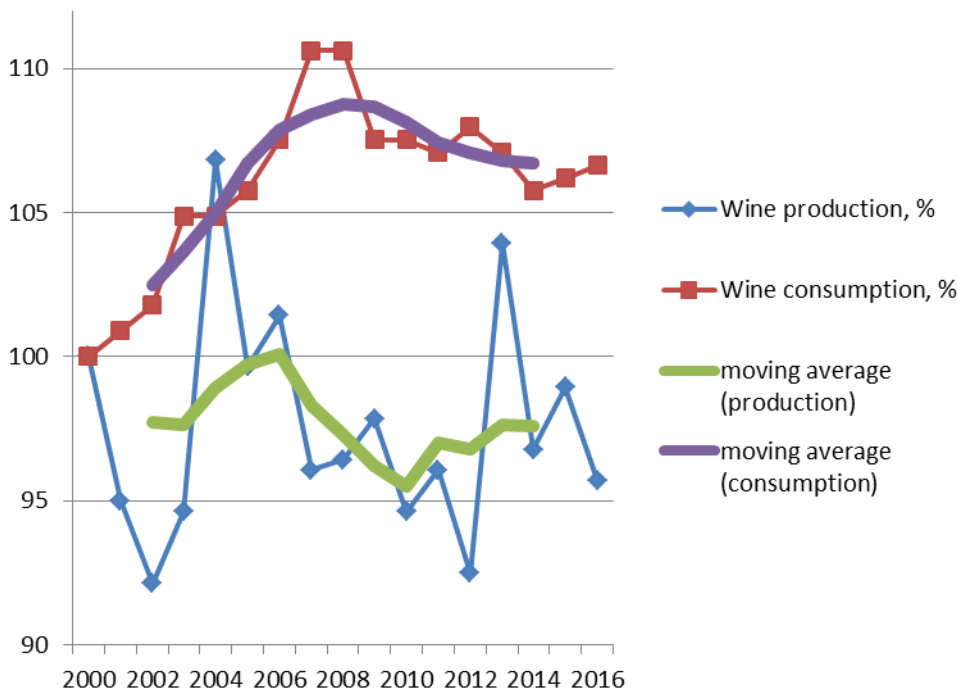


Figure 1. Trends of World Wine Production and Consumption in Volume (2000=100%)

Source: Calculated by author using the annual data from OIV (2017)

Therefore, this study is devoted to search for differences in the levels and trends of winemaking performance in Spain and Ukraine. On this way we will find out how much the productivity of winemaking has changed during the last decade and what are the main differences of productivity and efficiency in the wineries of the West and the East of Europe.

However, before studying the winemaking productivity in Spain and Ukraine, we briefly described the state of winemaking in these countries.

Spanish winemaking

The Spanish wine industry is an important sector in economic terms regarding the added value it generates and the number of people it employs (Sellers-Rubio, 2010). The wine industry in Spain is composed of approximately 4,500 wineries that belong to two primary groups of firms: big corporations, which control the highest market share, and family-owned wineries.

Spanish production increased in the first decade of the twenty-first century compared to the 1990s and is now steady around 40 million hectolitres per year, showing a slight decline from 2007 to 2013 (Figure 2).

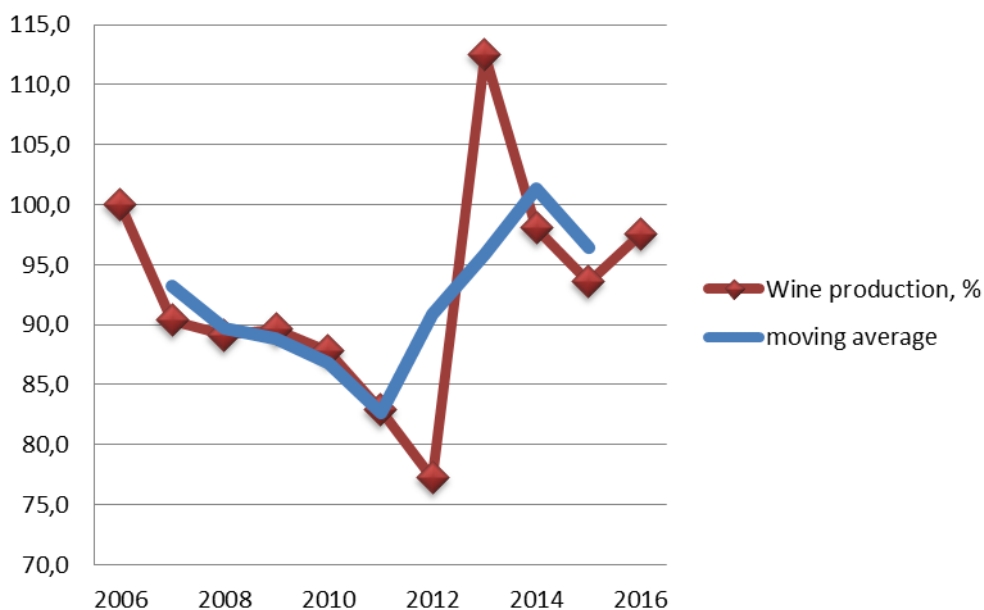


Figure 2. Wine Production in Volume in Spain in 2006-2015 (2006=100%)

