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Does CAP spending reflect taxpayer preferences? An analysis of expenditures for public goods and income redistribution in relation to preference indicators

Felix Schläpfer¹, Ivo Baur²

¹ Research and Development, Kalaidos University of Applied Sciences, Zurich, Switzerland. E-mail: felix.schlaepfer@kalaidos-fh.ch

² Ostrom Workshop, Indiana University, Bloomington, USA. E-mail: ipbaur@indiana.edu

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Felix Schläpfer^{a,*} and Ivo Baur^{a, b}

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^a Research and Development, Kalaidos University of Applied Sciences, Zurich, Switzerland.

^b Ostrom Workshop, Indiana University, Bloomington, USA

*Address for correspondence: Forschung und Entwicklung, Kalaidos Fachhochschule Schweiz, Jungholzstr. 43, 8050 Zurich, Tel.: +41 44 634 4595, E-mail: felix.schlaepfer@kalaidos-fh.ch

Abstract

Public support for agriculture in the European Union (EU) and other European countries targets two main objectives: providing public goods and securing a fair standard of living for farmers. However, whether the current level of spending on measures targeting these two goals reflects taxpayer preferences is unknown. We used a cross-section of countries to explore how levels of support relate to likely indicators of taxpayer demand. The indicators were derived from theoretical considerations, empirical literature on the demand for public goods, and opinion research about specific policy preferences. We evaluated eleven expectations concerning the relationships between these indicators and spending on direct payments (pillar 1), total payments for voluntary measures (pillar 2) and agri-environment measures in the reference year 2012. We found that spending on public goods was consistently related to variations in income and other indicators of willingness to pay. Spending on income support, in contrast, did not show the expected relations with preference indicators. Furthermore, the study revealed that reliable information about parameters of taxpayer preferences for agricultural support is currently largely lacking. More decentralized and participatory processes in agricultural policymaking would improve our knowledge about taxpayer preferences, and reduce the information needs of policy makers.

Keywords: Agri-environment measures, Common Agricultural Policy; direct payments, preferences, public goods, subsidiarity.

1 Introduction

Agricultural support for European farmers absorbs a large share of the EU budget. In funding period of 2007–2013 of the Common Agricultural Policy (CAP), the direct payments alone accounted for one third of all EU expenditures (European Commission 2014a,b). While the direct payments were originally introduced to cushion the effects of a reduction in price support, this justification weakens with the time elapsed since the reform (Tangermann 2012). The main remaining motivation and justification of agricultural support in the EU and other European countries is therefore increasingly the provision of public goods on behalf of European taxpayers along with specific distributional objectives (European Commission 2011a, b, Zimmermann et al. 2011).

From the perspective of allocative efficiency, levels of payments for public goods and income redistribution should reflect the preferences of the population (Stiglitz and Rosengard 2015). Of course, achieving – or approximating – allocative efficiency in European agricultural policy is a daunting task. Since the benefits of European agricultural public goods and income redistribution arise at multiple spatial scales, efficient policies require significant amounts of information about preferences and involve complex issues of multi-level governance. Additional challenges to align agricultural policies with taxpayers preferences arise from powerful agricultural lobby groups pursuing particular interests (Bureau 2012) and from a complex political economy setting which may favour the status quo (Pokrivcak et al. 2006, Swinnen 2010). It is therefore highly questionable whether agricultural policy outcomes in Europe consistently reflect the preferences for public goods and income support.

In its report "Reform of the CAP towards 2020" the European Commission appeared to be aware of these issues, stating that: “the actual support levels are still largely linked to historical type and level of production” and that “the payments are not sufficiently targeted, they provoke strong criticisms and are difficult to justify to the general public” (European Commission 2011a). Hence, the commission acknowledged the need for more targeted and more justifiable policies. The logical first step towards such policies is thus to examine to what extent the current policies reflect taxpayer preferences.

The literature provides very few attempts to investigate to what extent budgetary expenditures for agriculture meet taxpayer preferences. An obvious reason for this gap is that economic preferences for public goods are poorly known and difficult to measure. In particular, the results of stated-preference surveys remain contentious (e.g. Hausman 2012, Kling et al. 2012). Therefore, less direct empirical approaches must be pursued to assess taxpayer

preferences for public goods and income redistribution and to evaluate whether the current support for agriculture reflects these preferences.

A promising approach to study whether expenditures for agriculture align with taxpayer preferences is to examine, in a cross-section of regions or countries, whether the levels of spending on agricultural policies consistently relate to known or likely determinants and indicators of the demand for particular policies (Schlöpfer 2007). Potential determinants may derive from empirical studies of voting on local public goods where preferences for public goods are relatively well informed (e.g. Deacon and Shapiro 1975). Voter studies show, for instance, that the demand for environmental public goods related to land use increases with income (Press 2003) and decreases with local abundance of farmland (Kline and Wichelns 1994). Accordingly, if agricultural policies are to follow taxpayer preferences, spending for local environmental public goods should be higher in countries with higher income and less abundant farmland. Furthermore, existing agricultural support may be compared with policy preferences as expressed in large-n opinion surveys such as Eurobarometer surveys (European Commission 2014c), although preference formation towards actual political decisions are more reliable (e.g. Druckman and Lupia 2016).

