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## The pluriactive development of agricultural holdings in Poland with regard to the living standards of their users

This paper illustrates the regional diversity in terms of the agricultural income of economically weak farms in Poland (i.e. from 2 to 8 ESU). The results, expressed as average values for 2005-2009, indicate that farms are finding themselves in a very difficult situation. Furthermore, the assessment included farms that gained their income not only through agricultural activity, but also through doing non-agricultural work. The diversification of income sources created the opportunity to sustain less profitable agricultural production while providing a higher standard of living for farmers and their families. Such factors as the intensity of production, and the productiveness of current expenditures and fixed capital, as well as the financial position of the farms and the level of their debt, have been analysed. An important aim of the study was to identify the influence of the Common Agricultural Policy on the performance of farms.

**Keywords:** farm income, off-farm income, diversification of income, economically weak farms

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### Introduction

Publically available statistical data indicate that in 2002 and 2010 there were 2.2 and 1.9 million agricultural farms operating in Poland respectively, with more than 99 per cent of them being private farms (CSO, 2011a). In terms of economic size, farms with up to 2 ESU (European Size Unit) accounted for 70 per cent, farms of 2-8 ESU for approximately 20 per cent and those of 8 ESU and more accounted for around 10 per cent (CSO, 2008). Agricultural holdings with up to 2 ESU are usually subsistence farms that do not market their produce. However, they are home to 3.7 million people, accounting for approximately 10 per cent of the total population (Zegar, 2009a), and provide employment for 915,000 people expressed in AWU i.e. Annual Work Units (CSO, 2008). Although the farms are of little economic relevance, they are very important from the social perspective.

Economists are normally more interested in farms larger than 2 ESU – these are commercial farms in Poland that are included in the Farm Accountancy Data Network (FADN). In the FADN's field of observation, farms with 2-8 ESU, described as economically weak, account for 70 per cent (Goraj *et al.*, 2008). These farms utilise 4.4 million hectares of agricultural land, which accounts for approximately one third of the agricultural land owned by private farms, and provide employment for 803,000 people expressed in AWU (CSO, 2008).

The majority of farms of 2-8 ESU do not have the capacity to develop, and therefore there is no certainty as to their chances of sustaining their operation in the long term (Józwiak, 2009). The income of these farms is often too low to provide their users with a satisfactory standard of living (Zegar, 2009a). In order to enhance the living standards of the farmers' families, as well as to improve the financial situation of the farms, such as through the supply of funds for investments (Hertz, 2009), the owners are often forced to seek off-farm income. Usually, they do so by undertaking other off-farm activity, understood as employment outside the farm with other entities in the form of labour for which salary is received, obtaining social benefits and carrying out non-agricultural activity.

Based on data provided by the Central Statistical Office, Zegar (2009a) concluded that 87 per cent of the families of individual farmers made their living from at least two income sources in 2007, with 52 per cent of the families gaining off-farm income. According to the results of the FADN study and the surveys of the farmers' families carried out by the Institute of Agricultural and Food Economics – National Research Institute (IAFE-NRI), the highest share of non-agricultural income in the total income of farmers' families could be observed among farms of 2-4 ESU (62 per cent), followed by farms of 4-8 ESU (45 per cent), with the smallest share being identified in farms of 100 ESU and more (7 per cent) (Goraj *et al.*, 2010). The share of this income in the overall income of farmers' families tended to decrease as the economic size of the farms increased.

Supporting farmers' families' income through non-agricultural income is a common practice not only in Europe, but also in North America, Latin America, Africa and Asia. According to many studies, off-farm income accounted for approximately 40 per cent of the household income in the first years of the 21st century (e.g. Zhang, 2003; Ellis and Allison, 2004; Pfeiffer *et al.*, 2009). In Poland, a considerable number of farmers' families gain part of their income from activities unrelated to the farm. However, the availability of work constitutes a barrier. Despite the fact that rural areas account for 93 per cent of the total area of Poland, with 39 per cent of the population being resident in these areas, the professionally-active inhabitants of rural regions account only for 19 per cent of the professionally-active Polish citizens (CSO, 2011b). Such a small percentage hampers the multifunctional development of rural areas, including the development of agricultural farms.

The aim of the study was to show the diversity in the income situation of the economically vulnerable farms (with 2-8 ESU) located in four agricultural regions of Poland. The only income for those farms was from agricultural activity. The economic situation of farmers' families gaining their income (apart from agricultural activities) from non-agricultural activities was analysed separately. Therefore, an attempt was made to indicate a way out of impasse (i.e. the difficult economic situation) of small farms (economically and territorially), taking into account the production, economic and social functions of

these holdings. Also the role of the Common Agricultural Policy (CAP) in reaching this goal was considered.

