Wine Economics and Policy

Firenze University Press
www.fupress.com/wep

Citation: Ferto I., Bojnec S. (2023). Subsidies and the income inequality in the Hungarian wine sector. *Wine Economics and Policy* 12(2): 3-14. doi: 10.36253/wep-14091

Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Competing Interests: The Author(s) declare(s) no conflict of interest.

Subsidies and the income inequality in the Hungarian wine sector

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Abstract. The paper investigates the impact of different sources of income on wine farm total income inequality in Hungary using Farm Accountancy Data Network data for the period 2013-2019. The decomposition of the Gini coefficient is applied to focus on the impact of the Common Agricultural Policy (CAP) shift from market to government budgetary support on wine farm total income inequality. Off-farm income has a rather stable impact on wine farm total income inequality. CAP Pillar 1 subsidies have remained more important than CAP Pillar 2 subsidies, both in the structure of wine farm total income and in the reduction of wine farm total income inequality. The most striking finding is regarding a shift in wine farm market income from a negative (losses) to a positive (profit) value and its increasing role in wine farm total income inequalities. The 20% of the largest wine farms created from almost 90% to less than 80% of wine farm total incomes between 2013 and 2019, but during the same period their participation in CAP subsidy payments was reduced much more from more than 80% to around 60%. Subsidies from Pillars 1 and 2 were reduced, and wine market income increased wine farm total income inequality, while it remained constant for off-farm income. The wine farm market income has driven wine farm total income inequalities. This might strengthen because of the ongoing market selection process with the exit of less efficient and loss-making wine farms and the increasing role of surviving profitable wine farms. This market selection process can be related to managerial, entrepreneurial, and innovation activities based on the differentiation and segmentation of wine farm products and their market incomes.

Keywords: income inequality, off-farm income, market income, subsidies, wine farms, Gini decomposition.
JEL classification: Q12, Q18, D31, H23.

1. INTRODUCTION

Reducing in farm income inequalities is one of the agricultural and farm policy challenges. The available public financial resources and the restructuring of budgetary expenditure patterns create additional challenges for the reduction of farm income inequality. Outside the European Union

(EU), attempts have been made to address the situation by amending the regulatory and institutional frameworks and strengthening market orientations, meanwhile, the goal is to reduce or eliminate income inequality between farmers [1,2]. The impact of the agricultural policy measures applied may vary depending on whether the payments are decoupled [3], on the share of market income and direct payments within the total farm income [4] as well as the size of farms and their market positions [5]. The effect of market income remains significant while its share in total income decreases or is unstable [6,7]. In addition to subsidies, agricultural and farm income inequalities, social factors can lead to an increase in the farm income of farmers [8]. Due to agricultural policy regulations, the concentration of direct payments is observed in several countries. Small number of farms can receive most of the direct payments, while many small farms share the remaining part of the subsidies [9,10,11]. Regional differences in economic, agri-environmental, and competitiveness conditions [12,13] and the regional needs to support regional-level decision-making can also influence the effects of reducing income inequality through direct payments [14,15]. The level and distribution of farm incomes and their potential inequality have been topics of the highest political and economic importance [16,17].

Earlier literature has developed and empirically applied the concept and context of the decomposition of the Gini Coefficient to the structure and evolution of farm income [1,14,18,19,20,21]. These papers focus on the impact of Common Agricultural Policy (CAP) reform on farm income inequality. While there may be heterogeneity in results across EU member states and their regions, most studies report that CAP subsidies have reduced farm income concentration and thus also farm income inequality. Keeney [18] finds that direct payment policies have reduced farm income concentration in Ireland – particularly, the compensatory allowances awarded to farmers in areas faced with natural production handicaps – which are at the greatest risk of having low farm income. Allanson [6] and Allanson et al. [22] for Scotland, Allanson and Rocchi [23] in a comparative study of Scotland and Tuscany (Italy), El Benni et al. [24] and El Benni and Finger [14] for Switzerland, and Severeni and Tantari [19,20,21] and Cilierti and Frascarelli [25] for Italy have reported that agricultural support, especially direct payments (within the EU's CAP Pillar 1) have reduced income concentration and thus reduced farm income inequality within the agricultural sector. Hanson [26] carried out a panel-level assessment of the redistributive impact of the 2013 CAP reform. The negative impact of direct payments has been shown for the largest beneficiaries, while the redistributive effect on small farms is significant. Bojnec and Fertő [27] find that subsidies from Pillars 1 and 2 reduce farm income inequality in Slovenia, especially for less-favoured area (LFA) farms. In short, empirical evidence suggests that farm subsidies may reduce farm income inequalities in the investigated European countries.

