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E-mail addresses: franz.sinabell@wifo.ac.at, erwin.schmid@boku.ac.at, markus.hofreither@boku.ac.at
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Exploring the Distribution of Direct Payments of the Common Agricultural Policy

Franz Sinabell
Austrian Institute of Economic Research
franz.sinabell@wifo.ac.at

Erwin Schmid
University of Natural Resources and Applied Life Sciences, Vienna
erwin.schmid@boku.ac.at

Markus F. Hofreither
University of Natural Resources and Applied Life Sciences, Vienna
markus.hofreither@boku.ac.at

Abstract

Direct payments are the most important expenditure of the Common Agricultural Policy. They are mostly spent on decoupled direct payments which are intended to be allocatively neutral. Increasing volumes of such transfers imply that distributive aspects of CAP expenditures become more important. This paper looks at this issue by calculating various measures of concentration based on statistics on recipients of direct payments covering the period of 2000 to 2006. The findings are evaluated in the context of the objectives of the CAP and the review of the financial framework, due to be discussed in late 2008.

Keywords: common agricultural policy, distribution of transfers, single farm payments, direct payments

JEL-Classification: Q12, Q18, Q24, Q28

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1 Introduction

Until 1992, trade restrictions, market price support, and supply management policies were the major instruments of the Common Agricultural Policy (CAP). A process of 'decoupling' was initiated with the MacSharry reform to mitigate the weaknesses of this policy conception. After 1992, direct aids were granted to producers of arable crops, beef and veal, sheep meat and goat meat as a compensation for lower administrative prices. In the Agenda 2000 reform, this process continued by including the milk sector and by establishing the program for rural development (the "second pillar" of the CAP).

During the last 15 years direct payments have become the most important fiscal policy tool in the EU. In 2006, direct payments amounted to EUR 33.1 billion, which was equivalent to 31 per cent of the EU's total operating expenditure (EUR 106.58 billion). There are two categories with two components each: decoupled direct payments (DPPs) with Single Farm Payments (SFPs, EUR 14.2 billion), and Single Area Payments (SAPs, EUR 1.7 billion) and output linked direct payments for plants (EUR 12 billion) and livestock products (EUR 5.7 billion). The share of DPPs has increased recently, because the milk quota premiums had been fully decoupled by 2007, and due to the phasing in of area payments for member states that entered the EU in 2004. The share of DDPs will likely further increase because the Commission pledged to further reduce trade distorting internal support measures (see EU offer at the G4-summit in Potsdam 2007).

DDPs were established in 2003. They are intended to avoid the negative effects of price policy measures and the payments based on historical areas and heads of livestock. Theoretically, fully decoupled payments are considered to have minimal or no allocative effects at all and hence are classified as almost pure income support. Although it is not fully clear whether DDPs as established by the CAP are fully decoupled (OECD, 2006a and b), it is beyond doubt that this process has increased the degree of decoupling of agricultural support in the EU.

For a long time, agricultural economists (e.g. Koester and Tangermann, 1976) have considered the introduction of decoupled direct payments as an important step to mitigate the negative effects of market price support, high consumer prices and excess supply. They were also seen as a better alternative to reaching the farm income goals of the CAP and to avoid the

regressive distribution effects of output linked support. Being part of a distributive policy, such payments aim at correcting market outcomes according to politically determined objectives, as stated in the Treaty. According to Article 33, the goal of the CAP is "to ensure a fair standard of living for the agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture" while simultaneously guaranteeing adequate consumer prices. Usually, distributive policies involve transferring money from richer to poorer households. If decoupled CAP payments can be considered to be a distributive policy tool in its very meaning, one would expect similar redistributive outcomes in the case of direct payments.

An example of a redistributive policy element is "modulation". It channels a share of direct payments exceeding 5,000 Euros per holding (from 3 per cent in 2005 to 5 per cent from 2007 onwards) into the program for rural development. This has been justified on the grounds that larger holdings benefit from economies of scale and thus do not need the same level of support as smaller ones. Another distributive aspect is that SAPs will gradually increase in the member states that entered the EU in 2004 and 2007. The fact that the EU is planning to publish the names of recipients and the amounts of direct payments and rural development premiums (European Commission, 2008) is a further indication that distributive aspects have become more important.

In this paper the overall distributive effect of direct payments is addressed. We compare the distribution of direct payments for farm holdings across EU member states over a period of 2000 to 2006. Using various distributional measures, among them concentration ratios and Lorenz curves, we also look at the distribution within EU member states. These measures are frequently used to assess the distribution of household incomes which is not a topic of this paper. However, given that direct payments account for 26.5 percent of factor income of agriculture according to the Economic Accounts of Agriculture, direct payments are definitely an important source of farm incomes in the EU.

The paper is structured as follows: The next chapter briefly reviews the literature of distributive consequences of the CAP on farm household incomes and their spatial implications. The survey shows that a cross country comparison of direct payments before and after the 2003 CAP reform has not yet been made. We present a methodology to derive distribution indicators from budgetary statistics which facilitate the comparison of transfers

over time and across member states. Presentations of data and comparisons of income and transfer indicators are provided in the results section. The paper also addresses the need to establish better statistics to measure farm household incomes and ends with policy conclusions.

