

How did the COVID 19 transformed the competetiveness of wine businesses in Tokaj: is it any better?

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Abstract

Despite the fact that Tokaj is part of one of the poorest NUTS 2 regions of Europe it contains a wine region where wine businesses produce Tokaj wine. Wine business in this case did not make the geographical region and her inhabitants well off. It is only a small part of the local economy despite the fact that her presence in the landscape is spectacular and easy to see from the roads. What this article investigated was the structural break that the COVID 19 pandemic might have caused in the wine business of the region. In most industries of the economy the collapse of employment and performance was huge, however, in wine sector that was not the case. The immediate decline in demand was swiftly compensated for by various demand side self-correcting mechanisms. On top of that it took more time for the supply side response to materialize. In this article we analysed the supply side adjustment of the Tokaj grapes and wine business to the COVID19 pandemic. What we found was that a lot of companies actually managed to benefit a lot from the COVID period by growing more rapidly than before. A new factor combination could be observed that was associated with this success. Those

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companies grew more rapidly in general who managed to increase their working capital at the cost of using fixed assets! Tractor, building, cellar got less important in growth than inventory that is sellable wine in the barrels. The role of fixed capital in growth was declining. What is more interesting is that this stayed on for after the COVID lockdown so there is a drastic is a long-term impact on the structure of assets required for a competitive business and how the entrepreneur runs her wine business. The panel model reinforced this observation and further emphasized the role of firms specific knowledge, know-how and innovation. Many of the earlier significant parameters proved to be solely the result of firm specific knowledge only. This means that the reaction of the management to COVID made the difference for growth of the firm. What is more the overall mean growth of wine businesses was manifold higher after COVID than before even in real terms. The new business model seems to be much more successful than the model before COVID.

Background and introduction

Despite the fact that Tokaj is one of the best-known brands associated with Hungary abroad, the region itself is among the poorest of Europe. What is more the decline in population is among the highest and therefore it is obvious that the brand and the wine businesses associated it are not enough to keep the population. The competitiveness of local enterprises and the potential provide employment must be limited in general and the role and the economic weight of wine businesses must be small in the local economy.

Her small weight is also an opportunity as we are curious what changes of competitiveness we are seeing from the firm sector data for wine. A sector that is dominated by small firms and carries a small economic weight in the region itself should be more flexible, efficient and capable to cope with difficult times, adverse market conditions and declining demand. The two-year COVID shock did not result in the collapse of wine trade at all (OIV, 2024). There has been a gradual decline, but certainly no collapse due to COVID. The collapse might have happened during the first few weeks of the lockdowns, but the markets quickly (few months) recovered. By the end of the year 2020 most of the sales recovered. There can be a series of reasons why adaptation took place on the demand side (new selling techniques, new wine types, lower average prices) as well as the supply side. Our analysis focusses on the supply side, whose adaptation requires much more time than that of the demand side and therefore it is about the right time now to carry it out.

We are going to carry out an analysis of the determinants of business success in the wine producing and wine trading firms in Tokaj, which is a historic and internationally known wine growing area in the Northeast Hungary. From a technological point of view the main question for us is if the behavior of production factors and their average impact on revenue has changed in Tokaj after COVID is gone. We would also like to see if there is a return to their pre-COVID behavior. The behavior of production factors is crucial in generating competitive products and sales revenue. COVID might have had an impact even after the COVID period as new business models might have developed during COVID that proved resilient. Our main question would be if we found evidence of a new business model and if it became successful in Tokaj. We expect that despite a decline in revenue and lay-offs a significant part of businesses managed to increase their selling and market presence. We would also like to see who they are and how they managed to do that.

The international literature is treating the changing behaviour of the wine market from various perspectives (e.g. Witwer and Anderson, 2021). One can see that a lot of effort has gone into the documentation of short term fall of the consumer demand. A short-term analysis of the behaviour of the market is based on the data of 2020 and 2021 and are often based on surveys of companies in the sector. They document mostly the sharp decline in business and profits and analyse the potential ways of recovery.

