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The Regional Economic Consequences of Less Favoured Area Support: A Spatial General Equilibrium Analysis of the Polish LFA Program

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The Centre of Policy Studies (COPS) is a research centre at Monash University devoted to economy-wide modelling of economic policy issues.

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Abstract

On accession to the EU, Poland, one of the most agricultural countries in the region, became eligible for the Common Agricultural Policy (CAP), which it perceived as a chance to develop its rural economy. However, in constructing its 2007-2013 Rural Development Programme, Poland directed the largest funding share to Less Favoured Areas (LFA) -- a controversial measure accused of poor targeting and ineffectiveness. In this paper, we analyse the spatial economic consequences of LFA support for all 16 NUTS2 regions in Poland using a regional computable general equilibrium model called POLTERM. We show that LFA support did help to increase farmers' incomes, but harmed export-oriented sectors and hindered structural change in the Polish economy.

JEL Classification: C68, O18, O11, O21, Q18

Keywords: Common Agricultural Policy Reform, Rural development, Less Favoured Areas, Spatial Computable General Equilibrium Model, Poland

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1. INTRODUCTION

The European Commission designates as a "less-favoured area" those territories where agricultural activity is rendered difficult by natural handicaps such as poor climate, steep terrain or barren soil. A region may also be designated less-favoured if continued agricultural activity in the region is threatened by specific economic or environmental handicaps, and continued agricultural activity in the region is deemed important to conserve or improve the environment, maintain the countryside, and preserve tourism potential (IEEP, 2006). Across the EU27, LFA designations are significant, accounting for over a quarter of EU27 agricultural activity.[2]

The chief policy rationale for the LFA measures of the Common Agricultural Policy (CAP) is that farm difficulties in LFA areas generate an ongoing risk of agricultural land abandonment with attendant risk of biodiversity loss, desertification and forest fires. An ostensible aim of the LFA payment scheme is to mitigate these risks. LFA support is channelled through Rural Development Programmes (Pillar 2 of the CAP) in all EU27 countries. The majority of Member States have provided significant support to the scheme. For example, in Poland and Finland, the scheme represents about 50 per cent of the Pillar 2 budget. At the EU level, the European Agricultural Fund for Rural Development (EAFRD dedicated € 12.6 billion to the scheme for 2007-2013, corresponding to 13.9 per cent of EAFRD or 32 per cent of Axis 2 (the environmental component of the Rural Development Programmes). Under this measure, farmers who manage agricultural land in LFA and undertake to pursue their activity for a period of 5 years (not necessarily producing anything but keeping the land in good agricultural and environmental condition) receive annual compensation for additional costs and income foregone, with this compensation related to the natural handicap (EC, 2008). Since Poland joined the EU, approximately 1.4 million farms, representing about 13 per cent of the total number of farms in the EU25 received support under the LFA scheme[3].

From an historical perspective, LFA payments, introduced in 1975, brought to the CAP a much desired regional dimension and initiated area-based annual payments to farmers.[4] Hence the LFA

[2] Excluding mountain areas, LFA regions account for 30 per cent of EU27 agricultural holdings, 31 per cent of the EU27 agricultural labour force and 26% of EU27 agricultural economic potential (CC, 2009).

[3] See the official website of DG AGRICULTURE at: http://ec.europa.eu/agriculture/rurdev/lfa/index_en.htm

[4] This was the first time in the history of the CAP that a measure was applied based on delimitation of certain eligible areas among the regions on a per hectare basis.

was perceived at first as a major positive change in the nature of the Common Agricultural Policy (CAP), with a movement towards replacement of production-distorting price support by more production "neutral" support. This idea of decoupled payments later expanded to encompass other measures with later CAP reforms (Dax, 2005). Over time, the spatial importance of the measure has expanded with the eligibility of new EU regions. In 1975 LFA (including mountainous areas) constituted 32.9 per cent of the EU's total agricultural land (CEU, 2005). This coverage has expanded over the past 30 years to 57% per cent, with the entry of such countries as Finland in 1996 (with 100 per cent of the country classified as LFA) and Poland (with 52.4 per cent of the country classified as LFA) (DG AGRI/LFA, 2010)..

The LFA measure is in 2010 and will be in 2011 under revision both at EU and country levels. This follows a critical report in 2003 by the European Court of Auditors, which criticized LFA for lack of targeting of aid (OJ, 2003). Further revision of the LFA scheme revealed: inconsistencies in delimitation of LFA areas between countries and regions; extreme diversity of the LFA criteria among countries and regions leading to unequal treatment of beneficiaries; and, insufficient targeting of the aid (CC 2009), These criticisms have generated political pressure to revise the LFA measure across the EU and implement a new system from 2014, when the new Rural Development Programs will be implemented for the new budgetary period.

While the LFA instrument is under revision[5], there is surprisingly little literature on its economic impact, particularly at the regional level. The existing studies of CAP usually investigate its impact at the country level, not the regional level. Existing studies also tend to focus on Pillar 1, and Old Member States. Dixon and Matthews (2006) analysed the impact of the CAP reform on the Irish economy using a multi-sectoral computable general equilibrium (CGE) model and showed that although it re-allocated resources within agriculture, the economy-wide effects of CAP reform are minimal, with only a small positive impact on GDP. No regional effects were investigated. More recently, a study of CAP reform using the GTAP model stated that "[...]Rural development spending [Pillar II] is not modelled because the effects of this class of spending are too complex and uncertain and difficult to value [...]" (Costa, et al., 2009). A study by Gelan and Schwarz (2008), which analysed the LFA in a CGE context, quantified impacts of CAP reform on farming in Less Favoured Areas, but did not distinguish specific regions. In the context of the existing CAP literature, which emphasises investigation of the national impact of Pillar 1 measures on Old Member Countries, our study appears to be the first to investigate the spatial

[5] see http://ec.europa.eu/agriculture/rurdev/lfa/review/index_en.htm

impact of a Pillar 2 measure on a New Member State. Our research approach is a regional computable general equilibrium model POLTERM, tailored for rural and agricultural analyses. In particular, for the present analysis, we have adapted POLTERM to include (i) 11 agricultural sectors, (ii) 8 food sectors, (iii) 14 disaggregated non-agricultural sectors of manufacturing and services iv) two land inputs, and (iv) two types of households, rural and urban. Regions in the model are linked by trade flows, capital flows, population movements, changes in relative prices, and transfer payments. We take into account emigration, an important factor in Poland's labour market.

Our paper investigates various regional, national and sectoral economic consequences of Poland's LFA scheme. We investigate how LFA affects land rental prices, use of agricultural land, employment, and agricultural prices and production. We also investigate the indirect effects of LFA support on variables such as food prices, employment, GDP and population. Thus our paper elucidates the effectiveness of LFA in achieving one of its ostensible objectives, namely, maintaining agricultural production in the areas under question.

Poland presents an interesting case study for the regional economic consequences of LFA payments for a number of reasons. Firstly, Poland is one of the largest agriculture-dependent countries in the EU.[6] Hence, the effects of the LFA in Poland go some way towards elucidating the upper bounds of LFA impacts in other countries. Secondly, Poland has 16 very diverse regions, from predominantly urban and non-agricultural, to predominantly rural and predominantly agricultural. Hence, a variety of different regions can be analysed within one country. Thirdly, LFA in Poland absorbs the highest allocation of EAFRD of total LFA support in the EU (Tödtling-Schönhofer, et al., 2008).

