Title of the Paper

ANALYSIS OF HUNGARIAN AGRICULTURAL SUBSIDIES ON THE BASIS OF FADN DATABASE

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Abstract

On the basis of the micro-economic data of the Hungarian FADN system we analysed the role of subsidies in the profitability of farms, we aimed to reveal which types of farming and ecomic sizes are effected more by subsidies related to efficiency and profitability. The agricultural enterprises' balance of taxes and subsidies counted from the micro-economic data of FADN enterprises was also analysed in the different type of farming categories and economic size classes. Our aim was to find out what types of farms are subsidized and what types are net payers to the central budget.

Examining the pre-tax profit we made the conclusion that with the increase of economic size not only the proportion of profitable farms rises, but the profit per size unit increases and the loss decreases. Analysing the effect of production based subsidies and interest subsidies on the pre-tax profit we made the conclusion that the sum of subsidies received from government per size unit is almost equal in all economic size classes.

Introduction

The income conditions of Hungarian agricultural producers did not change to an encouraging direction in the past few years, after the accession to the European Union agricultural subsidies have an increasing role in financing the operation and subsistence of farms. The future formation of subsidy types and characteristics is unclear; there is a conflict between the growing demand for subsidies and the efforts wishing to liberalize world trade and agricultural production. Analyses investigating the role of subsidies in farms' operation are inevitable for an objective evaluation of agricultural subsidies.

The first goal of this paper is to describe the main characteristics of subsidies used by the Hungarian agricultural enterprises, and to examine how subsidies contribute to improving profitability on the basis of the micro-economic data of the **F**arm **A**ccountancy **D**ata **N**etwork (FADN), which types of farming and what economic sizes are effected more by subsidies related to efficiency and profitability. The second goal of this study is linked to the first one: What is agricultural enterprises' balance of taxes and subsidies counted from the micro-economic data of FADN enterprises according to the type of farming and economic size? Which enterprises are subsidized and which are net payers to budget.

Material and method

The primary data for the research was provided by the Hungarian FADN system, which was formed on the basis of the system founded in 1965 by the member states of the European Communities. This representative farm economics information system provides data from the income of several groups of agricultural holdings on the level of regions and member states. The name of the system: *Farm Accountancy Data Network.* The data collecting and data processing is organized by the member states on their own area. The data is transferred to the European Commission in the required form and to the required deadline. *(Keszthelyi, Kovács 2002)* (*http://europa.eu.int/comm/agriculture/rica*)

In Hungary the Research Institute for Agricultural Economics (AKII) began to realize the FADN system in practice in 1996 extending to more and more counties and farms. 2001 was the first year when the system was built for the whole country and gathered data from approx. 1900 agricultural enterprices.

The FADN system is a sample which is aimed for making conclusions for the field of observation, for the totality of Hungarian agricultural enterprises by the analysis of the farms in the

FADN system. By selecting the enterprises for the FADN system it was an important consideration to select farms with at least 2 European Size Unit (ESU) and to make the sampling process cost-efficient. According to the farm structure survey of the Hungarian Central Statistical Office (KSH), 2003, there are 92 514 agricultural enterprises in Hungary and this multeity is represented by 1895 farms in FADN system.

Defining the sample it had to be considered that the farm structure of the Hungarian agriculture is very heterogeneous. Accordingly, Neyman's optimal distribution was used for the sample, which means that more farms from the groups with higher standard deviation of Standard Gross Margin (SGM) and less farms from the more homogeneous groups must be selected into the sample, in order to minimize the sampling error. This procedure minimizes sampling errors with appropriate cost-efficiency.

Therefore this distribution must be considered in every research using FADN database and the variables must be weighted for counting aggregated data.

The database is divided into economic size classes on the basis of European Size Unit (ESU) and into type of farming categories in accordance with the EU nomenclature. Besides, the database is divided into the group of individual enterprises and companies. The weight numbers of each farm in the sample express the number of farms in the field of observation represented by the farm in the sample categorized by the size class and type of farming.

In this study the agricultural enterprises were divided into 6 economic size classes used in EU and into 6 type of farming categories used in the Hungarian nomenclature. The economic size of farms is expressed by Standard Gross Margin (SGM), which is the value of output from one hectare or from one animal less the cost of variable inputs required to produce that output. (Keszthelyi, Kovács 2004) The type of farming category is determined by the SGM of a farm in a certain type of farming category. The 6 type of farming categories used in the study:

1. Specialist field crops: (cereals, sugar beet, potatoe etc.) SGM of field crops >=2/3
2. Specialist horticulture: SGM of vegetables, ornamentals and nursery-gardens >=2/3
3. Specialist permanent crops: (wineyards, fruits, hop) SGM of permanent crops >=2/3
4. Specialist grazing livestock: SGM of cows, beeves, sheep and horses etc. >=2/3
5. Specialist granivore: SGM of pigs, poultry etc. >=2/3
6. Mixed crops-livestock: farms that cannot be diveded into the categories above

   (Keszthelyi, Kovács 2004)

The number of farms represented by the Hungarian FADN system is shown in the table in the different size classes and type of farming categories. In the Hungarian FADN system farms are observed with an economic size higher than 2 ESU.