It was pointed out recently (Niklas et al, 2022) that the discussion on various aspects of decline of the market and the change in consumption in the period affected by COVID is well documented. The main message is that there is a distinction between the investment behavior of the New World and the Old one. The Old-World business model more focuses on the upstream integration being more resilient in times of adverse shock than the model common in the New World that focuses on downstream integration. What seems to be common is that financial efforts (investments) are being more focused on direct and electronic sales rather than on vineyards and cellars. Nonetheless, it is noted that the changing operations and business model of the wineries is not yet researched widely enough. Our paper is addressing exactly the issue of use of assets for the case of Tokaj and is seeking the identification of long-term changes that can be attributed to COVID using models of structural change. Niklas et al (2022) point out that small and medium producers are underrepresented in their sample and therefore the results more reflect the behavior of larger players at the global level. This is totally unlike the structure of the population of businesses in our analysis of Tokaj, where only about ten percent of the population have international operations and only a handful who operate globally.

Our exercise focuses on the transformation of the factor combinations and the changing business model of wineries in Tokaj and emphasizes the long-term structural changes that COVID incentivized. Our database should show how the adaptation took place on the supply side and how producers and traders reacted to an abrupt and drastic demand shock in a small wine area like Tokaj.

The origins of the dataset and the choice of the deflator

We collected data from e-Beszámoló of Ministry of Justice (economic data companies have to report every year) based on the NACE 4 code of the grapes production and wine trade registered in the towns and villages of Tokaj wine region. We only included companies in the dataset as companies dominate the wine market jointly anyway. Natural persons as registered producers were omitted. Despite the fact that their number is high their presence on the market is essentially unobservable. The time period of collecting our research population was May 2024 and covered the geographical area of Tokaj wine region. We found a total of 138 companies with meaningful balance sheet data and reporting and we collected the data back as far as 2017. This was useful as we could have a benchmark period for before COVID as a result. We dropped companies with zero inputs and zero outputs and we thought that companies without revenue or who have zero inputs question the relevance of their operations and so we omitted them as well. All of dropped records were very small operations.

As far as the deflator was concerned we used the price data (wholesale producer prices) for grapes and wine published by the Central Statistical Office for the period covered. We thought it was a better to use these numbers than wider concepts like CPI, GDP deflator that have the advantage that they might correlate with the input prices better than producer prices, but also include much more information that are irrelevant for the state of the wine business.

Explaining the regression strategy

We analyse a traditional production functions with logged input and output variables of the Cobb-Douglas specification in the population. This is a very traditional approach. However, the results are easy to interpret. The elasticities that we estimate will tell about the importance of each production factor. The explained variable is

logged and deflated revenues of the firms and so the elasticities relate to the growth of revenues for the firms and the regression shows the sensitivity of revenues to factor use. Elasticities show which are the production factors when put in use lead to the largest percentage increase in revenue at the companies.

The statistics of deflated revenues (2017 prices) show that the average revenue in the population of 138 firms and the period between 2017 and 2023 was close to 54 thousand EUR and the largest being 16,5 million EUR and the smallest being barely below 500 EUR. This indicates the large differences in size of operations in the region.

In Table 1 we summarized that explanatory (input) variables. Those variable values that were in monetary terms got deflated. Such variables were fixed assets and the working capital of the companies. Labour was in natural quantities and was measured by the number of employees. Dummy variables related to ownership patterns were not deflated either.

A series of ownership related dummies got included in the regression as we assumed that quality and structure of the ownership of firms should be a crucial determinant of the market performance. We regarded ownership patterns as an important channel of success, particularly dominant ownership and foreign ownership. Dominant ownership means that there is an owner above 50 percent ownership in the firm. We expected this to be necessary for an efficient decision making that leads to better performance of firms (DOMOWN). We also expected foreign ownership (FOWNER) to have a large positive impact on revenue performance as the foreign owners have better access to international trade channel than locally owned firms and therefore they should growth more rapidly.

