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# GOVERNMENT-FUNDED AGRIBUSINESSES: EMPIRICAL EVIDENCE TO WHAT EXTENT IS FARMING SUPPORTED IN LITHUANIA

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**Abstract**
The aim of this study was to evaluate the extent to which agribusinesses in Lithuania are supported by the government and to analyse the differences in the effectiveness of this support among farms. The study examines the degree to which current subsidies enhance revenue generated from core business operations and their impact on farm profitability, with a focus on differences related to farm size. To achieve these objectives, two indicators, including the nominal direct support coefficient (NDSC) and return on assets (ROA), were used. The effect of current subsidies on RAO was measured as the difference between the values of indicator calculated "with subsidies" (reflecting the actual situation) and "without subsidies". The findings indicate significant variation in the effectiveness of current subsidies across farms, suggesting a distortion of competitive conditions from an economic perspective.

***Keywords:*** *agribusinesses, current subsidies, investment subsidies, nominal protection coefficient, return on assets.*
***JEL Codes:*** *Q12, Q14, Q18.*

## Introduction

Agriculture today receives substantial support from governments across most countries globally. Public subsidies, implemented through various mechanisms, significantly influence not only agricultural production but also a broader spectrum of societal issues, including rural development, employment, environmental protection (Hemmings, 2016), the supply of agricultural raw materials, and the consumption of food products (Tanil, Kalabak, 2023). Consequently, agricultural subsidies are a focal point for policymakers, economic researchers, and society at large (Kumbhakar, Li, Lien, 2023).

The literature examines the multifaceted impact of government support on agricultural performance. Notably, empirical studies have predominantly focused on the relationship between public subsidies provided to farmers and farm-level technical efficiency or productivity (Serra, Zilberman, Gil, 2008; Kumbhakar, Lien, 2010; Baležentis, Kriščiukaitienė, 2012; Pechrova, 2015; Biagini, Antonioli, Severini, 2023; Moulay, Fertő, Bojnec, 2023; Kumbhakar, Li, Lien, 2023; Cillero, Reaños, 2023; Minviel, Sipiläinen, Latruffe, Bravo-Ureta, 2024; Moulay Ali, Guellil, Mokhtari, Tsabet, 2024) among others. A meta-analysis of empirical research findings (Minviel, Latruffe, 2016) highlights that the relationship between public subsidies and technical efficiency is often explored through subsidy modelling frameworks. In these models, subsidies are incorporated as explanatory contextual variables influencing efficiency.

Empirical research on the relationship between subsidies and technical efficiency predominantly utilizes Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA). Moreover, certain studies investigating this relationship have incorporated subsidies as an additional variable alongside traditional farming outputs to assess efficiency (Minviel, Sipiläinen, Latruffe, Bravo-Ureta, 2024). A meta-analysis revealed that empirical findings are mixed, with public subsidies demonstrating both statistically significant positive and negative effects on farm technical efficiency in 71% and 29% of the models, respectively (Moulay Ali, Guellil, Mokhtari, Tsabet, 2024). Minviel and Latruffe (2016) noted that studies published prior to 2003 generally reported a more negative impact of subsidies on technical efficiency, while more recent research indicates a shift in this trend.

The empirical investigation of the relationship between public subsidies to farmers and the economic or financial performance of farms represents a rapidly growing area of research. Specifically, numerous recent studies, including those by Szálteleki, Bánhegyi, Bacsi (2024); Kusz, et al. (2022); Melnikienė, Morkūnas, Volkov (2022); Kiaupaite - Grushniene, Altman (2016); Vrolijk, De Bont, Blokland, Soboh (2010), have analyzed the effects of CAP subsidies on farms' financial risk, resilience, or viability. These studies employ either conventional financial indicators—such as liquidity, profitability, solvency, and efficiency—that effectively characterize farm performance or composite impact indicators (e.g., see Melnikienė, Morkūnas, Volkov, 2022 for details) to facilitate their analyses.

Empirical studies provide intriguing yet contradictory findings. For example, Kiaupaite-Grushniene and Altman (2016) concluded that subsidies influence the economic and financial performance of farms, attributing the positive effects to superior management quality. Similarly, Melnikienė, Morkūnas, and Volkov (2022) identified a positive relationship between direct payments and the overall economic resilience of agriculture across all EU countries. However, they also noted that the long-term sustainability of these impacts is questionable due to declining economic efficiency in farms. Furthermore, Szálteleki, Bánhegyi, and Bacsi (2024) demonstrated that subsidies significantly enhance financial stability, resilience, and efficiency, but only within the micro-sized farm category.

