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Assessment of inequality in the Common Agricultural Policy in Portugal

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Abstract

The Common Agricultural Policy (CAP) continues to represent a substantial part of the European Union's budget. Although the second pillar is co-financed by national governments, European funds represent the vast majority of public spending on agriculture and rural development. In the case of Portugal, the CAP envelope for the current Multiannual Financial Framework (MFF 2021–2027) represents a package of €10 billion. Our article focuses on the distribution of CAP support. Based on a synthetic indicator of equity aligned with the European Union objectives of the CAP, we assess the current distribution of CAP support and estimate its distribution in the future according to the new rules that come into force in January 2023. According to the data analyzed, the major factor of inequality in the CAP in Portugal rests in the exclusion of a significant part of agricultural holdings. In this sense, it is necessary to understand the reasons for this exclusion in order to study measures so that CAP rules can contribute to a fairer distribution between farmers and between regions.

Keywords: Common Agricultural Policy, Inequality, Strategic plan

Introduction

The distribution of support between farmers and between regions is, currently, one of the most critical aspects of the Common Agricultural Policy (CAP). This profoundly skewed distribution is the result of the main guidelines of the CAP in the initial phase of its implementation. Since its creation, the CAP has adapted to a constantly evolving internal and external context. In the period between 1962 and 1992, a production-oriented CAP prevailed, aiming to solve the problem of European dependence on food (Gay et al. 2005). In its initial phase, the CAP generated an intensive production model that was increasingly dependent on synthetic additives, many of which are highly harmful to public health (Lowe et al. 1999). At the same time, it caused huge production surpluses, which had to be sold on the world market at subsidized prices (Ackrill 2000). This created a huge burden for the Community budget, which tripled between 1980 and 1992 (Grant 1997).

From the 1980s onwards, the CAP became unsustainable. The Uruguay Round was an important impetus for the first major CAP reform led by Agriculture Commissioner MacSharry in 1992 (Patterson 1997). The MacSharry reform reduced support prices

for the first time. Farmers were compensated for the expected income loss through the introduction of partially coupled direct payments. In 1999, the European Council decided to complete the CAP with a second pillar dedicated to rural development. Its creation resulted from the need for accompanying measures to the 1992 reform: early retirement, agri-environmental measures, and afforestation, as well as aid schemes for disadvantaged areas. The first regulation (2000–2006) focused its priorities on the competitiveness of agriculture and its multifunctionality, on the promotion of environmental protection, forestry, and sustainable development and on the socio-economic development of rural areas (Baldock et al. 2001). With the 2003 CAP reform (2003 mid-term review of agenda 2000), subsidies were decoupled from production and replaced by the Single Farm Payment (SFP). The new payments were based on historical farm production. The economic rationale is that decoupled payments do not influence production decisions of farmers and allow free determination of market prices (Grant 2010). The amounts paid per hectares were calculated based on historical productions between 2000 and 2002 and remained unchanged until the 2013 reform, in favor of larger and more profitable farms. This decoupled payment ended up fixing the inequalities (Erjavec et al. 2011). The 2013 reform, applied in the 2014–2020 MFF, ended the Single Payment and its historical backing and launched the greening payment. This was replaced by the Basic Payment Scheme (BPS), the amount of which is subject to a process of internal and external convergence aimed at a uniform payment per hectare throughout the European regions (Ciliberti and Frascarelli 2018).

Today, despite the efforts of the European Union (EU), it is imperative to recognize that unacceptable inequalities in the distribution of direct CAP support remain. The European Commission estimates that 20% of farmers benefit from 80% of the CAP support (Garcia-Bernardo et al. 2021). In Portugal, according to data from 2020 released by the IFAP (Agriculture and Fisheries Financing Institute) and available on the European Commission's website, 65% of beneficiaries with 6.8% of the area received 12.5% of direct support, while 1.5% of the largest beneficiaries, holding 43.5% of the area, received 32.8% of the direct support. Aware of this problem, the European Commission proposes a greener, fairer, and more flexible CAP for the period 2021–2027 (Pe'er et al. 2020). Increasing farmers' income and promoting a fairer distribution of support is one of the nine main objectives of the new post-2020 CAP (even if, due to delays in the negotiations, the new rules only apply in 2023). To promote a fairer distribution, the new regulation proposes a cap on aid, a more ambitious redistributive payment aimed at rewarding smaller farms, support for young farmers and the continuation of internal and external convergence. Several studies show that the redistributive payment of the 2013 reform had a positive, but limited, effect within the EU (Hanson 2021).

The article assesses the distribution inequality of CAP support in Portugal, with three relevant contributions. Firstly, it draws up a comparative study that evaluates the present distribution of aid with that which will result from the application of the rules coming into force on January 1, 2023. Secondly, it uses the totality of registered farmers in Portugal as opposed to existing statistics that use only farmers who are within the support system, leaving out thousands of properties. As a third contribution, a synthetic inequality index adapted to the fundamental objectives of the CAP is proposed. Currently, many accuse the CAP of subsidizing profitable farms, to the detriment of others

located in disadvantaged territories where they provide relevant environmental services, but which are not remunerated by the market. This new indicator thus makes it possible to assess the distribution of support according to the CAP's fundamental goals in terms of employment, aid to vulnerable territories and rural development.

