



# Profitability of Hungarian Wineries in a Changing World

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**Abstract:** The rapidly changing global environment poses significant challenges to Hungarian wineries. While the COVID-19 pandemic - undoubtedly the most disruptive event of recent years - had a considerable impact on the financial and profitability of all domestic companies, wineries must also contend with the effects of climate change, shifting wine consumption trends, and regulatory risks. In our study, we examine how the profitability and financial position of Hungarian wineries evolved during the polycrisis period from 2016 to 2023. Our aim is to explore the relationships between capital structure, financing strategy, and profitability, and to understand how these indicators differ between the pre- and post-COVID periods among the most prominent Hungarian wine-producing enterprises.

Our empirical research is based on a dataset of 208 currently active Hungarian grape wine producers. From this population, we selected 104 companies according to our inclusion criteria (a minimum annual revenue of HUF 100 million and continuous operation since at least 2016). Our literature review focused on the size, capital structure, and financing strategies of Hungarian wineries, from which we defined the key performance indicators for our analysis: equity-to-debt ratio, financial leverage, ROE, ROA, and ROS.

Preliminary results indicate that the sampled wineries achieved a compound annual growth rate (CAGR) of 6.2% in total revenue during the study period. Aggregate profitability - measured both in terms of operating profit and pre-tax earnings - increased even more significantly at annual growth rates of 18.4% and 22.1%, respectively. However, detailed analysis of the company-level data reveals considerable variation in growth across individual years and wineries. Furthermore, while the overall trend in profitability showed improvement over the period, this growth trajectory was disrupted and began to decline following the COVID-19 pandemic.

Our research contributes to a deeper understanding of the crisis resilience and adaptive strategies of Hungarian wineries. The findings provide valuable insights for decision-makers in the wine industry, supporting more effective financial and capital structure decisions aimed at ensuring enterprise stability and sustainable growth under diverse macroeconomic conditions. Potential directions for future research include extending the timeframe of the study, incorporating additional performance metrics, or conducting international comparisons to better understand the impact of structural differences across regions.

**Keywords:** Capital Structure, Profitability, Resilience, Wineries

## 1. Introduction

Hungarian viticulture and winemaking, with their centuries-old traditions, constitute a key branch of domestic agriculture. At the same time, they are increasingly confronted by climatic, social, and digital-technological challenges arising from a rapidly transforming world. As McDermaid and Newton (2020) point out, crises affecting wineries are becoming more frequent, even while the management of earlier disruptions remains ongoing. Addressing these multifaceted challenges at the entrepreneurial, national, and global levels requires an intensified scientific discourse (cf. Canavati et al. 2020). Viticulture and winemaking are by nature long-term undertakings, as varietal selection entails decisions projected often over several decades. In contrast, the accelerating pace and complexity of contemporary change demand flexibility and short-term adaptability. Without resilience, wineries risk losing both their competitiveness and profitability. “Wine production is both art and science, a blend of individual creativity and innovative technology. But wine production is also business, with economic factors driving manufacturing practices. To be successful in the modern marketplace, a winemaker must integrate the artistic and economic aspects of wine production, and possess a solid understanding of the intrinsic and extrinsic factors that underlie purchase motivation.” (Bisson et al. 2002: 696)

This research is aimed at establishing an understanding about how the financial position and performance of Hungarian wineries evolved throughout the 2016 to 2023 period. This timeframe provides a basis for deriving important conclusions, by allowing the analysis of how the COVID-19 pandemic (COVID) impacted the sector’s financial strength and resilience. Our efforts aim to strengthen professional dialogue, alongside the systematic collection and scientific analysis of wine market data, to provide essential decision-making tools for the stakeholders of the sector. From a scholarly perspective, our findings demonstrate that profitability indicators must always be interpreted in conjunction with liquidity and capital structure measures, as growth figures alone may obscure underlying risks. The sector thus offers a valuable case study of how small and medium-sized enterprises operating within traditional industries balance resilience and risk-taking in the face of external shocks.

Our conclusions also carry practical implications for capital structure theory, crisis management, and the sustainability of agricultural finance. Overall, the study seeks to highlight the principal criteria of resilience, as well as the sector's points of vulnerability, the effective management of which is essential if the challenges of a changing world are to be transformed into opportunities.

The aim of our empirical research is to measure and analyse the financial performance of Hungarian wine-producing enterprises and to explore the underlying relationships using data from the period 2016–2023. The research questions established are as follows:

RQ1: How has the asset, financial, and profitability position of Hungarian wine-producing enterprises evolved over the study period?

RQ2: What specific characteristics define the capital structure and financing strategies of wineries?

RQ3: To what extent can the industry be considered resilient to various, potentially simultaneous crises, and what are its main points of vulnerability?

Methodologically, the study builds on sectoral financial statement data and applies ratio analysis to assess profitability, liquidity, and capital structure indicators in a comparative temporal framework.

The paper is structured as follows: Section 2 reviews the relevant literature on capital structure, profitability, and resilience in agribusiness and wineries. Section 3 presents the dataset and methodological framework. Section 4 discusses the empirical results, while Section 5 concludes with theoretical and managerial implications.

