Impacts of CAP Instruments on the Distribution of Farm Incomes – Results for Austria

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Abstract

The Common Agricultural Policy (CAP) has evolved from an allocative towards a distributive policy, according to the Sapir-report. Using two data-sets we take a closer view at the distributional consequences of CAP instruments. Data on direct payments of several EU Member States are used to show how the distribution among farm holdings and countries differs. We find that in Austria most direct payments go to smaller units compared to other EU Member States, in which large beneficiaries are represented over-proportionally. Data from the Austrian Farm Accountancy Data Network (FADN) are used to investigate the effect of direct payments on farm income distribution. Moreover, we show that other CAP instruments, i.e. less favoured area and agri-environmental payments, also alter the distribution of farm incomes, but in a different manner.

1   Introduction

Traditionally, income distribution as a problem of agriculture is primarily discussed with respect to developing countries (Kuznets, 1955, Adler, 1972, Martens, 2005, World Bank, 2005). However, it is also a problem of agriculture and agricultural policy in developed countries. A diverse distribution of natural and structural characteristics across farms and intensified by the mechanisms of the Common Agricultural Policy (CAP) causes a highly skewed income distribution of European agriculture (see Baldwin, 2005, for a recent discussion). The change in farm policy instruments – from market price support to decoupled payments – and the related increase in transparency with respect to the distribution of public funds have gradually increased the awareness of the distribution problem in recent years.

A frontal attack at the current situation in EU agriculture is conducted in the "Sapir Report" (Sapir et al., 2003). In this report of an Independent High-Level Study Group, initiated by Romano Prodi, the former President of the European Commission, a substantial reduction in the amount of community funds devoted to agriculture is proposed (Sapir et al., 2003, 164p). Among other arguments, distributional deficiencies of the CAP play a prominent role. The authors argue that the CAP has changed from an allocative policy enhancing competitiveness and efficiency towards being a distributive policy for a particular group of citizens. Such a task is viewed to be a "systemic anomaly" within the EU policy set and thus should be better carried out at the level of Member States.

In this paper, we take a closer view at distributional aspects of the CAP, using recently published data on direct payments. We show that their allocation is profoundly different across EU-15 Member States. One question is whether direct payments are – as other distributive policies – an instrument to enhance the equality of farm incomes, or not. We make an attempt to answer this question by using data from Austrian farms participating voluntarily in the Farm Accountancy Data Network (FADN). This data set provides information on various farm characteristics, incomes and accountancy items. Therefore, we can analyse the impacts of direct payments on the distribution of farm incomes.
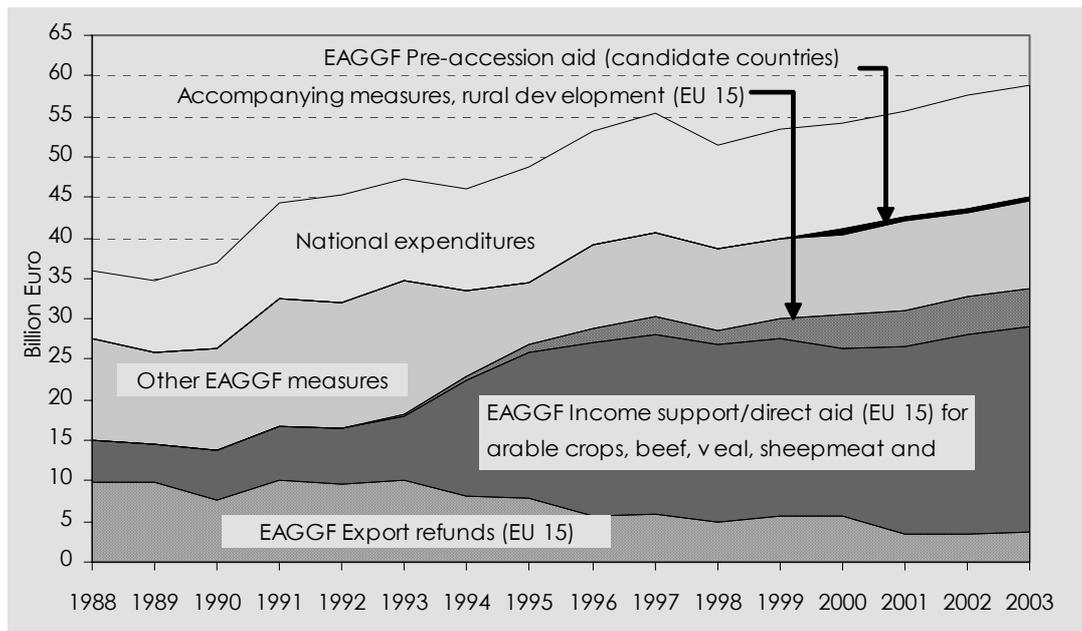
Direct payments were an element of a complex set of market interventions, dubbed "the first pillar" of the CAP. They have been an important, but not the only vehicle of farm policy transfers. Another instrument, the programme for rural development – the "second pillar" of the CAP – needs to be also considered, as well. We do so by taking account of these transfers in our analysis. Thus we can show the distribution of farm incomes from market activities before and after the inclusion of transfers from various CAP policies.