This paper contributes to the analysis of the impact of CAP reform on wine farm income inequality. The EU geographic concentration of wine farms is in Mediterranean, South-East, Central and Eastern European countries. The European Commission [28] provides an overview of a synthetic presentation of EU wine policy in the framework of CAP. In addition, Pomarici and Sardone [29] present the evolution and post-2020 challenges of EU wine policy in the framework of the CAP. While the performance indicators to support firm/farm-level decision-making in the wine sector [30] and the effects of agricultural policy on farm income inequality are well documented for Western European countries and for other developed countries, there have been limited similar studies for Central and Eastern European countries, except [27] for Slovenia and [31] for Hungary. This paper represents a rework of previous research [27,31] using a different dataset in terms of the types of farms and time span. In this paper, the time period is updated from the period 2007-2015 for all farm types in Hungary [31] to the period 2013-2019 for the wine farms in Hungary, thus covering the most recent CAP changes in the EU wine sector [32]. An adjusted Gini Coefficient decomposition is applied to deal with negative income values in two ways: first, by substituting negative income values with zeros, and second, by omitting the observations with negative income values [33].

Hungary is an interesting example to investigate the issues of farm income inequality in wine sector. Hungary has a more than 1,000-year wine tradition. 2021, Hungary was 16th among the world's wine producers with 2.59 million hectoliters, 16th in exports with 1.14 million hectoliters, 25th in wine consumption with 1.83 million hectoliters and 70th in imports 79 thousand hectoliters. These data show that Hungary is self-sufficient in terms of wine production, with a low volume of imports. The average annual wine consumption has been decreasing since 2010 and is currently around 22.0 litres per capita. Finally, the Hungarian wine sector can be characterised by a dual production structure. Therefore, it is an interesting question to see how subsidies affect income inequalities between farms under this production structure.

The remainder of this paper is structured as follows. In Sections 2 and 3, the methods and data used are presented. Section 4 presents and explains our results on

the effects of CAP reforms on the income distribution of wine farms. Section 5 discusses the results and derives managerial and policy implications, focusing on the effects of subsidies from Pillars 1 and 2 on wine farm income inequality. Finally, Section 6 summarises the main findings and concludes with study limitations and directions for research in the future.

2. METHOD

Following the FADN definition, we consider the farm-level income as a farm's gross income, which is equal to the total value of output minus intermediate consumption plus the balance of current subsidies and taxes. We focus on income inequality at the farm level instead of per hectare of land (vineyard) area, labour unit or any other input used. This is because the production structure of the Hungarian wine farms is highly dualistic, with a mass of small farms on one side and a few large farms on the other. As their farm organisation and labour use in terms of paid and unpaid labour and wage structure are fundamentally different, the income per unit indicators can lead to misleading results in the analysis of income inequality.

We employ Gini coefficient decomposition to analyse the inequality of the wine farms' income. Because some wine farms have negative total income values or in some of their components, these negative income values can violate the normalisation principle of the Gini coefficient [33].

Then, the decomposition procedure proposed by Jenkins and van Kerm [34] was applied to analyse the change in wine farm income inequality. The authors suggest the following method for determining the change in a single Gini index (G(v)):

$$\Delta G(v) = R(v) - P(v), \tag{1}$$

where

$$R(v) = G_0(v) - G^0{}_1(v) \tag{2}$$

and

$$P(v) = G_1(v) - G^0{}_1(v) \tag{3}$$

$G^0{}_1(v)$ is the generalized Gini concentration index for year one, based on the ranking of year zero. The value of $P(v)$ can be interpreted as a measure of the progressivity of income growth, while the value of $R(v)$ can be interpreted as a mobility index, based on re-ranking. Equation (1), therefore, expresses that inequality is progressive with an increase in income, assuming that it is not offset by simultaneous mobility. If the income grows between the starting and end periods, and the value of $P(v)$ is greater than zero, this means that the income is more concentrated in the "poor" than the "rich" wine farms. This is called pro-poor growth. If $P(v)$ is less than zero, then income growth is more strongly concentrated in "rich" than in "poor" wine farms. In our case, when the income does not grow but decreases, we can speak of growth in the "poor" wine farm population, when losses are less concentrated among the "poor" units compared to the "rich" ones.

In the second step, we decompose the inequality by income sources based on the approaches employed in earlier literature [1,14,18,19,20,21,24], in which income is generated by k components, and the decomposition of the Gini (G) coefficients by income source is undertaken in the following way:

$$G = \sum^{K}_{k=1} R_k * G_k * S_k \tag{4}$$

where R_k is the 'Gini correlation' between the income component k and the rank of total income, G_k is the Gini coefficient for the kth income component or factor Gini, and S_k is income component share of the kth income source of total income.

The concentration of coefficients of the kth income source is defined as:

$$C_k = R_k * G_k * S_k \tag{5}$$

The product of R_k, G_k, and S_k is C_k, which is defined as a contribution to total income inequality: the higher the value of each factor, the greater the contribution of the income component to total income inequality.