Source: Calculated by authors using the annual data from Statista (2018) and Bettini (2013)

Approximately 40 per cent of the wine produced is marketed under one of the Protected Designations of Origin existing in Spain, which control and guarantee the produced wine. Furthermore, Spanish wine sector shows great export performance, reaching 22.4 million hectolitres in 2016 (which represents more than 50 per cent of the produced wine). Besides, big wineries usually base their export strategy on low-price wine, while many of the small family-owned wineries are focused on high-price quality wines that are produced on a reduced scale. In fact, the average export wine price was 1.06 euros per litre in 2016, which is very low compared to the Italian or French exports.

Otherwise, a crucial aspect of the Spanish wine market is the dramatic drop in domestic consumption in the last decades, which currently accounts for barely one-third of overall production and has continued to fall under the pressure of the economic crisis (Martínez-Carrión and Medina, 2010). The average consumption per person is estimated around 18 litres per year. This situation has led to a significant imbalance between internal supply and demand. In this context, export growth and new market entry are key requirements to ensure the viability of the sector (Bardají et al., 2014).

Ukrainian winemaking

Defining the role of Ukraine in the world wine market, Mariani et al. (2012) included this country into a group of small non-traditional importing countries together with other 55 countries. However, Ukraine not only imports wine, it also produces one. In 2015 this country made about 0.7 % of all world production of wine and now holds the 20th position in the world ranking of wine producing countries (Wine Institute, 2018).

Nowadays, Ukraine processes over 200 thousand tons of grapes into wine materials annually. Domestic wine industry here includes about 60 wineries.

The dynamics of wine production in Ukraine in the recent decade is presented on Figure 3.

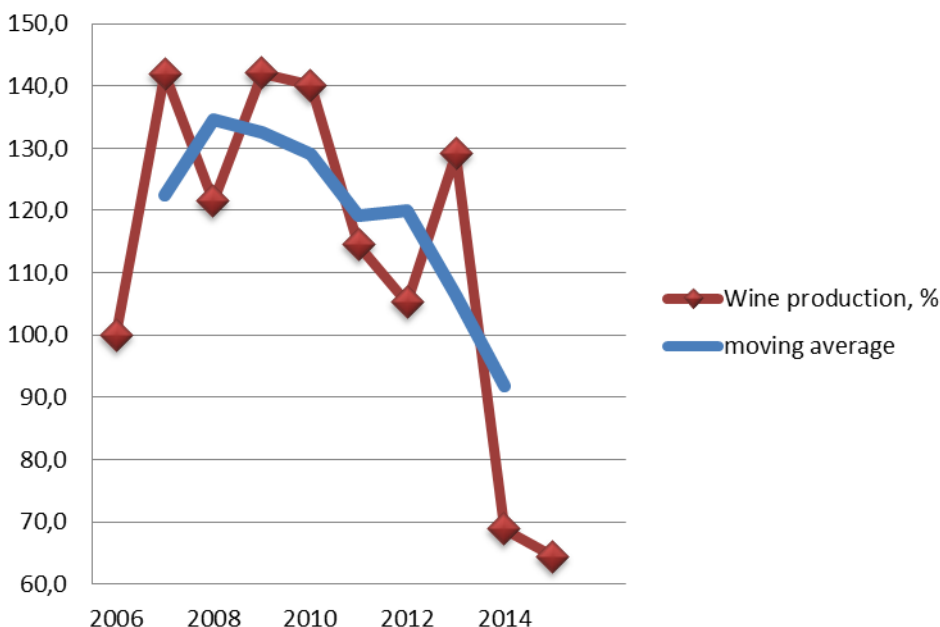


Figure 3. Wine Production in Volume in Ukraine in 2006-2015 (2006=100%)

Source: Calculated by authors using the annual data from Goncharuk (2018)

As the three-year moving average shows, the decline of winemaking in Ukraine continues since 2010. While in 2006-2013 the volume of grape processing was quite high and ranged between 300-450 thousand tons per year. In 2014, after the annexation of Crimea by Russia, this value tragically went down by almost twice – to 229 thousand tons.