The paper is structured as follows: in the next chapter we show graphically the distribution of direct payments across EU-15 Member States and discuss it. We highlight the policy context in which the underlying data were made available to the public. In the following chapter we present data and methodology, which allow us to take a closer view on the distribution of farm incomes and the role CAP transfers play. The results for Austrian FADN farms are presented next. Then we discuss our findings in the context of the newly introduced "single farm payment".

2   The Distribution of Direct Payment Across Farms in EU-15 Member States

In 2003, approximately 46.5 billion €were spent from the EU budget for the CAP. The largest share (25.7 billion €) was allocated towards direct payments (premiums for arable crops, beef, sheep and goat meats). The volume and share of these payments has increased after the 1992 reform of the CAP (Figure 1). These payments compensated farmers for lowering commodity prices. Administrative prices had been cut in order to better align domestic prices with world market prices. In 1992, "accompanying measures" were introduced which aimed at the promotion of environmentally friendly production methods and at measures to stimulate income diversification. After the Agenda 2000 reform, the newly established programme for rural development reinforced these initiatives while direct payments were further expanded to compensate for another round of price cuts.

Figure 1: Allocation of agricultural funds in the EU and in EU-15 Member States

In preparing the 2003 CAP reform, Franz Fischler EU Commissioner at this time, infringed a hitherto off-limits information barrier. He released fairly detailed data about the distribution of direct payments for the first time in EU history. The background for this action was his intention to limit the size of high-end CAP payments and thus to reduce the regressive nature of the CAP regime with the 2003 reform. Furthermore, in 2005 the European Commission started a "European Transparency Initiative", which aims to "increase openness and accessibility of EU institutions, raise awareness over the use of the EU budget, and make the institutions of the EU more accountable to the public" (CEC, 2005).

In order to comply with the claim to enhance information about projects and beneficiaries of EU policies, a couple of EU member states publish single farm data of CAP payments. In countries like Denmark, the UK or Estonia, everybody has access to a data file containing information about the CAP payments any single farm received during various years.

The most up-to-date figures for a set of EU Member States was published by EUROSTAT in 2005. In 2001, 4.498 million holdings got direct payments amounting to 24.98 billion € On average, each farm received 5,534 € The distribution of direct payments is skewed towards larger units: 1,5% of the recipients get 27% of the transfers. On the other end of the distribution, farms receiving less than 5,000 € (76% of the holdings) get 16% of direct payments.

The data for the countries in question (EU-15 except Greece) as a whole (labelled EU-14) and for some selected countries is shown in Figure 2. The graphical presentation of the data shows that the distribution of direct payments varies considerably across EU Member States. Classified data with varying class sizes were used for the construction of the graph, therefore the real, but unknown, distribution may look slightly different.

