

Assessing the Impact of Covid-19 on Farm Profitability in Czechia and Slovakia: A Comparative Dupont Analysis Using Firm-Level Data

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Abstract

This study evaluates the impact of COVID-19 on agricultural profitability in Czechia and Slovakia, distinguishing between crop, livestock, and mixed farms. Using firm-level financial data from the Orbis database, an extended DuPont model incorporating labour efficiency is employed to compare profitability drivers pre- (2018–2019) and during (2020–2021) the pandemic. The findings reveal persistent national differences and highlight labour efficiency as a stabilising factor, underscoring agricultural resilience and the importance of structural efficiency in mitigating shocks.

Keywords

Profitability, agriculture, COVID-19, DuPont, RoE, labour productivity, financial leverage.

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Introduction

Profitability is a key indicator of economic performance in agriculture and a major concern in ongoing debates about the viability of farming in Europe. Widespread farmer protests across Europe in the years following the pandemic have drawn attention to mounting economic pressures in the sector, including stagnant incomes, rising input costs, and regulatory burdens (Finger et al., 2024; Matthews, 2024). The COVID-19 pandemic was widely perceived as an unprecedented global challenge that disrupted agricultural markets - through falling prices, supply chain interruptions, and labour shortages, particularly in sectors dependent on seasonal and migrant labour - with presumed implications for farm profitability (Bochtis et al., 2020; Phillipson et al., 2020; Štreimikienė et al., 2022). Despite growing recognition of the sector's resilience during the pandemic, little is known about how profitability developed at the farm level, particularly in the Central European context. A deeper understanding of the pandemic's impact on farm profitability and its underlying drivers can help managers and policymakers strengthen the sector's resilience to future crises.

Traditional profitability indicators, such as return on sales (RoS), return on assets (RoA), and return

on equity (RoE), have long been used to evaluate agricultural performance. A large body of European empirical research has applied regression-based methods to identify statistically measurable determinants of these indicators, often using panel or cross-sectional data. In addition to other factors - such as farm size, market position, liquidity, and subsidies - these studies found that financial structure and investment in operational assets are fundamental drivers of farm profitability (Andrašić et al., 2018; Berežnicka, 2018; Kryszak et al., 2021; Lehenchuk et al., 2023; Martinho, 2022; Mijić and Jakšić, 2017; Beyer and Hinke, 2018). Other studies have emphasised the strong influence of labour use and productivity (Golas, 2016; Józwiak et al., 2019; Kusz et al., 2022; Martín-Retortillo and Pinilla, 2015).

These findings empirically justify the choice of factors used in pyramid-based decomposition techniques, which break down a profitability ratio into its constituent drivers through formal mathematical relationships. The most common of these, the DuPont approach, has often been applied in European agriculture to trace the contribution of margins, capital utilisation, and capital structure to overall profitability - usually focusing on specific countries and farm types. Szymanska (2015) analysed the RoE of Polish pig farms and found that it

was strongly influenced by RoS. Ladvenicová et al. (2019) used a DuPont model to analyse changes in RoE across farms in the four Visegrad countries, showing that profitability was largely driven by RoA. Parzonko et al. (2023) examined RoE variation over time in dairy farms from five selected European countries, while Baležentis and Novickytė (2018) focused on Lithuanian family farms, and Očić et al. (2025) studied Croatian farms. These studies found that RoE was influenced by distinct factors depending on region and farm type. However, they relied on aggregated data sources such as the Farm Accountancy Data Network (FADN), which do not account for firm-level heterogeneity and thus limit statistical differentiation among individual farms. Only a small number of studies use firm-level data to enhance analytical precision and capture structural variation more effectively. Aulová et al. (2019) applied a DuPont model to analyse the impact of legal form and farm size on the profitability of Czech farms, using company-level data from the Amadeus database, which has since been integrated into the Orbis database used in this study. Lehenchuk et al. (2023) used firm-level Orbis data for a regression model as discussed above. All these studies retain the capital-based focus of the classic DuPont framework without integrating additional explanatory factors.