CAP and inequality in Portugal

One of the main objectives of the European Commission for the current MFF is to build a fairer and greener CAP.[1] Justice in this case refers to equity. Regarding agriculture, an equitable distribution of public support must be correlated with the level of agricultural activity, but also with some weighting criteria that consider economies of scale and the specificities of territories. Asymmetries in the distribution of CAP support have long been diagnosed (Garcia-Bernardo et al. 2021; Sinabell et al. 2013; Volkov et al. 2019). This asymmetry is a consequence of the way the CAP was designed in the 1960s, in a historic moment when the priority was to produce to guarantee European food sovereignty. This concentration of support in certain cultures and larger and prosper farms was maintained, as we have already explained, with the Single Payment Scheme based on the historical production of each farm. Until now, despite the measures put in place by the European Commission, the distribution of CAP support continues to be deeply unfair and irrational from an economic point of view.

The most recent report by the European Commission on income support for 2020 pointed to Portugal as one of the countries where the distribution of direct aid is more concentrated.[2] The data in Table 1 compare Portugal with the EU average. According to the cumulative Portuguese distribution, 91.9% of the beneficiaries received only 31.87% of the total direct payments, while in the EU28, 92.03% of the farmers received 41.47%. Both distributions are uneven, but the Portuguese one clearly outperforms the EU average.

The inequality in the distribution of direct payments can also be illustrated using the Lorenz curves (Fig. 1). The area between the two curves reflects the polarization of payments at the upper poles of the distribution. If payments were distributed strictly equally to everyone, the two curves would merge into a straight line.

It is important to consider that these statistics consider only the farmers who are within the system—that is, the farmers who receive CAP support. Data from the latest INE agricultural census (Instituto Nacional de Estatística 2021), shown in Table 2, reveal that almost 40% of the farmers do not receive any support from the CAP (the data from the INE census allow to analyze the coverage rates of support by farms and by areas, but also by yearly work units). This proportion of excluded farmers increases significantly with smaller farms and, in the class of farms with less than 2 hectares, the exclusion rate is very close to 60%, while in the class of farms with more than 5 hectares, this rate drops to 15%.

Figure 2 shows the geographic distribution of this variable, revealing significant discrepancies. The cartogram illustrates that the proportion of farmers included in the

[1] factsheet-newcap-environment-fairness_en_0.pdf (europa.eu).

[2] "Indicative figures on the distribution of aid, by size-class of aid, received in the context of direct aid paid to the producers according to council regulation (EC) no 1307/2013 (financial year 2020)", available in—Income support breakdown|European Commission (europa.eu)—consulted on 6/2/2022.

Table 1 Cumulative distribution of direct payments and beneficiary in Portugal and the EU28

Value (thousands of euros)	Direct payments (PT)	Beneficiaries PT	Direct payments (EU28)	Beneficiaries (EU28)
0	0	0.02	0	0.06
0–0.5	1.16	14.88	1.04	21.26
0.5–1.25	10.04	66.4	4.09	46.54
1.25–2	13.58	75.32	6.68	57.38
2–5	22.44	86.57	14.91	74.59
5–10	31.87	91.9	25.49	84.52
10–20	46.64	96.03	41.45	92.03
20–50	66.74	98.64	68.96	98.02
50–100	82.83	99.58	83.43	99.47
100–150	90.33	99.83	88.29	99.74
150–200	94.33	99.92	90.9	99.84
200–250	96.51	99.96	92.75	99.9
250–300	97.76	99.98	94.09	99.93
300–500	99.11	100	96.79	99.98
More than 500	100	100	100	100

Source: DGAGRI, European Commission

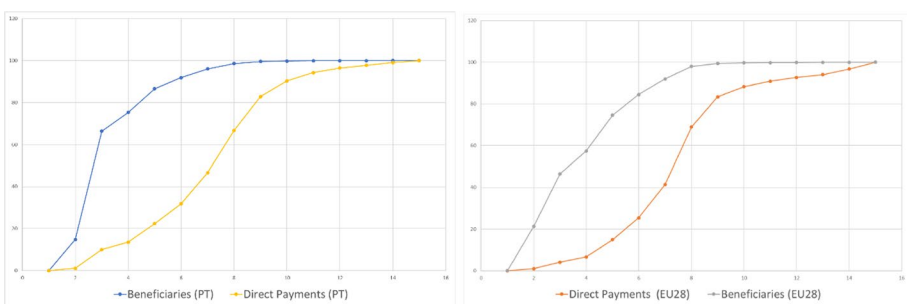

Fig. 1 Lorenz curves referring to the distribution of direct payments in Portugal (left) and in the EU28 (right) (*Source*: European Commission and authors' calculations)

Table 2 Proportion of farms (%) with access to CAP support

	Total	< 2 ha	EA 2–5 ha	EA > 5 ha
Exclusion rate	39.5	57.5	33.2	15.1
Inclusion rate	60.5	42.5	66.8	84.9

Source: INE Agricultural Census 2019

CAP support system is, for example, much higher in the southern regions (called the Alentejo) and the northeastern regions (called Trás-os-Montes). Analyzing the data from the Agricultural Census (Instituto Nacional de Estatística. 2021) in more detail, we find that the 40% of excluded farmers correspond to 15.3% of the entire Portuguese agricultural and forestry area and represent 32.2% of the manpower, measured in yearly work units. This high exclusion rate is explained by the property structure in the center and north of Portugal, where smallholdings predominate. In these regions, and in comparison with the Alentejo, mechanization is low, and the degree of