Figure 2: Distribution of Direct Payments in Selected EU Member States and in EU-14 in 2001
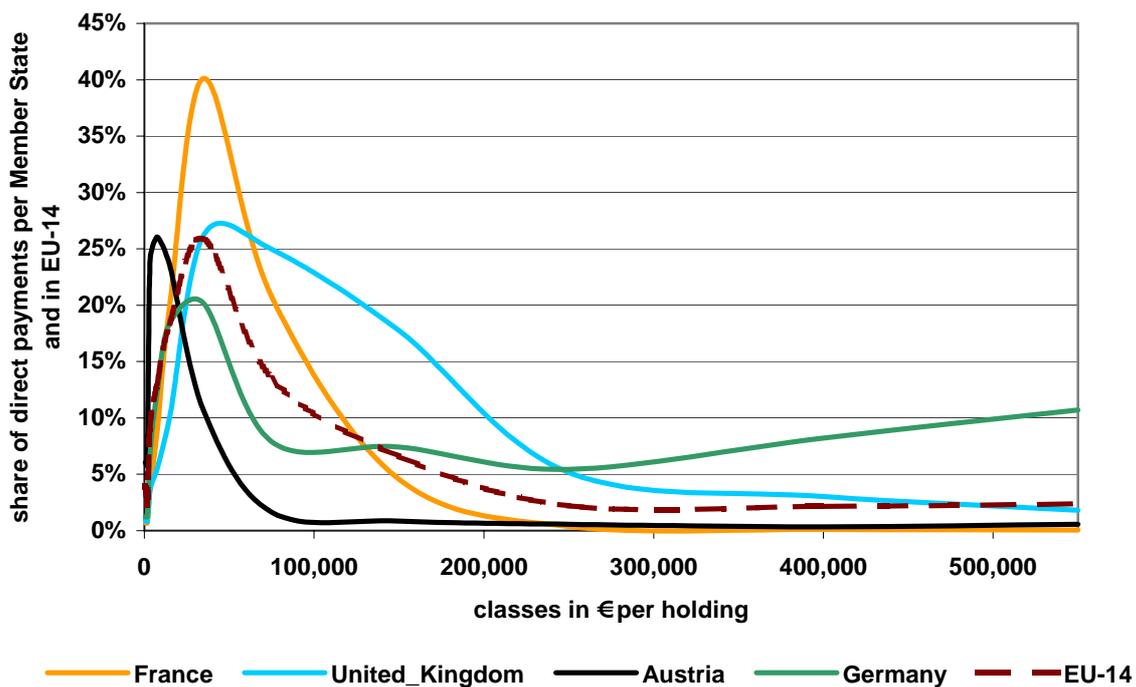
Source: EUROSTAT, 2005; own calculations. Note: Figures are truncated at 550.000 €, the presented volume of payments is for the open class 500.000 € and above. The graph is based on classified data with varying class sizes, therefore the real, but unknown distribution may look slightly different.

In Austria, the largest share of direct payments (62%) is spent for recipients getting less than 10,000 € Another country with a comparable small variation of payments among recipients is France (14% of the volume for recipients with less than 10,000 €). Consequently, the average French farm gets considerable more direct payments (14,114 €) than the average Austrian farm (3,565 €). Countries like the United Kingdom and Germany have distributions with broad tails meaning that very few farms get a large share (the largest 2.5% recipients have got 53% and 40% of the total direct payments in 2001, respectively).

3 Do CAP Payments Contribute to More Equal Farm Household Incomes?

3.1 Data – Farm Household Income Structure in Austria

Data for the analysis of farm household income structure and distribution are from the Austrian FADN (LBG, 2001, 2002, and 2003). The dataset contains records of 2,350 farms in the year 2000, 2,276 farms in 2001, and 2,288 farms in 2002. In this analysis, average figures for 2,572 different farms are calculated from the three-year panel record to offset annual anomalies[1].

The Agricultural Census of 1999 (LFBIS, 2001) is used to describe agricultural structures in Austria. About 38% of all surveyed farms (209,710) are run by full-time farmers, 44% are run by part-time farmers in the narrower sense, and 18% are operated by retired farmers. The distribution of FADN-farms according to Alpine Farming Zones is shown in Figure 1 (see row "farms"). A third of the farms is located in mountainous regions, classified from zone one (moderately mountainous) to zone four (very mountainous farm land).

The analysis of farm household incomes reveals that most farms have several sources of income. In the following text "farm household income" is (a) the total of market revenues from agricultural and forest activities net of operating expenses, investments, and depreciation plus (b) farm policy transfers, and (c) other revenues (e.g. off farm incomes, pensions, family allowances) of the farm operator household. Category (b) transfers are accounted for in a differentiated manner in order to capture the particular policy instrument: direct payments and premiums of the programme for rural development which consists of less favoured areas payments, agri-environmental payments and other payments.