In this study, we develop a set of preference indicators and test whether they relate to agricultural expenditures in Europe in the year 2012. We examine the expenditures for the following European policy schemes: (1) direct payments (pillar 1), (2) total spending on voluntary schemes (pillar 2), and (3) agri-environment measures (AEM, which are part of pillar 2). Based on empirical evidence and theoretical considerations we formulate eleven specific expectations regarding the relationships between indicators of taxpayer demand and spending for these policy schemes. We then examine if the empirical relationships confirm these expectations.

The paper is organized as follows: The next section reviews literature on the demand for land-use related public goods and income support. Section 3 describes the explanatory variables, the specific hypotheses and the data. Sections 4 and 5 contain the results and discussion. A final section offers conclusions.

2 Background on preferences for agri-environmental public goods and farm income support

2.1 Determinants of the demand for agri-environmental public goods

As reliable survey-based estimates for the demand of public goods are difficult to obtain (Hausman 2012), one potentially useful source of information is the analysis of voter behaviour in decisions about public goods (Deacon and Shapiro 1975). Related voter based studies suggest that income and farmland abundance are key determinants for preferences for agri-environmental public goods. These variables may therefore allow evaluating if the distribution of agri-environmental public goods in Europe reflects taxpayer preferences.

With regard to income, the literature suggests that increasing income leads to stronger preferences for public goods. In Europe, one study examined voter support for increased spending on landscape amenities including agri-environmental management in the Swiss canton of Zurich in 1996 (Schlöpfer and Hanley 2003). The study showed that approval for increased spending related positively to mean income at the municipality level. Given roughly proportional taxation, the positive income-effect implies that willingness to pay increases over-proportionally with income (Schlöpfer and Hanley 2003). More evidence for income effects is available for the United States. Nelson et al. (2007) find that on a municipality level median household income positively affects the likelihood for a referendum for open space, but not the approval rates. Further income-effects for land-use preferences other than farmland or open space preservation also point to a positive relationship. For California Kahn and Matsusaka (1997) find that approval rates for state-wide Park bond issues in California increased at mean incomes and only decreased in the top income range, while Press (2003) generally finds higher approval among wealthier voters for park bonds in California in subsequent years. These studies are contrasted by only one analysis of the approval for river restoration in the canton of Bern where approval did not relate to income (Deacon and Schlöpfer 2010). In summary, the demand for land-use related public goods in voting decisions is constant or slightly increasing in income. Given about proportional taxation, this implies that willingness to pay increases proportionally or even over-proportionally with income. The preferred share of income spent on public goods is therefore constant or increases with income.

With regard to farmland the related literature suggests that demand for agricultural land-use related public goods decreases with the relative amount of farmland area. Schlöpfer and Hanley (2003) find for the municipality level a negative relationship between the amounts of agricultural land per capita and the approval of increased spending on landscape amenities. Land Kline and Wichelns (1994) find for Pennsylvania and Rhode Island that voter support for public programmes to purchase development rights to farmland to be lower in counties with a larger percentage of farmland.

Hence, if land-use policy reflects preferences, spending on land-use related goods should be higher in higher-income jurisdictions, while the countries' share of GDP spent on these goods should be about constant or slightly increasing with increasing income levels. Furthermore, the demand for land-use related public goods typically decreases with increasing amounts of farmland. Spending per hectare for land-use related environmental public goods should therefore decrease with increasing abundance of farmland per capita of the population.

2.2 Determinants of the demand for income support

To our knowledge, no revealed preference studies examined the demand for income transfers to the agricultural sector so far. Survey studies on general preferences for redistribution identify income as an important driver of preferences (Olivera 2015). Higher-income individuals prefer less redistribution at the national level. This result, however, does not imply that taxpayers in higher-income countries would prefer lower budgets for redistribution absolutely (or even relative to GDP) than lower-income countries. Overall, the literature has little to offer about the determinants of willingness to pay for farm income support at the country level.

Based on theoretical reasoning, one natural indicator of national preferences for income support to farmers should be the national income level itself. According to the treaty of the European Economic Community ("Treaty of Rome") one objective 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". Hence, the income target depends on the living standard of the non-farmer population in a country. Furthermore, it seems reasonable to assume that the willingness to pay for income support to farmers will also depend on the disposable income among the non-farm population. Based on these considerations – and absent better information – we expect that the preferred spending on income support per hectare of land in a country should be roughly proportional to median income in that country.

2.3 Policy preferences in Eurobarometer surveys

Information regarding specific policy preferences is available from selected questions in Eurobarometer surveys. Regarding the preferences for public goods and income support, one survey question seems particularly relevant. The Special Eurobarometer 410 (European Commission 2014c) asks EU citizens how they think about "linking financial aid to farmers to

compliance with farming practices which benefit the environment” (see Section 3.4). The country-level differences in the responses may be interpreted as an indicator of policy preferences concerning spending for public goods vs. income support, and these preferences may be compared with patterns in actual spending.