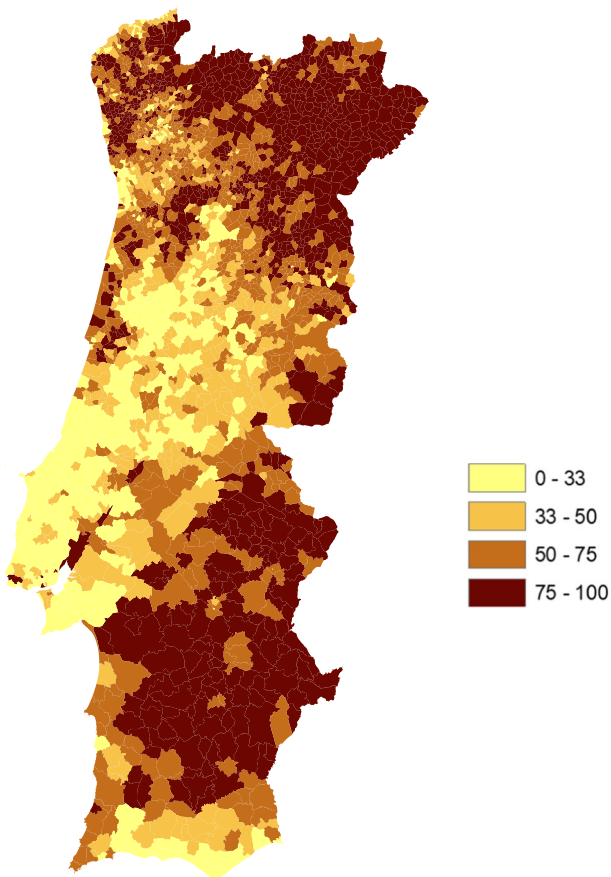

Fig. 2 Proportion of farms with access to CAP funds by parish (*Source*: INE Agricultural Census, 2019)

association is also small (Cordovil 2004). Moreover, the rural population is aging and lacks the skills to deal with the administrative procedures associated with CAP funding (de Lima 1991). Adding to this, given the small size of the properties, the incentives are also not very attractive.

So far, we have analyzed the distribution of support between farms and between regions. But the discussion on equity can be placed in a broader perspective, contemplating the entire economy and its various sectors. From this perspective, it is legitimate to question the primacy of the agricultural sector over other sectors of activity, considering its reduced weight in the GDP of developed economies. In Portugal, for example, CAP support totals €10 billion (over 7 years) while the agricultural sector represents around 2% of GDP. In fact, there is no other sector with this proportion of public support. A third wave of criticism concerns the fact that CAP funds are distributed in a large proportion to highly profitable and large farms, while smaller dimensions and more vulnerable ones receive little or nothing. According to several experts, the distribution of support should be less dependent on the agricultural area or the volume of production and should be more associated with job creation and the real need of individual farmer's income (Winters 1989).

Equity can be analyzed from a horizontal or vertical axis (Lécole and Thoyer 2015). Horizontal equity dictates that two individuals in the same situation should have the same rights and obligations. It converges with the concept of equality and is based on the principle of non-discrimination (the social security system is a good example of horizontal equity, considering that all individuals contribute to benefit from a set of rights that are universal, such as a retirement pension or unemployment benefit). Horizontal equity implies that two equal farms should receive equal transfers. Vertical equity aims to transfer income collected from the wealthiest individuals to the neediest individuals. It is carried out through selective measures that identify people in need compared to the general population. There are many social benefits aimed at disadvantaged sectors of society. The current base payment system is based on a universal benefit in the form of a fixed payment per hectare that will tend to converge to an equivalent value throughout all European member states. Should we maintain this horizontal equity, or should we change the rules and use criteria that allow a better targeting of aid in order to benefit those most in need or those who contribute the most to environmental services? This is the key debate.

In an article published in 2002, during the debate about the CAP decoupled payments, Butault et al. (2002) propose three criteria for assessing equity: allocation, result (or outcome) and endowment. Allocation equity focuses on the history of each farm, without any redistributive consideration. However, it opens the possibility of a negotiation that allows some readjustment, but always in a Pareto-optimal efficiency perspective demanding unanimity. The distributive formula overrides the result. This was the criterion that prevailed in the 2003 reform with the Single Payment scheme based on the production of the previous three years. Equity of outcome has two derivations. The first one is of an egalitarian nature and tends to adjust aid to smooth out inequalities in well-being between farms, but also, between agricultural activity and other economic sectors of society. The second derivation, called utilitarian, favors a distribution of aid that maximizes the utility of all individuals. In this perspective, it is necessary to remunerate the farmers who contribute most with the provision of public goods that increase social well-being. This is the underlying principle of eco-schemes and the remuneration of environmental services in general. Finally, equity from the endowment perspective seeks to counterbalance differences in endowments between farms, provided that these differences are exogenous, that is, they exist independently of the farmer's will. Aid would be distributed to compensate for differences in the allocation of these "non-controllable internal resources". This is the case, for example, of payments granted in mountain or other disadvantaged areas.