The average household income of FADN-farms consists of 13% agricultural and forest market income (a), 37% farm policy payments (b), and 50% of revenues are from other sources (c) which break down to 17% working and social rents, 25% off-farm salaries and wages, and 8% family support transfers.
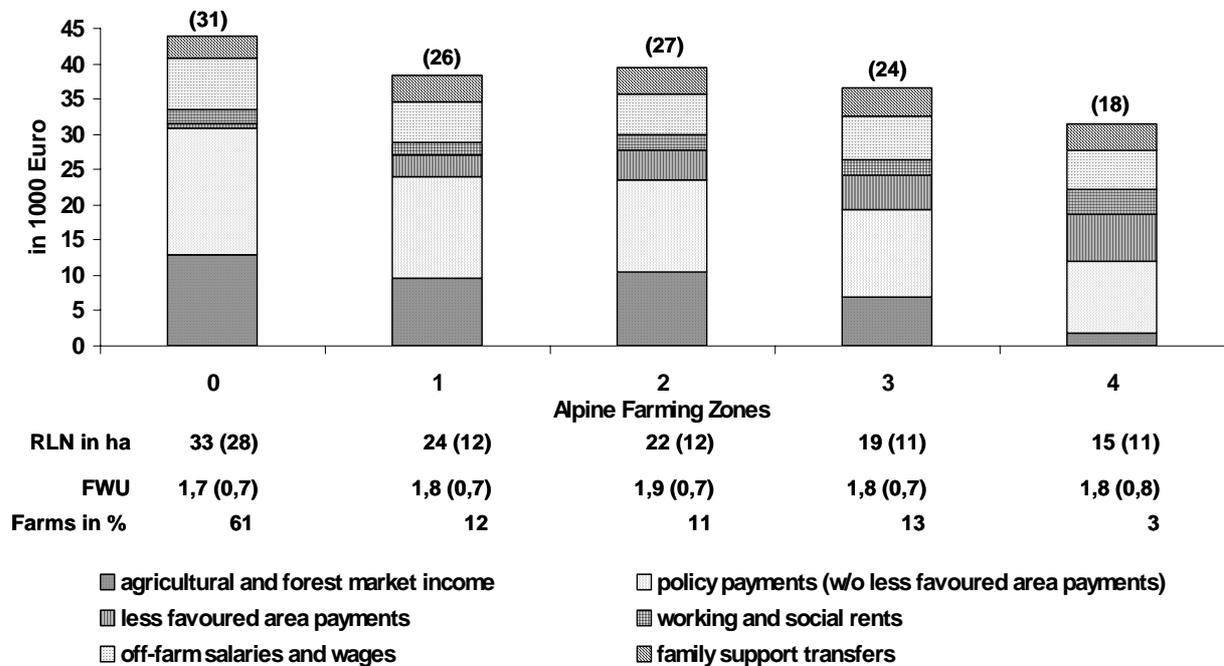
About 30% of all FADN-farms have on average negative incomes from agricultural and forestry activities (a). For the remaining 1,805 farms, the market revenues net of costs (a) is less than 25% of total farm household income for 36% of farms (less than 50% for 76% of farms, and less than 75% for 95% of farms).

The share of market incomes (a) on total farm household income is 34% for the average full-time farmer. On average, part-time farmers have (a slight) negative market income (a).

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[1] The number of 2,572 farms results because some farms have left LBG and others have been included. Consequently, not for all farms are 3-year average figures available, but are still included in this analysis.

Figure 1 shows total farm household income, revenue components, and other farm characteristics according to Alpine Farming zones, which are expressed in arithmetic means and standard deviations (in brackets).

Figure 3: Farm household income structure of FADN-farms according to Alpine Farming Zones in 1,000 Euro per farm (average of 2000-2002).