Public support for farms exerts a diverse range of impacts due to the variety of support measures, their objectives, and areas of influence. Consequently, theoretical discourse and empirical research on this topic are highly diverse, leading to a wide variability in the results and conclusions of empirical studies. The aim of this study was to explore to what an extent agribusiness in Lithuania are supported by the government and the differences in the effectiveness of this support among the farms.

## Methods and data sources

The study assessed the extent to which current subsidies to farmers enhance farm business revenue derived from core business operations and the overall impact of these subsidies on farm profitability. To achieve these objectives, three indicators were used, including the Nominal Direct Support Coefficient (NDSC) and Return on Assets (ROA).

The Nominal Direct Support Coefficient (NDSC) evaluates the influence of current subsidies on Gross Farm Revenue (GFR). It is defined as the ratio of gross farm revenue generated from core business operations, including current subsidies (CS), to the gross farm revenue excluding current subsidies. The NDSC builds upon the framework of the OECD Producer Nominal Assistance Coefficient (OECD, 2024). Mathematically, the NDSC can be expressed as follows:

$$\mathrm{NDSC} = \frac{\mathrm{GFR}}{(\mathrm{GFR} - \mathrm{CS})}$$

The value of the NDSC represents the degree to which current subsidies enhance the farm's revenue derived from the sale of its products or services.

The definition and calculation of RAO and Gross farm revenue examined, are shown in Table 1. The effect of current subsidies paid to farmers on the RAO is measured as the difference between the values of this indicator calculated "with subsidies" (reflecting the actual situation) and "without subsidies".

**Table 1. Measures of farm's RAO and Gross farm revenue**

| Indicators | Definition and calculation |
|---|---|
| Gross farm revenue (GFR): | The annual value of total revenue received from:<br>1) Core farming business operations (RCBO) such as revenue from the sales of crop products (RCS), animals and livestock products (RLS); and<br>2) Sales of goods and services from the farm's other gainful activities segment (ROGA) |
| Return on assets (ROA): | The farm profitability ratio in relation to its total assets.<br>ROA = (Net farm income from core business operations − cost of unpaid labour)/Total assets |

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Aggregated data by physical size class of farms obtained from Lithuania's datasets of the Farm accountancy data network (FADN) survey in 2014 and 2022 (ŪADT tyrimo duomenys, 2015 and 2023) were used for the empirical analysis. Farms are classified under the class by utilised agricultural areas (UAA). To evaluate the impact of government subsidies on the economic performance of farms, a medium-term (2014–2022) was selected. This period aligns with the Programming period 2014-2020 of the European Union's Common Agricultural Policy (CAP) and includes an additional two years to assess the testability of CAP measures under the scheme (scheme 7+2).

## Results and Discussion

*Trend in farm size and structure in Lithuania*

This section provides a comprehensive overview of the current structure of the farm population in Lithuania and examines its evolution since the 2009 economic crisis. Following the crisis, there was a marked decline in the number of very small farms, averaging an 11% annual decrease from 2010 to 2023, alongside an accelerated process of farm consolidation. In 2023, Lithuania's agricultural sector consisted of 88,425 farms, using a total of 2.8 million hectares of utilised agricultural area (UAA). The average farm size has expanded significantly over the past two decades, reaching 32 hectares in 2023 – an increase of more than threefold compared to the 9-hectare average reported in 2003 during Lithuania's first agricultural census after the agricultural reforms of the 1990s. Currently, the average size of family farms is 28 hectares, considerably smaller than the 484 hectares recorded for corporate farms.

Family farms dominate the Lithuanian agriculture, comprising over 99% of all farms and accounting for 86% of the total cultivated area. Conversely, corporate farms – defined as agricultural companies and enterprises – make up less than 1% of farms but manage nearly 14% of the total UAA. Since 2010, the total number of farms has decreased by more than 50%, a trend driven by a similar reduction in family farms. In contrast, the number of corporate farms has increased by approximately 25% over the same period (see Table 2).