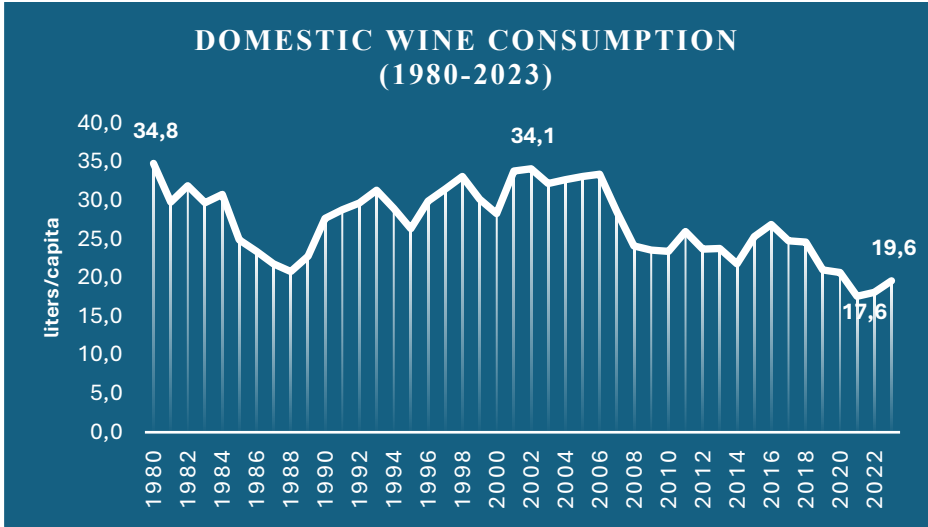
## 2. Literature Review

Goncharuk (2017a) classified the main challenges of wine value chains (WVCs) into global and environmental, methodological, financial, economic, and market-related categories. When narrowing the scope of his investigation exclusively to wineries (2017b), he identified two major groups: (1) global challenges (e.g., climate change, shifts in consumer preferences) and (2) regional challenges (specific issues affecting individual wine regions or countries). Among these, climate change exerts one of the most profound and complex impacts. Global warming significantly influences the physiological processes of grapevines - and consequently yield and quality - as well as biochemical mechanisms, thereby necessitating technological innovations (Schultz, 2010). These changes require wineries to engage in continuous adaptation and development in order to preserve wine quality, distinctiveness, and profitability (Bernetti et al., 2012). Mozell and Thach (2014) proposed an eleven-point set of recommendations ranging from grape variety selection and the adoption of new biochemical and technological processes to the effective use of renewable energy sources. The effects of climate change, however, are uneven across wine-producing countries and their respective regions. In Hungary, wine regions must prepare for rising

heat accumulation and temperature variability, increasingly frequent spring frosts, extreme precipitation patterns, and the emergence of new pests and diseases. These phenomena may lead to structural changes in grape varieties on the one hand and necessitate the introduction of new technologies on the other, posing significant financial challenges for enterprises.

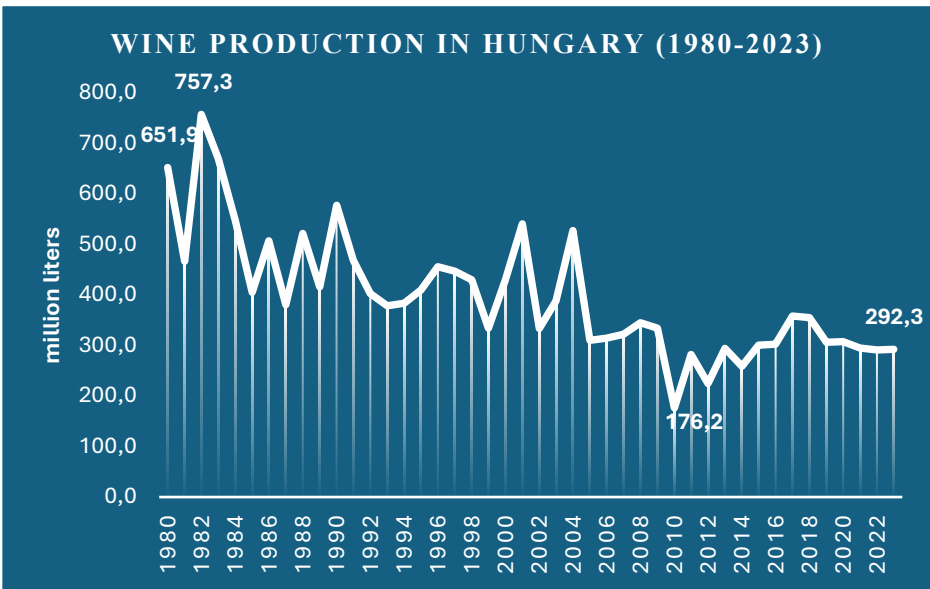
Puga et al. (2022) describe and analyse the climatic characteristics of all wine regions worldwide using multivariate statistical methods. Their findings indicate that, in terms of climatic conditions, Hungarian wine regions resemble those of Bordeaux, Burgundy, the Balkans, and northern Spain. These parallels may provide valuable insights for decision-makers within the Hungarian wine value chain. Importantly, the impacts of climate change are not uniformly negative: for example, increases in heat accumulation can positively affect yields and sugar levels. Nevertheless, altered weather conditions also bring substantial challenges and economic consequences, such as the emergence of new pests (Comte et al., 2024) and diseases (Giménez-Romero et al., 2024), while global fruit trade facilitates the introduction of exotic pests (Suffert et al., 2018).