## Methodology

The study was based on two data sources, with the data from agricultural farms from the FADN system being the main source. The second source was a voluntary survey of the non-agricultural income of farmers' families (carried out on the same farms as those included in the FADN accountancy) by IAFE-NRI. Monthly data are collected on income from four sources: from employment, pensions, allowances and compensation for social security and donations, net of income tax advances, and the system also collects annual data on income after tax from non-agricultural registered activities.

Two farm samples were selected. Both included private farms sized 2-8 ESU that did FADN accountancy continuously in 2005-2009 (balanced panel data) and that were located across the entire area of Poland. The differentiating characteristic for the selection of the samples was the source of income: income from farm only for the first sample of households and additional off-farm income for the second sample.

The first sample included 527 farms owned by farmers who gained their income based exclusively from their agricultural activity. To present the regional diversity of the results, the sample farms were grouped according to their regional (i.e. FADN regions<sup>1</sup>) locations.

The second sample, selected independently from the first, comprised 188 farms owned by families which, apart from their farm income, gained off-farm income (group A), and were therefore undergoing pluriactive development. In order to examine whether pluriactive development facilitates economic performance and provides a higher living standard for farmers' families, a comparative sample was selected for the farms from this sample. The comparative sample also comprised 188 farms (group B), that were selected from the first study sample (527 households). Households from group B were homogenous with the group A farms in terms of their economic size and agricultural type. The farms were selected in pairs based on the rule of statistical twins. For each group A farm its group B counterpart would be selected to be as similar as possible in terms of average economic size specified for 2005-2009, with its agricultural type established, due to its changeability over the years, for the last year of the study. This selection method made it possible to reduce the influence of economic size and agricultural size on the performance of farms included in the comparative sample (group B), and consequently to present the diversity in results for both groups according to the different causal factors.

Income from the family farm was the factor adopted as a basic measure for evaluating the effects of running an agricultural activity, while output value and costs incurred were also shown. The following ratios which relate to productivity of chosen resources and other fields of the farms' activity were used in the study:

$$\text{The productivity of current expenditures [\%]} = \frac{\text{the total production value}}{\text{current assets}} \times 100 \quad (1)$$

$$\text{The productivity of fixed capital expenditures [ratio]} = \frac{\text{the total production value}}{\text{depreciation}} \quad (2)$$

$$\text{The total productivity of assets [\%]} = \frac{\text{the total production value}}{\text{total assets}} \times 100 \quad (3)$$

$$\text{Fixed assets to current assets [ratio]} = \frac{\text{fixed assets}}{\text{current assets}} \quad (4)$$

$$\text{The fixed assets renewal rate [\%]} = \frac{\text{net investments}}{\text{fixed assets}} \times 100 \quad (5)$$

$$\text{The farms debt rate [\%]} = \frac{\text{total liabilities}}{\text{total assets}} \times 100 \quad (6)$$

$$\text{The debt structure ratio [\%]} = \frac{\text{long-term liabilities}}{\text{total liabilities}} \times 100 \quad (7)$$

The analysis of resource productiveness is a management tool for evaluating the performance of farms and comparing them with others, particularly those selected according to the same criterion (Kosieradzka, 2004; Lis *et al.*, 1999; Nowak, 2008). The fixed assets to current assets ratio indicates the degree to which the farm goods are immobilised. The higher the ratio, the longer the immobilisation period. This means that farms are less able to restructure and adapt to market changes (Nowak, 2008).

The fixed assets renewal rate indicates the degree to which assets are renewed. If the value of this ratio ranges from -1.0 to 1.0 per cent, then farms represent simple asset renewal, while values exceeding 1.0 per cent represent extended renewal, and those below -1.0 indicate restricted renewal (Józwiak, 2003). In the case of simple renewal only part of the fixed assets used during the production cycle is renewed, meaning that gross investments cover only depreciation. With extended renewal, investments not only cover depreciation but also increase fixed asset resources. In turn, restricted renewal means that the fixed assets used in the course of production are not fully renewed.

The debt level of farms is indicative of the financial risk related to production activity. The higher the value of the ratio, the bigger the financial risk. For private farms the ratio should not exceed 50 per cent (Goraj and Kulawik, 1995). In turn, the debt structure ratio reflects the financial stability of agricultural farms. The higher the ratio, the more financially stable the farm (Nowak, 2008).

The intensity of agricultural production was also analysed. This factor is considered to be a universal indicator of progress. Over the years, the approach to selecting optimum parameters for evaluating intensity has changed (Manteuffel, 1984; Hernández-Rivera and Mann, 2008). As plant production predominated in the tested farms, for the study, production intensity was measured based on farm input expressed as the level of direct costs (per hectare of agricultural land) and the selected components thereof, i.e. the cost of seeds, fertilisers and plant protection products.

The degree to which farms depend on subsidies on current operations was also evaluated. Furthermore, the paper pro-

<sup>1</sup> Pomorze i Mazury [PL\_A], Wielkopolska i Śląsk [PL\_B], Mazowsze i Podlasie [PL\_C], Małopolska i Pogórze [PL\_D].