**Table 2. The structure of the population of farms by size categories in Lithuania: number of farms and UAA**

| UAA size categories and legal form of farms | 2010 | | | | 2023 | | | |
|---|---|---|---|---|---|---|---|---|
| | Number of farms | Proportion of farms | UAA (1000 ha) | Proportion of UAA | Number of farms | Proportion of farms | UAA (1000 ha) | Proportion of UAA |
| Total | 199 913 | 100% | 2 742.6 | 100% | 8 8425 | 100% | 2782.1 | 100% |
| Less than 2 hectares | 32 570 | 16.3% | 46.6 | 1.7% | 6340 | 7.2% | 6.9 | 0.2% |
| From 2 to 4.9 hectares | 84 829 | 42.4% | 266.0 | 9.7% | 21 962 | 24.8% | 73.0 | 2.6% |
| From 5 to 9.9 hectares | 39 897 | 20.0% | 276.8 | 10.1% | 23 419 | 26.5% | 168.5 | 6.1% |
| From 10 to 19.9 hectares | 21 473 | 10.7% | 296.0 | 10.8% | 15 373 | 17.4% | 215.8 | 7.8% |
| From 20 to 29.9 hectares | 6 638 | 3.3% | 160.6 | 5.9% | 5 133 | 5.8% | 125.1 | 4.5% |
| From 30 to 49.9 hectares | 5 874 | 2.9% | 228.1 | 8.3% | 4 830 | 5.5% | 187.7 | 6.7% |
| 50 hectares and over | 8 632 | 4.3% | 1 468.5 | 53.5% | 11 368 | 12.9% | 2 005.1 | 72.1% |
| Family farms | 199 267 | 99.7% | 2 622.6 | 87.3% | 87 614 | 99.1% | 2 507.3 | 86.3% |
| Agricultural companies and enterprises | 646 | 0.3% | 381.0 | 12.7% | 811 | 0.9% | 399.4 | 13.7% |

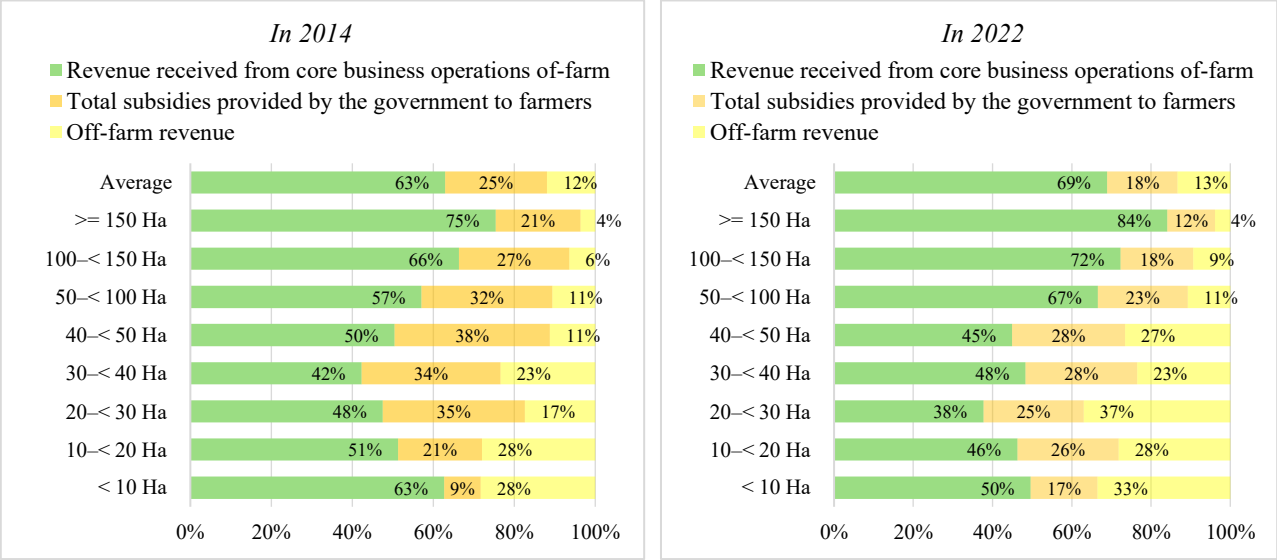
**Source: own composition based on the data from the 2010 Census of Agriculture and 2023 Survey of Farm Structure.*

Lithuania has experienced a marked consolidation of agricultural land following the economic crisis of 2009, as demonstrated in Table 2. Small and medium-sized farms have naturally declined or ceased operations due to economic pressures, with their land either being acquired or leased by larger family farms and corporate entities. Between 2010 and 2023, a substantial reduction in the number of farms was observed within smaller farm categories. Specifically, the number of very small farms (less than 5 hectares of UAA) decreased by more than 75%, while small farms (5 to 10 hectares of UAA) saw a reduction of 50%, and farms ranging from 10 to 30 hectares of UAA declined by over 25%. In contrast, the number of farms exceeding 50 hectares of UAA increased by nearly 33%. Notably, the most significant growth occurred in farms of 400 to 500 hectares of UAA, which expanded by 128%.