Another major global challenge for wine producers lies in the transformation of consumer habits, increasingly characterized by conscious alcohol consumption, moderation, and a focus on healthy lifestyles (Rousseau, 2015; Huang, 1996; Bazzani et al., 2018; Caputo et al., 2017). Whereas in the 1960s wine accounted for approximately 40% of global alcohol consumption – with significant variation across countries (Anderson & Nelgen, 2011) – by the 2010s this share had fallen to around 20% (Ritchie & Roser, 2018/2024). Multiple factors underlie this shift in consumer preferences. In food purchasing decisions, consumers increasingly consider a broad range of criteria, including labelling information, health consciousness, and environmental and social sustainability. Accordingly, the literature on wine economics has increasingly focused on consumer interest in nutritional labelling and health warnings (Wigg & Stafford, 2016; Annunziata et al., 2019; Bazzani et al., 2020). The so-called *clean label* is a consumer cue that signals products made with a limited number of simple, natural ingredients, minimal artificial additives, and transparent production practices. This concept is associated with organic, biodiversity-friendly, and biodynamic wine production (Pomarici & Vecchio, 2014; Delmas & Grant, 2014; Sogari et al., 2015; Ricci et al., 2018; Mazzocchi et al., 2019), as well as with harvest techniques and the avoidance of additives (Saltman et al., 2015; Amato et al., 2017; Dominici et al., 2020). Beyond labelling, consumer education may serve as an effective instrument for raising awareness of the positive health effects of moderate wine consumption (Grønbaek et al., 2000; de Lorimier, 2000; Vecchio et al., 2017). Thus, changes in wine consumption represent both a quantitative and qualitative transformation. Examining the Hungarian case, per capita wine consumption declined from 34.8 liters in 1980 to 19.6 liters in 2023 (Figure 1). Between 2016 and 2023 alone, this represents a 27% decrease, from 26.9 to 19.6 liters per capita.



**Fig. 1.** Trends in domestic wine consumption in Hungary, 1980–2023 (liters per capita)  
Source: own edition based on Hungarian Central Statistical Office data

Between 1980 and 2023, per capita wine consumption declined at an average annual rate of 1.3%. Producers largely mirrored this trend - albeit with considerable fluctuations - as wine production decreased by an average of 1.8% per year over the same period. While Hungarian wineries produced 651.9 million liters of wine in 1980, by 2023 output had fallen to 292.3 million liters (Figure 2). For the period 2016–2023, this corresponds to a 3.3% decline.



**Fig. 2.** Wine production in Hungary, 1980-2023 (million liters)  
Source: own edition based on Hungarian Central Statistical Office data

The faster rate of decline in wine production compared to consumption can be explained by a shift from quantity to quality. In accordance with Regulation (EU) No 1337/2011 of the European Parliament and of the Council, Member States are required to provide data on vineyards and, in relation to that, on the wine market every five years. The most recent publication available (HCSO, 2020) shows that the total area of Hungarian vineyards decreased from 91,000 hectares in 2001 to 62,000 hectares in 2020. This process was driven by a structural transformation aimed at improving quality: the reduction in vineyard area primarily affected plantations outside the designated wine regions, while nearly half of the vineyards within wine regions were replanted. As a result, most Hungarian wine regions have become suitable for the production of quality wines, meeting the growing consumer demand for higher-quality products (Hlédik & Harsányi, 2019). The restructuring and modernization program launched in 2007 [Decree 7/2007 (I. 30.) of the Ministry of Agriculture and Rural Development] has significantly enhanced the competitiveness of the domestic market.

### **The Impact of COVID-19 on Wineries**

The COVID-19 pandemic, which represented the most significant disruption of recent years, strongly affected the financial performance and profitability of enterprises, posing considerable challenges for wineries as well. A global survey conducted in 2020 (UNWTO, 2020) revealed that the majority of wineries suffered substantial losses in both turnover and international visitor numbers. The extent of these effects varied across countries and enterprises: the sharpest declines were experienced by businesses linked to the HORECA sector and wine tourism (Wittwer & Anderson, 2021; Roca, 2022), while some wineries were able to benefit from the changing environment through effective adaptation strategies.

The key to successful adjustment lay in managerial responsiveness, firm-specific knowledge, expertise, and innovation (Coyne, 2020; Niklas et al., 2022; Szolnoki et al., 2022; Novák et al., 2025). Business models differed significantly, particularly with regards to sales systems. Enterprises employing diversified sales channels and flexible marketing strategies not only demonstrated resilience during the pandemic, but also achieved above-average growth rates in its aftermath.

A growing body of research has examined the effects of the pandemic on alcohol consumption. However, these impacts are highly diverse, country-specific, and often contradictory. For instance, pandemics can cause an increase in consumption driven by depression and stress, but also a decline due to reduced disposable income (De Goeji et al., 2015; Agnoli & Charters, 2022). As such, a detailed discussion of these dynamics would extend beyond the scope of the present study and is therefore omitted here.

### **Changes in the regulatory environment of the domestic wine market**

In recent years, the regulation of the wine sector at both the EU and national levels has undergone several important changes, oriented towards greater digitalization, transparency, efficiency, and simplification. As part of the reform of the Common Agricultural Policy (CAP), the rules governing the wine market were reviewed in 2018–2019 and again in 2021. Regulation (EU) 2021/2117 extended the validity of the vineyard planting authorization system until 2040, thereby allowing Member States to continue controlling the expansion of vineyard areas.