Table 1: The number of farms represented by the Hungarian FADN system

		0- < 4 ESU	4- < 8 ESU	8- < 16 ESU	16- < 40 ESU	40-< 100 ESU	>= 100 ESU	Total
Individuals	Specialist field crops	22 925	9 598	5 426	2 687	708	36	41 379
	Specialist horticulture	577	1 940	956	497	93	34	4 097
	Specialist permanent crops	7 567	3 627	1 404	641	111	15	13 365
	Specialist grazing livestock	1 869	2 511	1 184	334	138	12	6 048
	Specialist granivore	2 302	1 130	426	490	146	9	4 504
	Mixed crops-livestock	10 193	5 002	1 657	712	162	7	17 735
Companies	Specialist field crops	158	504	211	554	674	652	2 752
	Specialist horticulture	186					34	220
	Specialist permanent crops		137	75	390	149	68	818
	Specialist grazing livestock		90	21	137	54	194	495
	Specialist granivore		37	95	152	92	249	625
	Mixed crops-livestock		34		86	29	328	478

Total number of the sample	**156**	**283**	**424**	**457**	**275**	**300**	**1 895**
Total number of field of observation	45 777	24 609	11 455	6 680	2 356	1 638	92 514

The table reveals that there are empty cells in the group of companies, therefore the specialist horticulture and 0-4 ESU size class companies were exculed from the analysis of proportion of profitable farms. Thus it does not influence the representativity and reliability of the whole system.

An important feature of Hungarian agriculture is that the multiety of farms is very heterogenous in economic size. There can be 100 times differences among farms in the same type of farming category. If this heterogenity is not treated, we will receive misleading results. All indices would correlate with farm size and differences in efficiency among the farms could not be revealed.

In the analysis of this study the data of farms in FADN were multiplied by the weight numbers of the farms, then the indices like pre-tax profit, investment subsidies, taxes etc. were summarized in the several size classes and type of farming categories. As the aim of the research is to compare farms with different size and type of farming, the adapted indices had to be independent from the size class and type of farming category. So the indices independent from type of farming had to be divided by an index expressing farm size which is independent from type of farming. We chose Standard Gross Margin (SGM) because it is widely used in EUROSTAT and FADN nomenclatures. The indices summarized by categories were divided by the summarized SGM of the farms in the certain size class and type of farming category. Then it was transfered from HUF (currency of Hungary) to European Size Unit, which corresponds to 1200 € which was 306.000 HUF in 2003. So all the indices used in this study are the value of the farms in the certain size class and type of farming category per 1 ESU. Using this method the indices of different size classes (like the investment subsidies per 1 ESU) can be compared.

The analysis is based on the 2003 data of the Hungarian FADN system, which contains more data than the EU system in some special fields because of the different tax regulation.

Analysing the profitability the individual farms and companies were examined together – except for the proportion of profitable farms – because the legal form theoretically does not have an effect on the profitability. In case of individual farms the pre-tax profit had to be adjusted, because the individual farms do not charge the wages of family members, which is in practice a production cost and should be reduced from turnover. So a certain part of family members' income appears in pre-tax profit. (Keszthelyi, Kovács 2004)

However, in the analysis of agricultural subsidies and balance of subsidies and payments it is important to differentiate the individual farms and companies due to the different tax regulations in Hungary.

Primary data necessary for the research has been provided by the Farm Business Analysis Department of AKI, in the frame of the OTKA research project (Ref. Nr. F 046881). Additional source of data were the publications of AKI about the 200 3data of FADN. *(Keszthelyi, Kovács 2004) (Kertész, Béládi 2004)*.

The frame of this study was the statistical analysis of the micro-economic data of FADN in 2003. A possible direction of continuing the study is to compile the 2003 and 2004 data, examining the year before the accession to the EU and the year of accession.

Results and evaluation

The analysis consists of three parts. The first part is examining the proportion of profitable farms. This is aimed to show that there were hard efficiency problems in the Hungarian agriculture in the year before the accession to the EU: most of the farms did not have profit before tax.

In the second part we analysed the pre-tax profit per ESU in different size classes and type of farming categories. This was aimed to reveal that the efficiency of the different types of farming changes with the economic size.

Thirdly, the impact of subsidies on the profitability was analised: how do the subsidies based on production influence the profitability and if they depend on economic size.