Despite the rapid consolidation of Lithuanian agriculture, the structural composition of farms remains dominated by a significant proportion of relatively small holdings in physical terms, as illustrated in Table 2. These farms are characterized by limited production scales. In 2023, very small farms (2–4.9 hectares of UAA) and small farms (5–9.9 hectares of UAA) represented more than half (51%) of all farms in Lithuania. Additionally, nearly a quarter of farms belonged to the remaining small farm size categories, namely less than 2 hectares of UAA and 10–19.9 hectares of UAA. Collectively, these small farms utilised approximately one-sixth (16.7%) of the total area under farming in Lithuania.

*Contribution of current subsidies to generating gross farm revenue in Lithuania*

This section provides an overview of the evolution of the structure of gross farm revenue over the medium term (2014–2023) across different physical size classes of Lithuanian farms. Farm revenues are categorized into three main types: revenue from core business operations (RCBO), public subsidies for farmers (PSF), and off-farm revenue (OFR), as illustrated in Figure 1. Additionally, Annex I presents a more detailed breakdown of gross farm revenue into six specific types. The RCBO is further classified into three primary sources: revenues from the sale of crop products, revenues from the sale of animals and livestock products, and revenues from the sale of goods and services originating from the farm's other gainful activities segment. Consequently, RCBO reflects the revenue generated directly by the farming business from market activities. PSF encompasses both current subsidies, derived from farming activities during the accounting year, and subsidies for farm investments, as defined by DG AGRI (2021). OFR represents income received from non-farming sources, such as wages and other household earnings. These funds are typically allocated to farming activities or other gainful operations on the farm.




**Source: Own calculations based on the data of Lithuania's FADN survey datasets (ŪADT, 2015; ŪADT 2023).*

**Figure 1. Breakdown of gross farm revenue by three main types across farm size classes in Lithuania**

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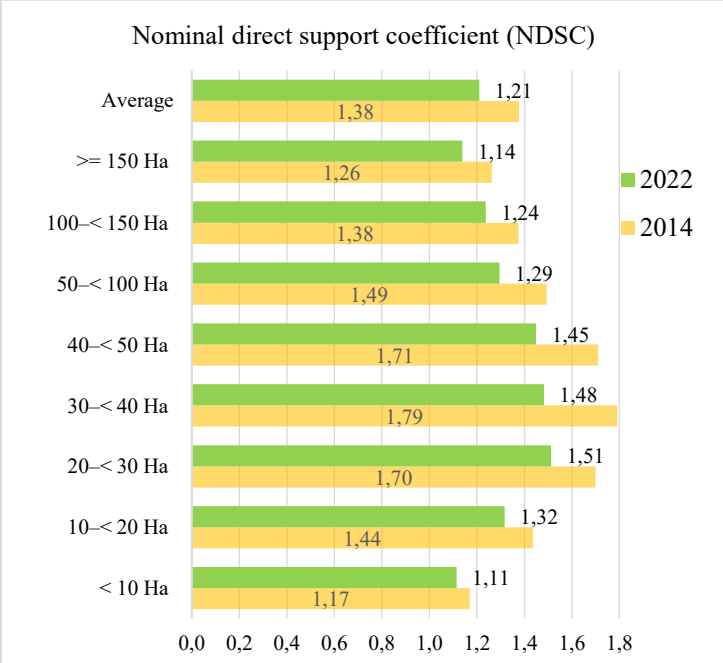
Both diagrams in Figure 1 and the data presented in Annex 3 demonstrate that the structure of gross farm revenue varies significantly across different farm size classes. According to the most recent data available for Lithuanian farms (see Figure 1, right), revenue generated from core business operations constitutes the primary income source for farms with 50 hectares or more UAA, as well as for small farms with up to 10 hectares of UAA. Conversely, farms within the 20 to 50-hectare UAA range derive over half of their gross revenue from government support and other off-farm income sources.