A new element introduced on 8 December 2023 was the tightening of EU wine labeling requirements. These rules specified that all wine products must display their energy content, full nutritional information, list of ingredients, and allergens. In 2023, the previous National Wine Support Program - through which EU funding could be accessed for activities such as wine promotion or vineyard restructuring - came to an end. From the post-2023 period onwards, these forms of support have been integrated into the CAP Strategic Plan. This primarily represents an administrative change: the eligible support measures (vineyard restructuring, investments, promotion) remain in place, but are now implemented within a new framework.

In Hungary, a new Wine Act entered into force in 2021 (Act CLXIII of 2020 on Viticulture and Oenology), replacing the previous legislation that had been in effect since 2004. The objectives of the new regulation were to reduce administrative burdens, promote digitalization, and strengthen harmonization with EU law. From 2022 onwards, the *ePincekönyv* (e-Cellar Book) system was introduced, replacing the former paper-based cellar registers with digital data reporting. While some wineries embrace progressive changes, the digital transition imposes substantial cost pressures on many enterprises, particularly smaller ones (Homolya & Loibl, 2024).

### **The relationship between capital structure and profitability in wineries**

A key dimension of corporate finance concerns financing decisions, as the establishment of an optimal capital structure has a fundamental impact on a firm's profitability and, consequently, its value (Modigliani & Miller, 1958; 1963). Owners are interested in designing a mix of financing sources that maximizes overall market value (Bélyácz & Pintér, 2024). In securing the resources required for operation, firms must consider the cost of capital, tax effects, profit stability, flexibility of financing sources, managerial preferences, creditors' attitudes, and monitoring costs.

Theories of capital structure emphasize different aspects of this problem (Hernádi, 2014). Trade-off theory (TOT) defines the optimal debt-to-equity ratio at the equilibrium point of costs and benefits. Principal-Agent theory places the representation problem at the centre of capital structure decisions (Williamson, 1988). In principal-agent relationships, the parties act as utility maximisers - sometimes at the expense of one another's interests - under conditions of information asymmetry. In

firms where the owner and manager are the same person, the agency problem does not arise (Jensen & Meckling, 1976). However, once external debt is introduced, conflicts emerge between management and external financiers (e.g., creditors), as managers generally possess more accurate information about the company's actual market position, risk profile, and value than lenders (Geiseler, 1997).

Building on agency concepts, the pecking order theory (POT) posits that firms prefer internal financing and, when external funding is required, adopt a conservative approach. Due to information asymmetries in capital markets, management establishes the following order of preference among financing sources: (1) internal financing; (2) external debt, such as loans and bonds; (3) equity financing and new share issuance (Myers & Majluf, 1984).

The flexible management of financing decisions constitutes a source of competitive advantage for enterprises (Donaldson, 1969; Higgins, 1992; Damodaran, 1997), as financial flexibility may help firms avoid distress during times of crisis and exploit inexpensive credit opportunities in low-interest environments. According to DeAngelo and DeAngelo (2006), such financial flexibility can serve as a unifying framework across different capital structure theories.

In summary, our review of the literature indicates that during the period under examination, the Hungarian wine sector - similar to that of other countries - has faced (and continues to face) complex challenges that often reinforce one another. Coping strategies may vary across countries, regions, and individual wineries; however, they share common requirements such as flexible management, a high level of professional expertise, and innovative solutions. From an economic perspective, maintaining (or enhancing) efficiency and profitability necessitates quality-oriented structural investments, innovative sales strategies, as well as the continuous optimization of capital structure and financial flexibility.

### **3. Research Objectives/Questions**

The aim of our empirical research is to measure and analyse the financial performance of Hungarian wine-producing enterprises and to explore the underlying relationships using data from the period 2016–2023. The research questions established are as follows:

**RQ1:** How has the asset, financial, and profitability position of Hungarian wine-producing enterprises evolved over the study period?

**RQ2:** What specific characteristics define the capital structure and financing strategies of wineries?

**RQ3:** To what extent can the industry be considered resilient to various, potentially simultaneous crises, and what are its main points of vulnerability?

#### 4. Data and methodology

The data collection was started by identifying a list of companies operating in winemaking that can form the basis of this research. The starting point was identifying the correct TEÁOR number, which is the Hungarian classification code of economic activities, similar to the European Union's NACE codes. Wineries can be classified as operating under the TÁOR number, 1102 - Grape wine production. Using this classifier, a search was conducted on the Nemzeti Cégtár website, a comprehensive database of Hungarian companies with the inclusion of their respective TEÁOR numbers. A total of 208 active wineries were identified at the time of running the relevant query (March, 2025). The company names, registration numbers, date of incorporation and latest annual revenue figures were extracted into an Excel spreadsheet to conduct further filtering of the entries.

As the objective of this research was to understand how the financial position and performance of the established Hungarian wineries evolved over the research period, it was decided to exclude certain entries from the original list. First, an annual revenue criterion was applied, as the aim was to focus on the largest wineries that can provide basis for meaningful subsequent analysis. Therefore, companies with annual revenue below HUF 100 million (approximately EUR 0.25 million) were excluded from the initial dataset. In addition, to allow for meaningful analysis of financial position and performance over the examination period, companies established after 2016 were also excluded from the analysis. The reconciliation of the number of companies in the original and final dataset is presented in Table 1.