The evolution of the CAP exhibits the coexistence of various criteria for the distribution of aid. The allocation criterion prevails in the basic payment scheme, which will provide, at the end of the convergence period, a uniform payment of around 80 euros per hectare. On the other hand, the utilitarian perspective is also present with the "greening" payment of 2013 and the eco-schemes of the current reform. Aid in less-favored areas, aimed at remunerating agricultural activities on less productive arable land, seeks to compensate for differences in allocations as described above.

Data and methods

In this section, we propose the construction of a new synthetic equity indicator already tested by (Cordovil 2020). This indicator uses only distributed subsidies and does not consider farmers' disposable income. Income heterogeneity among farmers is relevant to assess the impact of the CAP on inequalities (Finger and el Benni 2021), and other authors consider this approach (Ciliberti et al. 2022; Severini and Tantari 2015). Our work covers all beneficiaries in mainland Portugal, which does not allow us to have access to the income generated by each farm.

Most studies on the distribution of EU support are carried out on a neutral basis, considering all individuals and all geographical units on an equal footing. This indicator assesses the distribution of CAP support in line with the main CAP policy guidelines. Its results aim to assess whether agriculture funds are distributed to the regions identified as most in need regarding the political objectives of the CAP. The Treaty on the Functioning of the European Union (TFEU) enshrines the objectives of the CAP and places great emphasis on the issue of territorial cohesion and employment. Article 39º of the TFEU, which remains unchanged since 1962, lists the objectives of the Common Agricultural Policy: "(a) to increase agricultural productivity by promoting technical progress and by ensuring the rational development of agricultural production and the optimum utilization of the factors of production, in particular labor, (b) thus to ensure a fair standard of living for the agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture, (c) to stabilize markets, (d) to assure the availability of supplies; (e) to ensure that supplies reach consumers at reasonable prices."

We use the 278 municipalities of mainland Portugal as the base geographic unit. Our indicator qualifies the distribution of EU support according to a weighting aligned with the objectives of the CAP. In the numerator, we use the CAP support distributed in each municipality between 2018 and 2020. In the denominator, we consider agricultural employment and agricultural area most likely to be supported by CAP funds according to its potential to produce positive externalities. In this sense, we calculate for each geographic unit, the proportion of used agriculture area, of poor pastures, of unused agriculture area and of forest area in relation to the national values. We also calculate the share of each geographical unit in national agricultural employment. All these elements are taken from the last INE agricultural census of 2019 (Instituto Nacional de Estatística 2021) and are combined into a composite indicator.

Regardless of the different criteria used to measure equity, most of the literature focuses only on the universe of beneficiaries. Our work overcomes this gap, considering all the farmers registered in the 2019 Agricultural Census carried out by INE. Our synthetic equity index is calculated in each municipality, allowing us to understand the territorial dimension of inequality. The used criteria combine agricultural areas and workload, with a greater weight given to the former. All areas are calculated according to the areas declared in the 2019 agricultural census, in each of the existing farms in each municipality. The composite indicator integrates a distribution base that weighs not only the area of farms, but also the workforce measured in yearly work units. The equity index, Ieq_i, is calculated for each municipality (i). It corresponds to the ratio between the proportion of CAP funds received by each municipality, $PPAC_i$ against all the 278 continental municipalities of Portugal and the proportion of agricultural area weighted

by the labor factor of the same municipality, AAP_i against all the Portuguese continental municipalities:

$$Ieq_i = \frac{PPAC_i \Big/ \sum_{j=1}^{278} PPAC_j}{AAP_i \Big/ \sum_{j=1}^{278} AAP_j}$$

The weighted agricultural area, AAP_i, is composed of two parcels, AR_i and TR_i. The first parcel is calculated as follows. We remove poor pastures from the used agricultural area. To this value, we successively add three types of surfaces. The first corresponds to a third of the forest area, located within the farms. Although the forest area is not covered by the basic payment scheme, it is eligible for several agri-environmental measures, considering that forest areas are responsible for important environmental services that are not remunerated by the market. A second covers a third of the unused AAU. And the final portion corresponds to a third of poor pastures. The second parcel consists of the proportion of agricultural labor (in yearly work units) in each municipality. The weighted agricultural area (by the labor factor) of each municipality i results from the following formula:

$$AAP_i = 0.7\frac{AR_i}{\sum_{J=1}^{278} AR_j} + 0.3\frac{TR_i}{\sum_{J=1}^{278} TR_j}$$

An equitable value should not stray too far from unity. Values closer to zero indicate municipalities that receive little in relation to their weighted area. In other words, in view of the objectives of the CAP, they should receive more. Values greater than one indicate larger support in relation to the weighted area. These municipalities receive more than they should according to the objectives of the CAP. In a first exercise, we calculated the equity index for all municipalities in mainland Portugal using the historic payment from 2018 to 2020. We use the information released by the IFAP concerning the "single request." The single request comprises all the requests for direct payment that integrates the schemes provided by the EU regulations. It includes all payments linked to the first pillar as well as some payments linked to agri-environmental measures contained in the second pillar. In a second exercise, we used the projections made by the Portuguese Office of Planning, Policies and General Administration of the Ministry of Agriculture. These projections simulate the same aid schemes as the previous multiannual financial framework (2014–2020) with the application of the new rules of the CAP, transposed in the National Strategic Plan for the PAC (PEPAC, in the Portuguese acronym), to the universe of existing farms. These projections do not include the impact of the new green architecture and eco-regimes. However, they apply the new rules regarding redistributive payments, capping and the small farming regime.