Building on previous research, this study applies an extended DuPont framework that includes labour efficiency as an additional driver of profitability. This extension is particularly relevant because labour was severely affected by public health restrictions and the reduced availability of seasonal and migrant workers during the pandemic (Bochtis et al., 2020; Neef, 2020; Nicola et al., 2020). Using harmonised firm-level data from Orbis, the study compares specialised crop, livestock, and mixed farms in Czechia and Slovakia across two sub-periods: pre-COVID (2018–2019) and during COVID (2020–2021). Two hypotheses are tested: (H1) farm-level RoE and its components were significantly altered during the pandemic; and (H2) pre-existing profitability differences between Czech and Slovak farms were reinforced rather than reduced.

While the effects of the COVID-19 pandemic on the European agricultural sector have been widely discussed in qualitative research (Barcaccia et al., 2020; Blažková et al., 2023; Meuwissen et al., 2021), quantitative evidence on its specific economic consequences remains limited (Benedek

et al., 2021; Gómez-Limón et al., 2023). This study addresses this gap by offering a firm-level, decomposition-based comparative analysis of profitability dynamics during the pandemic in the agricultural sectors of Czechia and Slovakia. The findings provide policy-relevant insights into the resilience, efficiency, and structural differences of farms in these two countries.

Material and methods

The analysis uses firm-level data from the Orbis database (2024), which provides harmonised annual accounts for agricultural firms across Europe. Orbis is compiled by Bureau van Dijk (a Moody's Analytics company) and is available through institutional subscription. Its harmonised reporting standards ensure consistency and comparability across countries. The sample includes a large number of Czech and Slovak farms with comparable accounting standards, enabling cross-country comparisons and significance testing. Farms are classified according to the NACE system (Eurostat, 2008) into crop production (01.1-01.3), livestock production (01.4), and mixed farming (01.5).

The study focuses on the period 2020-2021 to isolate the effects of COVID-19 and excludes 2022 due to market disruptions following the invasion of Ukraine by Russia. The pandemic years are compared to the equally spaced pre-pandemic period (2018-2019). For these four years, the Orbis database provides complete financial data for 1,412 agricultural companies, categorised by country and farm type as shown in Table 1.

Type of farming	Czechia	Slovakia
Crop production	95	304
Livestock production	97	398
Mixed farming	290	228
Total	482	930

Source: Own processing based on Orbis (2024)

Table 1: Number of farms in the sample by country and production type.

In the typical DuPont logic, profitability measures can be decomposed into two components: an input-oriented volume or intensity dimension and an output-oriented margin or surplus dimension. This analytical principle provides the foundation for the multi-layered interpretation of firm performance applied in this study.

At the classical core of this model, return on net assets (RoNA) reflects the interaction between the intensity with which net assets are used to generate turnover (AT) and the margin achieved per unit of turnover (RoS). Net assets are defined as the sum of fixed assets and net working capital. The same decomposition principle can be extended in one direction to incorporate the financing structure. In this case, return on equity (RoE) combines the financial leverage (FL) as a capital-intensity dimension – represented by the relationship between net assets and equity – with RoNA as the margin component.

In the other direction, RoS – the margin element of RoNA – can itself be disaggregated following the same logic. Return on sales can be viewed as the product of a labour-intensity factor (LI), measured as the number of employees required per unit of turnover, and labour profitability (LP), representing profit per worker as the surplus component. This modification of the traditional model corresponds to the expected effects of the pandemic on the availability and profitability of labour.