Traditionally the list of largest wine-producing regions of Ukraine includes Odessa, Mykolaiv, Kherson regions and Crimea. Until 2014 the shares of these regions in total grape processing of Ukraine have been relatively stable. However, in 2014 with annexation the Crimea by Russia and losing substantial refining capacity there, the structure of grape processing and wine producing changed significantly: over 60% of grapes are now processed in Odessa region, about 20% - in Mykolaiv, about 16% - in Kherson, and only 4% in other regions of the country; in 2015 over 97% of wine production was concentrated in the Odessa region – over 60%, Mykolayiv – 23% and Kherson – 14% (Goncharuk and Figurek, 2017).

Therefore, the wine sector of Ukraine in terms of processing grapes and winemaking is now concentrated mainly in the three neighbouring Southern regions, the most part of which is located the Odessa region.

Ukraine has been a member of the WTO since 16 May 2008. And since that moment a stream of almost duty-free imported wine has poured into its market. Hence 2008 can be considered the year of the beginning of a competitive wine market in this

country.

We turned to the previous studies in order to determine how well the wineries in Spain and Ukraine are operating and how to measure the productivity level and change in winemaking.

Literature Review

Over the past decade, productivity has become an important task for winemaking managers. Often, the terms "productivity" and "efficiency" are used interchangeably, but this is not true, because they are not exactly the same. Bucklin (1978) stated that: "Total ratio productivity is the ratio of all outputs to all inputs. Partial input productivity is the ratio of all outputs to a single input". Based on this, productivity indices are calculated by inserting numbers into predetermined formulas or coefficients and do not consider the performance of other businesses. In contrast, the relative efficiency focuses on the performance of winery relative to the most efficient wineries rather than the average wineries as with the traditional absolute measures. The best wineries compose the efficient frontier, while the inefficient wineries remain behind that frontier. So, the farther from the frontier, the winery is lower efficient.

There are several studies on the winemaking productivity in the literature (see Sellers-Rubio et al., 2016 for a comprehensive revision). Furthermore, apart from these papers, among the studies based on the pre-crisis period (till 2008), we can single out papers by Liu and Lv (2010) and Marta-Costa et al. (2017).

Marta-Costa et al. (2017) studied productive efficiency of Portuguese regions over the period 1989-2007 and found that deterministic (data envelopment analysis - DEA) and stochastic (stochastic frontier analysis - SFA) approaches give different results. SFA results shown improving technical efficiency (TE) for all wine regions over the all observed period, but DEA results noted a decrease when calculated the Malmquist index or TFP change due to the efficiency change. Besides it was found that the changes in Malmquist index are derived from technical change that reveals that some regions had technological progress and others had loses in efficiency due to the non-modernization of its production technologies.

Liu and Lv (2010) using the nonparametric DEA-Malmquist productivity index found that during 2004-2007 the technical efficiency of Chinese winemaking firms was on the low level, but also shown a rising trend in the total factor productivity (TFP) due to the technical progress of winemaking industry. And this coincides with the pre-crisis growing trend in the world wine production (see Figure 1).

Thus, the applied tool (Malmquist productivity index) and indicator (TFP) helped to identify an impact of technical progress factor on winemaking productivity growth, which may be useful for our study too.

Reviewing the last decade, we identified studies by Sellers-Rubio et al. (2016) and Goncharuk (2017a).

Sellers-Rubio et al. (2016) using the Malmquist productivity index found very low efficiency levels for Spanish and Italian wineries and a decrease in their average annual productivity between 2005 and 2013. But 2005-2013 period is long enough and inside it there were ups and downs, development and crisis in wine production and consumption (see Figure 1).

Goncharuk (2017a) using DEA compared an efficiency of German and Ukrainian wineries for 2014 and found increasing returns to scale and several factors

of the higher efficiency of German winemaking. However, this paper used a cross-section sample of wineries and the efficiency factors for Ukrainian winemaking have not been studied there.

Furthermore, a few other studies analyse efficiency in Ukrainian wineries (Lazareva, 2015; Goncharuk and Figurek, 2017; Samofatova and Gerus, 2012).

Lazareva (2015) identified the efficiency level of Ukrainian wineries using three-criterion approach (relative, dynamic and structural) and detected ineffectiveness of small business in the Ukrainian wine industry.

Goncharuk and Figurek (2017) applied four models of DEA to analyse the efficiency of wineries in Ukraine and Bosnia&Herzegovina and found the high potential growth for efficiency of Ukrainian wineries.