**Table 1:** Selected information on 527 private farms sized 2-8 ESU grouped according to their regional location in Poland. Average figures for 2005-2009.

| Parameter  | Agricultural regions in Poland |                                   |                                  |                                   |
|--|--------------------------------|-----------------------------------|----------------------------------|-----------------------------------|
|  | Pomorze<br>i Mazury<br>[PL_A]  | Wielkopolska<br>i Śląsk<br>[PL_B] | Mazowsze<br>i Podlasie<br>[PL_C] | Małopolska<br>i Pogórze<br>[PL_D] |
| Number of farms surveyed                                 | 65                             | 97                                | 245                              | 120                               |
| Economic size of farms [ESU]                             | 5.5                            | 5.1                               | 5.4                              | 4.8                               |
| Area of agricultural land (AL) [ha]                      | 16.8                           | 11.0                              | 11.9                             | 8.8                               |
| Total labour input per 100 ha of agricultural land [AWU] | 10.0                           | 13.0                              | 14.3                             | 19.1                              |
| Share of farm managers with agricultural education [%]   | 41.5                           | 59.1                              | 41.6                             | 40.5                              |
| of which: with academic education                        | 1.5                            | 7.2                               | 1.6                              | 2.8                               |
| Wheat yield [dt/ha]                                      | 50.8                           | 47.8                              | 42.9                             | 37.5                              |
| Maize grain yield [dt/ha]                                | -                              | 85.6                              | 44.5                             | 63.9                              |
| Structure of total production value [%]                  | 100                            | 100                               | 100                              | 100                               |
| of which: crop production                                | 44.9                           | 63.5                              | 68.0                             | 41.1                              |
| animal production  | 55.1                           | 36.5                              | 32.0                             | 58.9                              |

[–] – in the surveyed households in region of Pomorze and Mazury there was no cultivation of maize for grain.

Source: Own calculations based on unpublished FADN data.

vides data on total employee labour input (Annual Work Unit – AWU) as well as on own labour input (Family Work Unit – FWU) and the labour intensity of production.

## Results

### Regional diversity in performance of farms of 2-8 ESU

The spatial diversity in natural, economic and social conditions influences the scale, intensity and line of production. This creates regional diversity in agricultural areas which, to some extent, also results from different past experiences. The 527 farms whose income source was agricultural activity were evaluated in order to identify how these factors influence regional diversity in performance. The economic strength of the farms was regionally equal, with values of around 5 ESU (Table 1). By contrast, there were differences in the area of agricultural land and the labour intensity of production, up to twofold in the extreme values of the two variables (the PL\_A and PL\_D region).

Around 50 per cent of farm managers were agriculturally educated, which is understood as having completed basic agricultural education, agricultural high school or agricultural university, (40.5-59.1 per cent), whereas the percentage of farmers with an academic education (understood as having at least a university degree in agriculture or equivalent) in agriculture tended to be low at 1.5-2.8 per cent, with the PL\_B region being an exception at a several fold higher level, which nonetheless remained low at 7.2 per cent. Knowledge is a major factor in stimulating progress in all branches of the economy, including agriculture. Each day farmers must make decisions concerning the most complicated of work objects that living organisms (plants, animals) are. In that respect, the situation in the farms surveyed was unfavourable.

There were regional differences in the structure of production value of farms. In two regions: PL\_B and PL\_C the focus was on crop production, with its share in total production value at 63.5 and 68.0 per cent respectively, whereas

the PL\_A and PL\_D regions were involved mainly in livestock production, with shares in total production of 55.1 and 58.9 per cent respectively (Table 1). The situation had a direct impact on economic performance. Regions focussed on crop production generated lower production values and farm incomes. By contrast, the regions with predominantly livestock production performed better. However, particular attention should be paid to production values which derive from the volume of production and its prices. These farms also had higher incomes (Table 2).

Since 2004, farm income has been heavily augmented by CAP direct support and funding from European Union (EU) structural funds. The share of subsidies on current operations in farm income differed for the farms surveyed, ranging from 34.1 per cent for the PL\_D region to 78.1 per cent for the PL\_A region. The funding per farm increased with farm size. On average, the amount of subsidies received by the biggest farms, i.e. those with an average of 16.8 ha of agricultural land (in the PL\_A region), exceeded the funding received by farms with the smallest area, i.e. 8.8 ha (in the PL\_D region), by more than twofold.

As opposed to the income of a farm, the income (average in 2005-2009) per full-time employed member of the family (FWU) was more equal, with its ratio to average net remuneration in the national economy (PLN 21,796 (i.e. EUR 5,602) per AWU) being at similar level (51.4-61.2 per cent) for all regions. The data indicate that, despite receiving subsidies, the farms surveyed did not provide their users with an income comparable to off-farm income.