2 Evidence on the distribution of CAP transfers and farm household incomes

2.1 Data sources and their (ir)relevance for distributional analyses – an overview

Established information systems measuring the effects of CAP on farm incomes are hardly adequate for analyzing distributional outcomes (Court of Auditors, 2004):

- The income indicator of the *farm accountancy data network* (FADN) – 'farm family income' – is tricky to interpret, because many agricultural holdings are organized as companies. In addition, the sample of farms providing the information is considered to not to be representative.
- The *economic accounts for agriculture* (EAA) is a satellite account of the national accounts. Its main indicators are 'factor income' and 'net entrepreneurial income'. Besides the fact that the quality of data supplied by some member states seems to be poor, these indicators are only provided at sector level. Distributional comparisons can therefore only be made across countries or with other sectors, but not among farm holdings within the farming sector of a country.
- The same is true for statistics on the *income of the agricultural households sectors* (IAHS; see Eurostat, 2002). The methodologies of the underlying concept are not harmonized which 'cast[s] doubt on the possibility of comparing data supplied by member states' (Court of Auditors, 2004). In general, IAHS allows comparing non-farm household incomes with farm-household incomes, yet not in all member states.

In preparing the 2003 CAP reform, EU Commissioner Franz Fischler infringed a hitherto "off-limits" information barrier. He released fairly detailed data about the distribution of direct payments to foster a political climate to limit the size of high-end CAP payments. A similar strategy was pursued by the European Commission in starting the "European Transparency Initiative" in 2005 (CEC, 2005). This initiative will gain momentum when the

names of individual recipients of CAP payments will be published in 2009 as laid out in CR (EC) No 259/2008.

2.2 Previous studies

Over the last years, the OECD (1999, 2003) has repeatedly looked at the various dimensions of the distribution of agricultural incomes. The OECD (1999) analyses the distributional effects of agricultural policies in the mid-90s using its own structural data and support estimates. In detail, the report compares the distribution of support in relation to output and income in OECD countries. The report concludes that the distribution of market price support is very similar to the one of output. Differences in output, support, and income across regions are less than those across farm types or size classes. Moreover, distributions of output, support, and income in the countries reviewed have shown little change over the last ten years.

Kurashige and Hwan Cho (2001) examine the incidence of low income as well as the impact of social security policies of OECD countries in agriculture. Farm households are delineated according to farm self-employment income, "low farm income" is defined as a certain fraction of a national median income. Based on six indicators, the degree of low income and inequality in income distribution, both for farm households and non-farm households, is scrutinized. Key results are that "low income" is higher among farm households than among non-farm households and that the income distribution shows a higher degree of inequality in farm households than in non-farm households, despite the fact that in many countries the farm sector receives significant benefits from the social security system.

Allanson (2003) explores the redistributive impact of Common Agricultural Policy reform with reference to the distribution of farming incomes in Scotland. The proposed measure of redistribution is based on the change in the absolute value of the Gini coefficient, which is valid even though average pre-support farming incomes would be negative. The main result of this study is that the distribution of support through direct payments has exacerbated the inequality of farm incomes in Scotland in 1999/00. In addition, the changes introduced by the 2003 CAP reform will have no effect on the given redistribution of farm incomes.

Moreover, Allanson (2007 and 2008) analyses the redistributive effect of classical horizontal inequities induced by agricultural support policy. "Horizontal inequity" within farm types,

defined as the differences in the level of support received by farms of a given type and the level of pre-support income, is traced back to systematic differences in support levels between commodity regimes. The redistributive effect of agricultural policy is measured as the difference between the absolute Gini indices of pre-transfer and post-transfer incomes of Scottish farms. The provision of support increased the average size of farm income differentials throughout the period 2000/01 to 2004/05. In a recent study on Tuscany (IT), Allanson and Rocchi (2007) find that the provision of support increased absolute income inequality within the agricultural community because the distribution of transfers was both vertically and horizontally inequitable. This outcome holds whether or not non-farm incomes are taken into account and for different definitions of the agricultural community.

There are only a small number of studies which lead to other conclusions. One example is Keeney (2000), a study of Irish agriculture based on individual farm records. Results are derived from a decomposition of the Gini coefficient of family farm incomes into two components, direct payments and market-based income. Keeney demonstrates that the direct payment of the MacSharry reform induced a more equal distribution of family farm incomes in Ireland. In a similar study, Frawley and Keeney (2000) confirmed this result showing that suckler cow premiums and other headage payments were the most effective policy measures. Cross compliance schemes and the special beef premium had a more moderate effect in terms of equity and arable aid payments contributed least to farm income equity

The territorial dimension of CAP expenditures has been analyzed by Shucksmith et al. (2005). Looking at the regional distribution of CAP payments and their contribution to cohesion objectives, the authors found that CAP payments do not support territorial cohesion, because more prosperous regions get higher levels of CAP transfers. Market based support, both per hectare of agricultural land and per annual working unit (AWU) is concentrated in the prosperous northern areas of Europe. Support of the rural development program is somewhat more dispersed, but still reaches primarily the richer regions of Europe. At a similar result with respect to the distribution of farm support between continental and Mediterranean agriculture arrive Mora and San Juan (2004). They present evidence that for widely acceptable definitions of equality, Mediterranean farming is discriminated against compared to continental farming, because smaller and more labor intensive farms are disadvantaged in the CAP framework.

Hence, with hardly any exceptions, most studies looking at distributional effects of the CAP result in quite negative judgments: the current instruments of the CAP do not prevent a substantial part of farmers from being among the poorest citizens of EU member states. At the same time, direct payments to high-income farm units clearly fuel vast income inequalities in this sector.