Samofatova and Gerus (2012) considering 2008-2010 period identified that that increasing wine production (see Figure 3) under reducing grape plantations area and vine harvests means an increase of the import of wine materials, or even a wine falsification.

Hence it can be concluded that small business in Ukrainian winemaking is inefficient, but nevertheless it has a high potential for increasing efficiency. However, given the poor quality control and the lack of own wine materials, wine producers there can resort to importing wine materials or producing a poor-quality product. Given the suspicion of the existence of wine falsification at Ukrainian wine market during the crisis, which enabled to restore wine production volumes in one year, it is inappropriate to consider this period 2009-2010 in our study.

Thus, the literature review revealed the papers covering various aspects of winemaking productivity in various countries. However, there is a lack of studies regarding the dynamics and factors determining the winemaking productivity in Ukraine after the membership of this country in WTO at 2008. Hence, to reach the purpose of this study we should to evaluate a productivity of Spanish and Ukrainian wineries during several years from 2008 excepting 2009-2010 period, and decompose TFP indexes to find the main differences and factors of winemaking productivity.

Methodology

The empirical analysis of this paper is based on a sample of Spanish and Ukrainian wineries, using panel data between 2007 and 2016.

As noted above, the most useful tool for evaluating productivity over many years is the Malmquist productivity index (). This index can be decomposed into efficiency changes and technological change, and its decomposition helps to find determinants of winemaking productivity.

The Malmquist total factor productivity index (MTFP index) was introduced by Caves et al. (1982). MTFP index uses DEA and is described in Coelli et al. (2005). Using one, the change of TFP between period t and period $t+1$ may be calculated in the following way:

$$M_i^{t+1}(x^t, y^t, x^{t+1}, y^{t+1}) = \left[\frac{D_i^t(x^{t+1}, y^{t+1})}{D_i^t(x^t, y^t)} \cdot \frac{D_i^{t+1}(x^{t+1}, y^{t+1})}{D_i^{t+1}(x^t, y^t)} \right]^{1/2}, \quad (1)$$

where $D_i^t(x^{t+1}, y^{t+1})$ is the distance function that represents the distance from

the period $t+1$ observation to the period t technology (Goncharuk, 2007). M_i in fact is the geometric mean of two TFP indices and if that value greater than 1 so it means a positive TFP growth from period t to period $t+1$ and to the contrary when that value less than 1 – TFP reduced.

The choice of MTFP index, in comparison with the other productivity changes indices like Fischer or Tornqvist, is predetermined by the following reasons: it doesn't require input or output prices in its construction that makes it particularly useful in the situations when prices are distorted or non-existent; it doesn't require a behavioural assumption such as cost minimization or profit maximization, which makes it useful in situations in which manufacturers objectives are different, unknown or unachieved; it is easy to compute (Goncharuk, 2007).

The MTFP index is estimated using distance functions and through the available panel data it allows the study of the changes in productivity, efficiency and technical change of Spanish and Ukrainian wineries. The decomposition of productivity changes on efficiency change and technical change was introduced by Färe et al. (1994) and has the following formulas:

$$\text{efficiency change} = \frac{D_i^{t+1}(x^{t+1}, y^{t+1})}{D_i^t(x^t, y^t)}, \quad (2)$$

$$\text{technical change} = \left[\left(\frac{D_i^t(x^{t+1}, y^{t+1})}{D_i^{t+1}(x^{t+1}, y^{t+1})} \right) \times \left(\frac{D_i^t(x^t, y^t)}{D_i^{t+1}(x^t, y^t)} \right) \right]^{\frac{1}{2}}. \quad (3)$$

In this paper, the DEA Frontier add-in for MS Excel by Zhu (2016) is employed, which enables us to estimate the Malmquist TFP indexes and its decomposition into efficiency change and technical change (frontier shift). The efficiency change represents the deviations of best practice frontier, while the technical change reflects the frontier shift over time.

At the first stage of empirical study we will compare Spanish and Ukrainian winemaking by calculating capital and labour factor productivity levels for both countries. This should reflect the differences in winemaking productivity between Western and Eastern Europe.

At the second stage we will explore the productivity changes by calculating MTFP fixed base indexes from 2008 to 2016 with the exception of 2009-2010 (due to the reasons mentioned above). Here we also will decompose MTFP indexes on an efficiency change and frontier shift (technical change). So this stage will reveal tendencies of wineries' productivity and the differences in its changes for both observed countries.

At the final stage we will find out the main local factors of productivity changes exploring the wine business environment and returns to scale separately for Spanish and Ukrainian samples.