The share (%) of total inequality from an income component (P_k) represents an income source's contribution to total income equality. The 'proportional contribution to inequality' of the kth income source (P_k) is defined as:

$$P_k = R_k * G_k * S_k/G \tag{6}$$

Relative income inequality from an income source, P_k/S_k, implies that income component kth contributes more or less than its share to total inequality. $P_k/S_k>1$ means that the income component kth contributes more than its share to total inequality, and vice versa $P_k/S_k<1$. The marginal change of income component kth will change the status of total inequality. The Gini coefficient rate of change with respect to the mean of the kth income component is defined as:

$$\frac{dG}{d\mu_k} = \frac{1}{\mu} * (C_k - G) \quad (7)$$

The Gini coefficient, as a measure of income inequality, leverages a scale of 0 to 1. The Gini coefficient of 0 would imply perfect income equality, while the coefficient of 1 would imply complete income inequality. One of the strongest limitations of the Gini coefficient is that in the presence of negative incomes, the coefficient is greater than 1 and the original Gini coefficient decomposition formulae become inappropriate [33]. Due to this limitation, the Gini coefficient decomposition to analyse wine farm total income inequality comparisons is also estimated using an adjusted Gini coefficient dealing with the problem of negative income values in two ways: negative income values are substituted with zeros, and the observations with negative income values are omitted.

3. DATA

The Hungarian Farm Accountancy Data Network (FADN) panel data for the period 2013-2019 is used as a data source to evaluate the impact of CAP reform and farm entrepreneurial-innovation activities on wine farm total income inequality in Hungary. The sample includes 492 farms over the period, with an average of 70 farms per year. Note that out of the total 492 observations, negative income was observed in 37 cases. The number of farms with negative income per year varied between 4 and 6.

The representativeness of the FADN sample, supporting the survey data collection is often biased towards more viable farms with economic size equal to or greater than a minimum determined by each Member State. The adoption of a random representation of the farms in the sample by economic size and type of farming can be also violated due to possible problems with non-responding and delay-responding farms [35].

According to the FADN farm typology (TF8), the sample covers specialist vineyards (code: 35). The average size of farms is 16.8 hectares, ranging between a minimum 2.4 of hectares and maximum of 114.6 hectares (Table 1). Half of the farms are below 10 hectares, and only 5% of them are above 50 hectares, while less than 5% of farms are organic.

The price indices as deflators obtained from the Hungarian Statistical Office are used to transform current forint values into constant forint values, using 2013 as the base-year. Total wine farm income is comprised of two potential components: 1) income components, which can contain market income and off-farm income; and 2) subsidy components, which can contain CAP subsidies from Pillars 1 and 2. Pillar 2 support includes subsidies related to agri-environmental measures, LFAs and other rural development measures. Pillar 1 subsidies play a dominant role in total CAP subsidies. Their share ranges between 75% and 95%.

Table 1. The distribution of the FADN wine farms in Hungary by their land size (in %).

Hectares	number of farms (%)
0-5	25.8
5-10	25.3
10-50	43.6
50-	5.4
mean (ha)	16.8
std. deviaton (ha)	19.6
minimum (ha)	2.4
maximum (ha)	114.6

Source: Authors' calculations based on the Hungarian FADN dataset.

EU Member States can choose a set of measures from the 5-year National Support Programme (NSP) that the CAP provides for the wine industry. Moreover, with 2014-2020 reform, vineyard areas became potentially eligible for Basic Income support. In the execution of the NSP for the wine sector by the CAP measures, Hungary devoted a major amount restructuring and conversion, by green harvesting, by-products and crisis distillations. In October 2020, the percentage execution of the financial ceiling for the Hungarian NPS in the wine sector was 93.7% [(total expenditures/ceiling) * 100], compared to 81% in October 2019 [36]. Note that FADN data and NEP expenditure statistics for the wine sector by the CAP measures are not based on the same conceptual approach, which limits direct comparisons.

According to FADN subsidy definitions, we can distinguish the following types of CAP subsidies within Pillar 1 payments: 1) total subsidies on crops; 2) total subsidies on livestock; 3) total subsidies on intermediate consumption; 4) total subsidies on external factors; 5) decoupled payments; and 6) other subsidies. Within Pillar 1, decoupled payments dominate with a share of around two thirds (Figure 1). The share of other subsidies and subsidies on intermediate consumption is around 24%.