3 Data, method and results

3.1 Direct payments across member states and holdings

In 2006, EU expenditures for the Common Agricultural Policy amounted to EUR 49.9 billion (47 per cent of the total budget; CEC, 2008). Direct payments (EUR 33 billion) had the largest share, followed by market related expenditures (EUR 8 billion) and payments for the rural development program (EUR 7.7 billion). Both volume and share of direct payments have increased since the CAP reform in 1992. In the year 2000, direct payments amounted to EUR 24.1 billion and EUR 32.5 billion in 2005. Given that farm payments have been increasing and that structural change has taken place at an average annual rate close to 2 per cent, payments per annual working unit (AWU) had been increasing until the entry of ten new member states in 2004.

Table 1

Aggregated data on the distribution of direct payments across EU member states have been published regularly since they were introduced and can therefore be set in relation to other variables of interest like the number of farms or persons engaged in farming like in Table 1. But the recipients of direct payments are only a subgroup of beneficiaries of CAP measures. Detailed data on the distribution of direct payments and the number of recipients were published for the first time in 2003. These data show how payments are distributed across different size-classes and are available starting with the year 2000 (in the case of Greece since 2002). Over the period 2000 to 2005, data on total direct payments per holding were published. Starting with 2006, data on decoupled direct payments and payments for crops and livestock are available too.

In the year 2000, the average payments per recipient were below EUR 2,000 in Portugal and Italy and were highest in Denmark (EUR 10,585) and the UK (EUR 19,272). Five years later, the EU-15 average was EUR 6,331 (ranging between EUR 1,747 in Greece and EUR 21,429 in the United Kingdom). Direct payments per holding were considerably lower in the new member states which entered the EU in 2004 (on average EUR 723; from EUR 232 in Cyprus to EUR 11,397 in Czech Republic). Therefore, the mean of direct payments per holding dropped from EUR 5,017 per holding to EUR 4,682 between 2000 and 2006 (Table 2, 1st and 2nd column). Only a small fraction of all farm holdings are recipients of direct payments in Hungary and Slovakia, while practically all farms get such transfers in Luxembourg, Denmark, Greece, The Netherlands, and Finland.

3.2 The distribution of direct payments within EU member states

How direct payments are distributed among recipients can be shown in several ways. EUROSTAT publishes the number of recipients and the volume of transfers aggregated in 12 classes. Comparing the holdings getting less than 5,000 Euros with those getting more can be used to show that a small number of recipients got a relatively large share of all direct payments in 2000: 953,000 holdings received more than EUR 5,000, totalling EUR 15.5 billion. 21 per cent of holdings getting such support received 82 per cent of all direct payments. Until 2006 the distribution has become more unequal: 1.3 million farms (18 per cent of the 7.3 million recipients) got EUR 27.9 billion (84 per cent of direct payments). The distribution of direct payments is quite different in the EU member states. Figure 1 shows a comparison of selected countries in 2002 and the development in EU-15 countries over a period of three years.

Figure 1

The ratio between mean and median of payments is another indicator of an unequal distribution. Using the method described in Bleymüller et al., (1991, pp15), the median payments per Member State were calculated (Table 2). In some countries, the ratio between mean and median is relatively large, e.g. in the Czech Republic (7.48), Slovakia (8.09), and Spain (4.09), indicating that the distribution is skewed. In some member states, more than 90

per cent of holdings received less than EUR 1,250 (e.g. Malta, Lithuania, Latvia, Cyprus, Poland, and Slovenia). In these countries medians and the means are very close.

Table 2

Another measure of (in)equality is the concentration ratio (CR). It has the same interpretation as the Gini-Coefficient, but it is calculated in a slightly different way (see Appendix). CRs can range from zero indicating absolute equality (all holdings get proportionally the same amount of direct payments) to one showing absolute inequality (one holding gets all direct payments). Percentages of CRs for the year 2000 and 2006 are presented in Table 2.

The ranking of CRs shows that the concentration of direct payments was relatively low in Slovenia, Finland, Poland and Ireland and relatively high in Slovakia, Malta, Portugal and the Czech Republic in 2006. This basically corroborates the results of the comparison between mean and median. Aggregated at EU-level, decoupled direct payments are distributed more unequally than the other direct payments.

The comparison of CRs between the years 2000 and 2006 shows that there is no uniform pattern of change. The CR of EU-15 member states was 78 in both years. This is the result of two antagonistic developments: in some countries like France, Ireland, and Austria the measure of inequality was lower in 2006 compared to 2000, while the opposite was true in countries like The Netherlands, Denmark, Sweden, and Italy. Given that the Single Farm Payment was introduced only recently, it is too early to draw conclusions on the distributive effects of the historical versus the area based scheme.

Figure 2

In Figure 2 an overview is presented that shows all three measures discussed so far in one graph. The horizontal axis indicates the mean (indicated by x) and median (|) payment per holding in the EU 25 member states in 2006. The vertical axis showing the concentration ratio is used to rank them according to the concentration of payments within the countries. The overview shows that even if the difference between median and mean is very large in absolute terms (like in the United Kingdom or in Germany) the CR may be relatively moderate

compared to other countries (like Malta, Slovakia or Portugal). Given that the CR is relatively high in the member states that entered the EU in 2004, it is evident that the CR in the EU has increased between 2000 and 2006 (from 78 to 90).