**Table 1.** Number of entries in the original and final dataset

Number of initial entries	208
Revenue below HUF 100 million	100
Established after 2016	4
Final entries	104

#### Financial data extracted

After the list of companies were identified, the next step was to collect financial data for further analysis. Unfortunately, there is no simple way to download the full financial statements of Hungarian companies from a central database, only as separate pdf files, and it was not considered operationally feasible to extract each financial statement line item into a format suitable for analysis, for such a large number of entries over an

extended investigation period. Therefore, an aggregator website was used that included information based on the most recent annual reports of companies for the following financial statement line items:

1. Revenue
2. EBIT
3. Profit before tax
4. Profit after tax
5. Long term assets
6. Current assets
7. Receivables
8. Cash
9. Total assets
10. Equity
11. Share capital
12. Provisions
13. Total liabilities
14. Long term liabilities
15. Short term liabilities
16. Total liabilities and equity

Using these figures, additional financial statement line items were calculated, following the rules from Hungarian accounting standards and how the data was structured, using the following formula:

- $\text{Inventory} = \text{Current assets (6.)} - \text{Receivables (7.)} - \text{Cash (8.)}$
- $\text{Prepayments} = \text{Total assets (9.)} - \text{Long-term assets (5.)} - \text{Current assets (6.)}$
- $\text{Accrued expenses} = \text{Total liabilities and equity (16.)} - \text{Total liabilities (13.)} - \text{Equity (10.)}$
- $\text{Cash-flow} = \text{Cash at the end of the period} - \text{Cash at the beginning of the period (8.)}$

Because the cash-flow figure could be only calculated using the difference between the opening and closing cash balances, the metric was only available from the second year of the investigation period (2017). Also, this kind of calculation didn't allow for the differentiation between operating, investing and financing cash-flows. Nevertheless, the resulting figure provided basis for additional, meaningful metrics to be calculated, used for assessing the financial position and performance of the wineries in our sample.

### Financial ratios calculated

After the data extraction was completed, various financial ratios were calculated for further analysis. The range of such metrics is endless, but these can be arranged into the following main categories:

1. **Liquidity ratios:** financial measurements that assess a company's ability to meet its short-term obligations using its most liquid assets.
2. **Asset turnover ratios:** indicators that show how efficiently a company uses its assets to generate sales revenue within a specific period.
3. **Metrics related to indebtedness:** ratios and measures that reflect the extent and management of a company's debt relative to its assets or equity.
4. **Financial performance metrics:** figures used to evaluate a company's profitability, efficiency, and overall financial health, including its efficiency in managing its cash-flows.
5. **Market valuation-based indicators:** financial measures that determine a company's market value, often by comparing its share price to earnings, assets, or other benchmarks.

Because there was no publicly traded companies in our dataset, the market valuation-based indicators were excluded from the list of potential ratios to be used. To achieve a comprehensive financial analysis of wineries in our dataset, in line with the research objectives, ratios from the remaining four categories were utilized. A total of 16 ratios were calculated following the methodology laid out in (Fiáth et al., 2014), analysing the financial performance and creditworthiness of different Hungarian companies.

Table 2. A list of financial ratios calculated for further analysis

Ratio calculated	Definition	Liquidity	Asset turnover	Indebtedness	Financial performance
Liquidity ratio	Short-term assets divided by short-term liabilities	x			
Quick ratio	Short-term assets less inventories divided by short-term liabilities	x			
Long-term assets to capital ratio	Long-term assets divided by total shareholders' equity	x			
Asset turnover ratio	Revenue for the year divided by total assets		x		

Ratio calculated	Definition	Liquidity	Asset turnover	Indebtedness	Financial performance
Inventory turnover ratio	Revenue for the year divided by total inventories		x		
Indebtedness	Total liabilities and equity less total equity divided by total assets			x	
Company wealth ratio	Total shareholders' equity divided by total assets			x	
Creditworthiness ratio	Total liabilities and equity less total shareholders' equity divided by total equity			x	
Long-term asset coverage	Total shareholders' equity divided by total long-term assets			x	
EBIT margin	Total EBIT for the year divided by total revenue				x
Return on equity	Profit after tax divided by total shareholders' equity				x
Asset efficiency ratio	Total assets divided by total revenue for the year				x
Cash-flow to debt ratio	Cash-flow for the year divided by total long-term liabilities				x
Cash-flow to assets ratio	Cash-flow for the year divided by total assets				x
Cash-flow to revenue ratio	Cash-flow for the year divided by total revenue				x
Working capital to equity ratio	Total working capital (short-term assets less short-term liabilities) divided				x

Ratio calculated	Definition	Liquidity	Asset turnover	Indebtedness	Financial performance
	by total shareholders' equity				

The list of ratios used for our analysis is presented in Table 2. It should be noted that certain indebtedness ratios required the use of external debt, which was not available directly in the dataset utilized, only the long-term liabilities line. Financial statements prepared under the Hungarian Accounting Standards include the following items under this heading:

- Long-term debt
- Convertible debt
- Bonds issued
- Investment and development debts
- Long-term intercompany debt
- Other long-term debt
- Deferred tax liabilities

Because the companies in our list were not part of larger, international operations, an assumption was made that the long-term liabilities line didn't include any obligation against intercompany, or otherwise related entities. Therefore, throughout the rest of the research, the long-term liabilities line was used to approximate the amount of external debt.

### Initial results across the investigation period

The evolution of key financial indicators calculated for all the wineries investigated in our sample in the 2016 - 2023 period is presented in Table 3.