Another question in that same survey asked the participants if they think the “financial support to farmers to help them stabilize their incomes” at the EU level is “too low, about right or too high” (see Section 3.4). The question also concerns preferences for agricultural support. However, these qualitative responses about preferred *changes* in total support do not yield information about preferred *levels* of support that could be compared with existing levels of support. Moreover, since the question refers to the EU level, the responses may not (only) reflect the preferences for a fair distribution of income between farm and non-farm populations within a country, but the financial interests of net contributors vs. net recipients of the CAP. Overall, the information on the specific policy preferences from Eurobarometer surveys is limited, but nevertheless worth considering.

3 Methods

3.1 Overview

We used a cross-sectional analysis to examine whether the levels of agricultural support received by farmers in European countries consistently related to indicators of taxpayer preferences. In this section, we first describe the examined measures of spending (dependent variables) and motivate in general terms the indicators of taxpayer demand and control variables (explanatory variables) included in the regressions. We then identify the specific relationships between measures of spending and indicators of taxpayer demand that we would expect to find if spending followed taxpayer preferences. Two final subsections describe the data sources and the statistical analysis.

3.2 Dependent variables

Examined expenditures

We examined three categories of agricultural support under the CAP; the direct payments of pillar 1; the total payments in pillar 2; and the AEM within pillar 2. To include the EFTA countries Norway and Switzerland, we classified the measures with similar objectives

according to the three expenditure categories (see Section 3.5). We included the EFTA countries to test for effects of EU level, relative to national level policies.

Regarding the three measures categories, we assumed the following objectives of the expenditures and the spatial scales of their benefits: For direct payments, the main objective is to re-distribute income from non-farm to farm households, and the spatial scale of the benefits is mainly national. The pillar-2 payments support a variety of environmental and social public goods including farm modernisation and infrastructure development, village renewal, maintenance of agricultural activity in regions with natural handicaps and agri-environment objectives (European Commission 2011b). The main objective of pillar 2 is therefore to support public goods with benefits at the European level (e.g. Grethe 2006). The main objective of AEM support is to support national (or even local) environmental public goods with only limited international spillovers. Examples include groundwater protection, prevention of soil erosion or support for more local biodiversity and landscape amenities. We recognize, however, that some agri-environment payments also support European-level public goods.

Measures

For the AEM and for the total pillar-2 payments, we measured the level of expenditures in three different ways: (1) as spending per unit of GDP, (2) as spending per hectare of agricultural land and (3) as effective spending per hectare of agricultural land. This third measure accounts for the fact that not every euro spent on pillar 2 or AEM necessarily results in the provision of additional public goods. Some of the spending may have the character of (pure) income support. Effective spending per hectare calculates as the payments per hectare, multiplied by an estimate of the share of the payment that compensates farmers for the costs of complying with the requirements of the policy instrument (see section 3.5). For the direct payments, we examine (1) and (2) but not(3), since that measure applies to payments for public goods.

3.3. Explanatory variables

Income and farmland

We examined the effects of (median) income in the population and abundance of farmland (per capita) as these are the two most important determinants of the demand for environmental amenities in the literature reviewed in section 2. The effect of income may depend on the

specific measure of expenditures (income support vs. public goods; national vs. European public good; spending per hectare vs. as a share of GDP). Abundance of farmland is typically associated with decreasing demand for land-use related public goods, probably due to a decreasing marginal utility of open space amenities.

National financing

If the allocation of funding follows taxpayer preferences, the (high-income) countries that contribute over-proportionately to European-level public goods also have a high demand for those public goods. Furthermore, the countries with a high demand for European-level public goods are likely to have a high demand for local public goods as well. Hence, large contributions to European-level public goods should be positively associated with high levels of local public goods. To examine this prediction we included one variable measuring the contribution to the CAP (national payments divided by receipts) and another variable measuring the co-financing rate of pillar 2.

Policy preferences

Some limited information about agricultural policy preferences at the national level is available from Eurobarometer surveys. We include two variables from Eurobarometer responses. The first variable measures agreement with linking farm support to environmental benefits, which provides an indication of whether the taxpayers prefer paying for public goods or for income support. The second variable – a measure of the support for increasing or decreasing the total EU budget for farm support – is included as a control variable.

Political variables

Two variables for country groups – EFTA countries and new member states – are included as further control variables.

3.4 Expected relationships

Based on the empirical background (Section 2) and the additional considerations above, we formulated eleven expectations (E1 through E11) concerning the relationships between spending and country level attributes. Three expectations concern the direct payments (pillar 1), one concerns spending on pillar 2, and seven concern spending on AEM (within pillar 2). We formulated the expectations so that evidence confirming the expectation indicates that the

spending is in line with taxpayer preferences.