A detailed analysis of the structure of farm gross revenue (see Annex 1) reveals that for farms larger than 20 hectares of UAA, government support for investments accounts for a much smaller share than subsidies aimed at supporting current farming operations. Conversely, for farms smaller than 20 hectares of UAA, an inverse proportion is observed. Moreover, by the end of the study period, the share of income derived from the sale of crop products increased significantly across all farm size classes, while the contribution from the livestock sector decreased.

During the study period (since 2014), the proportion of public subsidies in gross farm revenue declined for farms exceeding 20 hectares of UAA, whereas the share of income from core farm business operations increased. However, within two medium-sized farm classes (20–30 hectares and 40–50 hectares), the share of revenue from core operations decreased. Additionally, it was observed that for farms smaller than 20 hectares of UAA, the contribution of agricultural product sales to gross revenue decreased significantly, while the share of public subsidies increased. On these smaller farms, cash income from off-farm activities accounted for up to one-third of the total gross revenue.

The increasing contribution of government subsidies to farm income can be attributed to several factors. In Lithuania, nearly half of economically small agricultural producers consume more than half of their production within their own households (Vitunskienė, Droždz, Bendoraitytė, Sapa, 2020). Kusz et al. (2022) concluded that subsidies provided to farmers diminish the influence of market and economic factors on production and organizational decisions in small farms. Additionally, Moulay Ali, Guellil, Mokhtari, and Tsabet (2024) argue that when a significant portion of farm income is guaranteed through subsidies, farmers‘ efforts may decrease. Subsidies may also create soft budget constraints, reducing the necessity for productive effort, as farms increasingly rely on external financial assistance.

This study evaluates the extent to which current subsidies enhance farm business revenue derived from core business operations. The impact of government intervention through various subsidies aimed at supporting current farming operations is measured using the Nominal Direct Support Coefficient (NDSC). The NDSC values, segmented by farm size classes, are presented in Figure 2. The findings reveal that the role of current subsidies (excluding investment subsidies) in financing agribusinesses has declined since the conclusion of policy interventions under the Common Agricultural Policy (CAP) for the 2014–2020 programming period. This indicates that Lithuanian farms, regardless of size, have increasingly relied on market mechanisms to generate income rather than on government subsidies.




**Source: Own calculations based on the data of Lithuania's FADN survey datasets (ŪADT, 2015; ŪADT, 2023).*

**Figure 2. Contribution of current subsidies to generating gross farm revenue across farm size classes in Lithuania**

The smallest farms (up to 10 hectares UAA) received the lowest contribution from current subsidies, with subsidies increasing market-generated revenue by 11% at the end of the study period, compared to 17% at the beginning. A slightly higher contribution from direct support was observed in the largest farms (150 hectares UAA and more), corresponding to 14% and 26% at the end and beginning of the study period, respectively. However, small farms receive significantly lower annual subsidies compared to large farms. In 2022, this disparity amounted to a 46-fold difference, with small farms receiving €2.7 thousand annually versus €182 thousand for large farms. This gap was even more pronounced in 2014, with a 67-fold difference. Consequently, current subsidies fail to provide substantial support for the agricultural sector of small farms.

As illustrated in Figure 2, medium-sized farms (20 to 50 hectares UAA) benefited the most from current subsidies for business financing. In this farm size class, subsidies increased market-generated revenue by 45% to 51%.

*Impact of current subsidies on farm profitability in Lithuania*

Figure 3 presents the RAO results, calculated by decomposing the RAO into "without subsidies" and "subsidies contribution". This decomposition highlights the extent and direction in which current subsidies alter the RAO value "with subsidies". Specifically, it shows the percentage point changes that make the RAO more positive or negative.