Another factor indicative of the unfavourable situation of the farms surveyed is the percentage of farms with a negative income, which ranged from 6.7 to 12.5 per cent. The farms were generally reluctant to take loans, thereby stifling their development potential. The share of indebted holdings ranged from 27.8 to 44.1 per cent.

Two universal indicators were used to evaluate the intensity of farming for the surveyed farms: land efficiency (production value per hectare of agricultural land) and labour efficiency (production value per AWU). The results (Table 2) suggest that the ratio of labour efficiency to land efficiency was regionally less diversified. Labour efficiency ranged

**Table 2:** The economic performance of 527 private farms sized 2-8 ESU grouped according to their regional location in Poland. Average figures for 2005-2009.

| Parameter  |         | Agricultural regions in Poland |        |                                |        |                               |        |                                |        |
|--|---------|--------------------------------|--------|--------------------------------|--------|-------------------------------|--------|--------------------------------|--------|
|  |         | Pomorze i Mazury<br>[PL_A]     |        | Wielkopolska i<br>Śląsk [PL_B] |        | Mazowsze i Podlasie<br>[PL_C] |        | Małopolska i<br>Pogórze [PL_D] |        |
|  |         | PLN                            | EUR    | PLN                            | EUR    | PLN                           | EUR    | PLN                            | EUR    |
| Total production value   | [farm]  | 66,983                         | 17,286 | 50,389                         | 12,968 | 48,339                        | 12,477 | 64,186                         | 16,489 |
| Total costs  | [farm]  | 60,422                         | 15,584 | 42,227                         | 10,857 | 38,830                        | 9,997  | 49,553                         | 12,724 |
| The income of a farm   | [farm]  | 20,085                         | 5,173  | 15,167                         | 3,907  | 18,022                        | 4,672  | 21,346                         | 5,495  |
|  | [FWU]   | 12,632                         | 3,267  | 11,667                         | 3,001  | 11,194                        | 2,909  | 13,341                         | 3,427  |
| Share of subsidies on current operations in the income of a farm | [%]     | 78.1                           |        | 55.4                           |        | 55.9                          |        | 34.1                           |        |
| Subsidies on current operations                                  | [farm]  | 15,678                         | 4,023  | 8,400                          | 2,153  | 10,071                        | 2,591  | 7,271                          | 1,873  |
| Ratio of income per 1 FWU to net salary in the national economy  | [%]     | 58.0                           |        | 53.5                           |        | 51.4                          |        | 61.2                           |        |
| Share of farms with a negative income of a farm                  | [%]     | 6.7                            |        | 12.0                           |        | 7.2                           |        | 12.5                           |        |
| Share of indebted holdings                                       | [%]     | 44.1                           |        | 40.2                           |        | 38.4                          |        | 27.8                           |        |
| Land efficiency  | [ha AL] | 3,989                          | 1,027  | 4,598                          | 1,183  | 4,076                         | 1,053  | 7,261                          | 1,864  |
| Labour efficiency  | [AWU]   | 40,110                         | 10,317 | 35,485                         | 9,132  | 28,435                        | 7,357  | 37,982                         | 9,746  |

Source: Own calculations based on unpublished FADN data.

from PLN 28,435 to PLN 40,110 (from EUR 7,357 to EUR 10,317) per AWU, whereas land efficiency ranged from PLN 3,989 to PLN 7,261 (from EUR 1,027 to EUR 1,864) per hectare of agricultural land. This means that there are significant differences in the level of agriculture in the respective regions. However, they can also be used as an advantage to facilitate the development of a production profile that is optimum for the country.

### Comparison of holdings with income from agricultural activity only to those with additional off-farm income

A family holding and pluriactivity are the two characteristics which determine the role and character of agricultural holdings. The latter, which may take various forms, is becoming a leading strategy for rural families in Poland, including especially those that run agricultural holdings with low economic strength (up to 8 ESU). Pluriactivity covers the combination of agricultural and off-farm activities, performed by farmers or their family members. Our analysis covered 188 holdings with an economic size of 2-8 ESU which continually generated off-farm income in the years 2005-2009 to supplement their income from agriculture (group A). The comparative sample was made of 188 families for whom agricultural activity was the only source of income (group B).