(E1) Spending on direct payments (DP spending) per hectare increases with income. More specifically, we expect that DP spending increases *proportionally* with income. The expectation is based on the assumption that the objective of direct payments is mainly income support and that any gap between farm and non-farm incomes will be about proportional to income.

(E2) DP spending per hectare decreases with increasing popular support (in the Eurobarometer) for linking agricultural support to public goods. We expect this, since DP spending is relatively untargeted agricultural support.

(E3) DP spending divided by GDP decreases with increasing popular support (in Eurobarometer) for linking agricultural support to public goods, again since DP spending is relatively untargeted agricultural support.

(E4) Pillar-2 spending divided by GDP decreases with increasing income, since countries with low GDP should spend relatively more on EU-level public goods to satisfy the European demand for these public goods.

(E5) AEM spending per hectare increases with income, since willingness to pay for local to national public goods (such as AEM) typically increases with income.

(E6) AEM spending per hectare increases with increasing CAP net payment (payment-receipt ratio), since those who are willing to pay for EU-level public goods are also willing to pay for national public goods.

(E7) AEM spending per hectare increases with increasing pillar-2-co-financing rate, since those who are willing to pay for EU-level public goods are also willing to pay for national public goods.

(E8) AEM spending per hectare decreases with increasing amount of farmland per capita, since willingness to pay for local to national landscape quality decreases with abundance of open space.

(E9) AEM spending per hectare increases with increasing support for linking agricultural support to public goods, since AEM spending is relatively targeted agricultural support.

(E10) AEM spending divided by GDP proportionally relates to or increases with income, since demand for local environmental goods is typically constant or increases with increasing income, given about proportional taxation.

(E11) AEM spending divided by GDP increases with increasing support (in the Eurobarometer) for linking agricultural support to public goods, since AEM spending is

relatively targeted agricultural support.

The expected relationships for ‘effective AEM spending per hectare’ parallel those for ‘AEM spending per hectare’. The expected effects are summarized in Table 1.

[Table 1 about here]

3.5 Data

Spending

The sample includes the European member states (EU 27) and the EFTA countries Norway and Switzerland. With the UK represented by its four regions, the analysis builds on 32 observations. For the EU countries, annual spending on agricultural policy schemes was derived from two sources. The expenditures on direct payments (pillar 1) for the year 2012 came from European Commission (2014a). The expenditures for pillar 2 and for the AEM (measure 214 of pillar 2) are the realized mean annual expenditures of the programming period 2007–2013 as reported in European Commission (2014b).

The EFTA countries’ expenditures in the three spending categories refer to payments with analogous objectives. The Norwegian ‘regional environment programme’ and the Swiss ‘ecological direct payments’ were treated as equal to the EU’s AEM. The Swiss ‘financial aid for structural adjustment’ is comparable to infrastructure support in pillar 2, while Norway did not offer a comparable scheme. The Norwegian and Swiss data for the year 2012 are from OECD country statistics (OECD 2014) and from the Swiss Ministry of Agriculture (FOAG 2013), respectively.

The dependent variable *Effective spending for public goods per hectare* resulted from a European expert survey (Baur and Schläpfer 2016). The respondents of this survey estimated the share of payments for AEM and pillar 2 that “compensate farmers for the costs of complying with programme requirements”. To control for expert related bias we did not use the mean expert estimate in a country j but the estimate (predicted value) for an agronomist working at a research institution in country j .

Net national contribution and pillar-2 co-financing rate

The variable for the countries’ contribution per euro of CAP receipts (*CAPfin*) was calculated from the member states’ shares in financing the overall EU budget (European Parliament 2010, p. 20) and the shares of CAP funding received in 2010. The variable for national co-financing

in (*P2cofin*) was calculated by dividing the figures for the contributions of the European Agricultural Fund for Rural Development (EAFRD) by the total public payments. For the EFTA countries, these variables take the value 1, since there are no net contributions to (or receipts from) the CAP, and public goods are financed entirely at the national level.

Population, income and utilized agricultural area

Standard statistical information including population, median income and utilized agricultural area for the year 2012 were retrieved from EUROSTAT and the national statistical offices of Switzerland, Norway, England, Scotland, Wales and North Ireland. The median (rather than mean) income was chosen to be consistent with political-economic models of decision-making (e.g. Stiglitz and Rosengard (2015)). To obtain the median income for the UK regions, the regional mean income was multiplied with the median/mean ratio for the entire UK.

Policy preferences in Eurobarometer survey

Variables for the populations' preferences regarding agri-environmental spending refer to the Eurobarometer 80.2 (Special Eurobarometer 410) on "Europeans, Agriculture and the Common Agricultural Policy" (European Commission 2014c). The survey with about 28'000 participants was conducted in 2013.

The variable measuring preferences for general agricultural support (*EBspend*) was based on the following question:

"The EU gives financial support to farmers to help them to stabilise their incomes. This aid represents around 1% of the combined public expenditure of the 28 Member States of the EU and almost 40% of the total EU budget. Do you think that this support is too low, about right or too high?"