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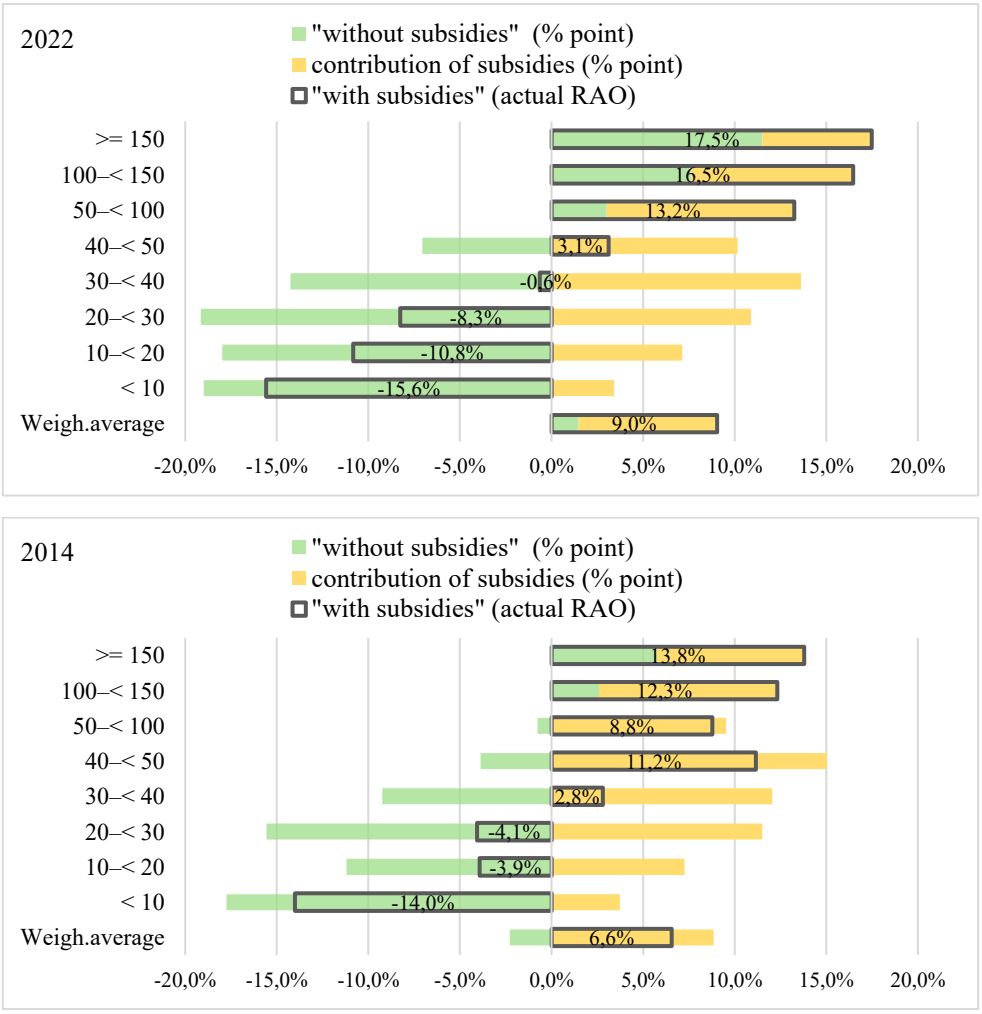


**Source: Own calculations based on the data of FADN Lithuania's survey datasets (ŪADT, 2015; ŪADT 2023).*

**Figure 3. The influence of current subsidies on profitability across farm size classes in Lithuania: a RAO decomposition**

The findings indicate that, both at the beginning and the end of the study period, current subsidies significantly enhanced the profitability (as measured by the RAO) for large farms while reducing the loss-making tendencies for small and medium-sized farms. Additionally, Stulpinienė and Aleknevičienė (2012) reported a positive ROA value (2010) for large Lithuanian farms, while smaller farms exhibited negative values. Similarly, Ciliberti and Frascarelli (2019) analysed the impact of CAP subsidies on farm profitability in Italy during 2008–2014 using FADN data, concluding that the subsidies had a positive effect, though their impact varied depending on the subsidy type. Kumbhakar, Li, and Lien (2023) also demonstrated that subsidies and farm size positively influenced changes in Norwegian farm profitability. Furthermore, Staniszewski and Borychowski (2020) emphasized that the effect of subsidies depends significantly on farm size, often leading to efficiency gains, particularly in large farms. However, they also noted that CAP subsidies can distort markets and promote the survival of unviable farms.

## Conclusion

The study measured the extent to which current subsidies to farmers have increased gross farm business revenue from core business operations and examined the impact of these subsidies on farm profitability. For the empirical analysis, a classification of farm revenues was developed, providing a comprehensive framework for understanding the composition and trends in

gross farm revenue. Two specific indicators were applied in the analysis. First, the Nominal Direct Support Coefficient (NDSC) was developed to assess the direct support provided to farmers. Second, a decomposition technique was employed to calculate the Return on Assets (ROA) indicator, enabling the evaluation of profitability. The empirical study focused on the EU CAP for the 2014–2020 programming period. The analysis extended by two years to 2022, accounting for the additional time allocated for the implementation of CAP measures.