The holdings had predominantly poor quality soils, whose value in use amounted to 0.87 and 0.85 points respectively (Table 3). The labour intensity in production was higher in group B holdings (by 7.1 per cent). Farmers generating agricultural income only were estimated to be more involved in agricultural activity: group A farmers tended to limit their labour input in order to earn a salary from outside their holding. Crop production was predominant within the structure of the production value, its share amounting to 61.8 per cent

**Table 3:** Selected information on two sets of farms in Poland sized 2-8 ESU: A: farms run by families earning income from both agricultural work and off-farm income; B: farms run by families earning income from agricultural work only. Average figures for 2005-2009.

| Parameter   | Farms group   |      |
|---|---------------|------|
|   | [A]           | [B]  |
| Number of farms surveyed                              | 188           | 188  |
| Economic size of farms                                | [ESU] 4.6     | 4.9  |
| Area of agricultural land (AL)                        | [ha] 10.5     | 11.4 |
| Share of rented agricultural land                     | [%] 20.5      | 17.7 |
| Quality classification of agricultural land           | [points] 0.87 | 0.85 |
| Total labour input per holding                        | [AWU] 1.40    | 1.62 |
| of which: own labour input                            | [FWU] 1.35    | 1.54 |
| Total labour input per 100 ha of agricultural land    | [AWU] 13.3    | 14.2 |
| Average age of holding manager                        | [years] 44    | 45   |
| Share of farm managers with agricultural education    | [%] 46.3      | 45.0 |
| of which: with academic education                     | 11.7          | 2.7  |
| Share of holdings with a declared farmer's successor* | [%] 36.0      | 47.2 |
| Wheat yield   | [dt/ha] 40.7  | 45.0 |
| Maize grain yield                                     | [dt/ha] 73.6  | 74.2 |
| Structure of total production value                   | [%] 100       | 100  |
| of which: crop production                             | 61.8          | 65.0 |
| animal production                                     | 36.8          | 31.1 |

\* Concerns the holdings the managers of which are aged 50 years or more.

Source: Own calculations based on unpublished FADN data and on questionnaires regarding income generated outside agricultural holdings by farmers' families.

in group A and 65.0 per cent in group B. This difference is mainly due to the fact that in households with wage labour grain occupied 63.2 per cent of agricultural land, which generates relatively low production value because of unfavourable prices. In family households living only from agriculture,

this share was just 54.8 per cent. The crop production profile was adopted despite poor quality soils, probably from the desire to simplify the holding organisation and to restrict the labour demand. Animal production involves a higher labour input and requires from farmers their full availability.

The share of managers with a higher agricultural education in group A holdings is higher by nine percentage points than in group B (Table 3). It seems that the function of group A holdings was slightly different, i.e. they were not subordinated to household-specific interests and objectives. They served as the place of residence and food production but the principal source of income of household members was work outside the holding. Holding managers, owing to their higher education, were better predisposed to undertake suitable work, and more jobs were available to them. A different function of group A holdings is also reflected in the share of holdings with a declared farmer's successor, which was 11.2 percentage points lower than in group B.

### Income from agricultural holdings and total income of farmers' families

The total production values, the total costs, and the total income of the farmers' families of holdings in groups A and B differed significantly ( $p \leq 0.05$ , Table 4). The income from agricultural in holdings for group A was lower, although the support obtained through subsidies on current operations was higher: 74.4 per cent, compared with 60.0 per cent for group B. Subsidy payments per hectare of agricultural land were also much higher, by 15.7 per cent. This may imply that the holdings with non-agricultural income were more active in gaining financial support available from various EU programmes, thereby searching for more efficient ways to improve their economic standing. But for such support, the income from agricultural production would only account for 25 per cent of the income that was actually generated by group A farmers, and for 40 per cent of that earned in group B.

The farm income of group B holdings was more favourable, and the production efficiency was higher, although this difference was just 2.8 per cent. Overall efficiency was measured by the unit cost of the production value. Agricultural production in both groups of holdings was commodity-oriented, and the share of the value of sold production accounted for around 75 per cent of the total production value. The financial means generated were most likely retained by holdings, allowing them to finance the purchase of current assets, and to carry out minor repairs and refurbishments.

The income of a farm per family work unit (FWU) shows the potential amount of remuneration available to farmers and their family members. In this respect, the situation of farmers in both groups of holdings was similar, with their income reaching a comparable level. The income was around 47 per cent of the average net wage and salary in the national economy. This means that the analysed holdings failed to satisfy the conditions of parity holdings, i.e. they did not provide their users with income comparable to that generated by persons employed in non-agricultural sectors (when converted per FWU). This is likely to have stemmed from an inadequate production scale and poor information on optimal production technologies, as well as from insufficient managerial skills and marketing knowledge. Józwiak and Kagan (2008) showed that an income from own work that is similar to parity pay may only be generated in holdings run by natural persons with a size of 8-16 ESU.

The off-farm income of group A holdings was 57% higher than the income earned from agricultural holdings. In effect, the total income of farmers' families in group A holdings was 2.2 times higher than that of families generating income from agricultural activity only (i.e. group B). Given the much more favourable standing of group A farmers' families, it can be assumed that the resources generated from off-farm activity were, at least to some extent, used to finance the agricultural holding. This is reflected by the share of holdings with negative income, being by 1.6 percentage points lower, and by a slightly lower percentage of indebted holdings (Table 4).