2. LFA MEASURES IN POLAND

Poland has chosen 22 measures for its Rural Development Program 2007-2013 (Pillar 2) -- so a fixed budget was thinly spread over many uses. Many studies have suggested that rural development goals would be easier to achieve if the funds were more concentrated (Zawalińska, 2009). Of all 22 Pillar 2 measures planned for 2007-2013 in Poland, LFA has the largest amount

[6] In Poland rural areas account for 93.2 per cent of land area and 38.6 per cent of population. The agricultural sector accounts for 15 per cent of employment (FDPA, 2010).

devoted to it, 2.45 billion EUR representing 14.7 per cent of Poland's total Pillar 2 budget. The allocation for other measures of the RDP 2007-2013 is presented in Table1.

The main aims of Poland's Country Strategic Plan for Rural Development are: facilitating outflow of farmers to other occupations, creating non-agricultural jobs in rural areas, increasing agricultural labour productivity[7], and improving quality of life in rural areas. Against these pressing needs, it seems unjustified to allocate most funds to measures like LFA.

Currently LFA covers 56 per cent of Poland's farmland (see Map 1). LFA support consists of annual flat rate payments (compensatory allowances) per hectare of agricultural land remaining in agricultural use, where that land is situated in mountain areas and other less-favoured areas.

The regional distribution of LFA support is determined by the definition of the LFA areas. We assume that the structure of the regional distribution will be similar to the previous budgetary period 2004-2006, since the definition of LFA has not changed. Of course, the amounts per region will differ, since the total allocation has changed in 2007-2013 period (see Table 2).

3. REGIONAL PICTURE OF POLAND

Before describing our CGE model, we classify Polish regions according to rurality and dependence on agriculture. The simplest regional rural typology is the OECD classification of predominantly rural (PR), intermediate/significantly rural (IR) and predominantly urban (PU) regions. This typology is based on the percentage of the population living in rural areas. The OECD classification is recognised across the EU, and has proved effective for many regional and policy studies (Terluin, 2006). However, here we extend the OECD typology, adding one more dimension, namely, the dependence of rural population on agriculture. This is represented by the percentage of the rural workforce in the primary sector. Adopting a similar cut-off to the OECD typology, we define predominantly agricultural (PA) regions as those in which more than 50 per cent of the rural workforce is employed in agriculture. We define intermediate agricultural (IA) regions as those in which between 50 per cent and 15 per cent of the rural workforce is employed in the primary sector, and other regions as predominantly non-agricultural (PN). Such

[7] Currently 15% of farmers produce less than 4% of GDP.

a presentation gives a more detailed picture of *rurality* across regions, and together with the OECD typology, generates 9 types[8] of regions, as in Figure 1 and Table 3.

4. POLTERM: A BOTTOM-UP MULTI-REGIONAL MODEL OF POLAND

4.1 Overview of POLTERM: A Polish implementation of the TERM model.

POLTERM is an implementation of the TERM model (Horridge, *et al.*, 2005) to the Polish economy.[9] Our explanation of results from POLTERM in Section 6 relies on familiar economic mechanisms, not on a detailed knowledge of TERM's theoretical structure. Thus we provide below only a brief summary of TERM, referring readers interested in the detailed structure of the model to Horridge, *et al.* (2005).

TERM is a bottom-up multi-regional CGE model. A defining feature of TERM is its compact data structure, which allows it to distinguish many sectors and regions while being quickly solved on a high-end PC. TERM's computational efficiency, relative to some other detailed bottom-up multi-regional CGE models, arises from a number of simplifying assumptions. For example, TERM assumes that all users in a particular region of a particular commodity source their purchases of that commodity from other regions according to common proportions[10]. The data structure is the key to TERM's strengths. It allows the same detailed bottom-up multiregional treatment of economic agents employed in other large-scale regional CGE models to be included in a model with many more regions.

TERM explicitly captures the behaviour of industries, households, investors, government and exporters at the regional level. The Polish version models economic activity in the 16 NUTS2 regions. The sectoral dimensions of POLTERM have been tailored for rural and agricultural analyses. In its full disaggregation, the model has 86 sectors, of which 20 relate to agricultural production and 8 to food production.

The theoretical structure of TERM follows the familiar neoclassical pattern common to many applied general equilibrium models. Producers in each region are assumed to minimize production costs subject to a production technology that allows substitution between primary

[8] In practice, type 7 (Predominantly Urban-Predominantly Agricultural) and 8 (Predominantly Urban – Intermediate Agricultural) are not likely to appear, so generally we distinguish 7 meaningful types or regions.

[9] Previous implementations of the TERM model include Australia (Wittwer, 2009; Horridge, Madden, Wittwer, 2005), China (Horridge and Wittwer, 2008), Finland (Kinnunen, Marttila and Honkatukia, 2009), Indonesia (Pambudi, 2005), Brazil (de Souza Ferreira Filho dos Santos and do Prado Lima, 2007) and South Africa.

[10] Thus, for instance, both households and food-products manufacturers in region *r* are assumed to purchase the same proportion of their vegetables from region *t*.

factors (labour, capital and land) and between geographical sources of supply for specific intermediate inputs. A representative household in each region purchases goods in order to obtain the optimal bundle in accordance with its preferences and disposable income. Investors seek to maximize their rate of return, while demand by foreigners is modelled via export demand functions that capture the responsiveness of foreigners to changes in export supply prices.

In TERM, economic agents decide on the geographical source of their purchases according to relative prices and a nested structure of substitution possibilities. The first choice facing the purchaser of a unit of a particular commodity is whether to buy one that has been imported from abroad or one that has been produced in Poland. If a Polish product is purchased, a second decision must be made as to the particular region the commodity originates from. For instance, in the purchase of a Polish-made agricultural tractor a purchaser will need to choose, say, between an URSUS manufactured in Mazowieckie and a PRONAR made in Podlaskie. It is assumed that Polish-made brands are considerably more substitutable, than is a Polish brand with a foreign brand. In order for goods to reach a customer located in a particular region, certain margin services must also be purchased. Thus the price to the regional purchaser will include a margin to the retailer and wholesaler of the good (i.e. the trade margin) and the transporter(s) of the good. For instance, a Skaryszew (Mazowieckie) purchaser of a good manufactured in Warsaw might find that the sale price includes a margin for a Warsaw distributor for rail freight to Radom, then road transport to Skaryszew and a Skaryszew retailer. It is assumed that substitution between the source of the margins may be affected by a change in the relative price of margins sourced from different geographical localities, particularly with regard to transport. Thus, for instance, Skaryszew, Radom, and Warsaw trucking companies are assumed to compete with each other to carry goods from Warsaw airport to Skaryszew. TERM contains a large database which keeps track of the flow of international and interregional purchases of each commodity from each region of origin to each destination region. It also keeps track of the associated margin payments and the geographical location of the suppliers of those margins. In the case of each regional user, TERM also keeps track of the taxes payable on the purchase.