The variable measures the percentage of the population who chose "too low" for their answer. Overall response at the level of the EU was 26% "too low", 45% "about right", 13% "too high" and 16% "don't know".

The variable measuring preferences for spending on measures to support environmentally friendly production practices (*Eblink*) was based on the following question:

"For each of these aspects of the Common Agricultural Policy (CAP), please tell me if you think it is a very good thing, a fairly good thing, a fairly bad thing or a very bad thing? -- Linking financial aid to farmers to compliance with farming practices which benefit the environment".

The variable measures the percentage of the population who chose “a very good thing”. Overall response at the level of the EU was 52% “very good”, 39% “fairly good”, 4% “fairly bad”, 2% “very bad” and 2% “don’t know”.

3.6 Statistical analysis

We examined the relationships between spending variables and preference indicators in multiple regression models and in bivariate analyses. Since the multiple regression coefficients are difficult to interpret due to multicollinearity, our focus is the unconditional (bivariate) relationships. In several cases, these unconditional relationships are also more relevant for answering our research question. For instance, in examining the expectation (E1) that income support per hectare increases about proportionally with median income, we are precisely interested in the *unconditional* income elasticity of income support. Multiple regression estimates of this parameter potentially contain bias, as the dummy variables for the EFTA states and the new member states and possibly other variables absorb part of these income effects.

4 Results

4.1. Descriptive statistics

Table 2 shows the means and standard deviations of the examined dependent variables. The direct payments in pillar 1 amount to about 350 euro per hectare on average, which is about twice the spending on pillar 2. The AEM payments represent about one third of the total payments in pillar 2. Pillar 1 payments on average represent about 0.5 percent of GDP. The 'effective spending on public goods' (see Section 3.2, Measures) represents about one half (Pillar 2) to about eighty percent (AEM) of the total spending on public goods.

[Table 2 about here]

Table 3 shows the descriptive statistics for the explanatory variables. Some of the explanatory variables are strongly correlated: Income is positively correlated with pillar-2 co-financing (*P2cofin*) ($r=0.62$), farmland per capita (*Farmlpc*) (-0.38), net contribution to the CAP (*CAPfin*) (-0.34), preferences for spending more on the CAP (*EBspend*) (-0.50) and new

member states (*EUnew*) (-0.45). *CAPfin* correlates with *Farmlpc* (-0.58). *P2cofin* is correlated with *EUnew* (-0.68) and *EBspend* (0.42). *EUnew* correlates with *EBspend* (0.42). All other correlations are below $r=0.30$. The correlations derive from 30 EU observations for which Eurobarometer data are available, i.e. excluding Norway and Switzerland.

[Table 3 about here]

4.2 Evaluation of expectations

Table 4 shows the coefficients of bivariate regression models in elasticity form (coefficients of log-log models). In the following, we report the empirical results on these relationships.

[Table 4 about here]

Income support: direct payments

The analysis did not confirm our first expectation (E1) that spending on DP per hectare increases proportionally with income. Instead, we found that direct payments per hectare increased much less than proportionally with income. When income increased by 1 percent, direct payments per hectare increased only by insignificant 0.29 percent (Table 4). This result suggests that farmers in lower-income countries received high levels of income support relative to local income levels. The result does not reflect an income re-distribution within countries, but a net transfer of income from high-income countries to farmers in low-income countries.

Countries with stronger preferences for linking agricultural support to environmental public goods (*Eblink*) did *not* have significantly lower income support (direct payments) per hectare (E2). Spending on direct payments as a share of GDP was even significantly positively associated with preferences for linking payments to public goods (E3).

EU-level public goods: pillar 2

The expectation that spending in pillar 2 in relation to GDP would be *negatively* associated with national income levels (E4) was confirmed in the bivariate regression analysis. Because pillar 2 reflects payments for EU-level public goods, this finding suggest that transfers exist from high-income countries to farmers in low-income countries who provide those public goods. In the multiple-regression analysis, the negative association with income was partially absorbed by the variable for new member states; spending on pillar 2 relative to GDP was

much higher in the twelve new EU member states than in the other EU countries. In the same model, the countries with higher contributions to the CAP (*CAPfin*) tend to spend less on pillar 2 themselves (see Table A2, $t=-1.40$). This again reflects a transfer of pillar-2 funding from high-income to low-income countries.

National-level public goods: AEM

The first expectation regarding AEM – a positive association of increased income with spending per hectare (E5) – was confirmed with a significant positive effect in the bivariate regression analysis (Table 4, second to last column). This finding suggests that the provision of national environmental public goods aligns with income related preferences. As expected, the spending on AEM per hectare was also positively associated with net contributions to the CAP (E6) and with pillar-2 co-financing rate (E7). These effects did not surprise, since high CAP contributions and co-financing rates reflect high incomes. In the multiple regression analysis, however, CAP contribution is unrelated to AEM spending per hectare. In line with expectations, AEM spending per hectare decreased with increasing farmland per capita (E8). However, AEM spending per hectare did *not* positively relate to preferences in the Eurobarometer survey for linking support to the provision of environmental public goods (E9). The findings for *effective spending on AEM per hectare* generally paralleled those for spending on AEM per hectare.