4. RESULTS

The empirical results are presented in three steps. First, we present the evolution of wine farm total income

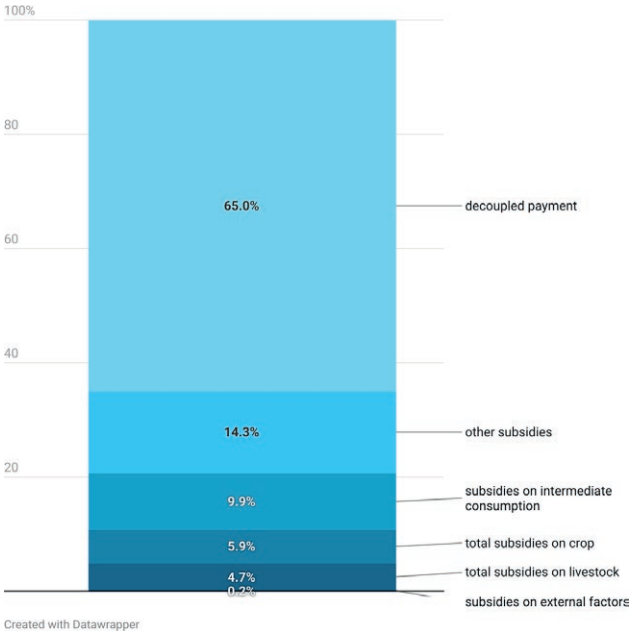

Figure 1. The distribution of Pillar 1 payment by subsidy types in 2013-2019 (in %). Source: Authors' calculations based on the Hungarian FADN dataset.

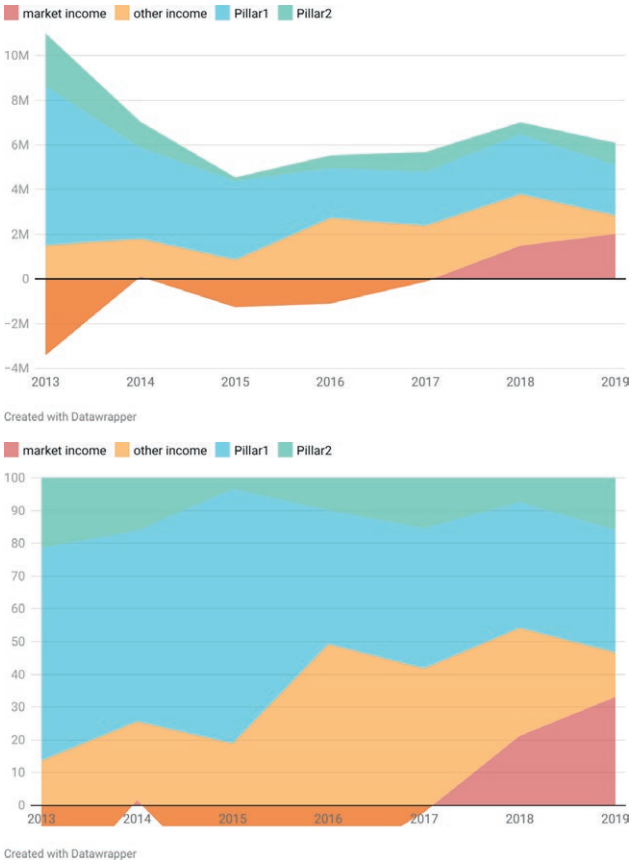

Figure 2. Total income and its composition for wine farms, 2013–2019. Source: Authors' calculations based on Hungarian FADN dataset.

structures in constant value terms and as relative shares. Second, we present wine farm total income inequality distribution by sources of income and total CAP subsidy distribution. Third, the wine farms total income inequalities are applied using the Gini coefficient decompositions over time and income sources.

4.1. The evolution of wine farm total income and its components

Figure 2 illustrates the evolution in total income for wine farms in Hungary (Figure 2 upper part) and the structure of different sources of wine farm total income: subsidies from Pillars 1 and 2, market income, and other income (Figure 2 lower part). Subsidies from Pillar 1 were the most single important source of wine farm total income, particularly prior to 2015 but also later, with a slightly smaller share. The most volatile was the market income, which was negative up to 2017 and was the second-most important source of wine farm total income in 2019. This shift from losses to profits in market income suggests substantial improvements in market-based economic performance of wine farms that can be a result of improved managerial, entrepreneurial, and innovation performance of wine farms and/or better selling and other economic conditions in the wine markets.

The importance of other income sources, or off-farm income, has oscillated between being the most important single source of wine farm total income in 2016 and mostly the second most important source of wine farm total income, but with a decline in 2019. Finally, subsidies from Pillar 2 are a continuously important and rather stable source of wine farm total income, being between the second and largely the third most important source of wine farm total income, except being the fourth one in 2018. In this year, the share of subsidies from Pillars 1 and 2 was less than 20%, unlike in the other years when their share in wine farm total income was greater and more important than market income and other income sources.