As an EU member state, Poland has an open labour market with the rest of the EU. Indeed since EU accession, the level of Polish emigration has been substantial. In modelling Poland's labour market in POLTERM, we allow the size of the in-Poland workforce to respond

endogenously to movements in the Polish real wage, with an elasticity of 0.10. This is consistent with the level of Polish emigration following EU accession[11]

4.2 Modelling the LFA measure in POLTERM

LFA payments take the form of an annual per hectare grant. From a modelling perspective, this can be viewed as a land rental subsidy. Any given Polish region, r, will tend to have producers cultivating both LFA and non-LFA land areas. Hence in POLTERM, we distinguish these two types of land. The ostensible purpose of LFA funding is to increase farmer incentives to farm more LFA land than they would otherwise (see Section 1 above). Implicit in this aim is a belief that agricultural activity in LFA areas would decline in the absence of the support. To model this, we allow the supply of LFA land to respond endogenously to movements in the post-tax rental price of LFA land. We set the elasticity of the supply of LFA land to movements in the post-tax rental price of LFA land ($\eta_r^{(S)LFA}$) at 0.2. For non-LFA land, we set the corresponding elasticity ($\eta_r^{(S)non-LFA}$) at 0, as there is very little fallow land in Poland that can be easily turned into arable non-LFA land. These elasticities are within relevant ranges reported in van Meijl, et al. (2006) and Abler (2003). Van Meijl *et al.* (2006) places the land supply elasticity within the EU in the range 0.01 to 0.2. This range of land supply elasticities is within the 0.0 to 0.2 interval found by Abler (2003). Van Meijl *et al.* (2006) note that land supply elasticities for developing countries can be higher than this range, in the vicinity of 0.5. We conjecture that for LFA land in Poland, a land supply elasticity at the upper end of the EU range reported in van Meijl *et al.* (2006) is appropriate. For non-LFA land, we set the supply elasticity at the lower-end of the Abler (2003) range, at 0.

[11] To our knowledge, there are no econometric estimates of the elasticity of Poland's workforce size with respect to the Polish real wage relative to the real wage in the rest of the EU. For the simulations reported in this paper, we set this elasticity at 0.10. This value is consistent with the size of Polish emigration following EU accession in 2004. In the years 2004-08, 2.2 m. Polish workers emigrated abroad (GUS, 2009, p.2). This represented approximately 9% of the Polish workforce of 24.6 m. (GUS-BDR, 2009). Prior to EU accession in 2004, opportunities for Polish labour to work in the EU were limited. At the time of EU accession, in the year 2004, the average Polish wage was 2290 zloty (GUS, 2010), the equivalent of approximately 573 EUR. The main destination for Polish emigrant labour post-accession was the UK (GUS, 2009, p.3). There, the majority of Polish workers earned the minimum UK wage of 1084 EUR (EUROSTAT, 2004, p.2). As such, Poland's EU accession made available, to workers willing to emigrate, wages 90 per cent higher than those possible in Poland. This generated a 9 per cent reduction in the Polish workforce. So our working age population supply elasticity of 0.10 is consistent with this historical outcome, according to elasticity formula -9/((1084-573)/573*100) = -0.10.

Figure 2 describes the modelling of regional agricultural land supply and land demand. At the bottom level of this diagram, regional endowments of LFA and non-LFA land (X_r^{LFA} and $X_r^{non-LFA}$ respectively) are potentially supplied to agricultural industries 1 – N in region *r*. Land supply functions across land users are modelled via constant elasticity of transformation (CET) functions[12]. We assume that landowners seek to maximise land rentals subject to constrained land transformation possibilities described by CET functions. At the top level of Figure 2, users of agricultural land face imperfect substitution possibilities between LFA and non-LFA land, which are described by constant elasticity of substitution (CES) functions[13]. In modelling the behaviour of users of agricultural land, we assume they minimise the cost of acquiring a given input of land by substituting across land types, subject to the constraints posed by the CES functions. Equations (E1) – (E5) describe, in percentage change form, the system of supply, demand and unit-cost functions implicit in the structure of land supply and demand represented by Figure 2.[14] Equations (E1) and (E2) describe the operation of the land supply nests at the bottom level of Figure 2. In (E1), the percentage change in the supply of land type *n* to agricultural user *j* in region *r* ($x_{j,r}^{(S)n}$) depends on both the availability of land type *n* in region *r* ($x_r^{(S)n}$) and the relative land rental received when supplying to user *j* ($p_{j,r}^n - p_r^n$). The average rental on land type *n* in region *r* (p_r^n) is defined by (E2) as the revenue-share-weighted sum of the percentage changes in rentals received from each user of land type *n* in region *r*. Equations (E3) and (E4) describe the operation of the land demand nests at the top level of Figure 2. In (E3), the percentage change in the demand for land type *n* by agricultural user *j* in region *r* ($x_{j,r}^{(D)n}$) depends both on the demand for land in general by such users ($x_{j,r}^{Land}$) and the relative user price of land type *n* ($p_{j,r}^n - p_{j,r}^{Land}$). The percentage change in the average cost of agricultural land to user *j* in region *r* is defined by (E4) as the cost share weighted sum of the percentage changes in the rental prices of the LFA and non-LFA land employed by user *j,r*. Together, (E1) and (E3) define percentage changes in user-, region- and land-specific land supply and demand. Equation (E5) imposes a market clearing condition on these user-, region- and land-specific land markets, thus allowing endogenous determination of land rental prices ($p_{j,r}^n$). Equation (E6) defines the percentage change in net land rentals received by land owners. In the original levels form, (E6) expresses net land rentals as the product of pre-subsidy land rentals and the power (one plus the rate) of land subsidy. In (E6), the percentage change in the land subsidy appears as

[12] For a description of the application of the CET function in CGE modelling, see Dixon *et al.* (1992: 128-133).
[13] For a description of the application of the CES function in CGE modelling, see Dixon *et al.* (1992: 124-126).
[14] For a formal derivation of these percentage change forms from economic problems such as those described by Figure 2, see Dixon et al. (1992).

s_r^n. It is s_r^n that we shock when modelling LFA payments in Sections 5 and 6. Equation (E7) defines the supply of land type *n* in region *r*. Under (E7), the percentage change in the supply of land type *n* in region *r* is positively related to the land's real post-subsidy rental rate. The strength of the land supply response to changes in the post-subsidy rental rate depends on the supply elasticity $\eta_r^{(S)n}$. As discussed in the introduction to this section, we set $\eta_r^{(S)LFA}$ =0.2 and $\eta_r^{(S)non-LFA}$ =0.

(E1) Land supply response functions

$$x_{j,r}^{(S)n} = x_r^{(S)n} + \phi_r^n (p_{j,r}^n - p_r^n) \qquad (n \in \text{LANDTYPE})(j \in \text{AGRIND})(r \in \text{REGION})$$

(E2) Average rental price of land

$$p_r^n = \sum_j B_{j,r}^n p_{j,r}^n \qquad (n \in \text{LANDTYPE})\ (r \in \text{REGION})$$

(E3) Demand function for land cultivated on LFA areas under activity j in region r

$$x_{j,r}^{(D)n} = x_{j,r}^{Land} - \sigma_{j,r} (p_{j,r}^n - p_{j,r}^{Land}) \qquad (n \in \text{LANDTYPE})(j \in \text{AGRIND})(r \in \text{REGION})$$

(E4) Average user price of land

$$p_{j,r}^{Land} = \sum_{n \in LANDTYPE} S_{j,r}^n p_{j,r}^n \qquad (j \in \text{AGRIND})(r \in \text{REGION})$$

(E5) Land market clearing conditions

$$x_{j,r}^{(D)n} = x_{j,r}^{(S)n} \qquad (n \in \text{LANDTYPE})(j \in \text{AGRIND})(r \in \text{REGION})$$

(E6) Net land rentals received by landowners

$$pps_r^n = p_r^n + s_r^n \qquad (n \in \text{LANDTYPE})\ (r \in \text{REGION})$$

(E7) Land supply functions

$$x_r^{(S)n} = \eta_r^{(S)n} (pps_r^n - p_r^{GDP}) \qquad (n \in \text{LANDTYPE})\ (r \in \text{REGION})$$

where:

$x_r^{(S)n}$ is the percentage change in the supply of land type *n* in region *r*;

$\eta_r^{(S)n}$ is the elasticity of supply of land type *n* with respect to its real post-tax rental price;

pps_r^n is the percentage change in the post-subsidy rental price of land type *n* in region r.

p_r^{GDP} is the percentage change in the regional GDP deflator for region *r*.