Lorenz curves are a graphical presentation of inequality (Lorenz, 1905). Based on the data on direct payments to holdings, estimates of parameters were made that can be used to construct Lorenz curves (see Appendix). The Gini-coefficients – a measure closely related to the CR – is the equivalent of the area between the diagonal of a Lorenz graph (showing equality) and a Lorenz curve of an observed distribution (Gini, 1921). Therefore, CR (or Gini-coefficients) and Lorenz curves are very similar measures. While Lorenz curves allow an ordinal ranking of different distributions owing to a visual impression over a wide range of payments, CRs show relative (in)equality in a single figure. An in-depth discussion on Lorenz curves and measures of inequality is provided in Rothschild and Stiglitz (1973).

For demonstration purposes, Lorenz curves of direct payments in the EU, Denmark and France are presented in Figure 3 based on the parameter estimates in Table A1. On the horizontal scale is the share of holdings and on the vertical scale is the corresponding share of total direct payments. The Lorenz curve shows the already mentioned fact that 80 per cent of holdings (horizontal scale) received 19.3 percent of total direct payments (vertical scale) in 2000. In addition, Figure 3 shows that inequality in the EU increased between 2000 and 2006: the solid line "EU25 2006" is farther off from the diagonal line than the dotted line "EU14 2000. The same is true for Denmark, but the opposite is the case in France (see the respective lines labelled "DK 2000" and "DK 2006", "FR 2000" and "FR 2006") in Figure 3.

Figure 3

Quintil ratios are another distribution measure and frequently used to evaluate social policies. If individual data are available, this measure can be derived directly by ranking recipients according to their payments and comparing the volumes of the first and last 20 per cent. Since only aggregated data are published, we use the estimates of Lorenz-curve parameters to derive quintil ratios of direct payments in the EU: the first quintil received EUR 30 million while the fifth EU 18 billion - this gives a quintil ratio of 602 in EU-15 in 2000. The quintil ratio is

lowest in Slovenia, Poland, and The Netherlands – the countries with the lowest CR. The advantage of quintil ratios over CRs is that they can be easily calculated if primary data are available.

4 Conclusions and discussion

The CAP reform of 2003 brought about a major change with respect to direct payments. Until then, their primary purpose was a compensation for lower farm gate prices relative to politically defined price levels (most frequently above world market level). With the introduction of Single Farm Payments (SFP) in the EU-15 countries and Slovenia and Single Area Payments (SAP) in the other member states, the purpose of the payments changed because higher transfer efficiency and less spill-overs to commodity markets have became more important.

The topic of the paper is the distribution of direct payments among agricultural holdings in the EU member states. We used a set of distribution measures to show the concentration of direct payments in EU member states and the development between 2000 and 2006. The results show that it is very heterogeneous across member states: The concentration is very high in Malta, Slovakia, Portugal and the Czech Republic and it is low in Luxembourg, Finland, Ireland and Slovenia. Different measures of concentration give a different ranking of member states. A comparison between the concentration in 2000 and 2006 which can be made for 14 member states shows that there is no uniform pattern of change either. The methods applied in the paper allow deriving various measures of concentration. The advantage of using quintil ratios or concentration ratios (CR) is that these measures are frequently used in evaluations of distributive outcomes of policies (e.g. European Commission, 2006).

Concerning social transfers, it is generally the case that the group of households with lower incomes gets higher transfers. A comparison of social transfers other than pensions in 13 EU member states showed that the first quintil of households received 51 per cent of social transfers, while the fifth received 7 per cent (Secretariat-General of the Commission, 2000). As the literature survey and the data published by EUROSTAT showed, the opposite is true for recipients of direct payments of the CAP.

A change of the distribution of direct payments has therefore three aspects: the distribution within EU member states, between them and the trade-offs between the objectives of the future farm policy:

- The Commission is proposing to abandon the historic model that has been implemented in most EU-15 countries. In this model only those holdings get SFP that had obtained direct payments in the reference period 2000-2002. In the alternative model flat payments per hectare are paid. Another plan is to define a minimum amount of payments above the current levels to save administrative costs. In addition, modulation (a reduction of direct payments above EUR 5,000 per holding) will be increased according the current proposals of the Commission (CEC, 2007). How the distribution of direct payments might change cannot be anticipated until the policy details are known.
- The funds collected by modulation are used to finance additional measures in the program for rural development. An open question is if changes of the distribution between member states via modulation are possible or not. The re-definition of disadvantaged regions that is currently on the agenda (IEEP, 2006) might justify such an outcome. Given that the financial framework with allocations across member states and the phasing in of payments for the new member states was decided only in 2006, it is more likely that further changes of the distribution between member states can only be expected after 2013.
- Market policy instruments have not been abandoned, but have been scaled back to lower levels of market intervention. Buckwell et al. (1997) suggested that in the longer run direct payments should become a social policy instrument while the program for rural development should become the policy instrument for improving competitiveness and financing public environmental goods. This opens the question whether the EU or the member states should be the primary sources of financing these tasks.

The distribution of direct payments within EU member states and between them is the consequence of agricultural structures and historical developments, in particular the process of integration. CAP payments, among them direct payments, are not motivated by distributive considerations alone. Currently they are justified to ease the process of integration for the agricultural community of member states that have recently entered the EU. Another purpose

is to facilitate structural adjustment of farms that are exposed to freer market conditions after decades of CAP interventions in the EU-15 member states. Given that direct payments are only granted if standards of good agricultural and environmental conditions ("cross compliance") are met, they have an environmental facet as well.