Results and discussion

The results are mapped in the cartograms in Fig. 3. The cartogram on the left shows the distribution of the equity index based on the historic payments between 2018 and 2020. The cartogram on the right uses the distribution of support according to a simulation made by the Office of Planning, Policy and General Administration at the Ministry of

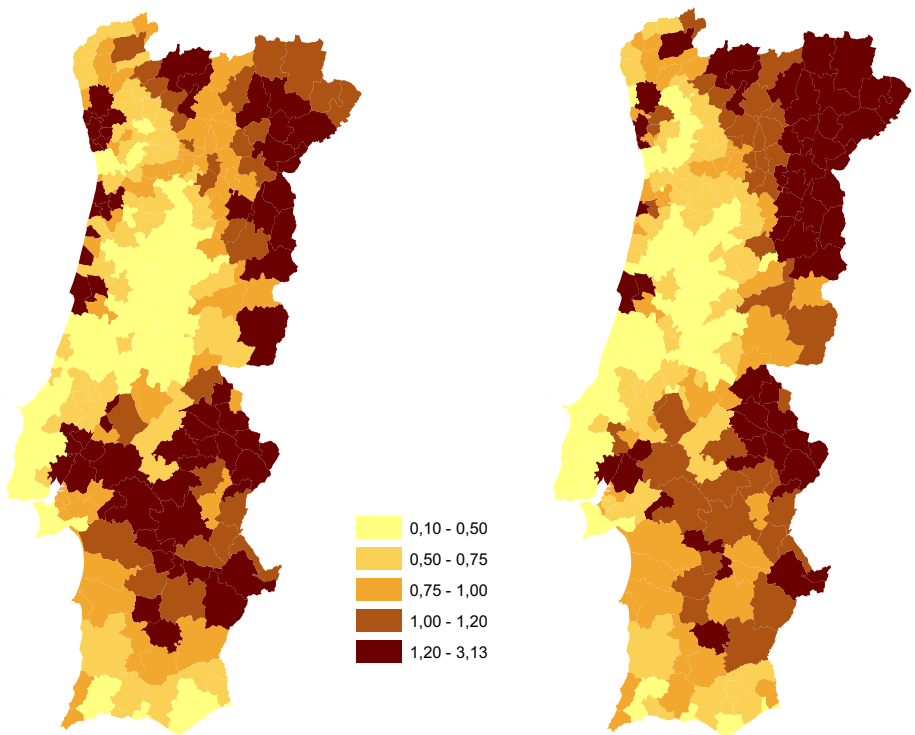

Fig. 3 Distribution of the equity index by municipalities, on the left based on average payments between 2018 and 2020, on the right based on GPP projections for 2026 (*Source*: INE data, GPP and authors' calculations)

Agriculture (GPP) considering the new PEPAC rules. Observing the two cartograms, we see that there are no major changes in the pattern of inequality. There is a slightly sparser spot in the Alentejo and another denser and darker in the eastern part of the North. In other words, we have a slight attenuation of inequalities in the Alentejo and a worsening of these inequalities in Trás-os-Montes. These changes become even more tenuous if we look at the individual results of each municipality. According to the average payment between 2018 and 2020, we have 187 municipalities with an equity index below 1 (out of a total of 278 municipalities in mainland Portugal). This means that these councils received less than they should, considering their area and the respective workforce. With the new PEPAC rules, only 18 councils improve their situation, with an index above 1. Of these 187 councils with an equity index below one, 69 worsen their situation with the new rules, leaving them with an even smaller equity index. The rest (187 minus 69 and minus 18, i.e., 100) improve slightly their equity index, but still continue below unity. On the other hand, with the current distribution of support, we have 91 municipalities with an equity index above 1. Of these, 36 have their position reinforced, with the new PEPAC rules that increase their respective equity indexes. These municipalities, that already received above average considering the respective allocation of area and workforce, will receive even more with the new CAP rule, as anticipated by the GPP. Still within the 91 municipalities with an equity index above one, we have 55 that see their equity index decrease. However, of these, only 13 remain with an index below unity with the new rules.

Table 3 Equity index calculated before and after the new PEPAC rules

	Half-sum of absolute values			
	2018_2020	PEPAC 2026	Effect PEPAC	
			Difference	% of 2018_2020
Sum	58.6	55.0	− 3.6	− 6%
Average deviation from de mean	21.1%	19.8%	− 1.3	− 6.1%