The Data

The panel sample is balanced and includes annual data for 98 Spanish and 14 Ukrainian wineries for 2008, 2011, 2012, 2013, 2014, 2015, and 2016. The wineries included in the sample are mainly located in the traditional wine-growing regions.

In this study we used the material costs, the number of employees and fixed assets as inputs. These three variables adequately reflect the quantity of main factors of

production used – raw materials, labour and fixed capital. As an output indicator the net sales were used, because this variable reflects total wineries' output – value of wine sold. Selected variables with a significant volume of sample provide valid results of the analysis. Besides, this set of inputs and output variables is well justified for efficiency analysis in previous studies, e.g. for breweries (Goncharuk, 2009) and wineries (Goncharuk, 2017a).

Using the combination of value and quantity inputs and outputs for calculating the Malmquist productivity index (1) is a common practice in economic research. For instance, Chen and Chen (2011) applied DEA and MTFP index to explore the operation performances using such input variables as total assets, operation costs, and selling and administrative expenditures, while the output variable was net sales. Tsaur et al. (2017) for the same goal used fixed assets, operating expenses, R&D expenses and number of employees as the input variables, while the output variables were cash flow and net sales.

The data is obtained from the official annual reports of wine companies reported by the Spanish SABI database (which is the national version of the well-known Bureau Van Dijk database) and Ukrainian Agency for Stock Market Infrastructure Development (UASPID, 2018).

The descriptive statistics of the employed variables are shown in Table 1.

Table 1. Descriptive Statistics for Wineries' Sample from 2008 to 2016

<i>Variables</i>	<i>Observ.</i>	<i>Mean</i>	<i>Median</i>	<i>Stand. dev.</i>
<i>Spanish wineries – 98</i>				
Number of Employees	686	67	41	92
Fixed Assets, 000 EUR	686	12544	8084	14382
Material cost, 000 EUR	686	32126	11981	74580
Net sales, 000 EUR	686	34302	11870	77323
<i>Ukrainian wineries – 14</i>				
Number of Employees	98	183	109	174
Fixed Assets, 000 EUR	98	3747	2213	3918
Material cost, 000 EUR	98	5720	4360	5818
Net sales, 000 EUR	98	8657	7319	7972

The sample size for both observed countries is representative and corresponds to the size of the winemaking in each of them. So, the total annual net sales of all wineries included in a sample amounted to 3.362 billion EUR for Spanish part (it is above 56% of total annual wine production in this country in 2016) and 121.2 million EUR for Ukrainian one (it is about 80% of total annual wine production in this country in 2016). Total number of employees in both parts of sample was 9100 people.

All value indicators of the Ukrainian wineries were converted from hryvnia to euro at the average annual official rates of the National bank of Ukraine.

So this sample includes the wineries of all existing size groups (small, medium and large) from main wine regions of Spain and Ukraine.

The Results

West-East Productivity Differences

Despite the fact that Spain and Ukraine are commensurate countries by territory and population, their economic development and consequently the productivity levels

are significantly different. According to the World Bank (2018) income grouping Spain is a high income country with GDP per capita in 2016 equalled 26617 USD (World Bank, 2017). Ukraine is included in the group of lower middle income countries with GDP per capita in 2016 just 2186 USD (World Bank, 2017). Hence, this twelve-fold gap in the overall productivity of the economies predetermines the difference in productivity and in the winemaking sector.

Firstly, we calculated capital and labour factor productivity levels for both countries. The results are reflected in Table 2.

Table 2. Capital and Labour Productivity for Wineries in 2008 and 2016

Country	Capital productivity, 000 EUR per 000 EUR			Labour productivity, 000 EUR per employee		
	2008	2016	2016 to 2008	2008	2016	2016 to 2008
Spain	2.082	2.734	+31.3%	372.16	514.00	+38.1%
Ukraine	1.592	2.310	+45.1%	41.47	47.34	+14.2%

As can be seen, the gap in the level of labour productivity in 2008 was about 9 times. However, it increased to almost 11 times by 2016. This result reflects that Spanish winemakers increased the labour productivity significantly faster than Ukrainian ones. And in Ukraine so far each employee brings to winery less than 50 thousand euros of annual income and this is a very low figure. It is no accident that Ukraine is at the end of the list of wine-producing countries by this indicator (Goncharuk and Lazareva, 2017). Low wages preserve the attractiveness of manual labour in the winemaking of this country in comparison with machines. Besides, recent years Ukraine is experiencing a series of shocks that can hinder the effective development of winemaking.