Together, these three layers – labour, operational net assets, and the financing structure – apply a consistent DuPont rationale across distinct domains of firm performance. At each level, profitability is shaped by how intensively a given resource base is used and by the surplus generated from that use. This yields a stepwise decomposition that includes return on sales (RoS) and return on net assets (RoNA) as intermediate components, as illustrated in Equation (1).

$$\begin{aligned}
 RoS &= \frac{Net\ income}{Turnover} = LP \times LI \\
 RoNA &= \frac{Net\ income}{Fixed\ assets + Net\ working\ capital} = RoS \times AT \\
 RoE &= \frac{Net\ income}{Equity} = RoNA \times FL = LP \times LI \times AT \times FL \quad (1)
 \end{aligned}$$

where:

- LP* Labour profitability = Net income / Employees
- LI* Labour intensity = Employees / Turnover
- AT* Asset turnover = Turnover / (Fixed assets + Net working capital)
- FL* Financial leverage = (Fixed assets + Net working capital) / Equity

RoE and its components were calculated at the farm level for each country, farm type, and sub-period. The analysis compares the average values

from the pandemic years (2020-2021) to those from the pre-pandemic years (2018-2019), yielding two sub-periods: COVID (cov) and pre-COVID (pre). This design allows for a two-dimensional comparison - both across countries (Czechia vs Slovakia) and over time (pre vs during COVID). Deviations in RoE (ΔRoE) are calculated by comparing a selected object (*O*) to a defined benchmark (*B*). The total deviation is then decomposed into partial effects using the drivers from Equation (1), as illustrated in Equation (2).

$$\begin{aligned}
 \Delta RoE_{O-B} &= RoE_O - RoE_B \\
 &= \Delta RoE_{O-B}^{LP} + \Delta RoE_{O-B}^{LI} + \Delta RoE_{O-B}^{AT} + \Delta RoE_{O-B}^{FL} \\
 &= \Delta RoE_{O-B}^{RoS} \\
 &= \Delta RoE_{O-B}^{RoNA} \quad (2)
 \end{aligned}$$

Because the profitability model in Equation (1) is multiplicative, a logarithmic decomposition approach (Montgomery, 1937; Vartia, 1976) can be applied to attribute deviations in RoE to their underlying drivers. This method enables consistent quantification of the effects at component level, a technique that is commonly used in agricultural economics (Golas, 2016; Ladvenicová et al., 2019). Equation (3) presents the specific form used in this study.

$$\begin{aligned}
 \Delta RoE_{O-B}^{LP} &= (RoE_O - RoE_B) \times \log(LP_O / LP_B) / \log(RoE_O / RoE_B) \\
 \Delta RoE_{O-B}^{LI} &= (RoE_O - RoE_B) \times \log(LI_O / LI_B) / \log(RoE_O / RoE_B) \\
 \Delta RoE_{O-B}^{AT} &= (RoE_O - RoE_B) \times \log(AT_O / AT_B) / \log(RoE_O / RoE_B) \\
 \Delta RoE_{O-B}^{FL} &= (RoE_O - RoE_B) \times \log(FL_O / FL_B) / \log(RoE_O / RoE_B) \quad (3)
 \end{aligned}$$

The choice of analysed objects (*O*) and their benchmarks (*B*) depends on the comparison perspective - either across countries or across time periods. The extended DuPont components are defined using financial variables from the Orbis database, as summarised in Table 2.

Indicators were calculated as weighted means to reduce the influence of small outliers, using farm-level two-sided t-tests to assess significance. Significance levels are indicated in Tables 3-5 using the following notation: † = $p < 0.1$; * = $p < 0.05$; ** = $p < 0.01$. All calculations were performed using Microsoft Excel. The empirical results are presented and discussed in the next section.