p_r^n is the percentage change in the pre-subsidy rental price of land type *n* in region *r*;

s_r^n is the percentage change in the power (1 plus the rate) of the land rental subsidy on land type *n* in region *r*;

$x_{j,r}^{(S)n}$ is the percentage change in the supply of land type *n* in region *r* to agricultural industry *j*;

ϕ_r^n is the elasticity of transformation of land type *n* in region *r* between alternative agricultural uses *j*;

$p_{j,r}^n$ is the percentage change in the price faced by agricultural producer *j* in region *r* for land type *n*;

$B_{j,r}^n$ is the share of type *n* land rentals in region *r* generated by agricultural industry *j*;

$x_{j,r}^{(D)n}$ is the percentage change in demand for land type *n* by agricultural user *j* in region *r*;

$x_{j,r}^{Land}$ is the percentage change in demand for land (undistinguished by land type) by agricultural industry *j* in region *r*;

$\sigma_{j,r}$ is the elasticity of substitution between different land types faced by agricultural industry *j* in region *r* ;

$p_{j,r}^{Land}$ is the percentage change in the average user price of land faced by agricultural industry *j* in region *r*;

$S_{j,r}^n$ is the share of industry (*j*,*r*)'s total land costs represented by rentals on agricultural land type *n*;

LANDTYPE (LFA land, non-LFA land).

REGION (regions 1 through 16. See Table 6).

AGRIND (Wheat, Rye, Barley, Other cereals, Oil seeds, Vegetables and fruit, Other crops, Other animals, Pigs, Poultry, Cattle).

5. SIMULATION DESIGN: MODELLING LFA IN POLTERM

LFA payments will have immediate impacts on rates of return, regional wage relativities and output prices. Our aim is to investigate the economic consequences of LFA payments after all market adjustments to these immediate LFA-induced relative price changes have taken effect. That is, our concern is long-run. Hence we use a closure of POLTERM that is a variant of the standard long-run TERM closure. This closure defines a long-run solution year with the following characteristics:

(i) Investors in each industry in each region have had sufficient time to adjust regional industry capital stocks in response to the policy change. Thus changes in demand for capital are manifest as changes in capital supply, not as changes in rental rates. We implement this by allowing capital to be in elastic supply to each regional industry at exogenous rates of return.

(ii) Supply of LFA land is positively related to post-tax land rental rates. Supply of non-LFA land is fixed.

(iii) We assume that long-run national employment is weakly positively related to the Polish real wage. This reflects Poland's open labour market with the remainder of the EU. As discussed in Section 4.1, we calibrate the labour supply elasticity to reflect Poland's emigration experience following EU accession.

(iv) Since our focus is long-run, we allow labour to move between regions in response to regional wage differentials. However, we recognise that household locational preferences constrain labour movements even in the long-run. We model this by allowing regional employment to be endogenous, but sticky. Stickiness in regional labour supply is achieved by allowing the gap between the regional wage and the national wage to be weakly positively related to the movement in regional employment. In terms of our model results, this closure has the effect of ensuring that long-run regional labour-market pressures mostly appear as movements in regional employment, with only limited movement in relative regional wage rates.

(v) We assume that the desired rate of capital accumulation in each regional industry in the long-run solution year is independent of the policy shock. We implement this via exogenous determination of regional industry investment/capital ratios. With movements in long-run regional industry capital stocks largely determined by the first closure assumption above, this effectively links long-run movements in regional industry investment to movements in regional industry capital stocks. National investment is determined as the sum of regional industry investments.

(vi) We constrain movements in the long-run balance of trade to reflect two features of solution year net foreign financing: net receipts of LFA payments by Poland, and the need to finance changes in solution-year capital stock. Ceteris paribus, LFA payments received by Poland allow the balance of trade to move towards deficit. In financing the solution year capital stock, we assume that 60 per cent of capital rentals arising from new capital are sent to foreign capital owners via an appropriate movement towards balance of trade surplus. With the solution year balance of trade constrained in this way, we allow private and public consumption to be determined endogenously. This closure can be interpreted as allowing domestic consumption to move with national income, where LFA payments represent an addition to national income, and servicing of foreign financed capital accumulation a gross subtraction from national income. Subject to this national constraint, we assume regional private consumption is a fixed proportion of regional income.

(vii) We assume that long-run regional public consumption spending will follow movements in the long-run regional distribution of economic activity. Regions in which long-run population, employment and consumption are rising (falling) receive a rising (falling) share of national public consumption spending. We model this via exogenous determination of region-specific ratios of real public consumption spending to real private consumption spending.

Our shocks to the POLTERM model are region-specific LFA payments. The aggregate value of Polish LFA payments under CAP funding round 2007-13 is reported in row 1 of Table 1. The regional distribution of these payments is reported in Table 2. These values are used to calibrate shocks to region-specific land subsidy variables, represented by s_r^n in equation (E6).

6. THE NATIONAL, SECTORAL AND REGIONAL EFFECTS OF LFA SUPPORT

We discuss the national, sectoral and regional economic consequences for Poland of LFA support payments. Our interpretation of the POLTERM results is comprised of a sequence of cross-referenced discussions, each of which relies on familiar economic mechanisms, not details of POLTERM's theoretical structure, so readers do not need to be familiar with POLTERM's many equations to follow our discussion of results.

6.1 The impact of LFA support on the national macroeconomy

6.1.1 LFA payments induce a small increase in LFA land supply

Table 4 reports the effects of LFA support on selected national macroeconomic indicators. At the national level, Poland's annual receipt of PLN 1.2 b. of LFA funds represents approximately 18 percent of the value of pre-LFA land rentals accruing to LFA-designated land[15]. We model the LFA support as a per-hectare subsidy to landowners (see section 4.2 above). In our macroeconomic results, this direct effect of LFA payments is manifested as a 17.8 percentage point gap (=11.8 - -6.0) between the LFA land rental rate received by landowners (row 29) and the LFA land rental rate paid by land users (row 26). LFA payments produce a fall in the user-price of LFA land (row 26) because we allow the supply of LFA land to be a positive function of the post-tax rental value of LFA land (see equation E7 above).

[15] In 2005, LFA land rentals were approximately PLN 6.6 b. (authors' estimates, based on official data from Polish Main Statistical Office).

As discussed in section 4.2 above, we set the LFA land supply elasticity at 0.2. Hence, with the post-tax rental price of LFA land rising by 11.8 per cent (row 29), the aggregate supply of LFA land rises by 2.26 per cent (row 5). As discussed in section 4.2, our land use theory allows agricultural producers to substitute between LFA and non-LFA land. The user-price of LFA land must fall (row 26) to induce land users to absorb the increase in LFA land supply.

6.1.2 The real wage rises, inducing an increase in the size of the Polish workforce

For a given level of employment, the increase in the supply of agricultural land (see 6.1.1 above) causes the marginal product of labour to rise. This tendency towards a higher marginal product of labour is reinforced by the rise in the capital stock (see 6.1.3 below) and the terms of trade (see 6.1.9 below). The rise in the marginal product of labour accounts for the movement in the real wage, which rises by 0.16 per cent relative to what it would otherwise have been (row 23).

As discussed in Section 4.2 above, recognising that Poland has an open labour market with much of the EU, we allow Polish labour supply to vary with the real wage -- so there is a small rise in Polish employment (row 2).

6.1.3 The rise in land supply, employment and the terms of trade causes the capital stock to rise relative to basecase

As discussed in Section 5, we assume Poland can obtain capital at fixed rates of return. With land supply and employment higher than basecase (see 6.1.1 and 6.1.2 above), for a given level of capital, the marginal physical product of capital must rise. With the terms of trade higher than basecase (see 6.1.9 below), for a given level of capital, the value of the marginal physical product of capital must rise. However, with rates of return exogenous, scope for the value of the physical marginal product of capital to rise is limited. Hence, the capital stock must expand relative to basecase (row 3).

