Aleksander Grzelak

Accumulation of assets in farms in Poland – the economic and environmental context*

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"The role of small farms in sustainable development
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The primary objective of the presentation: identify the accumulation processes in farms in Poland based on the economic size. In addition, the environmental context of was taken into account.

The following research questions were formulated:
- what are the differences in the accumulation processes in the group of farms under study?
- is higher accumulation accompanied by higher eco-efficiency of farms?
- what is the significance of subsidies for the shaping of accumulation?

Research methodology

- The article uses data from farms keeping farm accounts in compliance with the principles of the FADN system.

- The data refers to the arithmetic means of an average farm from a specific group of farms.

- The temporal scope of the analyses includes the years 2004-2016.

- Research focuses on groups of farms due to their economic size

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- The accumulation - change in the value of the farms' equity (SE506). It includes changes in the value of unencumbered farm assets (free from liens and claims)

- It was analysed mainly from the perspective of the accumulation rate index (accumulation/income), taking into consideration the economic size of farms (ES6).

- On account of the considerable significance of changes in land prices in the shaping of accumulation, relevant estimates of this element of accumulation were made using changes in land prices per 1 ha of own land

- The article also addresses the environmental context from the point of view of subsidies for public goods: agri-environmental payments, payments on account of set aside, support for less-favoured areas (LFA), and other payments for the development of rural areas (Czyżewski B., 2017)

- Also the return to cost ratio (RTC) using the eco-efficiency (sustainable Value (SV) concept was used.

- The concept of eco-efficiency appeared in the 90s as an instrument for measuring sustainability (World Business Council for Sustainable Development)

$$(1) \ \mathrm{ESV}_{\mathrm{i}} = \frac{1}{m} \sum_{j=1}^{m} r_{ij} \left(\frac{y_{ij}}{r_{ij}} - \frac{yb_{ij}}{rb_{ij}} \right)$$

where: ESVi is the sustainable value afferent to a farm with economic size i; rij and rbij represent the quantity of the type j resource and the economic size i of the analysed farm, i.e. of the farm considered as the reference system; yij and ybij are the return of resources of the analysed and benchmark farm; i = 1..n is the economic size and j=1...m is the type of the analysed resource.

- The point is to answer the question of how effectively the environmental inputs are transformed into output value by the farm (group of farms) ?

environmental input

share of cereals in the crop structure

purchase value of fertilisers and plant protection products

purchase value of fodder for animals

stock density (LU/ha)

energy consumption

forest cover index for the acreage of land used
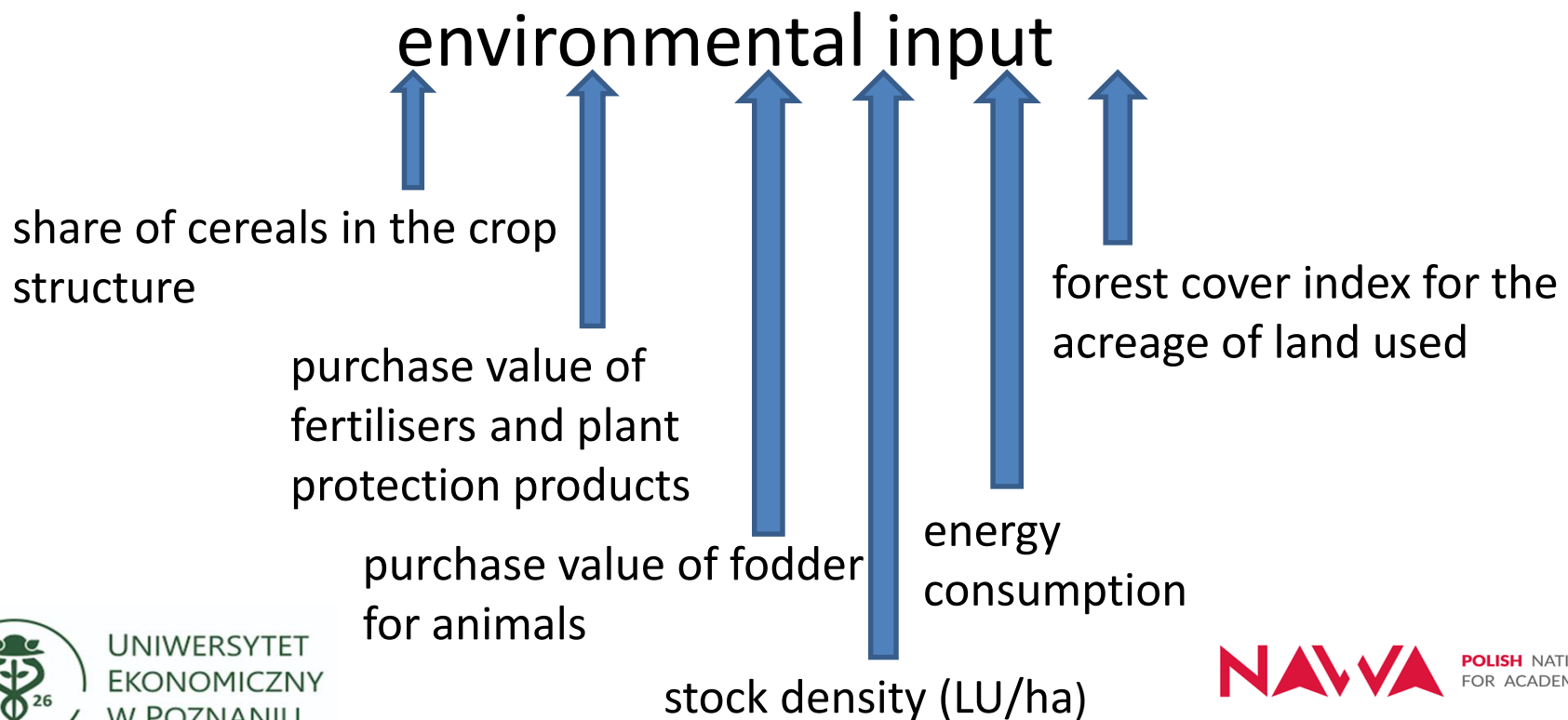
- Due to the fact that the ESV is expressed in pecuniary values and depends on the absolute size of farms, it is difficult to make direct comparisons between farms with different scales of production. This is why ESV was standardised and the return to cost ratio (RTCi) (Figge and Hahn, 2005)