	0	1	2	3	4
RLN in ha	33 (28)	24 (12)	22 (12)	19 (11)	15 (11)
FWU	1,7 (0,7)	1,8 (0,7)	1,9 (0,7)	1,8 (0,7)	1,8 (0,8)
Farms in %	61	12	11	13	3

- ■ agricultural and forest market income
- ▨ less favoured area payments
- ▢ off-farm salaries and wages
- ▢ policy payments (w/o less favoured area payments)
- ▥ working and social rents
- ▨ family support transfers

Note: RLN is normalized farm land in hectares (less productive land like alpine grassland is calculated at a fraction of an hectare); FWU is "family working unit" (one full time working equivalent farm household family member); Alpine farming zones are classes of natural disadvantages (land in zone 4 is most mountainous). Figures above bars are indicating standard deviations of farm household incomes.
Source: LBG, own calculation.

Generally, average total farm household income and farm size, measured in hectares of RLN (normalized agricultural land according to potential yields), decline with increasing level of natural and infra-structural disadvantages (i.e. Alpine Farming Zone). However, average annual Family Working Labour Units (FWU) per farm remains almost constant with 1.8 across Alpine Farming Zones. Hence, farms with increasing natural disadvantages spend comparatively more labour per hectare and make less farm income on average (Figure 3). The share of market incomes (a) of total farm household income ranges among Alpine Farming Zones between 5% and 30% with the smallest one in Zone 4. The share of CAP direct payments and agri-environmental payments is almost proportional to farm size and ranges between 40% in Zone 0 and 33% in Zone 4. The contribution of less-favoured area payments to total farm household income is ranging from 2% in Zone 0 to 22% in Zone 4. Relatively constant is the average share of off-farm salaries and wages (15%). Family support transfers

and working and social rents contribute to total farm household income from 11% in Zone 0 to 23 % in Zone 4. Standard deviations of total farm household incomes (numbers in brackets in Figure 3) indicate that total household incomes of farms within each Alpine Farming Zone are varying substantially (the variation coefficients range between 0.57 in Zone 4 and 0.71 in Zone 0).

Descriptive data analysis shows that agricultural and forest market incomes contribute relatively little to total household incomes. Off-farm wages and salaries, and family support transfers provide stability in total farm household incomes. CAP instruments have the largest share on total farm household incomes in average. However, it is evident that these shares are proportional to farm size (i.e. farm land and livestock units).

3.2   Method – Measures of Inequality

In this analysis, the impact of three CAP instruments: direct payments [DP] ("first pillar"), and transfers from the programme for rural development ("second pillar") which are differentiated in less-favoured area payments [LFA], and agri-environmental payments [AEP] on the distribution of farm incomes is measured by three methods:

- **Lorenz curves** (Lorenz, 1907) depict the percentage of the population arranged from the poorest to the richest on the horizontal axis and the percentage of income earned/enjoyed by the population is shown on the vertical axis. Obviously, 0% of the population earns/enjoys 0% of the income and 100% of the population earn/enjoy 100% of income. If all farms earn/enjoy the same income then the Lorenz curve runs diagonal i.e. absolute equality (see Figure 3). However, if there is inequality in income then the bottom income group of farmers gets a proportionally lower share of income. Such a situation is expressed in a downward bended Lorenz-curve. About 50% of Austrian FADN-farms earn/enjoy 30% of total farm incomes.

- **Gini-Coefficients**[2] (Gini, 1921) are a relative inequality measure. A Gini-Coefficient is the ratio of the difference between the diagonal line of absolute equality and a bended Lorenz curve to the triangular region underneath the diagonal. Gini-Coefficient is bounded between 0 (absolute equality) and a theoretical maximum of 1 (absolute inequality). The Gini-Coefficient is undefined for negative incomes.

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[2] $G = \dfrac{1}{\bar{x}n(n-1)} \sum_{i=1}^{n} (2i - n - 1)\, x_i$, which is calculated according to Dixon et al. 1987, 1988, where the data is ordered by increasing size of individuals, n is the number of observation in the sample, x is the income of individual i (i = 1,...,n), and $\bar{x}$ is the mean income size.

- The **Mean Absolute Difference**[3] (MAD), is an absolute inequality measure. It can be used for negative incomes and is invariant to equal absolute changes in all incomes. For instance, if all farms have got the same amount of payments (flat-payment per farm) then they receive the same level of support regardless of their current resource endowments (e.g. land, labour), production decisions, and income situation. Such a transfer would not change the MAD measure and may be judged as distributional neutral, because it has no effect on absolute inequality.