4.2. Wine farm total income inequality and CAP subsidy distribution

Figure 3 presents a rather unequal distribution of wine farm total income that remained rather stable over

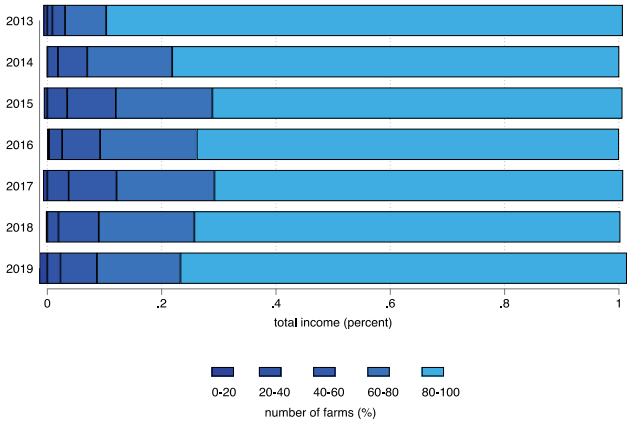

Figure 3. Distribution of wine farm total income between 2013 and 2019 (in %). Source: Authors' calculations based on the Hungarian FADN dataset.

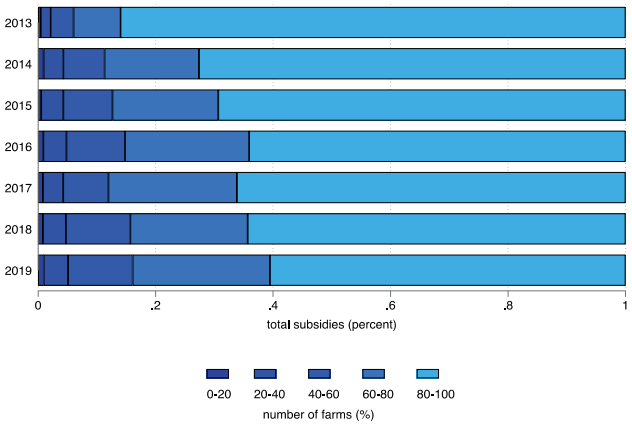

Figure 4. Distribution of total CAP subsidy payments to wine farms between 2013 and 2019 (in %). Source: Authors' calculations based on the Hungarian FADN dataset.

the years 2013-2019: 20% of the largest wine farms contributed around 80% of wine farm total income, but this share declined from almost 90% to less than 80%. The second largest group of wine farms contributed additional around 10% of wine farm total income. Finally, all other 60% of smaller wine farms contributed less than 10% of their total income.

While a concentration on a smaller percentage of the largest wine farms is also confirmed for the distribution of total CAP subsidy payments to wine farms, they are slightly less concentrated than wine farm total income. The comparison of Figures 3 and 4 showed similarities and differences in the distribution of wine farm total income and the distribution of total CAP subsidies to wine farms according to wine farm size: 20% of the largest wine farms received from substantially more than 80% of total CAP subsidy payments to wine farms in 2013 to slightly more than 60% of total CAP subsidy payments to wine farms in 2019. Unlike for wine farm total income, there is a substantial reduction in the percentage of total CAP subsidy payments to wine farms over the analysed years for the largest wine farms. The second largest group of wine farms received additional between less than 10% of CAP subsidy payments to wine farms in 2013 and more than 20% of CAP subsidy payments to wine farms in 2019. All other 60% of smaller wine farms received between slightly more than 5% of CAP subsidy payments to wine farms in 2013 and less than 20% of CAP subsidy payments to wine farms in 2019. These results and findings confirmed the redistribution of CAP subsidies from 20% of the largest wine farms to other smaller wine farm structures.

However, the unequal distribution of wine farm total income and CAP subsidy payments to wine farms strongly revealed thee dual structure of Hungarian wine farms where, a smaller number of the largest commercial wine farms dominates in the structure of wine farm total incomes and, to a lesser extent, also in total CAP subsidy payments received by wine farms over a larger number of smaller, mostly individual wine farms.

4.3 Gini coefficient decompositions

To analyse the dynamics of income inequality, we use the Gini decomposition methodology. Table 2 presents the Gini decomposition of change in wine farm total income inequality between 2013 and 2019. First, wine farm total income, including negative income values. Second, wine farm total income is substituted for negative income values with zero. Third, wine farm total income with omitted observations with negative income values. The values of the initial (year zero = 2013) and final (year one = 2019) single-parameter Gini coefficients show that the income in Hungarian wine sectors was strongly concentrated in 2013, and that this inequality had further strengthened by 2019. The main change in the results is observed for the P-component with a shift from negative values to positive values when dealing with negative income values. The negative value of the P-component that the decline in farm income tended to affect 'richer' wine farms with a higher income in the initial period switches to the positive values when negative income values have been replaced by 0 or they were omitted. The negative P-component indicates a 'pro-rich' ('for whoever has, to him more will be given') income reallocation, and vice versa, the positive P-component with the 'pro-poor' income

Table 2. Decomposition of change in wine farm total income inequality between 2013 and 2019.