We thought that a change in owners and ownership would boost performance in general (OWNCH). We expect weak performers rather to sell their share than to liquidate the company and the new owner to shape up the performance of the firm. We distinguished small (below 10 percent) changes in ownership and coded these changes as a separate dummy (OWNTEN) and expected her estimated parameter to be negative or insignificant as we expected that small changes are costly and ineffective compared to large changes in ownership (See Table 1).

<i>Dimension</i>	<i>Variable</i>	<i>Measura</i>	<i>Mean</i>	<i>Std.Dev.</i>	<i>Min</i>	<i>Max</i>
Fixed assets	InFIXEDD	Thousand EUR	10,19	2,66	1,89	15,94
Working capital	InWCAPD	Thousand EUR	10,09	2,18	2,46	15,64
Labour	InLABOUR	Nr of Employees	1,33	1,18	0,00	4,71
Ownership change	OWNCH	Dummy 0,1	0,10	0,30	0,00	1,00
Small change (below 10%)	OWNTEN	Dummy 0,1	0,10	0,29	0,00	1,00
Dominant owner	DOMOWN	Dummy 0,1	0,68	0,47	0,00	1,00
Foreign owner	FOWNER	Dummy 0,1	0,15	0,36	0,00	1,00
Increasing revenue under COVID	COVIDBOOST	Dummy 0,1	0,59	0,49	0,00	1,00

Table 1. Explanatory variables included in various regressions

In order to identify the group of companies that were successful under COVID we created a dummy for those who managed to increase their real revenues under the COVID period (COVIDBOOST). Our expectation was that there should be at least a small number who benefitted from COVID, particularly those, who are relatively new and innovative and are open to shift their trade to online channels in a short period of time. This should also show up in regressions explaining revenue growth as the related dummy should carry a significant positive sign.

Model:

$\ln REVENUE$

$$= \sum \beta_i \ln PRODUCTION_FACTORS + \sum \gamma_k * OWNERSHIP_DUMMIES + \delta * COVIDBOOST_DUMMY + \mu + \varepsilon$$

Dynamics of the wine market for Tokaj

We identified the patterns that are important in a modified Cobb-Douglas specification for the wine and grapes sector in Tokaj and overviewed the change in behavior of these firms before, under and after COVID. We were targeting the success factors of market revenue. However, it is worthwhile to see how the overall market for Tokaj wine and grapes developed over time and what patterns it showed (Table 2).

<i>PRECOVID, UNDERCOVID AND POSTCOVID, MEAN BI-ANNUAL GROWTH RATES</i>					
<i>Variable</i>	<i>Obs</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
CVDBOOSTD_POST	105	0.909	1.070	-2.534	5.014
CVDBOOSTD_UNDER	99	-0.017	0.830	-3.022	2.291
CVDBOOSTD_BEFORE	98	0.137	1.035	-3.291	3.723

Table 2. The revenue growth of wine business before, under and after COVID

In order to do that we created the period (biannual) real growth rates of revenues for each firm for before, under and after COVID. What we are seeing is slightly surprising. Before COVID growth rate for two years is 13,7 percent which is a number comparable to numbers in other sectors. Also, the fallback of 1,7 percent for the COVID period is extremely modest. That is closer to say that real revenues were close to constant under COVID. However, after COVID the average real growth of revenue of 90 percent in Tokaj wine business for two years is very high. This says that on average business is outstandingly good after COVID. The new business models that we discussed above and appeared under COVID must be very successful after COVID in practice.

The appearance of successful firms under COVID and how they impacted on the market

Originally, we expected revenues to collapse, however, we found that significant part of our population had her revenues not collapsing either nominally or in real terms. It must be noted that in wine business in Hungary the production price inflation for grapes and wine was very modest in the period observed and so nominal and real data do not significantly change our conclusions. We expected that wine business must have declined similarly to other branches of the economy as well. Despite the average decline we observed in the dataset that there are quite a number of firms who

managed to increase their revenues while others had collapsing revenues in the same period. We assumed a pattern that those who managed to grow under COVID must be new and innovative young firms and that their growth and business model that has become successful under COVID should stay successful and sustainable after COVID as well. We expected that after COVID their growth in revenue should be higher and exceed the growth of those firms who underperformed during COVID. In that case the market pressure under the COVID period helped select and create a lot of the future high growth firms. Can we justify this line of story through regressions?