6.1.4 With factor supplies higher than basecase, so too is Polish real GDP

The LFA payments induce small increases in aggregate land use (see 6.1.1 above), employment (see 6.1.2 above) and capital (see 6.1.3 above). This accounts for the small increase in real GDP relative to what it would otherwise have been (row 1).

6.1.5 LFA payments allow the rise in real consumption to exceed the rise in real GDP

The increase in national real consumption (rows 8 and 9) is substantially higher than the increase in real GDP (row 1). This reflects a rise in real (CPI-deflated) national income relative to real GDP. Real national income rises by more than real GDP for two reasons. First, the terms of trade improves relative to what it would otherwise have been (see 6.1.9 below). Second, and more importantly, the LFA funds received by Poland are financed almost entirely by the rest of the EU, and thus represent a net rise in Polish national income. Aggregate real consumption rises by 0.2 per cent (row 7). This is comprised of a 0.19 per cent rise in private consumption (row 8) and a 0.22 per cent rise in public consumption (row 9). The larger increase in public consumption relative to private consumption is due to differences across regions in the ratio of public to private consumption.[16]

6.1.6 The rise in the capital stock induces a small rise in real investment

As discussed in section 5, we assume that solution year investment/capital ratios by regional industry are exogenous. As such, the percentage change in real investment for each regional industry is the same as the percentage change in its physical capital stock. At the national macroeconomic level, this is reflected in a similar outcome for national real investment (row 10) as the national capital stock (row 3).

[16] As discussed in section 5, we assume that region-specific real public/private consumption ratios are exogenous. The initial levels of these ratios differ across regions. LFA payments stimulate consumption in regions with relatively high public/private consumption ratios. When outcomes for region-specific real public consumption are aggregated to the national level, the result is an outcome for national real public consumption (row 9) that is slightly higher than the outcome for national real private consumption (row 8).

6.1.7 The rise in GNE exceeds the rise in GDP, moving the trade balance towards deficit

The outcome for real investment (+0.06 per cent), is quite close to the outcome for real GDP (+0.07 per cent). However the outcome for national real consumption (+0.2 per cent) substantially exceeds the outcome for real GDP (see 6.1.5 above). Together, the outcomes for real investment and real consumption generate a rise in real GNE (row 11) that exceeds the outcome for real GDP. With the outcome for real GNE exceeding the outcome for real GDP, the real balance of trade must move towards deficit. This accounts for the contraction in real export volumes (row 12) and expansion in real import volumes (row 13).

6.1.8 The movement towards trade deficit requires real exchange rate appreciation

The movement in export volumes and import volumes implicit in the movement towards balance of trade surplus (see 6.1.7) requires a rise in the price of Polish goods relative to foreign goods. That is, it requires the real exchange rate to appreciate (row 15), making exports dearer in foreign markets, and Polish goods relatively more expensive than competing imports within the domestic Polish market.

6.1.9 The contraction in export volumes causes the terms of trade to rise

In POLTERM, commodity-specific export volumes are modelled as inversely related to commodity-specific foreign currency prices. The contraction in export volumes (see 6.1.7 above) thus requires a rise in foreign currency export prices. This accounts for the rise in the terms of trade, relative to what it would otherwise have been (row 14).

6.2 The impact of LFA support on national industrial outcomes

Table 5 reports national results for output by sector. The largest beneficiaries of the LFA funds are agricultural industries (rows 1-11, Table 5). This reflects the expansion in LFA land generated by the LFA funds (see 6.1.1 above). Food processing industries (rows 15-20, Table 5) are indirect beneficiaries of the expansion in agricultural land supply. By lowering the prices of agricultural output, expansion of agricultural production stimulates output of food processing industries by lowering input costs. At the same time, food processing industries receive a demand-side fillip to

their output via the expansion in real household consumption spending (see 6.1.5 above). Expansion in real consumption, both private and public, also accounts for expansion in the output of such industries as hotels and restaurants (row 26), dwellings (row 29), education (row 30), public administration (row 31), health (row 32) and other services (row 33). Note that traded goods sectors, such as forestry (row 12), mining (row 14) and other manufacturing (row 21) are adversely affected by Poland's receipt of LFA payments. This reflects the appreciation of the real exchange rate (see 6.1.8 above).

6.3 The impact of LFA support on Poland's regional economies

We report regional macroeconomic outcomes in Table 6. In Figure 1, we mark the regions experiencing the highest real GDP gains due to LFA (Podlaskie, Warminsko-Mazurskie and Lubelskie respectively) with the numbers 1, 2, and 3. In Section 3, we classified two of these regions (Podlaskie and Lubelskie) as Predominantly Agricultural, and two of the regions (Lubelskie and Warminsko-Mazurskie) as Predominantly Rural. Lubelskie is one of the poorest regions in the whole EU.

The chief determinant of relative regional GDP outcomes is the relative importance of LFA funding expressed as a share of regional GDP (Figure 3). LFA funding as a share of regional GDP is reported in the first column of Table 6. Figure 3 reports POLTERM results for real regional GDP outcomes. It also reports a predicted regional real GDP outcome based on a regression equation estimated by regressing the POLTERM results for real regional GDP (column 2, Table 6) against the ratio of regional LFA receipts to regional GDP (column 1, Table 6). In Figure 3 we find the predicted real GDP outcomes closely match the POLTERM real regional GDP outcomes.

As discussed in Section 5, national employment is weakly positively related to the real wage. However, despite national employment being endogenous, it remains sufficiently constrained that long-run expansion in employment in one Polish region will typically be at the expense of long-run employment in other Polish regions. By expanding land supply and agricultural production in some regions more than others, LFA funds cause a regional redistribution of national employment. In Table 6, we find employment tends to shift from the most urban

regions (such as Slaskie, Dolnoslaskie, Opolskie) to more rural regions (Podlaskie, Warminsko-Mazurskie, Lubelskie).

Column 6 of Table 6 reports percentage changes in LFA land supply relative to what it would have been in the absence of the LFA policy. Column 8 reports the percentage change in total agricultural land area by region. Together, these columns show how much land would be released from agricultural use without the LFA policy.

Hence, the results in columns 6 and 8 are a measure of the success of the Polish LFA in meeting its ostensible aim of maintaining land in agricultural use. In the absence of the LFA program the region that would release the most land from agricultural use is Podlaskie (row 10), the most agricultural region in Poland. The regions least affected in terms of agricultural land use would be Slaskie, Dolnoslaskie and Opolskie. These are among the most urban regions in Poland.

In terms of the two-dimensional OECD based regional typology (Table 7), LFA funds impact most on the group of Type 4 (Intermediate Rural-Predominantly Agricultural) despite the fact, that the largest LFA funds (as percentage of Gross Regional Product) were obtained by the regions of Type 5 (Intermediate Rural-Intermediate Agricultural). Regions of Type 4 experienced the highest increase in real GDP and real consumption (by 0.39 per cent and 0.90 per cent accordingly), also in those regions employment and capital stock were the most responsive to the policy (employment was 0.26 per cent and capital stock 0.68 per cent higher). Without this policy 3 per cent of LFA land in those regions would be abandoned, compared to 2.1 per cent in case of the regions of Type 5, or 2.2 per cent for Predominantly Rural-Intermediate Agricultural or 1.8 per cent for Predominantly Rural-Predominantly Agricultural regions. The only region type that suffers is Type 8 (Predominantly Urban-Intermediate Agricultural): GRP falls by 0.05 per cent, real consumption by 0.06 per cent, employment by 0.08 per cent and capital stock by 0.04 per cent. There, LFA funds retain agriculture only on 0.7 per cent of the LFA land.