The principle of fiscal equivalence (Olson, 1969) gives guidance for the question regarding which of the issues currently addressed by direct payments should be financed at EU level or at the level of member states: Beneficiaries of the Member State should finance the provision of public goods of national interest and the EU should finance those of interest for the EU in an appropriate way.

Cross compliance is implementing standards that are not uniform across the EU, but depends on national and sometimes sub-national conditions. Given that most aspects covered by cross-compliance regulations are concerning local public goods, it seems more justified that member states and not the EU should be responsible. Another argument is that property rights on environmental goods are distributed differently across the member states. This would allow keeping windfall profits at a minimum because currently it seems very unlikely that the per hectare premiums reflect social opportunity costs.

To ensure "a fair standard of living for the agricultural community" is one of the objectives of the CAP. This is definitely a distributive goal. Unfortunately, it is not possible to say something substantial about whether this objective has been reached or not. Statistics on the distribution of household incomes of the agricultural community relative to other communities do not exist for the EU. Given that social equity is generally an agenda of member states, it seems justified to hand over the competence in this field to them. The responsibility of the EU should be to establish the criteria and to control that member states abide by them as is the case in many other fields of policy.

Appendix

The Lorenz curve relates the cumulative proportion of direct payment units (farms), x, to the cumulative proportion of direct payment received, y, when units are arranged in ascending order of their direct payments. The data of EUROSTAT provide twelve classes of farms (x) and direct payments received (y), of which cumulative proportions are calculated (farms receiving negative transfers were excluded in the estimates). We use the functional form proposed by Rasche et al. (1980) to estimate Lorenz curves. The explicit functional form is:

$$(1) \qquad y = \left[1 - (1 - x)^{\alpha}\right]^{1/\beta} \quad \textit{where } 0 < \alpha \leq 1,\ 0 < \beta \leq 1;$$

The function possesses the proper convexity and slope constraints to assure that it always lies in the lower triangle of the unit square (Rasche et al., 1980).

A variety of statistical tools are used to obtain a quantitative measure of the difference between observed and predicted data from the Lorenz model (equation 1). The ability of the Lorenz model to predict the observed data is tested with a simple linear regression model through the origin. Predicted data is regressed against observed data and the hypothesis of the regression slope being equal to one is tested (H_0: $\beta = 1$). The regression model is described with the *slope estimate* ($\tilde{\beta}$) in Table A.1. The proximity of model predictions with respect to observed data is described with the *Mean Absolute Error (MAE*[1]*)*, the *Root Mean-Squared Error (RMSE*[2]*)*, and *Theil's inequality coefficient* (*Theil*[3]), all measures equal to zero when predictions are perfect (Pindyck and Rubinfeld, 1981).

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[1] $MAE = \frac{1}{n}\sum_{i=1}^{n}\left|\hat{y}_i - y_i\right|$, where $\hat{y}$ is the predicted value, y is the actual value of individual i = (1,...,n).

[2] $RMSE = \sqrt{\frac{1}{n}\sum_{i=1}^{n}\left(\hat{y}_i - y_i\right)^2}$, where $\hat{y}$ is the predicted value, y is the actual value of individual i = (1,...,n).

[3] $Theil = \frac{\frac{1}{n}\sum_{i=1}^{n}\left(\hat{y}_i - y_i\right)^2}{\sqrt{\frac{1}{n}\sum_{i=1}^{n}\left(\hat{y}_i\right)^2} + \sqrt{\frac{1}{n}\sum_{i=1}^{n}\left(y_i\right)^2}}$, where $\hat{y}$ is the predicted value, y is the actual value of individual i = (1,...,n), Pyndick and Rubinfeld (1981, pp. 364-365).

The computation of the Concentration Ratio (CR) is based on the functional form specified in equation (1). It is defined:

$$(2) \qquad CR = 1.0 - 2.0\int_0^1 \left[1-(1-x)^{\alpha}\right]^{1/\beta} dx,$$

substituting variables

$$(3) \qquad u = 1-(1-x)^{\alpha},$$

this is equal to:

$$(4) \qquad \begin{aligned} CR &= 1.0 - 2.0\left(\frac{1}{\alpha}\right)\int_0^1 (1-u)^{1/\beta}\, u^{1/\alpha - 1}\, du \\ &= 1.0 - \frac{2.0}{\alpha} B(1/\alpha, 1/\beta + 1) \end{aligned},$$

where B represents the beta distribution. It ranges between zero (absolute equality) and one (absolute inequality).

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Table 1: Farm structure - holdings, utilised agricultural area (UAA) and annual working units (AWU), direct payments (DP) and decoupled direct payments (DDP) in the EU member states