It was found that the structure of gross farm revenue varies significantly across different farm size classes. Farms larger than 50 hectares and smaller than 10 hectares derive most of their revenue from market transactions, whereas farms with 20–50 hectares generate more than half of their revenue from government support and off-farm income sources. Current subsidies were found to increase gross farm revenue from market transactions most significantly in medium-sized farms and least in small and large farms. Regarding the impact of current subsidies on farm profitability, these subsidies have more than offset farming losses for small and medium-sized farms in the 10–50-hectare range. This indicates that the effectiveness of the CAP support differs greatly across farm sizes, leading to a distortion of competitive conditions from an economic perspective.

The main limitation of this study is that the empirical analysis relied on aggregated data by farm size class, rather than original individual farm data. This approach constrains the depth of the analysis and provides only "averaged" results. Despite the limitations, this study contributes to the advancement of methodological approaches and scientific discourse regarding the impact of agricultural subsidies on farm economic performance. Furthermore, the results of the empirical analysis offer novel insights and valuable knowledge for decision-makers at both the farming practice and policy levels. Finally, the proposed methodology is straightforward and suitable for analysing individual farms.

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## Annex 1. Breakdown of gross farm revenue by six three main types across farm size classes in Lithuania

| Farm size classes | Revenue received from core business operations (RCBO) | | | Public subsidies to farmers (PSF) | | Off-farm revenue (OFR) | Gross farm revenue (GFR) |
|---|---|---|---|---|---|---|---|
| | Revenue from crop sales (RCS) | Revenue from animals and livestock products sales (RAS) | Revenue from other gainful activities (ROGA) | Current subsidies* (payments to farmers based on farm current activity of the accounting year) (CS) | Subsidies on investment (SI) | | |
| | | | | *in 2014* | | | |
| < 10 hectares | 15.1% | 45.1% | 2.5% | 6.9% | 2.1% | 28.3% | 100% |
| 10–< 20 hectares | 18.1% | 28.9% | 4.3% | 19.6% | 1.0% | 28.0% | 100% |
| 20–< 30 hectares | 18.4% | 26.0% | 3.1% | 31.8% | 3.3% | 17.4% | 100% |
| 30–< 40 hectares | 17.5% | 22.3% | 2.5% | 33.1% | 1.2% | 23.4% | 100% |
| 40–< 50 hectares | 17.9% | 28.6% | 3.9% | 35.5% | 2.9% | 11.2% | 100% |
| 50–< 100 hectares | 31.9% | 24.1% | 1.2% | 28.2% | 4.0% | 10.6% | 100% |
| 100–< 150 hectares | 37.1% | 27.5% | 1.7% | 24.9% | 2.4% | 6.4% | 100% |
| >= 150 hectares | 60.8% | 12.8% | 1.8% | 19.8% | 1.2% | 3.6% | 100% |
| Average | 38.0% | 22.8% | 2.2% | 23.1% | 2.1% | 11.9% | 100% |

| | | | | *in 2022* | | | |
|---|---|---|---|---|---|---|---|
| < 10 hectares | 21.8% | 22.7% | 5.1% | 5.7% | 11.2% | 33.5% | 100% |
| 10–< 20 hectares | 26.8% | 15.6% | 3.8% | 14.7% | 10.9% | 28.1% | 100% |
| 20–< 30 hectares | 17.3% | 18.7% | 1.7% | 19.3% | 6.0% | 37.0% | 100% |
| 30–< 40 hectares | 26.4% | 20.4% | 1.5% | 23.3% | 4.9% | 23.5% | 100% |
| 40–< 50 hectares | 23.5% | 19.9% | 1.6% | 20.2% | 8.2% | 26.6% | 100% |
| 50–< 100 hectares | 41.6% | 23.7% | 1.2% | 19.6% | 3.0% | 10.7% | 100% |
| 100–< 150 hectares | 51.0% | 20.4% | 0.9% | 17.2% | 1.2% | 9.4% | 100% |
| >= 150 hectares | 68.7% | 13.4% | 1.9% | 11.7% | 0.4% | 3.9% | 100% |
| Average | 49.5% | 17.3% | 2.1% | 14.5% | 3.3% | 13.3% | 100% |

*Note: According to the FADN standard result, this corresponds to the indicator Total subsidies -excluding on investments.*
**Source: Own calculations based on the data of Lithuania's FADN survey datasets (ŪADT, 2015; ŪADT, 2023).*