CZ_{cov}		ΔRoECZ-SK (cov)		SK_{cov}	
<i>LP</i>	7.187	<i>ΔRoE_{LP}</i>	2.3% *	<i>LP</i>	5.078
<i>× LI</i>	0.010	<i>+ ΔRoE_{LI}</i>	0.8% *	<i>× LI</i>	0.008
= RoS	6.9%	= ΔRoE_{RoS}	3.2% **	= RoS	4.3%
<i>× AT</i>	0.657	<i>+ ΔRoE_{AT}</i>	-1.6% **	<i>× AT</i>	0.834
= RoNA	4.5%	= ΔRoE_{RoNA}	1.6%	= RoNA	3.6%
<i>× FL</i>	1.408	<i>+ ΔRoE_{FL}</i>	-2.2% **	<i>× FL</i>	1.950
= RoE	6.4%	= ΔRoE	-0.6%	= RoE	7.0%
ΔRoE_{cov-pre} (CZ)			ΔRoE_{cov-pre} (SK)		
<i>ΔRoE_{LP}</i>	1.2% *	Crop production	<i>ΔRoE_{LP}</i>	4.2% **	
<i>+ ΔRoE_{LI}</i>	-0.5%		<i>+ ΔRoE_{LI}</i>	-1.0% †	
= ΔRoE_{RoS}	0.7%		= ΔRoE_{RoS}	3.3% †	
<i>+ ΔRoE_{AT}</i>	-0.1%		<i>+ ΔRoE_{AT}</i>	-0.1%	
= ΔRoE_{RoNA}	0.6%		= ΔRoE_{RoNA}	3.2%	
<i>+ ΔRoE_{FL}</i>	-0.1%		<i>+ ΔRoE_{FL}</i>	-0.2%	
= ΔRoE	0.5%	= ΔRoE	3.0%		
CZ_{pre}		ΔRoECZ-SK (pre)		SK_{pre}	
<i>LP</i>	5.908	<i>ΔRoE_{LP}</i>	4.6% **	<i>LP</i>	2.310
<i>× LI</i>	0.010	<i>+ ΔRoE_{LI}</i>	0.1% **	<i>× LI</i>	0.010
= RoS	6.1%	= ΔRoE_{RoS}	4.7% **	= RoS	2.3%
<i>× AT</i>	0.667	<i>+ ΔRoE_{AT}</i>	-1.2% **	<i>× AT</i>	0.844
= RoNA	4.1%	= ΔRoE_{RoNA}	3.5%	= RoNA	2.0%
<i>× FL</i>	1.440	<i>+ ΔRoE_{FL}</i>	-1.6% †	<i>× FL</i>	2.015
= RoE	5.9%	= ΔRoE	1.9%	= RoE	4.0%

Note: (*LP* = Labour profitability; *LI* = Labour intensity; *AT* = Asset turnover; *FL* = Financial leverage; t-test results: † = $p < 0.1$ * = $p < 0.05$; ** = $p < 0.01$)
 Source: Own processing based on Orbis (2024)

Table 3: RoE and its components in Czech vs Slovak crop farms before and during COVID-19.

hypothesis H1, indicating that some components of RoE were affected. However, the overall stability or even improvement in RoE, particularly in Czechia, suggests that the impact of COVID-19 was more limited than expected. The persistence and partial amplification of national differences, especially in labour-related drivers, provides stronger support for hypothesis H2.

Livestock production

Table 4 shows that during the period 2020–2021, Czech livestock farms had significantly higher labour profitability (*LP*), driving a 4.7% RoE advantage from a higher RoS. Slovak farms had lower *LP* and weaker RoS, and although they maintained higher *AT* and *FL*, these were insufficient to close the RoE gap, which favoured Czechia by 3.7% overall.

Within-country trends show a divergent impact of COVID-19. In Czechia, RoE rose modestly (+0.9%) due to higher *LP*. In contrast, Slovak RoE fell significantly (−2.0%), largely due to declining *LP*. Although only some component shifts were statistically significant, the patterns indicate heterogeneous effects. The results for livestock farms mirror previous findings in the European context. Szymanska (2015) demonstrated that in Polish pig farms, return on sales was the main determinant of profitability, whereas financial

leverage played only a minor role. Similarly, Parzonko et al. (2023) found that operational efficiency was the key source of RoE variation among European dairy farms. Overall, the results point to operational efficiency as the main source of performance divergence between Czech and Slovak animal farms, while financial leverage appears to have played only a secondary role.