In order to carry out the above exercise we identified a group of firms who managed to growth during COVID and observed and compared their rate of growth in the three periods using regressions. We created a dummy for firms who managed to grow under COVID in real terms. We expected that the share of these firms should be low. Instead, what we found was that the share of companies showing real growth was ranging between 45 and 55 percent, dependent of the deflator used. This is an unusually high ratio compared to our expectations. Who are these companies? Are they from among the new firms? After setting up the dummy for companies that showed real growth under COVID we found that the real growth rate is totally unrelated to the number of years since the founding of the company even when we lagged it. So, this means that the appearance of new successful business strategies was unrelated to the age of firms and old firms performed equally good or bad than young firms in experiencing real growth under COVID.

Variables	PRECOVID		UNDERCOVID		POSTCOVID	
<i>lnREV</i>	<i>Coef.</i>	<i>P value</i>	<i>Coef.</i>	<i>P value</i>	<i>Coef.</i>	<i>P value</i>
lnFIXEDD	0.122	0.005	0.093	0.156	0.046	0.357
lnWCAPD	0.304	0.000	0.354	0.000	0.297	0.000
lnLABOUR	0.552	0.000	0.586	0.000	0.728	0.000
OWNCH	-0.082	0.866	0.623	0.584	0.047	0.923
OWNTEN	0.027	0.957	-0.467	0.690	-0.122	0.817
DOMOWN	0.473	0.002	-0.208	0.396	-0.150	0.397
FOWNER	-0.220	0.225	-0.162	0.522	-0.242	0.256
COVIDBOOSTD_ DUMMY	-0.207	0.122	0.200	0.269	0.261	0.099
_CONS	4.602	0.000	4.559	0.000	5.987	0.000

Table 3. The performance of those firms who managed to grow under COVID before, under and after COVID

In line with our purpose we included a dummy for the firms who showed real growth under COVID (Table 3). What we observe is that working capital replaces the impact of fixed assets on revenue. The impact of fixed assets turned from significant in the period before COVID into insignificant under and after COVID. At the same time the point estimates of this parameter drastically decline. Essentially, it plays no role in business revenue generation anymore. However, the role of the estimated parameter of labour increases over time. In our opinion this only shows the huge importance of finding an extra employee that firm strategy of generating revenue based on working capital instead of fixed assets. In this case, the skills of an extra labour should be different after COVID than before. A mere tractor mechanic has much less of an impact after COVID than somebody with excellent marketing or selling skills or somebody who is good in buying quality grapes or wine. The role of fixed assets like a tractor has declined and therefore the importance of labour input associated with it should also be more modest. The labour input associated with working capital should gain more importance in line with the increased role of working capital even if we do not directly observe this relation as we have not observable data on the break-down of labour input.

Now let us have a look at how those firms who performed well under COVID and see their growth pattern behaves over time. What we see is that the relevant dummy is insignificant before and under COVID. It is marginally significant for after COVID and only at the 10 percent significance level. This means that our assumption that those firms who managed to successfully produce real growth under COVID must be successful and keep high growth after COVID is a very fragile finding. That suggests that the new business model of reducing the role of fixed assets and focusing on working capital and new sales channels is not only present and applied by those who were successful under COVID already, but is already being applied by those who were underperforming under COVID. This results in little and marginally different performance between the two groups, and thus a marginally significant estimated COVIDBOOST dummy parameter.

The role the fixed effects model and unobserved heterogeneity

We further develop the model we set up in Table 4. Table 5. complements the three-part pool specification of Table 4 by introducing a three fixed effects models instead of the three pools for the observations before COVID, under COVID and after COVID periods.