**Table 4:** The income of families in Poland earning income from A: both agricultural work and off-farm income; B: agricultural work only. Average figures for 2005-2009.

| Parameter   |           | Farms group |       |        |        | A/B<br>% |
|---|-----------|-------------|-------|--------|--------|----------|
|   |           | [A]         |       | [B]    |        |          |
|   |           | PLN         | EUR   | PLN    | EUR    |          |
| Total production value  | [farm]    | 38,273      | 9,866 | 48,522 | 12,502 | 78.9     |
| Share of the value of sold production in total production value             | [%]       | 73.0        |       | 74.2   |        | 98.4     |
| Total costs   | [farm]    | 32,882      | 8,460 | 40,525 | 10,427 | 81.1     |
| The income of a farm  | [farm]    | 13,883      | 3,591 | 16,084 | 4,154  | 86.3     |
|   | [FWU]     | 10,304      | 2,666 | 10,405 | 2,688  | 99.0     |
| Share of subsidies on current operations in the income of a farm            | [%]       | 74.4        |       | 60.0   |        | 124.0    |
| Subsidies on current operations   | [1 ha AL] | 981         | 251   | 848    | 217    | 115.7    |
| Relationship between income per 1 FWU to net salary in the national economy | [%]       | 47.3        |       | 47.7   |        | 99.0     |
| Share of farm with a negative income of a farm                              | [%]       | 9.6         |       | 11.2   |        | 85.7     |
| Share of indebted holdings  | [%]       | 36.9        |       | 37.1   |        | 99.5     |
| Off-farm income   | [farm]    | 21,819      | 5,611 | -      | -      | -        |
| Total income of farmer's family   | [farm]    | 35,703      | 9,202 | 16,084 | 4,154  | 222.0    |

-: calculations were not applicable.

Source: Own calculations based on unpublished FADN data.

**Table 5:** Production intensity in Poland in A: farms run by families earning income from both agricultural work and off-farm income; B: farms run by families earning income from agricultural work only. Average figures for 2005-2009.

| Parameter  |         | Farms group |       |        |       | A/B  |
|--|---------|-------------|-------|--------|-------|------|
|  |         | [A]         |       | [B]    |       |      |
|  |         | PLN         | EUR   | PLN    | EUR   | %    |
| Total production value   | [ha AL] | 3,635       | 937   | 4,264  | 1,098 | 85.2 |
| Direct costs   | [ha AL] | 1,397       | 359   | 1,501  | 385   | 93.1 |
| Costs of sowing materials, fertilisers and plant protection products | [ha AL] | 520         | 133   | 595    | 153   | 87.4 |
| The income of a farm   | [ha AL] | 1,318       | 342   | 1,413  | 365   | 93.3 |
| Labour efficiency  | [AWU]   | 27,338      | 7,065 | 29,952 | 7,724 | 91.3 |

Source: Own calculations based on unpublished FADN data.

## Production intensity

The holdings exhibit certain cause-and-effect relationships between production intensity and its economic outcomes (Table 5). Direct costs per hectare of agricultural land, used as the measure of production intensity, were higher in the holdings run by families whose income only came from agricultural activity (group B). Their average level in 2005-2009 reached PLN 1,501 (EUR 385), exceeding by 7.4 per cent the costs incurred by group A. A parallel trend involves the three components of direct costs, i.e. sowing materials, fertilisers and plant protection products, which in group B holdings were 14.4 per cent higher compared to group A. Based on these comparisons, it can be inferred that higher production intensity entails higher effectiveness of land use and better production outcomes. As a result, the profitability of land (the income of a farm per hectare of agricultural land) in group B holdings, as compared to group A, was 7.2 per cent higher, and so was labour efficiency, by 9.5 per cent. Higher labour efficiency, i.e. greater utilisation of the production resources, is considered to be one of the principal factors behind the competitive power of agricultural holdings. Low labour efficiency constitutes a barrier to more intensive development. Both production intensity and labour efficiency in the group A holdings were lower, which also triggered weaker production results and economic outcomes.

Analysing the input-side cost of fertilisers and plant protection products, it is estimated that their negative environmental impact was lower in group A holdings. A simple measure was provided by the total cost of fertilisers and plant protection products per the income of a farm unit, and the difference in favour of group A reached 5.5 per cent. In the production process, the level of expenditure on production means is a significant element, as it is mostly farmer-dependent. The consequences of the decisions made are apparent in the relationship between agricultural activity and natural environment.

## The productivity of current expenditure and fixed capital, and the use of holding assets

Intensity translates itself into productivity, i.e. the amount of production in relation to expenditure. This indicator reflects both the technical and economic aspects of economic activity (Coelli *et al.*, 2005). The productivity analysis of current expenditure (current assets) shows the impact of the expenditure management model on the resultant products. As in the case of production intensity, the results indicate

the superiority of group B holdings. The average productivity of current expenditure in group B in the surveyed years was 12.4 percentage points higher than in group A holdings (Table 6).