Components	farm total income with negative income values	farm total income with replaced negative income values by 0	farm total income with omitted negative income values
Initial S-Gini	0.776	0.756	0.725
Final S-Gini	0.850	0.790	0.755
Change	0.074	0.035	0.030
R-component	0.052	0.047	0.046
P-component	-0.022	0.013	0.016
Change of R and P component in % of the initial Gini			
Change	9.5	4.6	4.1
R-component	6.7	6.3	6.4
P-component	-2.8	1.7	2.3

Source: Authors' calculations based on the Hungarian FADN dataset.

growth concentrated in the "poor" than the "rich" wine farms. In other words, when considering also negative income values wine farms with a small initial income were the losers of the income change, and the 'pro-rich' process intensified the increase in income concentration in the Hungarian wine sector. However, when the negative income values were replaced by 0 or omitted, Hungarian wine farms with a small initial income were the gainers of the income change, and the 'pro-poor' process deteriorated the increase in income concentration. On the other hand, the high value of the R-component reinforces these pro-rich or pro-poor effects. The increase or decrease in concentration in the Hungarian wine sector was due to a high degree of reranking between wine farms.

The Gini (G_k) coefficients decomposition according to the different wine farm total income sources ranged between 0 and 1, except for market income with negative wine farm total income values (Table 3, upper part), which overshoots absolute value 1: wine farm market income was a negative (loss) in 2013 and a positive (profit) in 2019. In 2013, this was due to a negative wine farm total income caused by losses from wine farm market activities [7,31,37]. Wine farm market income, wine off-farm income, and Pillar 2 subsidies (LFA payments, agri-environmental measures, and other rural development programmes) are much more unequally distributed than subsidies from Pillar 1 (direct payments). Between 2013 and 2019, the G_k coefficients suggest substantial overshoots of 1 for wine farm market income with their negative values. The G_k remains constant for wine farm total income inequality from off-farm income, and decreases for the Pillars 1 and 2 subsidies.

The proportional contribution () to wine farm total income inequality by income sources changed between the years 2013 and 2019. While in 2013, Pillar 1 and off-farm income played a crucial role in terms of their proportional contribution to wine farm total income inequality, this changed in 2019 with a switch from a negative to an increasing positive contribution of wine farm market income in wine farm total income with its negative values and a substantial decline of off-farm income and Pillar 1 subsidies, as well as a slight decline of Pillar 2 subsidies. Interestingly, unlike in Slovenia [7], the proportional contribution of subsidies from Pillar 2 in Hungary is less important for wine farm total income inequality. The for off-farm income remains relatively low but makes a relatively stable proportional contribution to wine farm total income inequality. Unlike for all farm total income inequality in Hungary with the substitution effect of market income with off-farm income and further increase of Pillar 1 subsidies to farm total income inequality [31], wine farm total income inequality in Hungary has declined over time, but the increasing pressures were coming from wine farm market income from its negative to positive values, suggesting possible managerial, entrepreneurial, and innovation improvements in wine farms in achieving more favourable conditions for profit and market income. Table 3 also suggests a correlation between the values in the columns and the Share (in %) that captures similar structures.

The Pseudo-Gini correlation coefficients of the different wine farm total income sources are, except for wine farm market income with its negative values in 2013 (Table 3, upper part), greater than 0, suggesting that wine farm total income from the specific income sources is mainly distributed to farms in the upper tail of wine farm total income distribution [14]. Except for wine farm market income with its negative values in 2013 and Pillar 2 subsidies in 2019, all other sources of wine farm total income are correlated with total wine farm income. The highest Pseudo-Gini coefficients are found for off-farm income and subsidies from Pillar 1 as well as subsidies from Pillar 2 in 2013 and wine farm market income in 2019. Unlike for Slovenian farms [7], but consistently for Hungarian farms [31], the Pseudo-Gini coefficients suggest that subsidies from Pillar 2 in Hungary were slightly less important than subsidies from Pillar 1 in 2013, and this gap further increased over time in 2019. This can be explained by the greater role of direct payments from Pillar 1 subsidies than Pillar 2 subsidies as an important source of total income for Hungarian wine farms.

Table 3. Gini decomposition of wine farm total income by income source in 2013 and 2019.