At the same time, the capital productivity between Spanish and Ukrainian wineries differs not so clearly. If in 2008 this gap was 31%, then by 2016 it was reduced to 18% due to the accelerated growth of productivity in Ukrainian wineries. So now the difference in the capital productivity between the West and the East no longer seems so impressive. This means that the return on investment in the winemaking business of Eastern Europe is becoming higher and investments there are more attractive.

Total Factor Productivity Changes

We calculated the fixed-base MTFP indices for the 2008-2016 to understand how far the productivity has gone from the 2008 level. The results for productivity change in Spain and Ukraine are shown in Figure 4.

Productivity of Spanish wineries changed relatively slow: slightly deteriorating by 2011 and then gradually increasing till 2016. The productivity of the Ukrainian winemakers has changed more dynamically: accelerating to 2013, then losing all the accumulated five-year growth in just one year, and then huge growth in 2015 and correction in 2016. Total productivity change for 2008-2016 for Spanish winemaking was 6.6 per cent, while in Ukraine it equalled 19.1 per cent.

To find the reasons of so big difference in productivity changes we decomposed MTFP indices to define the values of efficiency change and frontier shift (technical change).

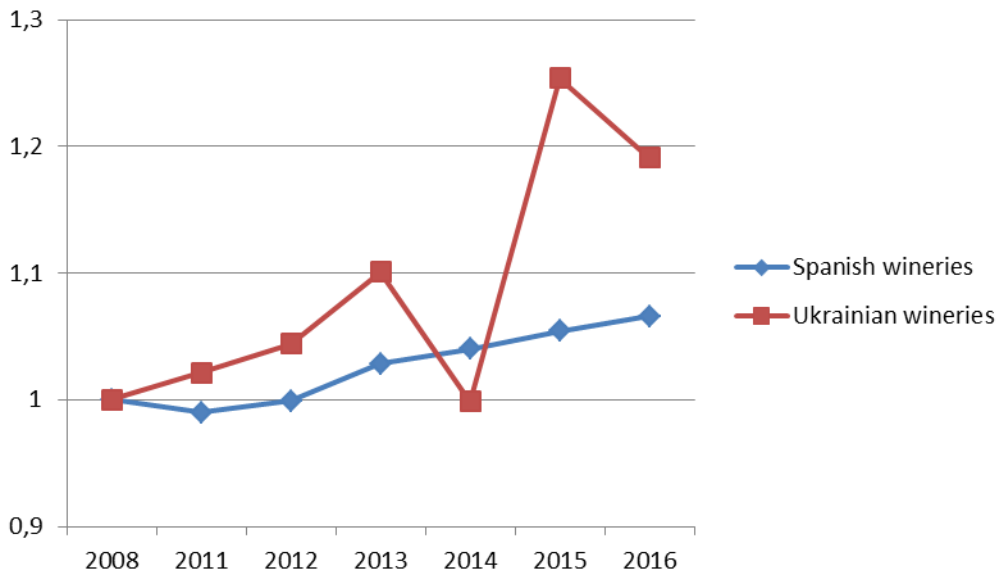


Figure 4. Total Factor Productivity Change: MTFP Index (2008=1)

The results for efficiency change in Spain and Ukraine are shown in Figure 5.

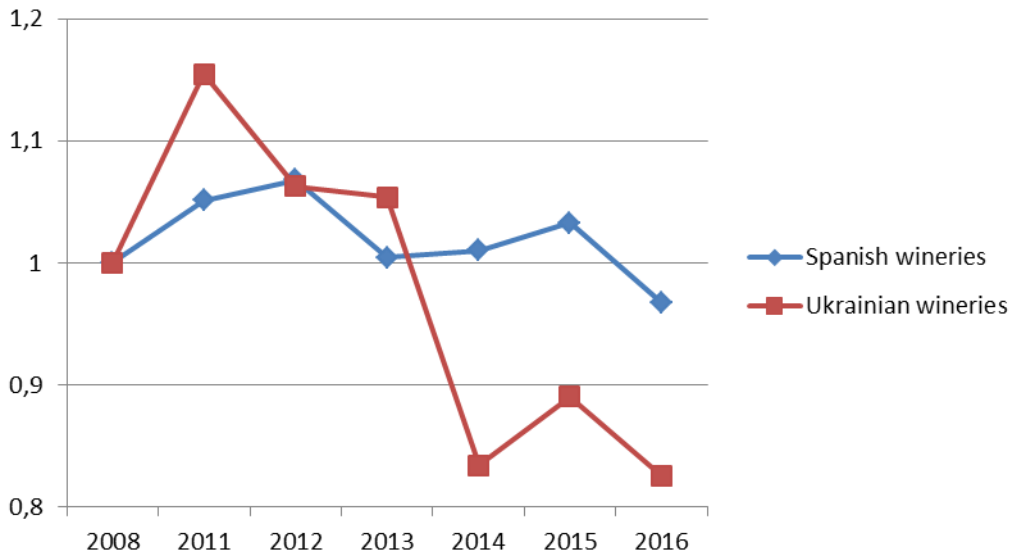


Figure 5. Efficiency Change (2008=1)