**Table 6:** Selected indicators describing the production and economic standing in Poland of A: farms run by families earning income from both agricultural work and off-farm income; B: farms run by families earning income from agricultural work only. Average figures for 2005-2009.

| Parameter                                      |         | Farms group |       | A/B   |
|--|---------|-------------|-------|-------|
|  |         | [A]         | [B]   |       |
| Productivity of current assets                 | [%]     | 128.5       | 140.9 | 91.2  |
| Productivity of fixed assets                   | [ratio] | 4.7         | 4.5   | 104.5 |
| Total productivity of current and fixed assets | [%]     | 18.1        | 20.0  | 90.7  |
| Share of fixed assets in total assets          | [%]     | 85.7        | 85.6  | 100.1 |

Source: Own calculations based on unpublished FADN data.

The productivity of fixed capital expenditure (fixed assets) was expressed as the production value per 1 PLN depreciation of the fixed assets involved. This type of productivity reflects the intensity of using fixed assets in the production process, i.e. fixed assets activity. The results show that the productivity of fixed capital expenditures in both holding groups was at a comparably low level. This can be partly explained through the analysis of the assets structure in the surveyed holdings, which indicates a dominating share of fixed assets in both holding groups (85.7 and 85.6 per cent). A considerable share of fixed assets in total assets was hardly conducive to high effectiveness of capital use, and it made the reproduction of assets rather difficult.

The effectiveness of assets use is illustrated in more detail in Table 7. In general, the surveyed holdings were characterised by a limited predisposition towards restructuring and adjusting to market transitions, as shown by the central immobilisation index, exceeding 1.0. In average terms, the central immobilisation index in the surveyed period amounted to 6.0 in both groups of holdings. Farmers probably had insufficient financial resources to modernise and upgrade their holdings. They also made a minor use of loans, with the share of indebted holdings amounting to around 37 per cent. The structure of liabilities was dominated by long-term loans (which constituted around 70 per cent), generally allocated to investments.

The debt ratio in both types of holdings was similar, in group A amounting to 3.7 per cent and in group B to 4.0 per cent. Nevertheless, group A holdings indicated higher

reproduction of fixed assets, at the rate of -1.4 per cent, as compared to -3.0 per cent in group B. The limited reproduction of fixed assets, as indicated by the data, means that the rate of reproduction was insufficient, and fixed assets were subject to depreciation. It is projected that the future of most such holdings, operating as self-sufficient and self-financed production entities, is very uncertain.

**Table 7:** Selected indicators describing the financial risk and predisposition towards restructuring in Poland in A: farms run by families earning income from both agricultural work and off-farm income; B: farms run by families earning income from agricultural work only. Average figures for 2005-2009.

| Parameter                            |         | Farms group |      | A/B % |
|--------------------------------------|---------|-------------|------|-------|
|                                      |         | [A]         | [B]  |       |
| Fixed assets to current assets       | [ratio] | 6.0         | 6.0  | 100.0 |
| Rate of reproduction of fixed assets | [%]     | -1.4        | -3.0 | 47.0  |
| Share of indebted holdings           | [%]     | 36.9        | 37.1 | 99.5  |
| Debt ratio of holdings               | [%]     | 3.7         | 4.0  | 92.9  |
| Debt structure ratio                 | [%]     | 66.9        | 70.8 | 94.4  |

Source: Own calculations based on unpublished FADN data.

## Discussion

The use of land for agricultural production forms the intrinsic quality of rural areas. In Poland, agricultural land constitutes over 50 per cent of the total area of the country. However, the fragmentation of agricultural holdings is a factor that at least partly restricts their use. This phenomenon is especially strong in the southern regions of Poland. The economic results achieved by the holdings are characterised by regional diversity, arising from the diversified concentration of production intensity, which stems from historical processes, as well as from dissimilar natural conditions. In certain regions, the scattered holding structure leads to the marginalisation of agriculture, or even to the disappearance of agricultural activity, which may result in a considerable landscape downgrading.

The average income situation in 2005-2009 of the surveyed holdings was very unfavourable, despite substantial support through EU subsidies, the share of which in holding income ranged from 34.1 to 78.1 per cent, depending on the region. Nonetheless, the income of agricultural holders was not comparable with the income earned by persons employed in non-agricultural sectors, amounting to as little as 51.4-61.2 per cent of the latter. The results of Augustyńska-Grzymek and Skarżyńska (2011) also show that farms of 2-8 ESU find themselves in a difficult situation and that their long-term viability is uncertain. Some might survive if they adopt a more professional management approach. It is necessary for farmers to improve their agricultural qualifications and become more active in gaining external financial support, including loans, as well as considering starting non-agricultural farm activity or seeking external sources of income. From the economic point of view, land concentration in family farming is necessary to (a) increase labour productivity, (b) make efficient use of technology, in view of the problem of overinvestment in small holdings, (c) relieve the pressure to reduce unit costs, which is of major importance to economic

competitiveness, and (d) create grounds for increasing the income of the agricultural population (Zegar, 2009b).