	2000	2005	2005	2005	DP 2000		DP 2006		DDP 2006	
	holdings		UAA	AWU	holdings	volume	holdings	volume	holdings	volume
	1,000	1,000	1,000 ha	1,000	1,000	mil €	1,000	mil €	1,000	mil €
BE	62	52	1,386	70	45	250	44	467	43	294
BG	–	535	2,729	625	–	–	–	–	–	–
CZ	–	42	3,558	152	–	–	20	256	20	256
DK	58	52	2,707	60	62	658	71	924	70	882
DE	472	397	17,024	643	362	3,615	378	5,050	377	4,990
EE	–	28	829	37	–	–	19	28	19	28
GR	814	834	3,984	601	*814*	*1,749*	868	1,616	827	41
ES	1,287	1,079	24,855	993	887	3,445	897	4,463	865	55
FR	664	567	27,591	855	598	5,822	427	7,616	396	50
IE	142	133	4,219	152	166	771	129	1,203	127	1,194
IT	2,152	1,729	12,708	1,374	1,582	2,838	1,580	3,456	1,474	2,153
CY	–	45	152	29	–	–	38	14	38	14
LV	–	129	1,702	137	–	–	78	38	78	38
LT	–	253	2,792	222	–	–	225	102	225	103
LU	3	2	129	4	2	16	2	32	2	32
HU	–	715	4,267	463	–	–	203	367	203	367
MT	–	11	10	4	–	–	4	1	0	0
NL	102	82	1,958	174	63	167	102	649	70	7
AT	200	171	3,266	166	138	427	133	665	133	509
PL	–	2,476	14,755	2,274	–	–	1,465	807	1,465	807
PT	416	324	3,680	398	252	380	240	538	192	272
RO	–	4,256	13,907	2,596	–	–	–	–	–	–
SI	–	77	485	95	–	–	52	30	0	0
SK	–	68	1,879	99	–	–	14	102	14	102
FI	81	71	2,264	83	72	265	65	501	65	7
SE	81	76	3,192	71	64	504	83	669	83	580
UK	233	287	15,957	339	166	3,205	195	3,524	192	3,477
EU15	6,766	5,853	124,920	5,985	5,274	24,115	5,213	31,372	4,915	14,545
EU25	–	9,698	155,348	9,495	–	–	7,332	33,117	6,977	16,260
EU27	–	14,489	171,984	12,716	–	–	–	–	–	–

Note: recipients of direct payments are not necessarily classified as "holdings" according to the farm structure surveys. BE = Belgium, BG = Bulgaria, CZ = Czech Republic, DK = Denmark, DE = Germany, EE = Estonia, GR = Greece, ES = Spain, FR = France, IE = Ireland, IT = Italy, CY = Cyprus, LV = Latvia, LT = Lithuania, LU = Luxembourg, HU = Hungary, MT = Malta, NL = Netherlands, AT = Austria, PL = Poland, PT = Portugal, RO = Romania, SI = Slovenia, SK = Slovakia, FI = Finland, SE = Sweden, UK = United Kingdom. UAA = utilized agricultural area, AWU = annual working unit, DP = direct payments, DDP = decoupled direct payments consisting of single payment scheme (budgetary item 05 03 01 01), single area payment scheme (budgetary item 05 03 01 02) and additional amounts of aid (bugetary item 05 03 03).

Source: European Commission, Financing the CAP, Indicative figures on the distribution of aid, by size-class of aid, received in the context of direct aid paid to the producers to Reg. (EC) No 1782/2003 and Reg. No 1259/99 for the financial year 2000, 2006. European Commission, Budget online (http://eur-lex.europa.eu/budget/www/index-en.htm), DP and DDP 2006. Eurostat, Database NewCronos, structuaral data 2000 and 2005, data access March 2008.

Table 2: Descriptive statistics and distribution indicators of direct payments (DP) and decoupled direct payments (DDP) in EU member states 2000 and 2006

	mean / holding		median / holding		concentration ratio CR			quintil ratio	
	DP 2000	DP 2006	DP 2000	DP 2006	DP 2000	DP 2006	DDP 2006	DP 2000	DP 2006
BE	5,624	10,548	3,678	5,988	54	57	58	28	52
CZ		11,397		1,675		86	86		> 5,000
DK	10,585	16,996	6,417	4,548	56	69	69	36	363
DE	9,982	15,006	3,714	4,843	71	71	70	62	78
EE		1,119		386		84	84		1,544
GR	n.a.	1,747		608		67			131
ES	3,884	4,953	1,144	1,225	75	76		318	388
FR	3,884	17,277	3,724	10,694	68	57	35	412	64
IE	9,737	9,459	2,601	5,498	62	55	54	83	32
IT	4,664	2,602	857	454	76	81	86	247	732
CY		232		291		71	71		93
LV		368		302		71	71		65
LT		343		296		71	71		51
LU	1,794	14,136	5,577	13,929	47	46	46	18	22
HU		1,555		419		85	85		859
MT		73		264		94			> 5,000
NL	7,312	5,619	1,642	1,450	54	71		24	868
AT	2,640	4,946	1,548	2,693	60	57	63	49	39
PL		508		348		58	58		16
PT	3,101	2,273	746	437	86	85	89	1,830	2,950
SI		428		375		55			15
SK		6,709		401		91	91		> 5,000
FI	1,510	7,123	2,558	5,238	51	50		23	21
SE	3,706	11,139	3,841	2,492	64	68	67	77	193
UK	7,873	21,429	6,054	5,149	71	72	71	354	459
EU10		723		347		78	78		94
EU15	5,017	6,331	1,162	1,123	78	78	90	602	1,068
EU25		4,682		537		82	90		3,594

Source: see Table 1; own results. Note: EU-15 in 2000 without Greece.