Source	Sk	Gk	Rk	Share (%)	Marginal Change
farm total income with negative income values					
2013					
market income	-0.3105	-2.1735	-0.2791	-21.71	0.0934
off-farm income	0.4472	0.9523	0.9573	46.98	0.0226
Pillar 1	0.6507	0.8188	0.9042	55.52	-0.0955
Pillar 2	0.2126	0.9069	0.8642	19.20	-0.0206
2019					
market income	0.3306	1.6014	0.8262	56.36	0.2330
off-farm income	0.1357	0.9515	0.9125	15.18	0.0161
Pillar 1	0.3748	0.6631	0.7449	23.86	-0.1362
Pillar 2	0.1589	0.7408	0.3031	4.60	-0.1129
farm total income with replaced negative income values by 0					
2013					
market income	0.2127	0.9056	0.8926	20.16	-0.0111
off-farm income	0.4436	0.9523	0.9571	47.41	0.0305
Pillar 1	0.6455	0.8188	0.9055	56.12	-0.0843
Pillar 2	0.2109	0.9069	0.8643	19.38	-0.0171
2019					
market income	0.4710	0.8416	0.9446	50.25	0.0315
off-farm income	0.1333	0.9515	0.9125	15.53	0.0220
Pillar 1	0.3682	0.6631	0.7477	24.50	-0.1232
Pillar 2	0.1561	0.7408	0.3046	4.73	-0.1088
farm total income with omitted negative income values					
2013					
market income	0.5197	0.8142	0.9797	54.28	0.0231
off-farm income	0.0363	0.9289	0.9538	4.21	0.0058
Pillar 1	0.3992	0.7579	0.9569	37.91	-0.0201
Pillar 2	0.0448	0.8338	0.7353	3.60	-0.0088
2019					
market income	0.5117	0.7577	0.9508	51.95	0.0078
off-farm income	0.1207	0.9473	0.9575	15.43	0.0336
Pillar 1	0.2850	0.7136	0.9544	27.36	-0.0114
Pillar 2	0.0825	0.7990	0.5657	5.26	-0.0300

Source: Authors' calculations based on the Hungarian FADN dataset.

The estimated marginal changes in the Gini Elasticities for the different income sources relating to wine farm total income distribution, which are presented in the last column in Table 3, range between less than zero (negative values) and more than zero (positive values). Values above 0 for wine farm market income and off-farm income show that an increase in the income source under consideration of 1 percent increased wine farm total income inequality (as measured using the Gini coefficient) by the defined percentage, ceteris paribus. While values below 0 for an increase in Pillars 1 and 2 subsidies decreased the inequality of wine farm total income.

5. DISCUSSION OF THE RESULTS WITH MANAGERIAL, ENTREPRENEURIAL AND POLICY IMPLICATIONS

Our empirical results confirmed that the wine farm total income inequality in Hungary highly depends on wine farm market income, which has shifted from a negative value (losses) to a positive value (profits). The wine farm total income inequality primarily driven by market components suggests that the wine production sector and wine farm total incomes rely to greater extent on managerial, entrepreneurial, innovation, and human-based wine farm specific factors [38,39] than some oth-

er farm type specialisations such as crop farms [27,31]. In the initial stage of transition in the early 1990s, the Hungarian wine sector was also open to new initiatives coming from foreign innovation and foreign direct investment that had a spillover effect on wine farms and the wine sector [40].

CAP-subsidies represent a stable source of wine farm total income that slightly decreases the wine farm total income inequality with a shift in their reduction from the 20% of the largest wine farms to their increase in other smaller wine farm sizes. This redistribution in CAP subsidy payments was more substantial than changes in wine farm total incomes according to their size. This striking finding suggests that 20% of the largest wine farms compensated for reductions in CAP subsidy payments with increases in wine farm market incomes. This is consistent with the finding that if wine farms make a positive profit, the contribution of Pillar 2 subsidies is marginalised due to the prevailing wine farm market income. Therefore, wine farm differentiation and wine farm total income inequalities are driven by non-governmental policies such as managerial, entrepreneurial, marketing, and similar farm-specific measures rather than relying on government transfers related to CAP-subsidy payments. However, income redistribution through public policies poses a challenge to farm management and policy-making due to fluctuations in wine farm market incomes [41]. While wine farm total incomes still depend on CAP subsidies and their reforms with income redistribution in the EU [29], the wine sector and wine farm total income can more related to adjustments to regional determinants of wine consumption and purchasing behaviour [42], and wine prices in association with geographical indications, objective quality, brand names, and individual reputation [43]. One additional factor for market income oscillations over time can be related to climatic risk and variations in weather conditions in Hungarian grape growing regions [12]. Wine tourism on a farm can also be an important source of wine farm market income generation [44]. Investments in wine tourism as on-farm activity can also contribute additional flows of investments and Pillar 2 subsidies into wine farms that can drive efficiency and profitability of wine farms [45,46,47].

As for several EU countries [425,29,48], Pillar 1 subsidy payments are for Hungarian farms [31] and narrowly for Hungarian wine farms, the most important CAP subsidy payments in reducing farm total income inequalities. Farm total income inequalities can be biased to farm type specialisation and the different regional and agri-ecological farming characteristics eligible for different types of CAP subsidies regarding different production conditions [14,15,27]. The comparison of the results from the previous research for all farms in Hungary for the period 2007-2015 [31] vis-à-vis this research for the wine farms in Hungary for the period 2013-2019 suggests diminishing role of the CAP subsidies in the structure of farm total incomes and in total income inequality. This finding is consistent with the changes in the CAP measures leading to reductions of subsidies for wine farms [29,32] and the greater role of entrepreneurial spirit in wine farms as drivers of competitiveness, farm growth, and farm survival [30,49].