$$(1)\ RTC_i = \frac{y_i}{y_i - ESV_i}$$

where yi represents the created value; ESVi – environmental sustainable value of a farm with the economic size class i.

Theoretical considerations

- The accumulation of assets is a determinant of development processes in agriculture. It refers to putting aside (accumulating) the generated income in order to ensure continuity of the production process, and to finance investments.

The most common accumulation channels in agriculture

income

increase (but not every) in the prices Of land

- Accumulation may be achieved through different channels: the income one, and the one related to an above-average increase in the prices of land resulting from the capitalisation of subsidies, among others.

- It reffers to an increase in the value of the resource exceeding the average level of inflation as well as the long-term rates of return on alternative low-risk capital investments.

- This source of generating accumulation may limit the development of agriculture due to the fact that increased prices of land and lease fees hinder the transformations of the area structure

- Due to the implementation by the farmer and his family, forming the household, also the utility maximisation function (as a consumer) only satisfying the consumption needs allows creating savings that can be allocated to investments, constituting the basis for an increase in the value of the assets

- Therefore, savings – which are the basis for investment and generation of accumulation – can only be made in a situation in which the income is higher than the consumer needs of the farmer's family

- A reverse relationship is also possible. An increase in the value of capital has a positive influence on investments (by generating higher income), whereas investments positively impact savings (Behrman et al. 1995)

- In literature on the subject, many studies on accumulation refer to the capitalisation of agricultural support (Swinnen and Vranken, 2009; Góral and Kulawik, 2015).

- They show that direct payments under the CAP are deposited in the rates of land lease, the price of land, and other fixed assets.

- An interesting discussion on accumulation was included in the study by (Barham et al. 2000). The accumulation of capital in agriculture is a function of the past (primary accumulation) and in consequence, smaller farms with a lower level of assets have difficulty "catching up" with the economically stronger ones.

- Due to the evolution of the EU's CAP towards greater valorisation of the environmental dimension of functioning of farms, attention was paid to the context of public goods and of eco-efficiency (in the sense of the relation of output value to environmental input) (Picazo-Tadeo et al., 2011; Bonfiglio et al. 2017).

- In the second of mentioned issues it is increasingly raised in the literature (Gadanakis et al. 2015, Van Passel et al. 2006; Czyżewski et al 2018). It is about recognizing what changes in eco-efficiency are accompanied by a higher accumulation.

- Is the higher of transformation of environmental input into output effects related to the improvement of accumulation?

Table 1. Accumulation rate (accumulation/income; in %) in farms covered by the FADN farm accountancy system in Poland based on the economic size (ES) of farms in the years 2004-2016

Years	ES1	ES2	ES3	ES4	ES5	ES6	Total	Total-b*
2004	35.36	228.02	53.46	57.91	60.55	45.83	111.51	-
2005	-105.78	-50.26	-18.03	-9.39	5.39	-22.30	-36.37	-34.73
2006	-1.06	30.81	42.41	49.49	53.97	35.38	33.25	42.46
2007	59.48	59.47	66.09	66.76	58.83	69.90	62.13	83.22
2008	-1.03	15.34	31.16	32.06	91.24	148.36	31.74	26.07
2009	-7.36	5.71	45.06	74.09	58.20	45.10	36.87	28.99
2010	-2.67	3.66	21.84	35.78	35.05	66.42	20.90	32.38
2011	-1.52	44.32	53.86	62.83	60.56	56.77	47.29	51.56
2012	-7.24	9.60	32.08	46.92	51.93	64.42	31.84	31.8
2013	-36.73	1.10	21.93	40.45	35.15	31.92	18.52	16.81
2014	-59.83	-17.89	6.81	30.31	27.17	75.31	8.35	7.37
2015	-122.94	-26.24	-14.73	-2.78	14.02	11.25	-15.71	-14.09
2016	-79.81	-26.58	6.81	15.78	18.09	24.53	-3.73	-3.67
Average	-25.47	21.31	26.83	38.48	43.86	50.22	26.66	22.35