Table 3. The evolution of key financial indicators in the 2016 - 2023 period for the wineries investigated (n = 104)

	2016	2017	2018	2019	2020	2021	2022	2023
Revenue (million HUF)	83,452	90,715	98,544	96,630	102,225	110,388	127,998	135,453
EBIT (million HUF)	1,763	5,544	7,919	7,886	9,541	7,988	8,777	6,791
Pre-tax earnings (million HUF)	1,252	5,048	7,103	7,274	9,324	7,916	8,143	6,178
Liquidity ratio	2.2810	2.3450	1.7945	2.0795	2.1821	1.9808	1.7705	1.9333

Quick ratio	0.98 68	0.96 14	0.72 85	0.76 32	0.839 4	0.724 2	0.613 4	0.676 1
Long-term assets to capital ratio	0.83 52	0.82 21	0.89 11	0.87 92	0.865 9	0.906 0	0.916 7	0.905 5
Asset turnover ratio	0.50 52	0.50 52	0.51 28	0.45 69	0.446 2	0.449 2	0.478 1	0.477 4
Inventory turnover ratio	1.66 39	1.60 78	1.69 60	1.50 88	1.507 3	1.497 3	1.530 3	1.515 9
Indebtedness	0.44 97	0.44 00	0.45 65	0.41 27	0.406 2	0.424 3	0.440 5	0.440 5
Company wealth ratio	0.55 03	0.56 00	0.54 35	0.58 73	0.593 8	0.575 7	0.559 5	0.559 5
Creditworthiness ratio	0.81 72	0.78 58	0.84 00	0.70 27	0.683 9	0.736 9	0.787 5	0.787 2
Long-term asset coverage	1.19 73	1.21 64	1.12 22	1.13 73	1.154 9	1.103 7	1.090 9	1.104 4
EBIT margin	0.02 11	0.06 11	0.08 04	0.08 16	0.093 3	0.072 4	0.068 6	0.050 1
Return on equity	0.00 76	0.04 63	0.06 23	0.05 52	0.065 1	0.053 0	0.050 4	0.035 1
Asset efficiency ratio	1.97 93	1.97 95	1.95 01	2.18 88	2.241 1	2.226 4	2.091 4	2.094 6
Cash-flow to debt ratio	n.a.	0.10 53	0.08 36	- 0.09 17	0.152 9	- 0.060 7	0.000 9	0.064 1
Cash-flow to assets ratio	n.a.	0.01 59	0.00 93	- 0.01 15	0.019 7	- 0.007 5	0.000 1	0.007 4
Cash-flow to revenue ratio	n.a.	0.03 15	0.01 82	- 0.02 51	0.044 2	- 0.016 7	0.000 2	0.015 5
Working capital to equity ratio	n.a.	0.27 38	0.19 98	0.21 89	0.220 7	0.190 3	0.162 5	0.183 0

On the surface, it appears that the Hungarian wine sector performed strongly in the examination period, based on the financials extracted from the companies in our sample. Revenue increased from HUF 83.5 billion in 2016 to HUF 135.5 billion in 2023, representing a Cumulative Annual Growth Rate (CAGR) of 6.2%. Operating profitability and pre-tax profits increased at a faster pace, at a CAGR of 18.4% and 22.1%, respectively. The CAGR of revenue increase was approximately 4.1% in the pre-COVID period, suggesting that the pandemic didn't have a significant adverse impact on the turnover of companies investigated, as reflected by the higher value of the metric over the whole investigation period. This suggests that the industry demonstrated resiliency in combating the impact of lockdowns and other measures negatively impacting the everyday business conduct.

### Liquidity metrics

The liquidity metrics - liquidity ratio, quick ratio, and long-term assets to capital ratio - reflect the wineries' capacity to meet short-term obligations and the structure of their capital investments. Over the 2016-2023 period, the **liquidity ratio** showed a noticeable decline from 2.2810 in 2016 to a low of 1.7705 in 2022, with a modest rebound to 1.9333 in 2023. This suggests a gradual erosion in short-term financial flexibility, potentially due to tighter working capital or increasing current liabilities. The **quick ratio**, which excludes inventories, mirrors this trend, falling from 0.9868 in 2016 to 0.6134 in 2022, before improving to 0.6761 in 2023. The dip in both ratios during the post-COVID years may reflect increased inventory buildup, delayed receivables, or operating disruptions typical of the polycrisis period.

The **long-term assets to capital ratio**, which captures the extent to which equity finances fixed assets, showed a gradual increase over the investigation period, suggesting an effort to invest into new capacities. The increase was the strongest in 2018, suggesting renewed investment in long-term assets or a relative depletion of equity reserves. The steep rise in this year could also signal strategic reallocation of funds towards fixed assets, potentially driven by modernization efforts or EU-backed rural development programs available earlier.

Overall, the liquidity position of Hungarian wineries deteriorated between 2016 and 2022 but began to improve by 2023. While the sector demonstrated strong liquidity pre-COVID, the decline in both liquidity and quick ratios in the middle years raises concerns over short-term solvency pressures. The simultaneous increase in the long-term asset-to-capital ratio further implies a more asset-heavy capital structure, with possible implications for future financial flexibility.

### Asset turnover metrics

Asset turnover metrics assess how efficiently wineries utilise their resources to generate revenue. In this study, we focus on two key indicators: the **asset turnover ratio** and the **inventory turnover ratio**. Together, these metrics help to characterise operational efficiency, capital utilisation, and the responsiveness of wineries to shifting demand and supply conditions across the 2016-2023 period.