<i>Variables</i>	<i>PRECOVID</i>		<i>UNDERCOVID</i>		<i>POSTCOVID</i>	
	<i>Coef.</i>	<i>P value</i>	<i>Coef.</i>	<i>P value</i>	<i>Coef.</i>	<i>P value</i>
lnREV						
lnFIXEDD	0.194	0.010	-0.169	0.598	0.374	0.062
lnWCAPD	0.130	0.231	0.169	0.406	0.623	0.000
lnLABOUR	0.430	0.044	0.253	0.557	0.330	0.351
OWNCH	0.002	0.993	0.482	0.149	0.368	0.404
OWNTEN	0.351	0.260	0		-0.585	0.278
DOMOWN	0.466	0.023	-0.219	0.819	-0.373	0.175
FOWNER	-0.322	0.507	-3.331	0.107	0.317	0.679
COVIDBOOSTD_ DUMMY	0.553	0.559	4.940	0.070	-2.016	0.286
_CONS	10.557	0.000	7.769	0.006	0.8386	0.609

Table 4. Fixed effects model in PRECOVID, UNDERCOVID and the POSTCOVID period

We ran fixed effects regressions with our data for these three periods and see if former results still hold for this model and to check if unobserved heterogeneity plays a role in successful behavior. Fixed effects model means in practical terms that we introduce a fixed unobserved error part in the error term: What this extra error term does is that it represents all those factors that do not change (fixed) over time and we cannot directly observe them and influence the revenue of firms. Such factors are for instance the quality of management, technological or marketing skills and know-how that are characteristic of the specific firm. These factors hardly change over time and can be regarded as fixed. Technically, the estimated parameters could be modelled by including 138 company dummies in the equation and observe how all the other estimated parameters change.

It is interesting what changes take place under the panel specification and the results got included in Table 4. All estimated parameters turn insignificant except for the dummy for ownership (DOMOWN). This parameter consistently proves significant, but only before COVID. This means that the positive impact of dominant ownership on performance disappears with COVID. Labour and fixed assets are significant before COVID, however, later on all significant parameters disappear with the exception of working capital that holds a crucial role in the new business model that drives business growth after COVID. One the most important points from earlier still holds and so the change in the business model under COVID that we observed earlier is not temporary at all.

A key point is that during and after COVID almost all usually significant parameters disappear with the introduction of the fixed effects model! What meaning does that hold for us? It certainly does not mean that we have noth-

ing to say because most estimated parameters are insignificant. The way we interpret the disappearing significant parameters is that the fixed effects (essentially, the firm dummies) pick up the covariance that made a lot of the estimated parameters significant in Table 3. This means that what so far looked as the impact of certain production factors on revenues or the impact of a successful high growth firms under COVID (dummy COVIDBOOST) is just a mere result of individual companies using the soft skills and management, technological knowledge and inclination to innovate that is specific to them and not shared by other firms. What so far showed up as a result of successful application of factors a production such as working capital (Table 3) is only a result of good management and capacity to adapt to COVID times and the development of new business practices (Table 4). This is a very robust result as it says that production factors are not having a positive impact on revenue on their own right. They only do if the technological skills and know-how of the management makes it possible. Otherwise they have no impact on performance at all.

Conclusions

The COVID period made the life of most businesses difficult and resulted in a significant and spectacular loss of employment in Tokaj wine businesses. However, a large part of businesses successfully adapted to the new conditions.

The patterns of adaptation in Tokaj that this article uncovers are follows:

1. *There is a crucial role of working capital as opposed to fixed assets.* Businesses when in trouble were quick to become more efficient mainly through reducing employment. At the same time the loss of revenue was much smaller overall. Employment has been slowly recovering since then. However, there is a large number of businesses who managed to visibly increase their revenues when the rest was losing (Table 2). We presume that this was not possible without a successful online business under COVID and also because they have a visibly different asset composition from those below average. They invest in working capital instead of fixed assets and at the same time they generate slightly more rapid increase in revenue than the rest. This pattern held up under the panel model as well, which means that increasing working capital and acquiring, having and selling wine instead of investing in fixed assets happened at firms with inefficient managements as well. This pattern did not exist before COVID, however, it held on strongly after COVID, so there is a visible departure from the business model that existed before COVID.