Source: INE 2019 agricultural census, GPP and authors' calculations

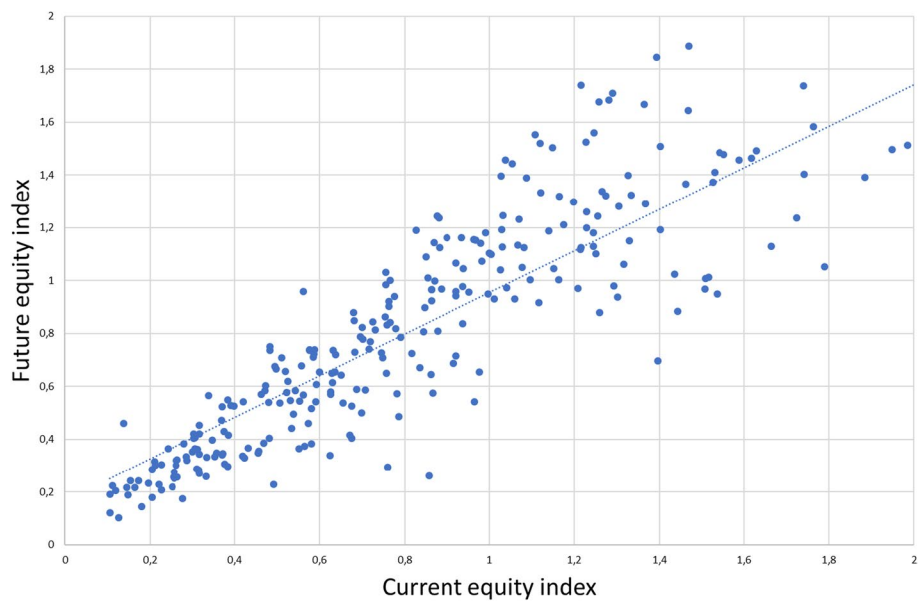

Fig. 4 Scatter plot with present and future equity index (*Source*: INE 2019 agricultural census, GPP and authors' calculations)

The numbers in Table 3 confirm these findings. To compare the two periods, we use the half-sum of the absolute values of the deviations from the mean (equivalent to the unit). The average value of this half-sum corresponds to the average deviation of the municipalities. As can be seen in the table, we have a slight improvement. The average deviation thus goes from 21.1 to 19.8%, which corresponds to a decrease of 6%. In other words, despite the European Commission considering equity as one of the priorities of the future CAP after 2022, our calculations point to a very slight improvement in that matter. The scatter plot in Fig. 4 further reinforces these results by showing that most municipalities are in the lower left and upper right quadrants. That is, those who are penalized today will continue to be penalized in the future and those who are benefited today will maintain their privileges. In view of the blatant level of inequality in the distribution of support, recognized by national and European authorities, we believe that the new rules will do little to improve the situation, contributing to a result far below the European Commission's ambitions.

Furthermore, in addition to the high levels of inequalities in the distribution of support at a global level, the pattern of geographical distribution remains almost

Table 4 Impact of the coverage rate on European funds

	Coverage rate
Equity index with present distribution	
Pearson correlation coefficient	.643**
Sig. (2 extremity)	< .001
N	278
Equity index with projection for 2026	
Pearson correlation coefficient	.765**
Sig. (2 extremity)	< .001
N	278

Source: Instituto Nacional de Estatística 2021, GPP and authors' calculations. ** Indicates significance at 0.01 level

Table 5 Regression analysis between equity indices (current and future) and the coverage rate

Model	R	R squared	R squared ajust	Standard error
Present	.643[a]	.414	.412	.37190
Future	.765[a]	.586	.584	.28160

[a] Predictors: (Constant). Cover rate

Source: Instituto Nacional de Estatística 2021, GPP and Authors' calculations

unchanged (as can be inferred from Fig. 3). In other words, municipalities with an equity index above are still mostly in the Alentejo and in Northeastern territories of Portugal. A large clear spot corresponding to parts of the Algarve and the Center Region continues to concentrate the municipalities most penalized in the distribution of CAP funds, with the latter continuing to be the most penalized region. This region groups the territories where there are the greatest population losses due to aging and the migration of young people to the large urban areas of the coast, and it is also in this region where living standards are lowest and where the prevalence of forest fires is highest.

As we have seen in the methodology and data section, there is a significant part of farmers who do not receive any support from the CAP. This proportion varies from municipality to municipality and from region to region. Next, we will infer the impact of this coverage rate on the equity indicators calculated for each municipality. We calculated the impact on the current scenario and on the GPP projections of the support distributed in the future according to the new PEPAC.

Our calculations confirm that the coverage rate of community support has a significant impact on equity indices. In Table 4, we can see the Pearson correlation coefficient applied to the present and future equity indices. Both coefficients are positive, high, and statistically significant. The correlation is stronger when applied to the future distribution increasing from 0.643 to 0.765.

To reinforce these results, we performed a regression of coverage rates on equity indices. The positive association between the variables is confirmed. It is also confirmed that the association is more significant when we use the GPP simulation on future forecasts of the distribution of support according to the new CAP rules (see results in Table 5). Indeed, the coefficient of determination is 41.4% in the present model. This means that the coverage rate of PAC support explains 41.4% of the

variability in current equity indices. However, when we apply the regression to the GPP projections for 2026, this coefficient of determination increases to 58.6%. These results support the need to find mechanisms to include more farmers within the CAP support system. Without meeting this need, it will be very difficult to change the current level of inequality in the distribution of CAP support in Portugal. For this, it is important to understand the reasons why so many farmers are outside the system, not receiving any support from the CAP. One of the reasons has to do with the support mechanisms that are still associated with the historical production of each farm. In the current system, those who benefit with direct payments continue to be favored over others who apply for the basic payment scheme, becoming dependent on the availability of allocated payment entitlements, in the national reserve. A second reason is the poorer regions' weak capacity to absorb European. This weak capacity is related to the strong aging of the population and lack of capacity to respond to the high bureaucracy associated with support.

Conclusion

The inequality in the distribution of CAP support is fully recognized by the European Commission. In Portugal, this inequality is also acknowledged, with funding heavily concentrated on a few farmers and with strong regional asymmetries. The new CAP rules transposed in the PEPAC present several measures to improve the distribution of subsidies. With the new rules, the evaluation methods also change, which will be increasingly based on results. In this sense, it is necessary to find performance indicators that can help to improve political decisions.