Compared to the MAD, relative inequality measures like the Gini-Coefficient, are scale invariant. A policy instrument which increases current incomes proportionally e.g. by 10% may be deemed as distributional neutral i.e. shows no redistribution effect. CAP instruments of this group are direct payments, which are granted per hectare or per head of livestock. However, exactly this proportionality is the reason for many debates (see CEC, 2002; OECD, 2003): larger production units benefit from their scale twofold - they receive more payments due to the amount of crop land and livestock units and they benefit from lower average cost.

3.3   Results –Income Inequality of FADN-Farms in Austria

The impact of CAP instruments on the distribution of *agricultural and forest market income* (i.e. market income) is the focus of this empirical analysis.

Table 2:   Mean, standard deviation (Std), minimum (Min), maximum (Max), Mean Absolute Difference (MAD), and Gini-Coefficients (Gini) of income components from FADN-farms in €(average of 2000 - 2002)

	Mean	Std	Min	Max	MAD	Gini
market income	10,895	21,125	-51,503	262,435	20,507	-
market income + DP	17,541	22,455	-49,166	265,091	22,202	-
market income + LFA	13,068	21,102	-44,866	262,435	20,697	-
market income + AEP	17,701	22,053	-35,306	272,290	21,740	-
market income + CAP	26,520	24,392	-27,300	274,946	24,883	-
CAP €/ha (RLN)	608	261	0	3,511	-	0.21
CAP €/FWU	9,310	7,725	0	91,273	-	0.41

Note: DP direct payments; LFA are less-favoured area payments, and AEP are agri-environmental payments. CAP = DP + LFA + AEP. FWU is annual family working unit. All denominators of CAP/ha and CAP/FWU that are less than one were changed to one for calculation purposes. RLN is normalised agricultural land in hectares.
**Source:** own calculation, based on LBG.

The table contains statistical figures (mean, standard deviation, minimum, and maximum), Mean Absolute Difference (MAD), and Gini-Coefficients (Gini) from average (2000 to 2002)

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[3] $MAD = \dfrac{1}{n^2} \sum\limits_{i=1}^{n} \sum\limits_{j=1}^{n} \left| x_i - x_j \right|$ where x is the income of individual i (i = 1,...,n), and x_i, x_j denote the i'th and j'th elements of the sample.

FADN farm accountancy items in Euro. The figures are calculated using the SAS software package (version 8.2). On average, market incomes (a) are increased with direct payments and agri-environmental payments by 7,000 € each, and with less-favoured area payments by 3,000 €, respectively. Only less-favoured area payments seem to narrow the market income gap between FADN-farms which is expressed by a lower standard deviation (see 'market income + LFA'). Agri-environmental payments have the major effect on income extremes (minimum, maximum), such that negative incomes are substantially reduced (from -51 to -35 thousand €) and top incomes are further elevated (from 262 to 272 thousand €) in average. Market incomes (a) are more than doubled when (b) CAP transfers (DP, LFA, AEP) are added. Calculations of MAD reveal that less-favoured area payments have only a minor effect on absolute inequality, they are almost neutral and therefore close to a flat transfer per farm. Direct payments (DP) and agri-environmental payments (AEP) increase absolute inequality between FADN-farms, because they are proportional to farm sizes.