The impact of the pandemic was more heterogeneous in livestock production. Czech farms experienced a modest improvement in RoE, while Slovak ones saw a significant decline, primarily due to reduced labour profitability. These findings offer only partial support for hypothesis H1: some profitability components were affected, but the magnitude of overall change remained limited in Czechia. In contrast, the growing performance gap between Czech and Slovak farms - driven by persistent or even increasing structural differences - strongly supports hypothesis H2, indicating that the pandemic reinforced rather than reduced existing disparities.

CZ _{cov}		ΔRoECZ-SK (cov)			SK _{cov}	
LP	5.077	ΔRoE _{LP}	5.1%	*	LP	0.365
× LI	0.009	+ ΔRoE _{LI}	-0.3%	**	× LI	0.011
= RoS	4.7%	= ΔRoE _{RoS}	4.7%	**	= RoS	0.4%
× AT	0.692	+ ΔRoE _{AT}	-0.5%	**	× AT	0.887
= RoNA	3.3%	= ΔRoE _{RoNA}	4.2%	**	= RoNA	0.4%
× FL	1.328	+ ΔRoE _{FL}	-0.5%	**	× FL	1.744
= RoE	4.4%	= ΔRoE	3.7%	**	= RoE	0.6%
ΔRoE _{cov-pre} (CZ)		Livestock production			ΔRoE _{cov-pre} (SK)	
ΔRoE _{LP}	1.4%				ΔRoE _{LP}	-1.9%
+ ΔRoE _{LI}	-0.4% *				+ ΔRoE _{LI}	-0.2% †
= ΔRoE _{RoS}	0.9%				= ΔRoE _{RoS}	-2.1%
+ ΔRoE _{AT}	0.1%				+ ΔRoE _{AT}	0.1%
= ΔRoE _{RoNA}	1.0%				= ΔRoE _{RoNA}	-2.0% *
+ ΔRoE _{FL}	-0.1%				+ ΔRoE _{FL}	0.0%
= ΔRoE	0.9%				= ΔRoE	-2.0% *
CZ _{pre}		ΔRoECZ-SK (pre)			SK _{pre}	
LP	3.582	ΔRoE _{LP}	2.7%	*	LP	1.439
× LI	0.010	+ ΔRoE _{LI}	-0.6%	**	× LI	0.013
= RoS	3.7%	= ΔRoE _{RoS}	2.2%	**	= RoS	1.8%
× AT	0.677	+ ΔRoE _{AT}	-0.7%	**	× AT	0.847
= RoNA	2.5%	= ΔRoE _{RoNA}	1.5%		= RoNA	1.5%
× FL	1.367	+ ΔRoE _{FL}	-0.7%	†	× FL	1.714
= RoE	3.4%	= ΔRoE	0.8%		= RoE	2.6%

Note: (LP = Labour profitability; LI = Labour intensity; AT = Asset turnover; FL = Financial leverage; t-test results: † = p < 0.1 * = p < 0.05; ** = p < 0.01)
 Source: Own processing based on Orbis (2024)

Table 4: Comparison of RoE drivers in Czech and Slovak livestock farms, pre- and during COVID-19.

Mixed farming

Table 5 shows that in 2020–2021, Czech mixed farms retained higher labour profitability (LP), contributing to a stronger impact of RoS. However, the total RoE gap narrowed, as Slovak farms benefited from higher asset turnover (AT) and financial leverage (FL), yielding only a slight Czech RoE advantage of +0.4%.