The Gini coefficient is less than 1 for off-farm income and subsidy payments from Pillars 1 and 2. It is a greater than 1 only for wine farm market income with its negative values, with a shift from a negative value in 2013 to a positive value in 2019. The negative wine farm market income suggests that without CAP subsidy payments and off-farm income, farms experienced losses and difficulties covering their operation costs to survive. However, a large dependence of wine farms on CAP subsidy payments and non-farming activities has weakened at the end of the analysed period, reinforcing the importance of wine farm market income and profitable wine farm business performances. This might suggest an ongoing market selection process in the Hungarian wine sector, exiting less efficient and indebted wine farms and the survival of the profitable ones. While this process may lead to greater inequality in wine farm market incomes, at the same time, it may lead to more efficient, competitive, and profitable wine farms that may rely less on CAP subsidy payments. With efficient wine farms, there can be a greater need for on-farm employment that can generate on-farm wine farm market incomes. However, it is still likely that off-farm incomes will continue to be an important source of total income for wine farms in Hungary.

There is a clear pattern regarding a reduction in the concentration of CAP subsidy payments that allows for a more equal distribution of government support for lower income wine farms. While there is a correlation between subsidy payments from Pillars 1 and 2, and the level of wine farm total income, this has weakened over time. The crucial problem can be instabilities in market-driven income that have become an increasing pattern, but they are still unclear whether it is of a cyclical nature or whether they can be expected to have a more stable positive (profitable) development in the future. This is the reason that subsidy payments from Pillar 1 have an impact on the reduction of wine farm total income equality [25]. In trade-offs between the wine farm efficiency and equity of CAP subsidy payments, wine farm managerial, entrepreneurial, and innovation measures that can generate

greater wine farm market incomes should not be neglected, despite the fact that this can contribute to greater wine farm total income inequality and create a possible additional market selection process with the exit of economically less efficient wine farms and the survival of more efficient and competitive wine farms.

6. CONCLUSION

The paper investigated the development of total income inequality in Hungarian wine farms over the period 2013–2019 using FADN data. A shift in CAP policy and related measures, off-farm income, and particularly a shift from a negative (losses) to a positive (profit) wine farm market income have determined the evolution and structure of wine farm total incomes. CAP subsidy payments, particularly from Pillar 1, have reduced wine farm total income inequality, while wine farm market incomes have increased wine farm total income inequality. While CAP subsidy payments have been shifted from 20% of the largest wine farms to smaller wine farm sizes, this has to a lesser extent caused changes in wine farm total incomes according to their size. This finding implies that the 20% of the largest wine farms compensated for the reduction in CAP subsidy payments with an increase in other incomes, particularly in wine farm market incomes that can be the result of on-farm managerial, entrepreneurial, and innovation improvements, including in wine farm marketing channels for their produce.

While the results highlight the importance of CAP subsidy payments in Hungarian wine farms total incomes and in the reduction of wine farm total income inequalities, it is also clearer that wine farms do not share the same characteristics as all other farm types. This finding can also be biased to the different dataset used in terms of the analysed time span and dealing with the problem of negative farm incomes (losses).

Wine farms produce specific products that are sensitive to managerial, entrepreneurial, and innovation activities on farms, but the final products that appear on the market are not necessarily homogenous in monopolistic competition that relies on quality and diversity. The product differentiation and market segmentation in on- and off-farm marketing activities make the specific product that can achieve different prices, thus resulting in different wine market incomes, a reason for wine farm total income inequality. This finding should be considered a positive outcome of market developments in the Hungarian wine sector that cannot be only related to the existence of large-scale commercial wine farms. They can operate efficiently and profitably in spite of the reduction of CAP subsidy payments during the period 2013-2019. The stabilisation of wine farm total incomes is likely to largely depend on the greater stability of wine farm market income.

Policy modelling of wine farm total income diversification and the role of CAP subsidy payments on wine farm total incomes and wine farm total income inequalities across different wine farm structures is important for improving understanding of the impacts of CAP on different total income structures and their associated total income inequalities on wine farms and in rural areas. It is also important to increase and stabilise wine market incomes. Questions that are related to wine farm management, entrepreneurial and innovation activities in wine farm total income generation, wine farm sustainability, and international competitiveness, will be issues for future research. Among such open questions is wine farm specialisation in protected designation of origin (PDO) and protected geographical indication (PGI) wine quality products. Finally, among the specific challenges for research in the future is the investigation of the CAP 2021-2027: How total income inequality in wine farming can be more effectively reduced? How can agricultural policy measures adapt to and influence the special dual farm structure in Hungarian wine farming?

ACKNOWLEDGEMENTS

The authors gratefully acknowledged useful comments and suggestions by the two anonymous journal reviewers that helped us to improve the quality of the paper.

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