Figure 4:   Distribution of CAP payment rates per hectare farm land (ha) and per annual family working unit (FWU)
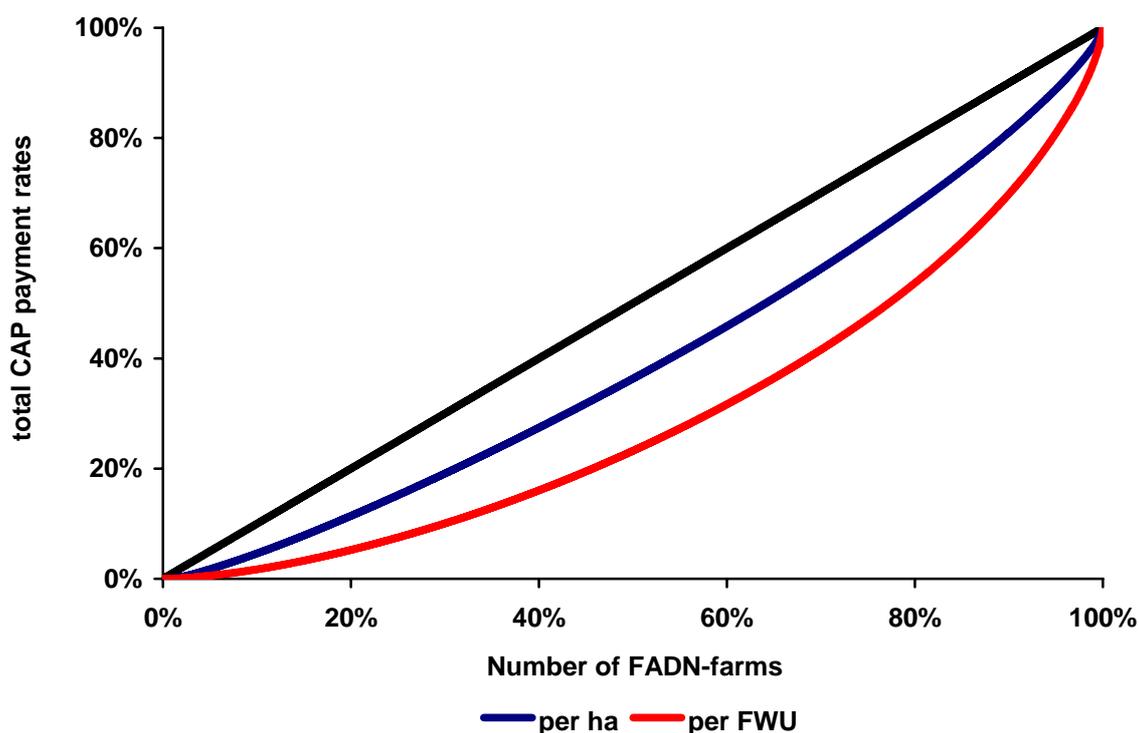
The average FADN-farm receives CAP payments (DP, LFA, AEP) amounting to 600 €/ha (the range is between 260 €/ha and 3,500 €/ha). The average CAP payment per annual family working unit (FWU) is 9,300 €/FWU (ranging between almost 8,000 €/FWU and more than

90,000 €/FWU). The corresponding Gini-coefficients are listed in Table 1 and the Lorenz-curves are shown in Figure 4.

Summing up, we have shown that major CAP instruments have an proportional effect on farm income. In particular, direct payments and agri-environmental payments favour larger production units. We have also argued that larger production units exhibit economies of scale so that big farms benefit twofold: (i) from proportional CAP payment schemes and (ii) lower average production costs. Figure 5 depicts such degressive course in costs by representing FADN-farm expenses per hectare farm land for five classes of farms.

Figure 5:   Ranked FADN-farm expenses by farm size classes in Euro/ha (average of 2000-2002)
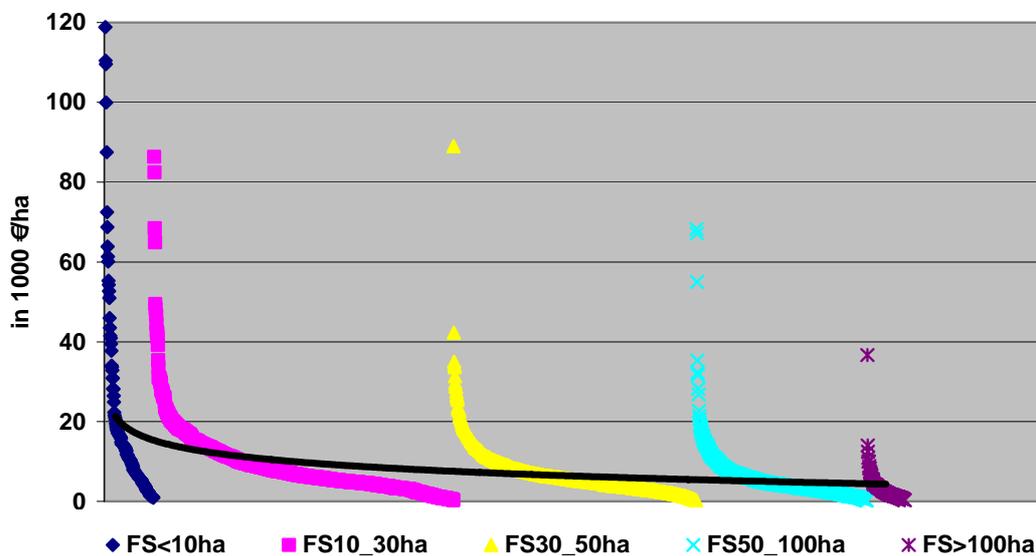
Note: Farm expenses include operating expenses and not investment and depreciation costs. Farm size is the sum of normalized agricultural land (RLN) and forest area in hectares. FS<10ha are farm sizes below 10 ha; FS10_30ha are farm sizes between 10 and 30 hectares, FS30_50ha are farm sizes between 30 and 50 hectares; FS50_100ha are farm sizes between 50 and 100 hectares, and FS>100ha are farm sizes above 100 hectares. **Source:** LBG, own calculation.