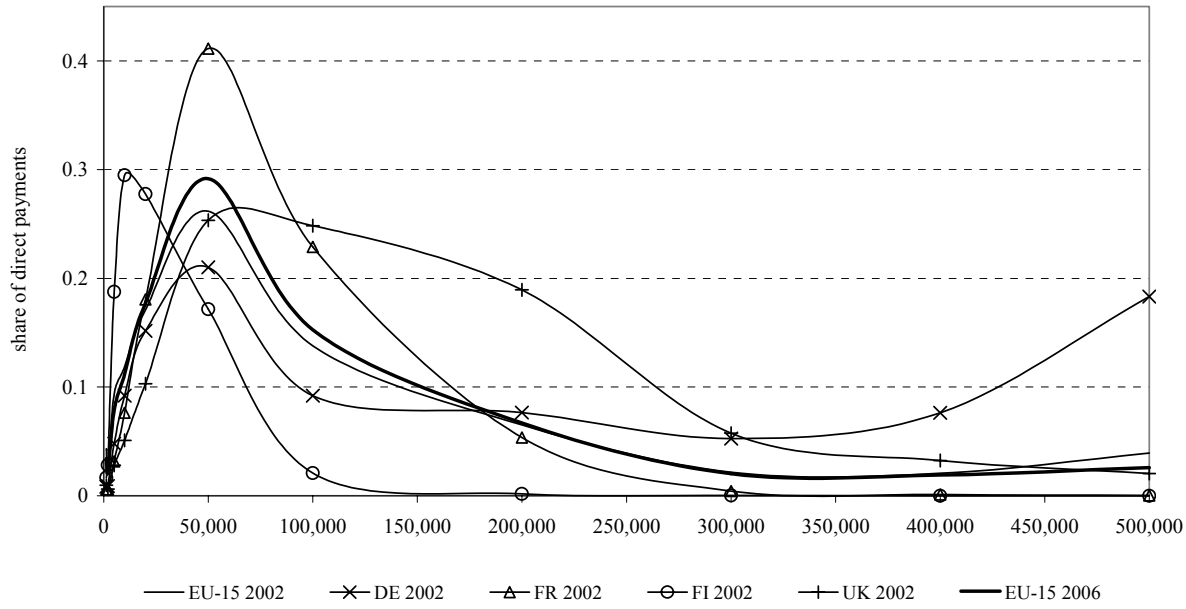
Table A.1: Lorenz Curve parameter estimates, Standard Errors, and Goodness of Fit Measures for Direct Payments among EU member states in 2006 (n=10)

Member	Parameter Estimates		Standard Error		Goodness of Fit Measures			
State	$\hat{\alpha}$	$\hat{\beta}$	$\hat{\alpha}$	$\hat{\beta}$	$\tilde{\beta}$	RMSE	MAE	Theil
BE	0.72938	0.42246	0.00396	0.00324	1.00124*	0.001496	0.013631	0.000002
CZ	0.71824	0.15325	0.0387	0.0181	0.99142*	0.019303	0.19525	0.000326
DK	0.71357	0.30721	0.00624	0.00448	0.99986*	0.002647	0.023955	0.000005
DE	0.4423	0.50694	0.0111	0.0198	0.99969*	0.00952	0.094649	0.000077
EE	0.4728	0.30764	0.0415	0.0473	0.99355*	0.024141	0.21343	0.000398
GR	0.63322	0.3861	0.00886	0.00841	0.99895*	0.003691	0.032771	0.000009
ES	0.55131	0.3474	0.00342	0.00357	0.99970*	0.002175	0.019649	0.000003
FR	0.76839	0.39275	0.00929	0.00701	1.00314*	0.003171	0.031263	0.000008
IE	0.66078	0.49518	0.00518	0.00535	0.9995*	0.00177	0.015940	0.000002
IT	0.46487	0.34267	0.00941	0.0119	0.99607*	0.007909	0.083036	0.000045
CY	0.46557	0.47853	0.0198	0.0348	0.99915*	0.00707	0.059541	0.000029
LV	0.39595	0.55186	0.0294	0.0652	0.99754*	0.015362	0.13028	0.000141
LT	0.35737	0.60848	0.0210	0.0559	0.99656*	0.013727	0.11151	0.000114
LU	0.83907	0.46182	0.0250	0.0178	0.9997	0.005342	0.045546	0.00002
HU	0.40091	0.35688	0.0256	0.0395	0.98759*	0.0258	0.26841	0.000496
MT	0.77309	0.062826	0.0551	0.0133	0.99873*	0.012645	0.081850	0.000096
NL	0.76491	0.2617	0.0247	0.0143	1.00521*	0.008249	0.078048	0.000048
AT	0.66535	0.47338	0.00783	0.00793	1.00286*	0.003151	0.030186	0.000007
PL	0.37248	0.78916	0.0135	0.0416	0.99828*	0.009964	0.10804	0.000058
PT	0.47343	0.28378	0.0316	0.0351	0.98593*	0.026142	0.28175	0.000505
SI	0.45395	0.71981	0.0498	0.1078	1.02073*	0.028742	0.28270	0.000468
SK	0.79654	0.084105	0.0266	0.00741	0.99656*	0.011490	0.10733	0.000112
FI	0.68876	0.53214	0.00356	0.00369	1.0002*	0.001214	0.012379	0.000001
SE	0.64788	0.35727	0.00977	0.00843	0.99944*	0.004305	0.040329	0.000013
UK	0.6778	0.3053	0.00402	0.00315	1.00103*	0.001958	0.019442	0.000003
EU10	0.31406	0.56545	0.0306	0.0854	0.98549*	0.035013	0.36412	0.000835
EU15	0.58087	0.29368	0.00667	0.00588	1.00122*	0.004142	0.041576	0.000013
EU25	0.57389	0.25421	0.00952	0.00776	1.00004*	0.006219	0.059229	0.000029

Note: RMSE = Root Mean-Squared Error, MAE = Mean Absolute Error, and Theil = Theil's inequality coefficient. * is not significantly different from one at the 0.1% significance level.

Source: own calculation.