We had expected *spending on AEM as a share of GDP* to be constant or increasing with income (E10). Instead, the measure strongly and significantly *decreased* with increasing income in the bivariate regressions (Table 4, third-to-last column). In the multiple-regression analysis, which controls for farmland per capita and other factors the effect of income, however, is positive as expected (Table A2). Finally, the expected positive relationship with preferences for linking support to environmental public goods (E11) is not significant.

Summary of findings

The bivariate regression analysis produced eight significant effects for the eleven expectations. Four of the significant estimates confirmed the expectations, suggesting that agricultural support reflects taxpayers' preferences. The effects with regard to direct payments did not produce any empirical evidence that spending reflect taxpayers' preferences. In fact, none of the three expectations relating to spending on DP were confirmed, with two of them being even significantly rejected. In contrast, the expectations with regard to the second pillar and AEM suggest that spending for measures aiming at providing public goods relate fairly well to

preference indicators, in particular to those related to income, but not those from the Eurobarometer.

4.2 Multiple regression estimates

Considering the multiple regression estimates the main drivers of *spending as a share of GDP* (Table A1) are amount of farmland per capita and new member states. Farmland per capita is throughout significantly positively associated with spending for all three measure categories, and *EUnew* is significantly positively associated with the pillar 2 and AEM. Furthermore, higher income is associated with higher spending on AEM and pillar 2, but decreases spending on direct payments, although these coefficients are not significant. Countries contributing more to the CAP (*CAPfin*) tended to spend less of their GDP on AEM, pillar 2 and direct payments. Finally, those who favoured linking payments to environmental services did not spend more on AEM and tended to provide higher direct payments.

The main drivers of *spending per hectare* (Table A2) differ by schemes. The AEM payments per hectare tended to increase with income, pillar-2 co-financing and new member states, but none of these coefficients are significant. The pillar-2 payments increased with CAP net contribution and were higher among new member states. A striking result is that the direct payments in the EFTA countries Norway and Switzerland strongly exceeded those in the EU even when income is controlled. Finally, preferences for linking payments to environmental benefits in the Eurobarometer are *not* related to (higher) AEM or (lower) direct payments in the expected ways. Generally, the patterns for *effective spending per hectare* are very similar to those for spending per hectare (Table A3).

5 Discussion

The probably most interesting relationships are those between expenditures and income. Regarding the direct payments, the allocation of support across member states does not appear to reflect the objective of securing a fair standard of living for farmers relative to other parts of the population. Instead, since the direct payments per hectare increase much less than proportionally with median income, they may result in large landowner rents in low-income countries. Given unequal landownership, the income disparities within those countries may even increase through the income support (cf. Brady et al. 2009).

Regarding the pillar-2 payments, we found patterns that are broadly consistent with the objective of providing European-level public goods. The allocation of funding for schemes with European benefits such as Natura 2000 payments and other payments in pillar 2 may thus be well justified by taxpayer preferences. It is important to note, however, that this result hinges on our interpretation that pillar-2 payments support mainly EU-level public goods.

For the AEM, the differences in levels of spending across Europe consistently reflect differences in income and other indicators of taxpayer preferences at the national level. This evidence is admittedly weak, however, as consistency refers only to the sign of the examined relationships.

The findings on the relationship between spending and Eurobarometer preferences for linking farm support to the provision of environmental public goods were not as expected. We did not find any evidence that these preferences reflect either higher spending on AEM or lower spending on income support (direct payments). However, the results may not necessarily indicate a policy failure. Another plausible interpretation is that the issue had not received sufficient attention in public debates to the date of the survey. In that case, the survey responses would not be a reliable indicator of preferences for spending on environmental public goods *vs.* income support.

Regarding policy implications, the present findings suggest that the total pillar 2 payments and the AEM are relatively targeted policy measures. This interpretation relies on the assumption that the benefits of AEM accrue mainly at the national and pillar-2 payments at the EU level. The spending on direct payments may not be consistent with the policy objectives and may need reconsideration in the light of these objectives. This implication is based on the assumption that, other things equal, the need for income support would be about proportional to the mean or median income in a country (cf. section 2.2).

Given the imperfections in agricultural policies observed herein, the question is which policy processes would bring the allocation of funds in line with taxpayers demand. A standard approach to pursue this objective is to build on two main principles of public finance: subsidiarity and fiscal equivalence. Following subsidiarity, public goods should be managed at the lowest possible level of government at which the policy objectives can be efficiently attained (Musgrave 1959, Oates 1972, Weingast 2005). According to fiscal equivalence, the spatial incidence of the benefits of a public good should coincide with the geographical boundaries of the jurisdiction operating and financing the public good; furthermore, on the individual level contributions ideally reflect individual benefits (Olson 1969, Loomis 2000).