Figure 5 shows that the farm expenses per hectare range widely within each farm size class. However, the ranges are wider in smaller farm size classes (e.g. FS<10ha) than in larger farm classes (e.g. FS>100ha), because most farm operations with special and permanent crops (vegetables, orchards, vineyards, etc.) are located in small farm size classes. The black line combines average farm expenses of each farm size class. The line is declining with increasing farm size which corroborates our statement that larger farms gain twofold.

11

4 Conclusions and Discussion

This paper deals with key determinants of farm household income distribution in Austria. The empirical analysis shows that farm household income from market activities only accounts for a relatively small share of overall income. Moreover, this income category shows wide differences with respect to both, its absolute and relative distribution across all farms. Not unexpected, due to economies of scale, on average, bigger production units are better off than smaller ones . This effect is strengthened by the proportionality of many CAP instruments, which transfer payments to farmers in relation to acreage or numbers of livestock. The actual policy setting, with a fully decoupled farm premium and "modulation" (a cut of direct payments for larger farms) only slightly mitigates the skewed distribution of farm incomes.

In general, concerns about farm income distribution can be seen as facets of a discussion about distributive justice, which focuses on what is just or right with respect to the allocation of goods (or utility) in a society. Distributive justice concentrates on just outcomes and has been prominently –with a different focus – analysed by philosophers like John Rawls (1971) and Robert Nozick (1974). With respect to agriculture the interesting sub-branch of this theoretic discussion is entitlement theory where researchers are looking at the history of actions which have led to the current situation.

The question whether the actual distribution of CAP payments is just or unjust appeals to the historic development of the CAP. Following Nozick the current distribution of economic benefits in agriculture is just if these benefits have been justly acquired initially, and all later actions were "non-aggressive and consensual". Hence, in accepting the democratic correctness of the decision process underlying agricultural policymaking, the legitimacy of the current effects of agricultural policy would hinge upon the correctness of its starting position in the past.

However, the early stages of European agricultural policy, with trade measures aiming at establishing high price levels at domestic markets, have recurrently been criticized by economists, who pointed out the regressive distributional effects of such policies. They proposed transitional direct payments as a viable alternative to mitigate these shortcomings.

Actually, direct payments have become a central element of agricultural policy making since the beginning of the 90s. However, the specific form in which such support has been introduced, was not in line with the suggestions of economic science. The uneven distribution of benefits emerging from agricultural policies based on market price support, have carried on to subsequent reforms following the formula "income compensation" for price reductions.

The potential of direct payments, to correct for the shortcomings of market price policies was widely left idle. As a consequence of the 1992 reform even substantial "over-compensation" occurred (particularly grain farmers). Initially, the introduction of area and livestock payments was seen as the price for a system change in the "McSharry Reform" of 1992. A similar course of action has followed in the CAP reforms 1999 and 2003, which is more difficult to understand from a purely economic point of view. As a bottom line, the decoupled payments in their various forms left income distributions within European Agriculture more or less unchanged.

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