2. *The quality of firm management and know how explain all success factors in firm performance.* The panel specification and the use of firm dummies suggested that the quality of management and firm specific culture had crucial role in survival under COVID. The joint significance of the firm dummies in all three periods holds up (Table 4) however, the significance of almost all other parameter estimates disappear under and after COVID, which means that the role of management and firm specific market innovations (fixed effects) become even more important after COVID. For instance, the good performance of extra labour in generating revenue under and after COVID was just a result of unobserved impact of efficient management as we had no variable for it in the earlier specifications. Drastically put: only these firm specific dummies matter and nothing else! The only exception to this seems to be the working capital (Table 4) that has a very high elasticity under this specification and that shows the huge importance of the changing business model of putting capital in liquid assets instead of fixed assets. This shift took place under COVID and could be a reason for survival for many wineries in Tokaj.
3. *Firms successful under COVID performed marginally better than the average after COVID. Most of those unsuccessful under COVID managed to catch up and so the difference in sales growth is not large.* We were also trying to see if the composition of successful firms is changing under COVID. Has the crisis that resulted raised some companies and weakened others? Can we see a pattern in that? We selected those firms that managed to grow under COVID (about half of the population) and compared their performance to the average and we only observed a marginally significant deviation of 10 percent between growth differences. This difference disappeared with the panel specification so the quality of management and other fixed effects factors fully explained it (Table 3 and Table 4). Those who were underperforming under COVID caught up quite well during COVID. We find no correlation between being successful after COVID and earlier performance.
4. *It is worth noting at the end of the summary the outstanding sales performance of the wineries of Tokaj after COVID.* The biannual 90 percent real growth of sales is certainly not in line with the general trend of languishing sales in the wine sectors. That only shows that a successful change in business model is happening and that the main factor of resilience in that period was the quality of managements, know how and skills at within the firms. It is also worth mentioning the increase in standard deviation of the growth rates. Probably, this could be a productive future line of research to analyse not just the mean growth of the market, but the disparities in growth among the producers. All in all our reply to the question posed in the title is definitely positive: there is a definite new business case happening after COVID that suggests that resulted in a very high mean

increase in real revenue in the trade.

5. Obviously, these conclusions do not extend to other wine regions in Hungary or Central Europe at large, but are results that emanate from the firm performance of wineries in Tokaj only.

What limitations did we face and what could be future be a subject of further research? The most important limitation are always data limitations. More detailed data on the types of labour employed or data collected on online sales could be useful. Despite the fact that classical econometrics have a lot of methodological limitations the relevant results are often robust. A fascinating line of further development of the model could be how long term are the new structural patterns of the wine industry in Tokaj post COVID and what other structural determinants are present? A second line of research could be observing the impact of the changing ownership structure in a more detailed manner, probably with making use of quintile regression analysis. It is very difficult to believe that ownership and ownership structure should be so unimportant in sales performance as practically has been the case in our regressions. Our hunch is that there should be large differences among groups of businesses behind the average and insignificant numbers. We expect that in large parts of the population the impact of ownership should be large and significant despite the average impact being insignificant. Another possible extension of the research could be to uncover the potential interactions between the factors of production and ownership. Ownership patterns should not make their impact isolated from all the other factors of production or pattern of ownership. It should be investigated if there are factors that multiply or deflate the 'stand alone' impact of the factors we analysed here. This has not been done yet.

References

1. Niklas, B., Cardebat J.-M., Back, R., Gaeta, D., Pinilla V., Rebelo J., Jara-Rojas & R. Schamel, G., Wine industry perceptions and reactions to the COVID-19 crisis in the Old and New Worlds: Do business models make a difference? *Agribusiness*, Wiley Online, 25 May, 2022.
2. OIV (2024) , 'State of the World Vine and Wine Sector Sector in 2023', OIV.
3. Wittwer, G., & Anderson, K., COVID-19's impact on Australian wine markets and regions. *The Australian Journal of Agricultural and Resource Economics*, 2021, 65, pp. 822-847.