The two principles would entail a stronger focus of the CAP on EU-level public goods and a stronger financial responsibility of the member states for income transfers to farmers and for public goods with only national scope. A first step would be to clarify whether it is the EU or the national level where the benefits of particular measures are to occur. As consequence, CAP support for EU-level public goods would likely be higher than the current support of pillar 2, while EU support for national public goods or national-level redistribution would be phased out. National-level income support would then likely depend more heavily on national income levels. In any case, the coefficients of the EFTA variable in the multiple regression analysis suggest that income support in high-income countries may increase if the responsibility remains at the national level.

The present analyses are limited in several ways. A first limitation is the use of highly aggregated data. Availability of Eurobarometer on the national level also determined the level of aggregation of the entire analysis. However, a subset of the examined relationships could also be explored using regional data. Regarding aggregation, the present study also used a very coarse classification of AEM and pillar 2 as payments for national and EU level public goods, respectively. Pillar 2 and even the AEM could be further disaggregated and their components more sharply classified as regional, national or European in terms of the spatial scales of their benefits.

Another limitation concerns the available preference indicators. Our expectations about preferences for agri-environmental public goods in relation to income and amount of farmland build upon studies of voting in the United States and Switzerland. We also had only very limited information on preferences for income support, and the Eurobarometer survey did not address separate spending categories but only the linkage of spending and environmental benefits. More information about preferences from participatory policy decisions (Renn 2006) would be useful, especially from cases where the policy issues are widely discussed in public and preferences therefore relatively well developed. While the present study is only a modest beginning, we see a considerable potential in similar analyses. The spatial resolution, the dependent variables and the preference indicators could be sharpened in future work.

6 Conclusions

The aim of the present study was to start examining empirically whether agricultural support schemes in Europe reflect taxpayer preferences. We identified country-level indicators of the demand for agricultural policies and examined if agricultural spending related to these

indicators in the expected ways. We found that the European distribution of payments in pillar 2 is at least qualitatively consistent with patterns found in voting based studies on the demand for public goods. By contrast, our findings for the direct payments cast doubt on the efficiency of those payments and support the perception of the European Commission (2011a) that actual support levels are (or were) not sufficiently targeted and may be difficult to justify to the public.

While the present analyses are limited in several ways, they suggest that cross-section analyses may be one possible approach to address the question asked in this paper. If the patterns of spending turn out to be consistent with indicators of preferences, the results of cross-section analyses could be an effective approach to demonstrate the efficiency of public spending. For critics of the current CAP, empirical evidence of any mismatches between taxpayer preferences and agricultural policies could be an equally powerful argument for further reforms (e.g. Tangermann 2012).

The study also revealed that we know very little about the preferences for agricultural policies in Europe. Agricultural policy at the European level is highly complex, and preferences may not be well defined at the individual level. Standard survey approaches like contingent valuation or Eurobarometer surveys may not be able to produce reliable information about policy preferences. We suggest that preferences from widely discussed and intensely fought political decisions on clearly defined land-use issues at local or regional level could fill this important gap. Such information should be systematically collected to produce a richer picture of preferences for various local public goods for better assessments of agricultural policies at national and European levels.

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Table 1. Summary of expected relationships between expenditures and country attributes: positive (+), negative (–), no relationship (/).

	Direct payments		Pillar-2			AEM		
	S/ha	S/GDP	S/ha	ES/ha	S/GDP	S/ha	ES/ha	S/GDP
Income	+				–	+	+	/ or +
Farmland						–	–	
CAPfin						+	+	
P2fin						+	+	
EBlink	–	–				+	+	+

Notes: S: spending; ES: effective spending for public goods.

Table 2. Means and standard deviation (SD) of the dependent variables.

Dependent variable	Direct payments		Pillar 2		AEM	
	Mean	SD	Mean	SD	Mean	SD
Spending divided by GDP (x 1000)	4.70	3.52	3.30	2.91	0.80	0.58
Spending per hectare (euro)	351.7	464.5	184.7	187.3	63.3	90.9
Effective spending per hectare (euro)	–	–	92.0	125.5	53.79	77.3
<i>N</i>	32		31		32	

Table 3. Means and standard deviation (SD) of the explanatory variables.

Variable name	Description	Mean	SD	<i>N</i>
Income	Median income in euro	13766	11206	32
Farmland	Hectares of utilized agricultural area per capita	0.43	0.27	32
CAPfin	National contribution to CAP divided by national receipt of CAP funding	1.20	1.00	32
P2cofin	National co-financing rate for pillar-2 payments	0.42	0.22	32
EBlink	Percent stating that linking support to compliance with environmental benefits is “a very good thing” (Eurobarometer)	26.3	8.9	30
EBspend	Percent stating that spending on the CAP is “too low” (Eurobarometer)	54.8	9.9	30
EUnew	Dummy for 12 new member states	0.38	0.49	32
EFTA	Dummy for EFTA countries	0.06	0.25	32

Table 4 Associations between expenditures and country attributes: percentage change in expenditures associated with a one-percent change in the country attributes.