The pandemic had minimal impact on Czech mixed farms, where RoE declined slightly (−0.1%). Slovak farms, though, saw a modest increase (+2.0%), driven by improved labour profitability. However, few component shifts were statistically significant, and profitability structures remained largely stable. This stability in profitability composition is broadly consistent with earlier findings for the Central European agricultural sector. Kryszak et al. (2021) and Lehenchuk et al. (2023) showed that overall farm profitability in Poland, Slovakia and Ukraine was mainly driven by operational efficiency and liquidity rather than by leverage, with debt effects depending on the institutional environment. Similarly, Ladvenicová et al. (2019) found that RoE in the Visegrad countries was largely determined by return on assets, while financial structure factors were secondary. Aulová et al. (2019) observed a comparable pattern for Czech farms, where

financial leverage had little influence on small and medium-sized enterprises but became more relevant in larger farms. Taken together, these findings suggest that the profitability patterns observed for mixed farms reflect structural and efficiency-related conditions rather than differences in financial leverage, similar to the patterns found for specialised crop and livestock farms.

The findings suggest that the effects of the pandemic on mixed farms were moderate and less polarised than in crop or livestock production. As in the other farm types, Czech farms maintained a consistent advantage in terms of labour, while Slovak ones relied more on capital-based drivers to improve RoE. The limited within-country changes in overall RoE offer only partial support for hypothesis H1, suggesting that while individual components such as labour profitability shifted, the broader profitability structure remained relatively resilient. The persistence of Czechia’s advantage in labour efficiency and the stability of other structural differences provide stronger support for hypothesis H2, reinforcing the view that pre-existing disparities were maintained or modestly deepened during the crisis. The limited short-term variation further supports

CZ_{cov}		$\Delta RoE_{CZ-SK (cov)}$			SK_{cov}	
<i>LP</i>	5.161	ΔRoE_{LP}	3.4%	**	<i>LP</i>	2.308
$\times LI$	0.010	$+\Delta RoE_{LI}$	-0.4%	**	$\times LI$	0.011
= RoS	5.1%	= ΔRoE_{RoS}	3.0%	**	= RoS	2.5%
$\times AT$	0.601	$+\Delta RoE_{AT}$	-1.9%		$\times AT$	0.934
= RoNA	3.1%	= ΔRoE_{RoNA}	1.2%		= RoNA	2.3%
$\times FL$	1.439	$+\Delta RoE_{FL}$	-0.8%	†	$\times FL$	1.738
= RoE	4.4%	= ΔRoE	0.4%		= RoE	4.0%
$\Delta RoE_{cov-pre (CZ)}$					$\Delta RoE_{cov-pre (SK)}$	
ΔRoE_{LP}	0.5% *	Mixed farming	ΔRoE_{LP}	2.4%	<i>LP</i>	1.027
$+\Delta RoE_{LI}$	-0.4% *		$+\Delta RoE_{LI}$	-0.4%	†	
= ΔRoE_{RoS}	0.1%		= ΔRoE_{RoS}	2.0%		
$+\Delta RoE_{AT}$	-0.1%		$+\Delta RoE_{AT}$	0.1%		
= ΔRoE_{RoNA}	0.0%		= ΔRoE_{RoNA}	2.1%		
$+\Delta RoE_{FL}$	-0.1%		$+\Delta RoE_{FL}$	-0.1%		
= ΔRoE	-0.1%	= ΔRoE	2.0%	†		
CZ_{pre}		$\Delta RoE_{CZ-SK (pre)}$			SK_{pre}	
<i>LP</i>	4.647	ΔRoE_{LP}	4.7%	*	<i>LP</i>	1.027
$\times LI$	0.011	$+\Delta RoE_{LI}$	-0.4%	**	$\times LI$	0.012
= RoS	5.1%	= ΔRoE_{RoS}	4.3%	**	= RoS	1.3%
$\times AT$	0.614	$+\Delta RoE_{AT}$	-1.2%	†	$\times AT$	0.912
= RoNA	3.1%	= ΔRoE_{RoNA}	3.1%		= RoNA	1.1%
$\times FL$	1.457	$+\Delta RoE_{FL}$	-0.6%	*	$\times FL$	1.787
= RoE	4.5%	= ΔRoE	2.5%	†	= RoE	2.0%