In the present work, we provide an assessment on inequality in the Common Agricultural Policy in Portugal, with three relevant contributions. First, we make a comparative analysis between the current distribution of CAP support and the one that results from applying the rules defined for 2023, carrying out a forecasting exercise of the impact of the new rules on the future distribution of CAP funding. Second, we integrate the totality of farms into the inequality measures and not just those that are within the single request system of CAP funds. Third, we build a synthetic indicator of inequality that weights the distribution of support according to the general objectives of the CAP, namely: increasing farmers' income, promoting employment, and ensuring territorial cohesion. This indicator is calculated for all municipalities of mainland Portugal, giving our index a territorial dimension that allows to locate the great poles of attraction and concentration of subsidies.

The results show a strong concentration in the Southern and the Northeaster parts of mainland Portugal. Our prospective analysis based on the GPP's projections does not estimate a significant change to this pattern with the CAP rules implemented from 2023 onwards. We also conclude that the aid coverage rate—i.e., the proportion, in each municipality, of farmers benefiting from the CAP subsidies—is critical in explaining the current and future inequalities.

The PEPAC contains some measures that seek to introduce greater equity in the distribution of CAP support. However, these mechanisms may be insufficient to reverse a system that, in the last decades, has induced a strong polarization of support. New CAP regulations allow the imposition of a cap with a maximum limit of support per farm. The

Portuguese PEPAC does not go that far. It introduces a 50% cut in aid that exceeds the EUR 100.000 limit (after deducting labor costs). In the opposite direction, the PEPAC is more generous in the smallholding regime, benefiting small farms with more than one hectare. Finally, the Complementary Redistributive Support, which until now only benefited the first 5 hectares, will be extended to the first 20 in farms up to 100 hectares. We do not have elements that allow us to estimate the global impact of this last measure on equity.

Our results indicate that a large part of the existing inequality in the distribution of CAP support results from a high proportion of farmers who are excluded from the system and do not receive any subsidy. The introduction of more farmers into the support system is, therefore, considered as mandatory to improve equity. In this sense, it is necessary to accelerate the process of internal convergence, anticipating as much as possible its conclusion, ending with an amount of around 80 euros per hectare. Once this convergence process is over, it will be possible to place all farms on an equal position in the single request applications, ending the separation between farmers who are already in the system and those who are not. Until now, the national reserve of payments entitlements has not been able to match all new applications.

As a second measure, we propose that smallholder farms, who benefit from the small farm's regime, must be able to access eco-schemes, at least in vulnerable territories. This proposal has three objectives. In the first place, it complements the support given by the small farm's regime, which is quite limited. Secondly, it values agricultural employment and contributes to the establishment of population in rural territories. In this way, this measure ensures a better distribution of support among farmers and promotes a fairer geographical distribution of support, which is currently very asymmetrical. Finally, with the extension of eco-schemes to smallholder farms, our equity indicator will improve, considering the high contribution of smallholdings to biodiversity and to the preservation of ecosystems.

Without prejudice to the incentive to promote the various modalities of grouped management (ZIF, AIGP, etc.), we suggest, as a third measure, the creation of simple and appealing support aimed at improving individual forest management. This may include specific aid for small producers or the creation of an agri-environmental measure to the autochthonous forest, like the one that exists for the cork oak forest. This measure can be justified with the environmental services provided by the farmer and must require concrete commitments from the owners and be accompanied by technical support services. In many inland territories or in vulnerable areas, forestry is the only profitable alternative for thousands of smallholders. This measure will channel funds to inland areas and mountain areas where forested areas are larger. The measure will help socially depressed regions. Furthermore, it is rational from an economic point of view because it will remunerate environmental services through the recovery and development of the forest and the reduction in fires.

Finally, we suggest attributing 1% of the second pillar allocation to technical support and rural extension services. These services should increase the technical capacity of the neediest territories to carry out applications for CAP support. With this measure, it will be possible to include more farmers within the CAP support system in regions where the exclusion rate is higher. EU funds, which are currently concentrated in the

most prosperous agricultural regions of Portugal, would then benefit poorer and more needy regions.

The study of inequalities is complex and presents many methodological approaches. This article explores some angles, while also revealing some limitations which are worth addressing in future works on the subject. A first limitation stems from the difficulties in quantifying the externalities linked to the agricultural sector, which can be of social or environmental nature. We believe that it is necessary to investigate more in this field to promote a fairer distribution of CAP subsidies based on criteria of economic rationality. The ecological schemes foreseen in the current regulations provide interesting clues to guide this investigation. In addition, the present work quantifies all CAP support in aggregate form, without differentiating the different typologies. In Portugal, coupled support represents 20% of the first pillar. This justifies a distinct analysis of the impact of each payment (decoupled, coupled and agro-environmental) on the distribution of support and their potential to mitigate inequalities, as in Severini and Tantari (2015). Finally, several studies have estimated the impact of direct uncoupled payments on land rent (Ciaian et al. 2018). This effect on land rent has significant impacts on farmers' income with consequences on inequality that need to be studied and estimated.