	Direct payments		Pillar-2			AEM		
	S/ha	S/GDP	S/ha	ES/ha	S/GDP	S/ha	ES/ha	S/GDP
Income	0.29	-0.62***	-0.14	0.43	-1.08***	0.62***	0.67***	-0.63***
Farmland	-0.81***	0.38	-0.38	0.31	2.89***	-0.24	-0.31	1.12**
CAPfin	-1.11**	-1.01***	-0.65	0.92***	-0.88***	0.66***	0.70***	-0.89***
P2fin	0.43	-0.70**	-0.24	0.29	-1.29***	0.71***	0.85**	-0.69**
EBlink	-0.37	0.84**	0.12	-0.54	1.29***	-0.58	-0.78*	0.74

Notes: Significance levels: *: $p < 0.1$; **: $p < 0.05$; ***: $p < 0.01$. The sample includes the EU countries only. S: spending; ES: effective spending.

Appendix

Table A1. Models for expenditures as a share of GDP.

	Direct payments (Pillar 1)				Pillar 2				AE payments			
	EU/EFTA		EU		EU/EFTA		EU		EU/EFTA		EU	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Constant	3.328	1.69	-0.383	-0.11	0.638	0.42	1.966	0.81	0.060	0.14	0.173	0.24
Incmed	-0.074	-1.11	-0.044	-0.61	0.031	0.67	0.038	0.77	0.016	1.24	0.016	1.09
CAPfin	-0.671	-1.10	-0.758	-1.20	-0.543	-1.40	-0.463	-1.14	-0.181	-1.62	-0.176	-1.49
P2cofin					-0.788	-0.27	-0.911	-0.30	0.416	0.49	0.395	0.45
farmlpc	5.988**	2.52	5.394**	2.21	4.117**	2.77	4.208**	2.74	0.808*	1.89	0.855*	1.92
EUnew	0.864	0.75	0.417	0.35	3.846***	4.34	3.799***	4.12	0.597**	2.35	0.613**	2.29
EFTA	4.574*	1.74			-0.668	-0.29			-0.462	-0.8		
EBspend			0.026	0.48			-0.034	-1.02			0.000	-0.04
Eblink			0.094	1.34			0.015	0.33			-0.004	-0.32
R ²	0.50		0.55		0.73		0.74		0.43		0.45	
N	32		30		31		30		32		30	

Note: Significance levels see Table 4.

Table A2. Models for expenditures per hectare.

	Direct payments (Pillar 1)				Pillar 2				AE payments			
	EU/EFTA		EU		EU/EFTA		EU		EU/EFTA		EU	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Constant	284.5***	3.39	229.6**	2.24	-111.0	-1.20	-196.9	-1.34	-9.464	-0.15	-42.054	-0.72
Incmed	1.104	0.39	1.75	0.84	4.129	1.47	3.588	1.2	1.657	0.84	1.68	1.42
CAPfin	26.945	1.03	28.097	1.54	153.8***	6.51	148.5**	6.07	-0.118	-0.01	-0.297	-0.03
P2cofin					-25.074	-0.14	-16.956	-0.09	113.383	0.90	109.264	1.51
farmlpc	-121.885	-1.21	-110.632	-1.58	69.022	0.77	63.644	0.69	-31.183	-0.49	-20.066	-0.55
EUnew	-94.862*	-1.94	-99.274**	-2.87	96.293*	1.79	100.07*	1.80	23.249	0.62	24.265	1.1
EFTA	1714.8***	15.30			1.58	0.01			119.135	1.40		
EBspend			0.206	0.13			2.308	1.14			0.729	0.91
Eblink			1.186	0.59			-1.129	-0.43			-0.425	-0.41
R ²	0.95		0.57		0.76		0.78		0.50		0.41	

N 32 30 31 30 32 30

Note: Significance levels see Table 4.

Table A3. Models for effective expenditures per hectare.

	Pillar 2				AE payments			
	EU/EFTA		EU		EU/EFTA		EU	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Constant	-132.5**	-2.17	-194.6*	-1.98	-6.598	-0.12	-25.778	-0.52
Incmed	2.883	1.56	2.856	1.43	1.097	0.66	1.058	1.06
CAPfin	110.2***	7.06	107.3***	6.56	-0.597	-0.04	-0.533	-0.07
P2cofin	-14.934	-0.13	-9.863	-0.08	117.011	1.10	112.998*	1.85
farmlpc	93.398	1.57	87.059	1.41	-36.24	-0.68	-25.607	-0.83
EUnew	49.991	1.41	48.792	1.31	18.394	0.58	20.079	1.08
EFTA	29.064	0.31			92.243	1.29		
EBspend			1.141	0.84			0.551	0.81
EBlink			0.179	0.1			-0.552	-0.62
R^2	0.77		0.78		0.51		0.44	
<i>N</i>	31		30		32		30	

Note: Significance levels see Table 4.