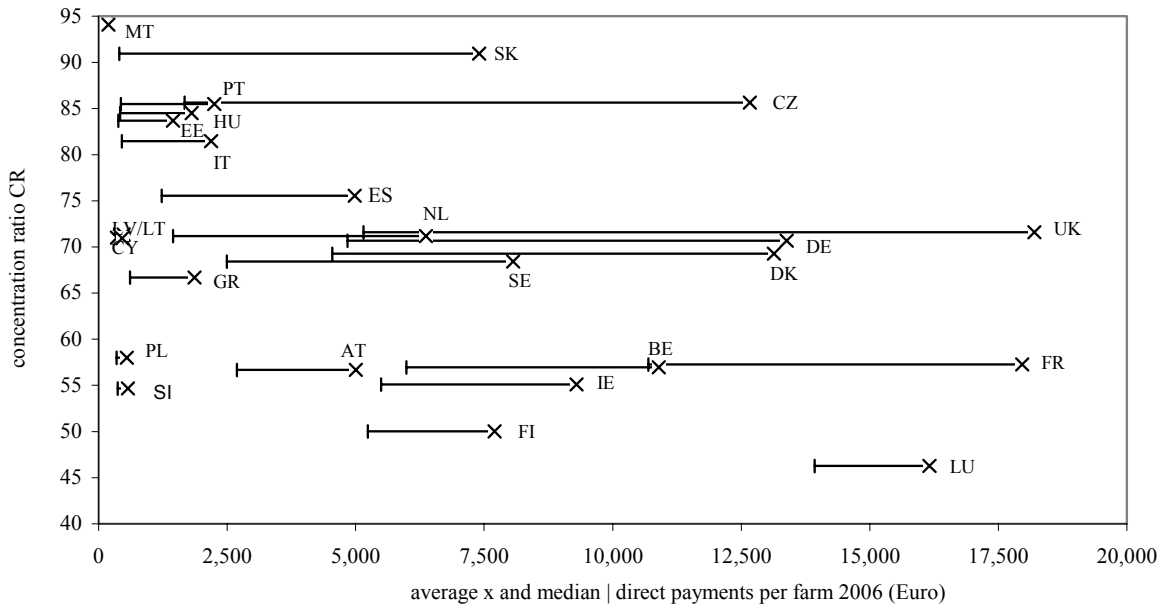
Figure 1: Distribution of direct payments in EU-15 and selected member states 2002 and 2006



Source: see Table 1.

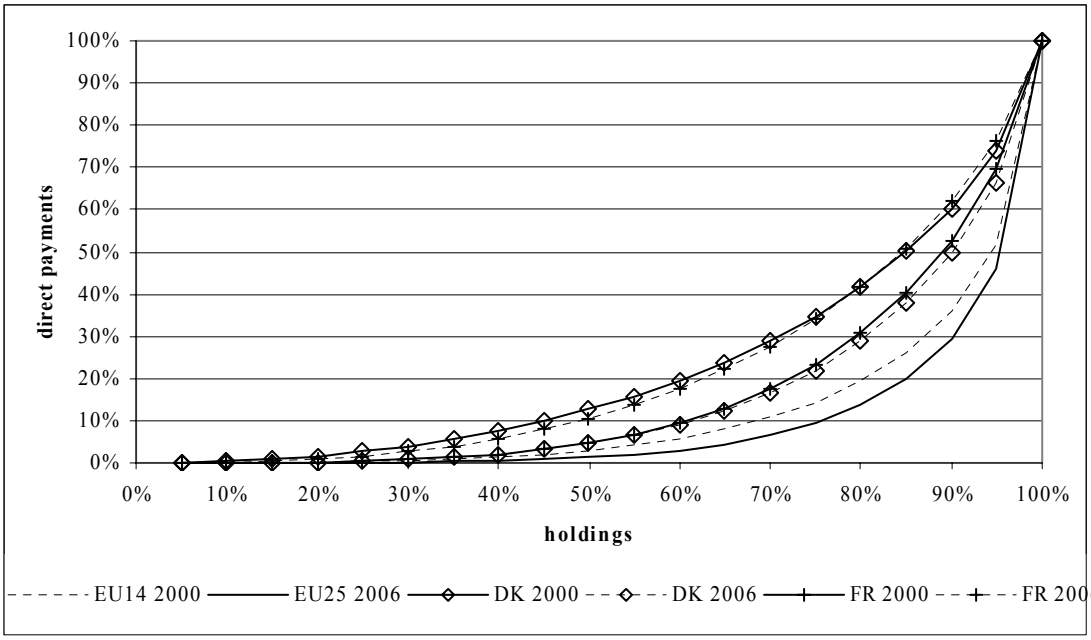
Note: Figures are truncated at 500.000 Euro, the presented volume of payments is for the open class 500.000 € and above. The graph is based on classified data with varying class sizes, therefore the real, but unknown distribution may look slightly different.

Figure 2: Concentration Ratios (CR), medians (|) and means (x) of direct payments in 2006



Source: Own estimates.

Figure 3: Lorenz curves of direct payments in selected EU member states in 2000 and 2006



Source: Own estimates.

Medieninhaber (Verleger), Hersteller: Österreichisches Institut für Wirtschaftsforschung • Wien 3, Arsenal, Objekt 20 • A-1103 Wien, Postfach 91 • Tel. (43 1) 798 26 01-0 • Fax (43 1) 798 93 86 • http://www.wifo.ac.at/ • Verlags- und Herstellungsort: Wien