The **asset turnover ratio**, calculated as annual revenue divided by total assets, remained relatively stable between 2016 and 2018 at around 0.50, before declining to 0.4569 in 2019 and reaching its lowest point at 0.4462 in 2020. This decline suggests a temporary weakening in asset utilisation, likely reflecting the early impacts of the COVID-19 pandemic, including lockdown-related sales disruption and the underutilisation of fixed production assets. From 2021 onwards, a gradual recovery is visible, with the ratio improving to 0.4781 in 2022 and 0.4774 in 2023. These post-crisis figures, however, remain below pre-pandemic levels, implying a persistent lag in productivity relative to total asset size.

The **inventory turnover ratio** presents a different pattern. It increased from 1.6639 in 2016 to a peak of 1.6960 in 2018, indicating that, prior to the pandemic, wineries had been improving their ability to convert inventory into revenue more quickly. However, a notable decline followed in 2019 (1.5088) and onwards (down to 1.4973 in 2021), likely caused by demand shocks and disruptions in distribution channels during COVID. The rebound from 2022 (reaching 1.5159) suggests a degree of operational normalisation but not a full recovery to pre-pandemic efficiency levels.

The combined interpretation of both ratios reveals that asset turnover metrics remained constrained in the latter half of the period investigated. The impact of the disruption caused by the pandemic is visible, and the slight rebounds indicate that wineries were able to partially adjust asset and inventory management practices in response to external shocks. This may reflect short-term adaptation rather than a structural improvement. Overall, the data suggest that Hungarian wineries have yet to fully restore operational efficiency to pre-pandemic levels, particularly in terms of capital utilisation.

### **Indebtedness metrics**

The indebtedness metrics in this study - including **indebtedness**, **company wealth ratio**, **creditworthiness ratio**, and **long-term asset coverage** - provide insight into the capital structure, financial risk, and long-term solvency of Hungarian wineries over the 2016-2023 period. Collectively, these indicators reveal how wineries financed their operations and investments during a time marked by both expansion and systemic shocks. The **indebtedness ratio**, which reflects the proportion of assets financed through liabilities, declined steadily from 0.4497 in 2016 to a low of 0.4062 in 2020. This trend suggests a conservative financing strategy in the pre-pandemic years, possibly driven by cautious investment practices or limited access to external credit. However, the subsequent increase in indebtedness to 0.4405 in 2022 and 2023 indicates a reversal of this trend, potentially reflecting the need for external funding during the post-COVID recovery or inflationary cost pressures. These figures, while moderate, suggest that the Hungarian wine sector maintained a relatively balanced capital structure throughout the period.

The **company wealth ratio**, representing equity as a proportion of total assets, followed an upward trajectory until 2020 (peaking at 0.5938), signalling strengthened balance sheets and an improving equity buffer. This aligns with a period of revenue and profit expansion in the sector. However, the ratio declined to 0.5595 by 2023, indicating a relative weakening of equity financing, possibly due to increased debt uptake or erosion of retained earnings during the crisis years.

The **creditworthiness ratio** - which measures liabilities relative to equity - fluctuated over the investigation period. After a strong start in the 2016 to 2018 period (increasing from 0.8172 to 0.8400), it dropped to 0.6839 by 2020 before rebounding to above 0.78 levels in 2022-2023. The decline in the early years suggests the impact of deleveraging, while the recovery may indicate increasing reliance on debt in the face of liquidity

needs or investment ambitions. Despite the fluctuations, the values remained within a relatively conservative range, indicating stable risk profiles of wineries in the sample over the investigation period.

The **long-term asset coverage ratio** remained consistently above 1.0, ranging from 1.0909 to 1.2164, implying that equity was sufficient to cover long-term asset investments throughout the period. This is a positive sign of financial prudence, particularly relevant in capital-intensive sectors like winemaking.

In summary, Hungarian wineries pursued a relatively cautious capital structure pre-COVID, marked by strong equity positions and low reliance on external debt. While indebtedness rose slightly in the post-COVID period, the overall financial leverage remained contained. These findings suggest that the sector preserved financial resilience and avoided excessive risk-taking, even amid external shocks and rising costs.

### **Profitability and cash management metrics**

The profitability and cash management metrics examined in this study offer a comprehensive view of the wineries' ability to generate earnings and convert profits into operational liquidity over the 2016-2023 period. This category includes the **EBIT margin, return on equity (ROE), asset efficiency ratio**, and several **cash-flow-based indicators**.

The **EBIT margin**, measuring operating profitability relative to revenue, showed a positive trend from 2.11% in 2016 to a peak of 9.33% in 2020. This fourfold increase over five years suggests significant improvements in operational efficiency and cost management leading up to the pandemic, potentially reflecting the generic economic prosperity in the country and the world. However, margins started to gradually decline after 2020, reaching 5.01% in 2023, indicating profitability strains in the post-COVID years. This drop may reflect rising input costs, pricing pressures, or shifts in product mix, all contributing to reduced profits after the pandemic.

The **return on equity (ROE)** followed a similar trajectory as EBIT margin, increasing from 7.6% in 2016 to 6.51% in 2020, before declining steadily to 3.51% in 2023. The ROE trend is particularly noteworthy, as it signals that the strong equity base built before the COVID pandemic hit became less productive in generating shareholder returns during the recovery period. This aligns with broader observations of post-pandemic profitability decline in the sector.