Finally, the farms' balances of subsidies and payments to government was analysed. Our goal was to show that the agricultural enterprises are not only well-subsidized organizations, but they are also important payers to government, but this payment is influenced by the type of farming, economic size and legal form.

Proportion of profitable farms

First the proportion of farms with positive pre-tax profit was examined in the different groups of farms. (Figure 1) The analysis was made separately for individual farms and companies. The specialist horticulture farms were excluded due to the low number of farms in the sample.

One important statement is that in the group of individual farms the proportion of profitable farms increases with the economic size but this proportion is slightly higher than 50% for the whole field of observation. The results in the several type of farming categories are highly different. In the group of specialist permanent crops farms the proportion of profitability goes down to 30 per cent in the economic size of 40-100 ESU (ca. 30-75 ha. permanent crops).

The percentage of profitable specialist grazing livestock and specialist garnivore farms increases significantly with size. For the specialist grazing livestock farms the size-efficiency is even more significant: in the size class above 100 ESU the proportion of profitable farms highly increases. In the group of specialist field crop farms the proporion of profitable farms are approximately equal above 8 ESU economic size.
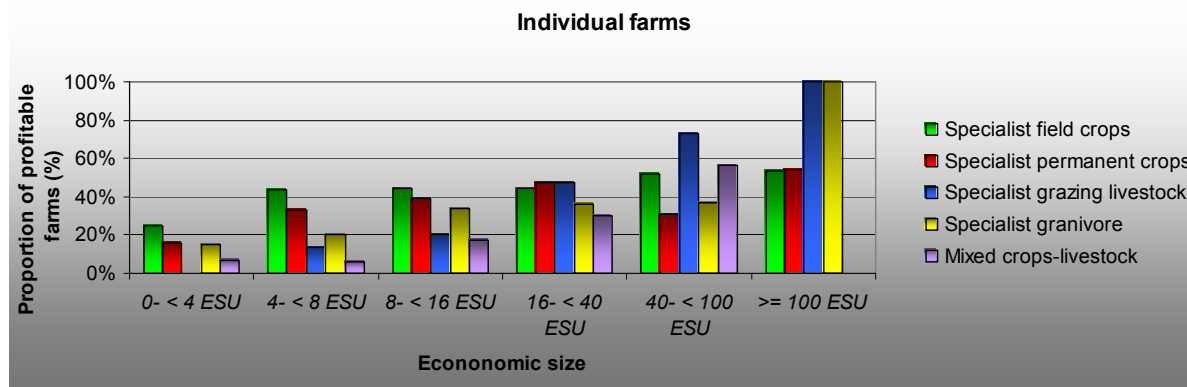

Figure 1: Proportion of profitable farms in the group of individual farms

The picture is more differentiated in the group of agricultural companies. In case of companies, the first economic size class (0-4 ESU, corresponding to ca. 0-23 ha. cereals) was excluded from the analysis, due to the low number of farms in the sample. Companies in this size class are highly similar to individual farms - such as employing only one part-time worker -, they only chose this legal form for some reason.

In the group of specialist grazing livestock farms the proportion of profitable farms increases with size, besides, in the largest size class the number of profitable companies exceeded the number of farms with loss. This is due to the larger dairy farms.

In case of specialist field crops companies the proportion of profitable farms was 40-60 per cent, independent from economic size.

The proportion of profitable specialist garnivore companies and companies with mixed type of farming is the highest in the 40-100 EUME size class, above this size the percentage of profitable farms decreases.
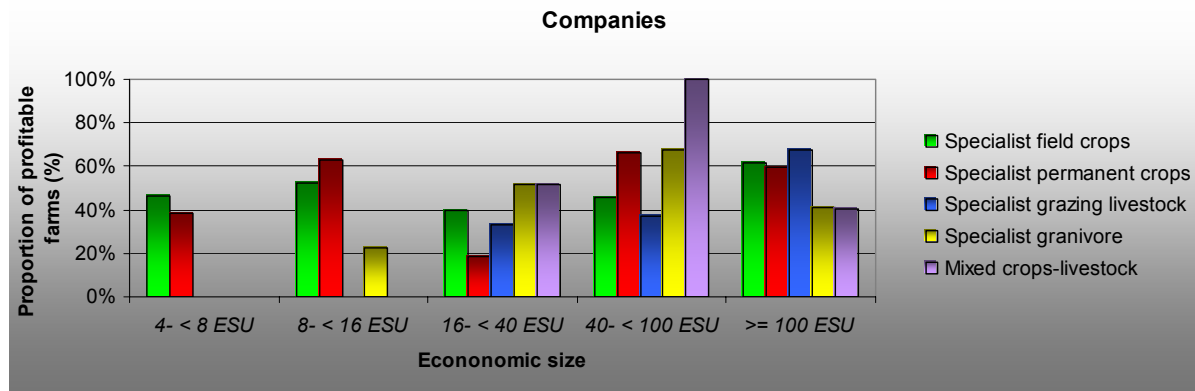
Figure 2: Proportion of profitable farms in the group of companies

Analysing the pre-tax profit per type of farming and economic size

Examining the pre-tax profit we made the conclusion that with the increase of economic size not only the proportion of profitable farms rises, but the profit per ESU increases and the loss decreases. In the analysis the summarized pre-tax income of the enterprises in a certain economic size class and type of farming category was divided by the sum of the farms' economic size (ESU) in that category so that the results can be compiled.