Note: (*LP* = Labour profitability; *LI* = Labour intensity; *AT* = Asset turnover; *FL* = Financial leverage; t-test results: † = $p < 0.1$ * = $p < 0.05$; ** = $p < 0.01$)
 Source: Own processing based on Orbis (2024)

Table 5: Breakdown of RoE differences in Czech and Slovak mixed farms across time periods.

the interpretation that pandemic-related effects were absorbed within existing efficiency structures rather than altering them fundamentally.

While the use of harmonised firm-level data from a common source and a consistent methodology strengthens the comparability between Czechia and Slovakia, several limitations remain. The relatively short observation window (2020–2021) may not capture delayed effects of the COVID-19 crisis. Additionally, the Orbis database likely over-represents larger, more formalised farms, potentially biasing results toward greater resilience. Finally, although the analysis reveals strong associations between profitability drivers and outcomes, it does not establish causality. These limitations should be borne in mind when interpreting the findings, even though they remain broadly consistent with the existing literature, as summarised in the following conclusion.

Conclusion

In summary, the direct impact of the COVID-19 pandemic on agricultural profitability appears to have been relatively limited. This finding holds across specialised crop, livestock, and mixed

farms, though the effects were not uniform. In particular, Slovak livestock farms experienced a notable decline in profitability, while most other farm types either maintained or modestly improved their financial performance. These findings offer only partial support for hypothesis H1, indicating that while individual profitability components - especially labour-related metrics - were affected, the overall return on equity remained broadly stable. This limited impact suggests a high degree of resilience in the agricultural sector, consistent with previous findings on its countercyclical behaviour (Barcaccia et al., 2020; Meuwissen et al., 2021).

At the same time, the evidence provides stronger support for hypothesis H2, confirming that crises such as COVID-19 tend to reinforce rather than reduce existing structural differences. Pre-pandemic profitability disparities between Czech and Slovak farms - particularly those linked to labour efficiency and financial leverage - either persisted or widened during the pandemic. This aligns with broader evidence from firm-level research in other sectors showing that economic shocks tend to entrench pre-existing performance advantages (Alcalde-Fradejas and Ramírez-Alesón,

2015). Similar patterns are observed in agriculture, where persistent profitability differences have been documented among Visegrad farms, largely explained by variations in asset returns rather than capital structure (Ladvenicová et al., 2019), and where cross-country heterogeneity in farm performance remains substantial despite common policy frameworks (Kryszak and Herzfeld, 2021).

The general finding that RoE in DuPont decompositions is driven primarily by the margin term (RoS), rather than by volume- or intensity-related factors such as asset turnover or financial leverage, is fully consistent with earlier studies, as discussed above. This supports the further disaggregation of RoS into labour intensity and labour profitability, as applied in this study. The renewed low impact of labour intensity on RoE contradicts expectations based on widespread reports of labour shortages during the pandemic (Bochtis et al., 2020). Instead, it underscores the importance of labour profitability and its determinants, as analysed by Golas

(2016) and Kusz et al. (2022). Incorporating these determinants into future extensions of the DuPont framework would help to address current limitations.

These findings may also help to contextualise the farmer protests that emerged in the immediate aftermath of the pandemic. Despite reports of economic pressure, the results of this study suggest that short-term profitability was not the main driver; instead, structural burdens such as regulatory complexity and long-term competitiveness issues likely played a greater role. Further research is needed to assess the motivations for protest directly.

Future studies should examine these structural challenges more closely and assess how policy can support both the resilience and sustainability of European agriculture. Differentiating between temporary shocks like COVID-19 and longer-term stressors will be essential for designing targeted and effective policy responses.

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