7. CONCLUDING REMARKS

We analyse the largest EU Rural Development Policy instrument in Poland: the support for Less Favored Areas (LFA). Our modelling suggests that the policy contributes to its ostensible aim -- retention of marginal agricultural land use in predominantly agricultural and rural regions.

However, the LFA scheme's contribution to reducing land abandonment appears to be small. In Type 4 regions (intermediate rural-predominantly agricultural), where the scheme appears most effective in promoting continued land use, LFA payments cause total land use to be 3 per cent higher than it would otherwise have been. However for Type 8 regions (predominantly urban-intermediate agriculture) we found this effect to be much smaller, with total land use only 0.7 per cent higher than it would otherwise have been. These small effects are consistent with a survey carried out as part of an ex-post evaluation of the Rural Development Plan 2004-2006, which found that 73 per cent of LFA support recipients would pursue farming even if they had not received LFA support[17].

From an economy-wide perspective, Poland appears a net beneficiary of the LFA program, with the scheme lifting real national consumption by 0.2 per cent. However this macroeconomic outcome masks important impacts on the regional and industrial distribution of economic activity. These distributional impacts are brought about mainly via a Dutch Disease effect, which arises from the fact that the large LFA transfers from the EU cause the Polish real exchange rate to appreciate. Since Poland is a net beneficiary of EU support in general it is unavoidable that measures such as LFA contribute to real appreciation. However it is the composition of the adversely affected trade-exposed sectors that may concern policy makers. By design, LFA funds tend to flow to agricultural industries in regions that are primarily rural. This leaves non-agricultural industries in regions that are primarily urban exposed to the real exchange rate appreciation, while receiving little direct compensation via LFA receipts. Labour productivity in Polish agriculture is among the lowest in the EU. While not studied directly in this paper, our results for sectoral output raise the important question of whether the LFA program - by discouraging marginal farmers from leaving the land, while simultaneously penalising the trade-exposed high-growth sectors that might otherwise absorb surplus farm labour - could have an adverse impact on Poland's economic growth,

[17] See: Ex-post evaluation of RDP 2004-2006 at: http://www.minrol.gov.pl/index.php?/pol/content/download/669/3797/file/RAPORT

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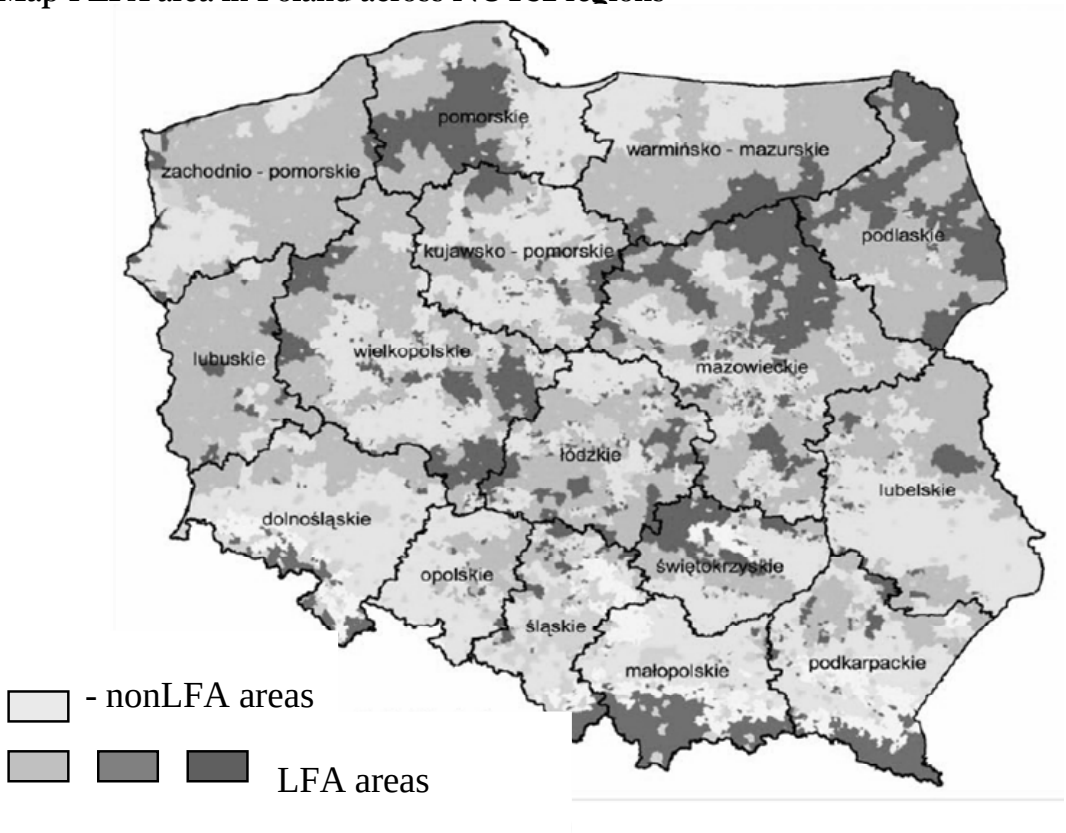
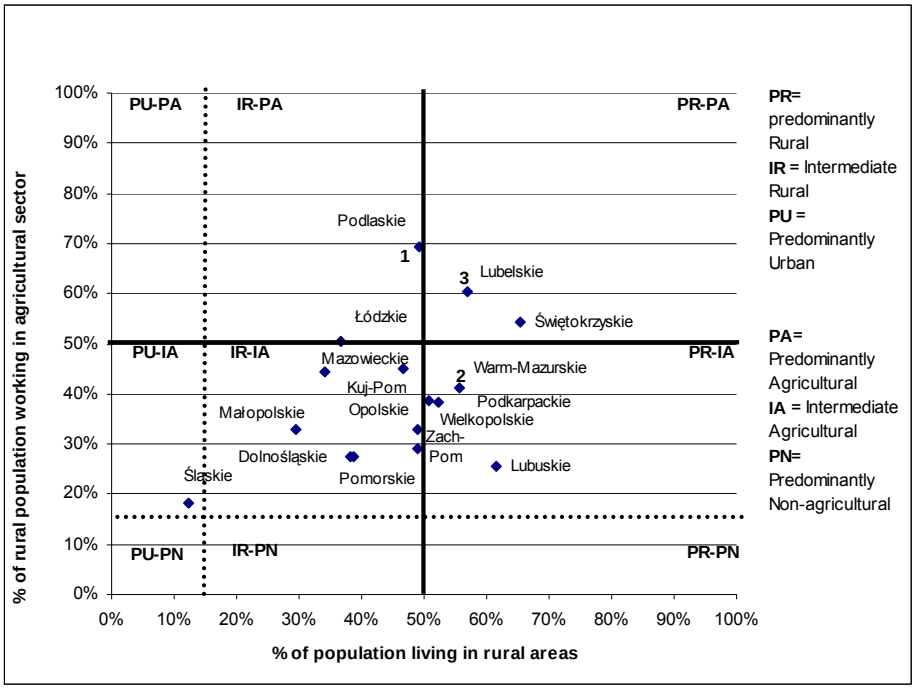
Map 1 LFA area in Poland across NUTS2 regions