b* − accumulation rate with time shift = accumulation$_{t+1}$ / income$_{t}$

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Detailed division	ES1	ES2	ES3	ES4	ES5	ES6	Total
Share of subs. for public goods in all subs. (%)	25.6	20.0	15.8	13.9	11.1	5.0	17.6
Income/fixed asset value (PLN)	3.6	4.9	6.5	7.4	9.1	9.8	5.8
Accumulation/1ha (PLN)	-159.1	373.9	528.5	794.8	900.1	393.7	426.8
Share of subs. in income (%)	104.3	78.0	57.1	50.5	45.3	98.7	69.2
Share of subs. in accumulation (%)	-682.9	277.1	189.1	124.7	101.2	205.7	239.1
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Accumulation-subsidies (in PLN)	-9 646.5	-9 240.2	-12 549.2	-8 880.0	-1 049.9	-253 029.0	-10 837.6
Accumulation resulting from changes in land prices (in PLN)	2 321.5	6 129.2	13 075.0	16 600.5	28 323.3	41 994.5	3 166.7
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Pure accumulation* (in PLN)	-11 969.1	-15 369.4	-25 624.2	-25 480.5	-29 373.2	-295 023.5	-14 904.3
RTC (cf. 2)	0.6	0.9	1.1	1.2	1.3	1.2	1.0

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RTC (cf. 2)	0.6	0.9	1.1	1.2	1.3	1.2	1.0

* Pure accumulation = accumulation – subsidies – accumulation resulting from changes in land prices

Table 2. Selected characteristics regarding accumulation in farms covered by the FADN farm accountancy system in Poland based on the economic size (ES) of farms (average for the years 2004-2016)

Detailed division	ES1	ES2	ES3	ES4	ES5	ES6	Total
Share of subs. for public goods in all subs. (%)	25.6	20.0	15.8	13.9	11.1	5.0	17.6
Income/fixed asset value (PLN)	3.6	4.9	6.5	7.4	9.1	9.8	5.8
Accumulation/1ha (PLN)	-159.1	373.9	528.5	794.8	900.1	393.7	426.8
Share of subs. in income (%)	104.3	78.0	57.1	50.5	45.3	98.7	69.2
Share of subs. in accumulation (%)	-682.9	277.1	189.1	124.7	101.2	205.7	239.1
Accumulation (in PLN)	-1 232.2	5 217.2	14 079.4	35 907.0	90 582.0	239 337.9	7 775.7
Accumulation-subsidies (in PLN)	-9 646.5	-9 240.2	-12 549.2	-8 880.0	-1 049.9	-253 029.0	-10 837.6
Accumulation resulting from changes in land prices (in PLN)	2 321.5	6 129.2	13 075.0	16 600.5	28 323.3	41 994.5	3 166.7
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Conclusions

- Cross-analysis has shown that with the transition to groups of farms with an increasing economic size, the situation was more favourable from the perspective of accumulation rate and its level per 1 ha

- The highest value was recorded in the ES5 group of farms - broader opportunities for the optimisation of production factors and for achieving economies of scale

- In terms of the accaumulation rate, the situation was unstable in the period under study and dependent on the economic conditions. Polarisation was observed in the case of the accumulation effort of farms.

- The smallest farms, i.e. the ES1-2 groups, diverged from the remaining farms to a growing extent.

- However, this does not exclude the important role of these farms in maintaining the viability of rural areas. This function is already being indexed through payments for public goods, whose share in the subsidies was the highest in smaller farms

- Subsidies, without which the accumulation would be negative in all of the analysed groups of farms, substantially contribute to the shaping of the accumulation

- The channel of accumulation associated with the increase in the prices of agricultural land was important.

- The higher rate of accumulation associated with the transition to groups of farms with greater economic strength is accompanied by an increase in eco-efficiency through the prism of the RTC ratio.

- Larger (but not the largest) farms are more efficient in using the transformation of environmental inputs into production output, which does not mean that they exert an absolutely lower environmental pressure

- The importance of subsidies for public goods is lower in larger farms, which indicates a less sustainable (in the environmental sense) nature of development

- In the next budget outlook, it would be advisable to include the diverse functions served by farms with different scales of production in the set of CAP instruments, including the issues concerning a more efficient use of environmental resources without causing degradation of the environment

Thank You for attention