In Poland, income from work outside agriculture is the prevailing source of income in rural households, followed by social transfers, retirement pay and pensions, whereas income from agricultural activity constitutes the third major source (Grosse and Hardt, 2010). The growth in the employment of rural residents outside their own holding, which has been noted in Poland in recent years, is connected with growing entrepreneurship and the investment attractiveness of rural areas. These lead to a decreased share of agricultural income, combined with an increased share of off-farm income, in the overall income generated by rural residents. Research conducted in Norway also indicates that the financial situation small family farms is generally better when family members are also employed outside the farm. The greater involvement in off-farm work resulted in a reduction of economic effects of farms (Lien *et al.*, 2010).

The concept of multifunctional agriculture indicates that it is possible for farms to combine the function of agricultural production (in compliance with the environmental and landscape preservation requirements) with additional activities oriented towards diversifying the business. Despite being small in terms of area and having a low industrial capacity, farms with 2-8 ESU have a considerable capacity to produce traditional local food or niche products (e.g. rarely produced goods). The challenge for these farms is to adapt their production profile to their production and environmental capacity.

While insufficient income from agricultural production fosters the undertaking of non-agricultural investments, farmers are more inclined to opt for multi-occupation or diversification of their activity. Holdings in the EU countries, which are small in terms of land (up to 5 ha) and economy (up to 8 ESU), usually base their additional income on the work performed outside their own holding. This concerns more than one third of agricultural holders in the EU-27. In turn, the diversification of agricultural holding activity is generally more popular with larger holdings (over 50 ha). In 2007, along with agricultural production, more than 1,361,000 holdings in the EU-27 conducted non-agricultural activity. This accounts for around 10 per cent of all holdings (EC, 2008; Krakowiak-Bal, 2010).

In Poland, off-farm activity has been the prevailing source of income of rural households in recent years. Our survey showed that the income of farmers' families was 2.2 times higher as compared to the holdings generating income only from agricultural activity. The availability of work outside the agricultural holding is, nevertheless, determined by some factors that can cause difficulties in finding a suitable job, and that may deepen intra-regional development differences. These include, among other things, the communication barriers and the low level of transport infrastructure in rural areas, the demand for work in the rural population and the supply, i.e. adjusting the qualifications of rural residents who look for a job, to the nature of the demand for work. Nonetheless, the availability of non-agricultural jobs to persons residing in rural areas acts as one of the major barriers to rural development and agricultural modernisation.

However, there are efforts being made to improve the living conditions of the Polish countryside, especially towards

the development of entrepreneurship and creating non-agricultural jobs. Examples include activities under the Rural Development Programme 2007-2013 (RDP), i.e. *Diversification into non-agricultural activities* and *Establishment and development of micro enterprises*. Agency for Restructuring and Modernisation of Agriculture data show that by the end of 2011 under both of these activities, the payments amounted to PLN 1.1 billion (ARMA, 2012a). Moreover, in the second action (*Establishment and development of micro enterprises*) to the end of 2011, work in small firms found 12.5 thousand people and 15 thousand applications from entrepreneurs awaited examination (Farmer – portal nowoczesnego rolnika, 2012). An example of successful use of funds under this activity is creation new jobs in the company MEGA MOLD Sp. z o.o. in Jesionka village near Rzeszów (Bobrowska, 2011), as well as the newly-opened clinic for horses EQUUS-VET in Śrem, near Poznań, and in the modernised confectionery Supreme PPH in Brąszewice in Łódź voivodeship (ARMA, 2012b).

Actions towards improving the economic situation of small farms are also shown in the European Commission proposals for the CAP after 2013. Efforts to improve the distribution of the Single Farm Payment between farms with very different area of agricultural land (capping) and to simplify the support system for small individual farms can be assessed positively. This means that participants will have to meet less stringent requirements for the cross compliance and will be exempt from the requirements of ‘greening’. Another benefit of introducing the small farms scheme will be lower transaction costs, the amount of which is often close to the payments for these households. Therefore, the concept of the differentiated treatment of small farms should be interesting. The obligation to use 7 per cent of agricultural land for ecological purposes (such as fallow land) may be unfavourable from the point of view of small farms, as may be the required maintenance of permanent pasture by each household (even not maintaining livestock) that does not join the small farms scheme. That will create many but mostly small ecological areas, which do not improve the relationship between agriculture and the environment. Also perceived negatively is the inability to return to the small farms scheme in case of an earlier withdrawal (EC, 2011; MARD, 2012a; MARD, 2012b).

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