The efficiency change for both observed countries during last decade was not so good. Prior to 2011 their efficiency was growing, but then Ukrainian winemaking experienced a three-year collapse in efficiency. And efficiency has fallen in Spain and Ukraine, even in a very fruitful 2013 (see Figures 1, 2, 3). But the greatest failure in

efficiency was observed in Ukraine in 2014. This obviously was connected with the annexation of Crimea by Russia in 2014 and several exogenous factors described below.

The last two years the efficiency changes for both countries were almost similar. It could be regarding with the global factors those influenced on efficiencies of Spanish and Ukrainian winemaking. It was at that time that Ukraine became an associate member of the EU and received a free trade zone with European countries. So we can assume that if operating in similar conditions the winemaking efficiency depends mainly on global factors.

The results for frontier shift (technical change) in Spain and Ukraine are shown in Figure 6.

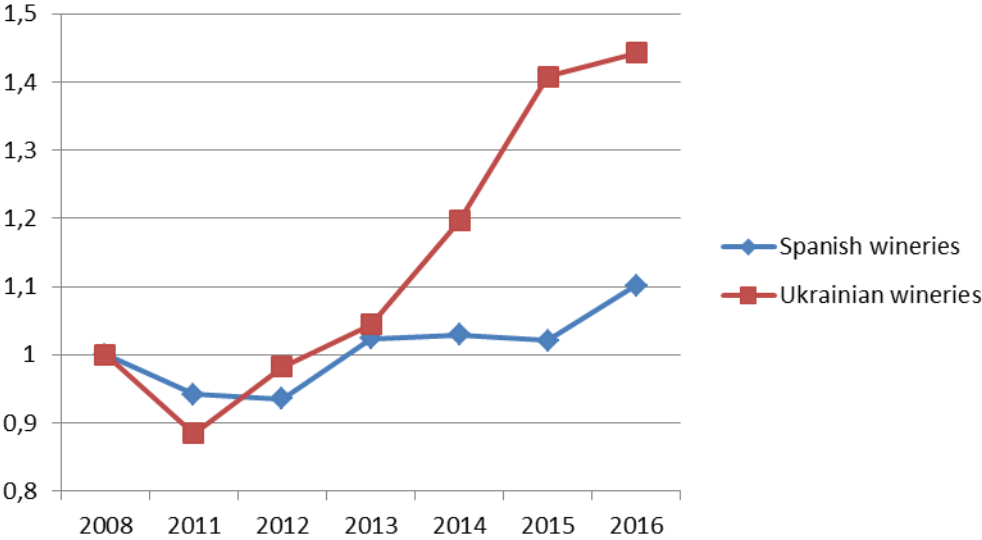


Figure 6. Frontier Shift (2008=1)

Distinguishing the positive trend of technical change (from 2012 in Ukraine and from 2013 in Spain), we figured out that the growth of productivity in both countries was provided by improving technologies. This factor moved up a capital productivity in both countries and made winemaking more attractive for investments. However, a decrease in the efficiency of winemaking may indicate overheating of this market, which is confirmed by a reduction of wine consumption in the world last decade (see Figure 1).

Thus, it can be noted that the improvement of winemaking technologies ensures productivity growth both in the West and the East of Europe. However, the decline in interest in wine in the world creates more and more difficulties for winemakers with the sale of wine on the market. In spite of the fact that Spain still has higher productivity, it also loses the efficiency of winemaking, especially in the good harvest years, probably due to the impact of global factors.

Exploring the Local Factors of Productivity Change The East

The most critical change in productivity and efficiency of Ukrainian winemaking was detected in 2014. This drop can be caused by both exogenous and endogenous

factors. The key factors among exogenous ones are the following:

(a) military and political factors

After the annexation of Crimea by Russia in the first half of 2014, the wine production in Ukraine tragically went down by almost twice due to the lost areas of vineyards and wineries in Crimea. Besides a several millions people that stayed in the occupied territory of Crimea and Donbass left the Ukrainian wine market.