Abbreviations

AIGP	Integrated Landscape Management Areas (Portuguese acronym)
BPS	Basic Payment Scheme
CAP	Common Agricultural Policy
EU	European Union
GDP	Gross Domestic Product
GPP	Office of Planning Policy and General Administration at the Ministry of Agriculture (Portuguese acronym)
IFAP	Agriculture and Fisheries Financing Institute (Portuguese acronym)
INE	National Statistical Institute (Portuguese acronym)
MFF	Multiannual Financial Framework
PEPAC	National Strategic Plan for the PAC (Portuguese acronym)
SFP	Single Farm Payment
TFEU	Treaty on the Functioning of the European Union
ZIF	Forest Intervention Zone (Portuguese acronym)

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Availability of data and materials
We agree to share all the data used in our paper.

Declarations

Competing interests
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References
Ackrill R (2000) Common Agricultural Policy, vol 9. A&C Black

Baldock D, Dwyer J, Lowe P, Petersen J-E, Ward N (2001) The nature of rural development: towards a sustainable integrated rural policy in Europe. Synth Rep 6:66
Butault J-P, Chantreuil F, Dupraz P (2002) Critères d'équité et répartition des aides directes aux agriculteurs. Économie Rurale 271(1):84–91. https://doi.org/10.3406/ecoru.2002.5345
Ciaian P, Kancs D, Espinosa M (2018) The impact of the 2013 CAP reform on the decoupled payments' capitalisation into land values. J Agric Econ 69(2):306–337. https://doi.org/10.1111/1477-9552.12253
Ciliberti S, Frascarelli A (2018) The CAP 2013 reform of direct payments: redistributive effects and impacts on farm income concentration in Italy. Agric Food Econ 6(1):66. https://doi.org/10.1186/S40100-018-0113-5
Ciliberti S, Severini S, Ranalli MG, Biagini L, Frascarelli A (2022) Do direct payments efficiently support incomes of small and large farms? Eur Rev Agric Econ 49(4):796–831. https://doi.org/10.1093/ERAE/JBAC013
Cordovil FC (2004) A política agrícola e rural comum e a União Europeia: factos e políticas, futuro e opções. Principia
Cordovil F (2020) Política Agrícola e Equidade Territorial no Limiar 2020. In: Instituto Nacional de Investigação Agrária e Veterinária, I.P., Oeiras
de Lima AV (1991) Velhos e novos agricultores em Portugal. Análise Social 66:335–359
Erjavec E, Chantreuil F, Hanrahan K, Donnellan T, Salputra G, Kožar M, van Leeuwen M (2011) Policy assessment of an EU wide flat area CAP payments system. Econ Model 28(4):1550–1558
Finger R, el Benni N (2021) Farm income in European agriculture: new perspectives on measurement and implications for policy evaluation. Eur Rev Agric Econ 48(2):253–265. https://doi.org/10.1093/ERAE/JBAB011
Garcia-Bernardo J, Jansky P, Misak V (2021) Common Agricultural Policy beneficiaries: evidence of inequality from a new data set. IES Working Paper
Gay SH, Osterburg B, Baldock D, Zdanowicz A (2005) Recent evolution of the EU Common Agricultural Policy (CAP): state of play and environmental potential. MEACAP WP6, D4b, Federal Agricultural Research Centre, Braunschweig and Institute for European Environmental Policy, London
Grant W (1997) The Common Agricultural Policy. Bloomsbury Publishing
Grant W (2010) Policy instruments in the Common Agricultural Policy. West Eur Polit 33(1):22–38
Hanson A (2021) Assessing the redistributive impact of the 2013 CAP reforms: an EU-wide panel study. Eur Rev Agric Econ 48(2):338–361. https://doi.org/10.1093/ERAE/JBAB006
Instituto Nacional de Estatística (2021) Recenseamento Agrícola. Análise dos principais resultados: 2019. https://www.ine.pt/xurl/pub/437178558%3E. ISBN 978-989-25-0562-6
Lécole P, Thoyer S (2015) Qui veut garder ses millions? Redistribution des aides dans la nouvelle PAC. Economierurale 348:59–79. https://doi.org/10.4000/ECONOMIERURALE.4701
Lowe P, Falconer K, Hodge I, Moxey A, Ward N, Whitby M (1999) Integrating the environment into CAP reform. CRE Res Rep 6:66
Patterson LA (1997) Agricultural policy reform in the European Community: a three-level game analysis. Int Organ 51(1):135–165
Pe'er G, Bonn A, Bruelheide H, Dieker P, Eisenhauer N, Feindt PH, Hagedorn G, Hansjürgens B, Herzon I, Lomba Â (2020) Action needed for the EU Common Agricultural Policy to address sustainability challenges. People Nat 2(2):305–316
Severini S, Tantari A (2015) The distributional impact of agricultural policy tools on Italian farm household incomes. J Policy Model 37(1):124–135. https://doi.org/10.1016/J.JPOLMOD.2015.01.004
Sinabell F, Schmid E, Hofreither MF (2013) Exploring the distribution of direct payments of the Common Agricultural Policy. Empirica 40(2):325–341
Volkov A, Balezentis T, Morkunas M, Streimikiene D (2019) In a search for equity: Do direct payments under the Common Agricultural Policy induce convergence in the European Union? Sustainability 11(12):66. https://doi.org/10.3390/su11123462
Winters LA (1989) The so-called "non-economic" objectives of agricultural support. OECD Econ Stud 13:237–266

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