Source: Based on Rural Development Programe 2007-2013

Figure 1 Rural Typology of Polish NUTS2 regions



Source: Authors own calculations

Figure 2: Agricultural land supply and agricultural land demand in POLTERM

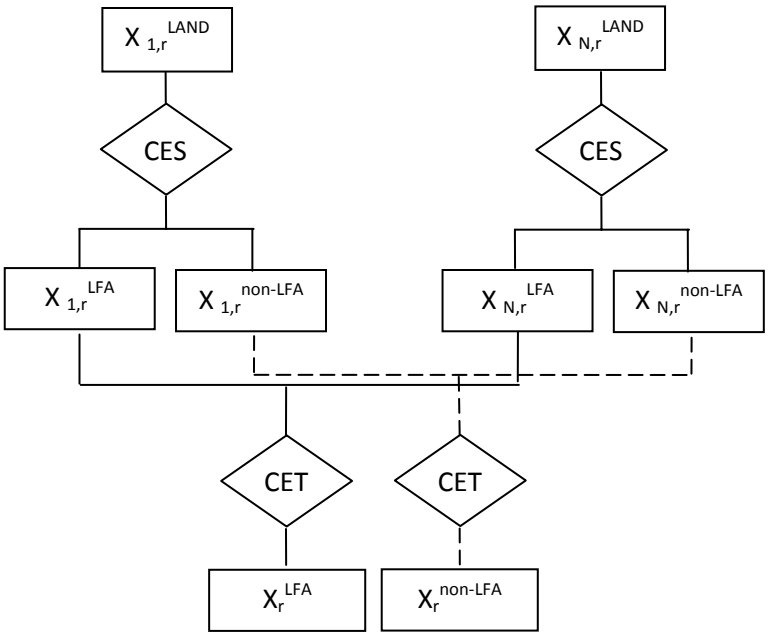
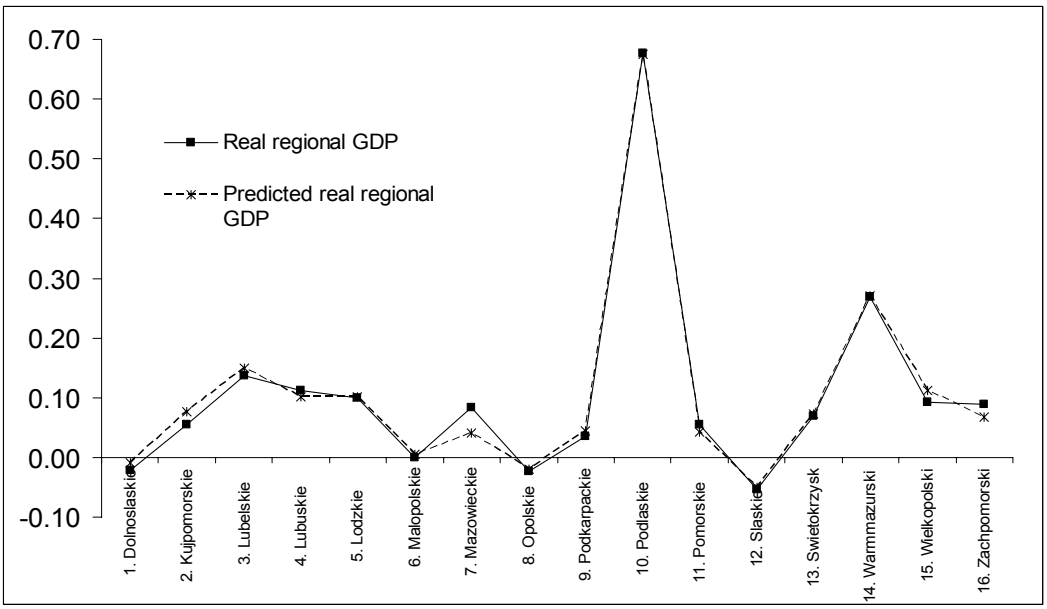


Figure 3: Real regional GDP and predicted real regional GDP compared (percentage change from base-case, long-run solution)



Source: Authors' calculations using POLTERM output. Predicted real regional GDP is calculated from the linear regression of the POLTERM result for real regional GDP against region specific LFA / GDP ratios.

Table 1 Annual amounts and shares of Pillar 2 measures, sorted by size

	Short name of measure	Millions EUR	%
1	LFA (Less favoured areas)	350.0	14.7
2	Agri-Environmental programs	329.3	13.9
3	Early Retirement	293.1	12.3
4	Modernization of farms	238.5	10
5	Basic Services	197.2	8.3
6	Added Value	147.4	6.2
7	Micro-Enterprises	137.2	5.8
8	Afforestation	93.4	3.9
9	Development of Infrastructure	80.4	3.4
10	Village Renewal	79.0	3.3
11	Semi-subsistence farms' support	59.0	2.5
12	Young Farmers support	56.3	2.4
13	Technical Assistance	47.6	2
14	Advisory	46.9	2
15	Diversification	46.3	1.9
16	Restoring Forest	20.0	0.8
17	Producer Groups	18.8	0.8
18	Food quality systems	13.4	0.6
19	Training	5.4	0.2
20	Information and Promotion	4.0	0.2
21	LEADER (1+2+3)	112.6	4.7
22	**Total**	**2 375.5**	**100**

Source: Based on Polish RDP 2007-2013

Table 2 Regional structure of annual LFA payments in Poland (millions of EUR)

		Regional shares of LFA*	Millions EUR	Population 2003 Millions	Main Town
1	Dolnośląskie	0.037	87.9	2.9	Wroclaw
2	Kujawsko-Pomorskie	0.053	125.9	2.1	Bydgoszcz
3	Lubelskie	0.067	159.2	2.2	Lublin
4	Lubuskie	0.030	71.3	1.0	Bydgoszcz
5	Łódzkie	0.075	178.2	2.6	Lodz
6	Małopolskie	0.040	95.0	3.3	Krakow
7	Mazowieckie	0.185	439.5	5.1	Warsaw
8	Opolskie	0.008	19.0	1.1	Opole
9	Podkarpackie	0.032	76.0	2.1	Rzeszów
10	Podlaskie	0.134	318.3	1.2	Białystok
11	Pomorskie	0.049	116.4	2.2	Gdansk
12	Śląskie	0.015	35.6	4.7	Katowice
13	Świętokrzyskie	0.028	66.5	1.3	Kielce
14	Warmińsko-Mazurskie	0.074	175.8	1.4	Olsztyn
15	Wielkopolskie	0.128	304.1	3.4	Poznań
16	Zachodniopomorskie	0.045	106.9	1.7	Stettin
	TOTAL	**1**	**2375.5**	**38.2**	

* Assumed to be the same as in 2004-2006

Source: Own calculations based on Polish RDP 2004-2006

Table 3. Two-dimensional OECD based rural typology of regions.