The **asset efficiency ratio** (assets/revenue) provides a counterbalance to the asset turnover ratio discussed earlier, with higher values indicating lower efficiency of how assets are employed. The ratio worsened from 1.9793 in 2016 to a peak of 2.2411 in 2020, implying a temporary drop in efficiency as assets increased more rapidly than revenue before the crisis. The gradual improvement post-2021 suggests a stabilisation of asset utilisation among leading Hungarian wineries.

Cash-flow-based metrics - only available from 2017 onwards - add further details to the previously discussed picture. The **cash-flow to debt ratio** peaked at 0.1529 in 2020, reflecting improved ability to cover long-term obligations during a period of relatively strong cash flow generation capabilities. However, the sharp decline to 0.0641 in 2023 indicates deteriorating debt-servicing capacity. Similarly, **cash-flow to assets** and **cash-flow to revenue** ratios both declined up to 2023 after the COVID pandemic hit (to 0.0074 and 0.0155, respectively), suggesting significant challenges in converting revenues into liquidity in the post-pandemic period. Lastly, the **working capital to equity ratio** decreased from its peak of 0.2738 in 2016 to 0.1830 in 2023, pointing to a shrinking liquidity buffer relative to equity. This may reflect tighter cash cycles, inventory build-ups, or delayed cash inflows from receivables outstanding.

To summarize the discussion, profitability among Hungarian wineries improved steadily up to 2020 but faced renewed pressures in the post-COVID years. Cash generation capacity weakened substantially after the pandemic, indicating liquidity stress despite acceptable (albeit, shrinking) accounting profitability. This divergence between earnings and cash flow may signal structural risks in financial sustainability, particularly under inflationary or credit-constrained conditions.

## 5. Summary of results

The analysis of the financial position and performance of Hungarian wineries between 2016 and 2023 highlight both periods of advancements and vulnerabilities in the sector. On the one hand, the industry demonstrated resilience through sustained revenue growth and improvements in operating and pre-tax profitability, particularly in the pre-COVID years. On the other hand, the evolution of key financial ratios points to structural vulnerabilities that intensified after the pandemic and may pose long-term challenges for the financial sustainability of Hungarian winemaking.

First, the deterioration of **liquidity ratios** highlights a weakening ability to cover short-term obligations from current assets. This erosion, most pronounced after 2020, suggests increasing reliance on external financing or slower asset turnover, leaving firms more exposed to shocks in cash flow and working capital cycles. Second, **indebtedness indicators** show that while wineries pursued conservative capital structures before the pandemic, the post-2020 period saw rising debt and declining company wealth ratios. This shift indicates a slow depletion of equity buffers generated in the pre-pandemic years, with a greater dependence on debt financing. This can raise concerns about future creditworthiness of the industry in an environment characterized by higher interest rates and tighter financial conditions. Third, **profitability and asset efficiency** indicators point out constraints on the sector's overall financial resilience. Although margins and returns improved steadily until 2020, they weakened thereafter, reflecting potentially higher input costs, volatility in demand for wine and grape-based products, and the underutilisation of production assets. The reversal of these gains

suggests that the increase in profitability may have been the result of external factors mostly and was less due to structural efficiency improvements implemented by companies in the Hungarian wine sector. Finally, **cash-flow ratios** reveal that despite the acceptable levels of accounting profitability, the sector struggled to generate sufficient operational liquidity in the post-COVID years. The divergence between profit indicators and cash-flow measures points to a growing mismatch between reported earnings and underlying financial health of Hungarian winemaking companies.

## 6. Implication and Conclusion

Taken together, these insights suggest that while Hungarian wineries adapted reasonably well to the polycrisis period, their financial position became more fragile in key dimensions. For academic inquiry, the findings highlight the importance of triangulating profitability measures with liquidity and solvency indicators, as reliance on headline growth figures risks obscuring vulnerabilities. Moreover, the sector offers a relevant case for studying how small- and medium-sized enterprises in traditional industries balance resilience and risk under external shocks, with potential implications for capital structure theory, crisis management, and the sustainability of agribusiness finance.

This research has several limitations that should be acknowledged. First, the analysis is based on secondary financial data, which, while reliable for ratio calculations, does not capture qualitative aspects of managerial decisions that may influence financial outcomes. Second, the use of aggregated cash-flow figures limits the ability to distinguish between operating, investing, and financing activities, which could provide a more detailed view of liquidity management practices followed by the wineries in our sample. Third, the study relies primarily on aggregate ratios calculated and does not apply more advanced statistical methods such as regression modelling, component analysis, or panel data techniques, which could reveal more meaningful relationships between capital structure, profitability, and financial resilience. Furthermore, the sample is restricted to 104 Hungarian wineries with annual revenues above HUF 100 million and continuous operation since at least 2016. This inclusion criteria narrows the scope and reduces generalisability, both within Hungary and internationally. Also, the financial dynamics of smaller or recently established wineries may differ substantially compared to the larger, better-established players in our sample, introducing the risk of survivorship bias into this study. By analysing only companies that endured the entire study period, the findings may overstate sectoral resilience and underrepresent the risks faced by less stable or less capitalised wineries. Future research could be conducted to address these limitations by incorporating smaller and younger wineries into the analysis, applying advanced statistical techniques to uncover deeper relationships between financial indicators, using qualitative methods (e.g. in-depth interviews with

wine experienced executives) and extending the scope beyond Hungary through cross-country comparisons that capture different institutional and market contexts.

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