(b) changes in consumer behaviour

In the atmosphere of the war in Donbass and a general fear in Ukraine, consumers began to drink less alcohol, including wine. For example, in 2014 the total volume of consumption of vodka declined by 23%, brandy – by 42%, beer – by 12%, sparkling wine – by 32%. At the same time consumption of milk increased by 15%.

(c) government regulation

Ukrainian government during 2014 twice (in January and July) increased excise duties on wine and other alcohol. And so the wine prices went up, which further pushed out consumers from buying a wine.

These and other factors led to the fall in wine production in 2014 by 39% below the level of 2008 (see Figure 3). Winemakers did not manage to adequately react to such a collapse of the market by an adequate reduction in inputs. As a result, the efficiency of winemaking has fallen (see Figure 5).

Nevertheless, the fact that 50 per cent of all wineries from Ukrainian sample in 2016 had increasing returns to scale with the rapidly positive shifting the efficiency frontier of Ukrainian winemaking leaves it chances on further efficient development and productivity growth.

The West

Obtained results for the Spanish wineries confirm the idea that the positive contribution of technological progress to productivity growth is offset by a deterioration of the wineries' efficiency (Sellers et al., 2016). Overall, the growth of the gap between efficient and inefficient wineries and the technological advances suggests that much of the decrease in efficiency can be attributed to the failure of wineries to adapt to the technological improvements made by some of their competitors. In this sense, in the Spanish market there are a few groups of wineries that are innovators (Sellers et al., 2016) and shift the frontier, while most of the other wineries fail to adapt to the technological improvements and fall behind.

Nowadays, the biggest wineries in Spain intensively use of new technologies (i.e. GIS applications) to control the development of the vineyard, efficient water-use or optimise the vineyard practices to reduce pesticides.

Furthermore, it should be remembered that the subsidized distillations by the Common Market Organization (CMO) budget for wine that disappeared in 2008 affected wine production and commercialization in all EU countries (Bardají et al., 2014). In this sense, under the current regulation, the connection to competitiveness in world markets has taken prevalence. Particularly, many Protected Designations of Origin have implemented international promotion plans in order to promote exports which, by the fact, have continuously increased for the Spanish wineries. Eventually, many wineries have opened their business channels to world markets, allowing them an outlet for large volumes of wine that were previously dedicated to alcohol distillation for oral use.

The fact that 90 per cent of all wineries from Spanish sample in 2016 had increasing returns to scale with the steady positive shifting the efficiency frontier of Spanish winemaking, despite the high volume of wine production by this country, leaves it good chances on further efficient development of winemaking and productivity growth.

Conclusions and Discussion

The goal of this paper has been to analyse differences in winemaking productivity on a sample of Spanish and Ukrainian wineries, which act as representative of Western and Eastern Europe. The results obtained allow us to draw the following conclusions.

Over the last decade, the wine market has become even more globalized. The growing harvests of grapes and the growth of wine production by themselves do not stimulate the growth of wine consumption in the world, which on the contrary is declining.

Despite the positive technological changes that ensure the growth of winemaking productivity, the problem with sales does not allow either Western or Eastern winemakers to raise an efficiency of wine business.

When a country enters the free world or European wine market, the dynamics of the efficiency of its winemaking becomes similar to the dynamics of other countries, which is provided by the influence of global factors. However, in addition to global factors, the local (regional) factors affect the efficiency and productivity of winemaking. And on example of Ukraine we demonstrated how productivity and efficiency trends can unfold in the opposite direction under the influence of such non-global factors.

Despite the huge gap in living standards and economic development between Western and Eastern Europe, we found a shrinking gap in the capital productivity in winemaking of Spain and Ukraine. This means that the return on investment in the winemaking business of Eastern Europe is becoming higher and investments there are going to be more attractive.

However the low wages preserve high attractiveness of manual labour in the winemaking of Ukraine in comparison with machine ones. This led to significantly faster labour productivity growth in Spanish wineries in comparison with Ukrainian ones. Currently Ukraine has one of the lowest labour productivity in the world winemaking (below 50 thousand euros per employee). Besides, recent years Ukraine is experiencing a series of shocks that can hinder the effective development of winemaking.

Nevertheless, the positive technological changes, which have shifted the efficiency frontier by 50 percent over the past 5 years, remain hopeful for the future growth of winemaking in this country.

The steady positive shifting the efficiency frontier of Spanish winemaking and increasing returns to scale for 90 per cent of Spanish wineries, despite the high volume of wine production by this country, leaves it good chances on further efficient development of winemaking and productivity growth.

Considering the trade-off between productivity and efficiency, we can conclude that sometimes they behave identically, but often completely opposite. And this trade-off depends on technical changes and innovations in the wine industry.

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