% share in total population	% employed in agricultural sector		
RURAL POPULATION:	**P**redominantly **A**gricultural Above 50%	**I**ntermediate **A**gricultural Between 15-50%	**P**redominantly **N**onrRural Below 15%
Predominantly **R**ural Above 50%	***Type 1*** **PR-PA**	***Type 2*** **PR-IA**	***Type 3*** **PR-PT**
Intermediate **R**ural Between 15-50%	***Type 4*** **IR-PA**	***Type 5*** **IR-IA**	***Type 6*** **IR-PT**
Predominantly **U**rban Below 15%	***Type 7*** **PU-PA**	***Type 8*** **PU-IA**	***Type 9*** **PU-PN**

Table 4: Impact of LFA support at the national level [(a)]

National macroeconomic indicator:	% change
1. Real GDP at market prices	0.07
2. Aggregate employment (wage bill weighted)	0.02
3. Aggregate capital stock (rental weighted)	0.06
4. Aggregate land supply - all land (rental weighted)	1.19
5. Aggregate land supply - LFA land (rental weighted)	2.26
6. Aggregate land supply - non-LFA land (rental weighted)	0.00
7. Real consumption (private & public)	0.20
8. Real private consumption	0.19
9. Real public consumption	0.22
10. Real investment	0.06
11. Real GNE	0.17
12. Real exports	-0.23
13. Real imports	0.07
14. Terms of trade	0.06
15. Real exchange rate	0.08
16. Nominal exchange rate (foreign currency/PLN)	0.00
17. Consumption deflator (private & public)	0.06
18. Private consumption price deflator	0.04
19. Public consumption price deflator	0.13
20. Investment price deflator	0.05
21. GDP deflator (market prices)	0.08
22. GDP deflator (factor cost)	0.08
23. Real wage	0.16
24. Rental price of capital	0.05
25. Average user price of land - all land (rental weighted)	-2.20
26. Average user price of land - LFA land (rental weighted)	-6.02
27. Average user price of land - non-LFA land (rental weighted)	2.18
28. Average owner price of land - all land (rental weighted)	7.33
29. Average owner price of land - LFA land (rental weighted)	11.8
30. Average owner price of land - non-LFA land (rental weighted)	2.18

(a) Results are reported as the annual percentage change away from where the economy would otherwise have been in the absence of LFA support.

Source: Authors' calculations using POLTERM.

Table 5 Impact of LFA support on output by sector

Sector	Percentage change in output
1. Wheat	0.35
2. Rye	0.42
3. Barley	0.34
4. Other cereals	0.38
5. Oil seeds	0.33
6. Vegetables and fruit	0.40
7. Other crops	0.38
8. Other animals	0.46
9. Pigs	0.36
10. Poultry	0.35
11. Cattle	0.40
12. Forestry	-0.01
13. Fishing	0.12
14. Coal, ore and other mining	-0.02
15. Beef meat manufacturing	0.13
16. Pork meat manufacturing	0.11
17. Dairy products	0.11
18. Other food products	0.14
19. Beer manufacturing	0.16
20. Other beverages	0.27
21. Manufacturing n.e.c.	-0.13
22. Electricity (coal generated)	0.06
23. Other electricity	0.06
24. Construction	0.06
25. Trade	0.03
26. Hotels and restaurants	0.14
27. Transport	0.00
28. Finance	0.03
29. Dwellings	0.10
30. Education	0.18
31. Public administration	0.21
32. Health	0.21
33. Other services	0.11

Source: Results of the POLTERM model. Regional industry results aggregated to the national level.

Table 6 Regional impact of LFA support

Region	LFA funds as a per cent of regional GDP 1	Real GDP 2	Real Consumption 3	Employment 4	Capital stock 5	Land supply		
						LFA Land 6	Non-LFA Land 7	Total Land Supply 8
1. Dolnoslaskie	0.05	-0.02	0.02	-0.05	-0.02	1.66	0	0.41
2. Kujpomorskie	0.14	0.06	0.20	0.01	0.05	2.96	0	0.86
3. Lubelskie	0.21	0.14	0.37	0.09	0.12	2	0	0.98
4. Lubuskie	0.16	0.11	0.29	0.05	0.10	2.08	0	1.97
5. Lodzkie	0.16	0.10	0.27	0.04	0.09	1.7	0	1.35
6. Malopolskie	0.07	0.00	0.06	-0.03	0.00	2.5	0	0.73
7. Mazowieckie	0.1	0.08	0.19	0.02	0.09	2.6	0	2.06
8. Opolskie	0.04	-0.02	0.01	-0.04	-0.02	1.2	0	0.24
9. Podkarpackie	0.11	0.04	0.15	0.00	0.03	2.1	0	0.82
10. Podlaskie	0.73	0.68	1.52	0.47	0.59	4.33	0	4.1
11. Pomorskie	0.1	0.06	0.17	0.01	0.06	2.15	0	1.59
12. Slaskie	0.01	-0.05	-0.06	-0.08	-0.04	0.73	0	0.11
13. Swietokrzyskie	0.13	0.07	0.21	0.02	0.06	1.6	0	0.95
14. Warmmazurski	0.33	0.27	0.65	0.17	0.23	2.46	0	2.08
15. Wielkopolski	0.17	0.09	0.27	0.03	0.08	2.03	0	1.2
16. Zachpomorski	0.13	0.09	0.23	0.03	0.09	1.87	0	1.48

Source: Results from the POLTERM model

Table 7 Impact of LFA support in two-dimensional OECD based rural typology of regions

a) i b) - average, change in %

% share in total population	← RURAL POPULATION →	% employed in agricultural sector	
	a) Real GDP **b) Real Consumption**	**Predominantly Agricultural** above 50%	**Intermediate Agricultural** between 15-50%	**Predominantly NonAgricult.** below 15%
	Predominantly Rural above 50%	***T1: PR-PA*** ***a) 0.10%*** ***b) 0.29%***	***T2: PR-IA*** ***a) 0.13%*** ***b) 0.34%***	***T3: PR-PN*** ***------***
	Intermediate Rural between 15-50%	***T4: IR-PA*** ***a) 0.39%*** ***b) 0.90%***	***T5: IR-IA*** ***a) 0.03%*** ***b) 0.13%***	***T6: IR-PN*** ***-----***
	Predominantly Urban below 15%	***T7: PU-PA*** ***------***	***T8: PU-IA*** ***a) -0.05%*** ***b) -0.06%***	***T9: PU-PN*** ***----***

a) i b) - average, change in %

% share in total population	← RURAL POPULATION →	% employed in agricultural sector	
	a) Employment **b) Capital stock**	**Predominantly Agricultural** above 50%	**Intermediate Agricultural** between 15-50%	**Predominantly NonAgricult.** below 15%
	Predominantly Rural above 50%	***T1: PR-PA*** ***a) 0.06%*** ***b) 0.18%***	***T2: PR-IA*** ***a) 0.06%*** ***b) 0.44%***	***T3: PR-PN*** ***------***
	Intermediate Rural between 15-50%	***T4: IR-PA*** ***a) 0.26%*** ***b) 0.68%***	***T5: IR-IA*** ***a) -0.01%*** ***b) 0.24%***	***T6: IR-PN*** ***-----***
	Predominantly Urban below 15%	***T7: PU-PA*** ***------***	***T8: PU-IA*** ***a) -0.08%*** ***b) -0.04%***	***T9: PU-PN*** ***----***

a) i b) - average, change in %

% share in total population	← RURAL POPULATION →	% employed in agricultural sector	
	a) LFA land supply **b) Total land supply** **c) LFA funds,% GRP**	**Predominantly Agricultural** above 50%	**Intermediate Agricultural** between 15-50%	**Predominantly NonAgricult.** below 15%
	Predominantly Rural above 50%	***T1: PR-PA*** ***a) 1.8%*** ***b) 1.0%*** ***c) 0.08%***	***T2: PR-IA*** ***a) 2.2%*** ***b) 1.5%*** ***c) 0.18%***	***T3: PR-PN*** ***------***
	Intermediate Rural between 15-50%	***T4: IR-PA*** ***a) 3.0%*** ***b) 2.7%*** c) 0.14%	***T5: IR-IA*** ***a) 2.1%*** ***b) 1.1%*** ***c) 0.21%***	***T6: IR-PN*** ***-----***
	Predominantly Urban below 15%	***T7: PU-PA*** ***------***	***T8: PU-IA*** ***a) 0.7%*** ***b) 0.1%*** ***c) 0.10%***	***T9: PU-PN*** ***----***

Source: Authors' own calculations using POLTERM results.