In the highest size class the specialist field crops farms, the specialist grazing livestock farms, the specialist horticulture farms and the permanent crops farms could achieve positive pre-tax profit.

The efficiency of specialist field crops farms do not improve significantly above the size of 8 ESU, so on an area of 45-50 ha arable land or higher the field crops can be produced with a similar profit per ESU, so the advantages due to size-efficiency do not improve highly the efficiency of production above the 8 ESU size.

The specialist garnivore farms had a loss in all economic size classes, but the loss was minimal over 16 ESU. Mixed crops-livestock farms had profit only in economic size between 40 and 100 ESU.
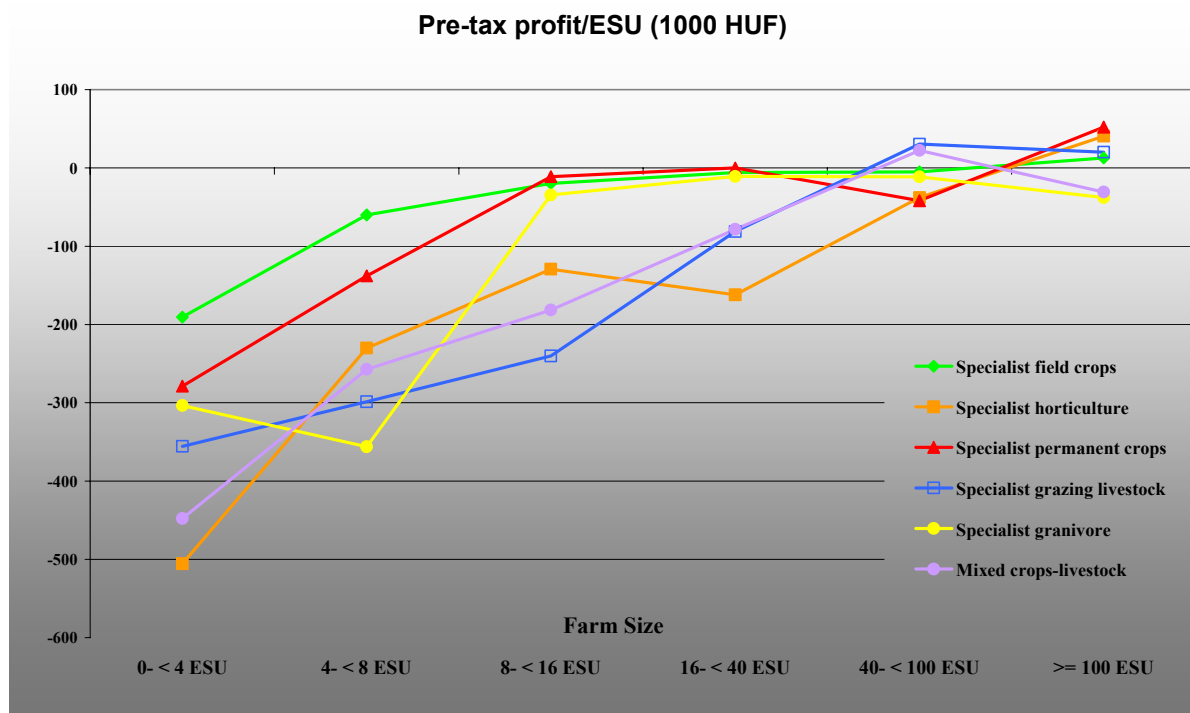

Figure 3: Pre-tax profit per size unit (ESU) in the different type of farming categories and economic size classes

The effect of agricultural subsidies on the profitability

In this part of the study the effect of subsidies on pre-tax profit was analysed. We only counted with the subsidies based on production (subsidies per hectare, per animal, interest subsidies), the investment subsidies are not involved in the diagrams. In the graphs we compare pre-tax profit per size unit (1 ESU) with pre-tax profit decreased by subsidies.

Due to the lack of space we show the analysis of specialist field crops farms, grazing livestock farms and garnivore farms. The mixed crops-livestock farms are similar to the specialist livestock farms. The specialist horticulture and specialist permanent crops farms are not subsidized, so the pre-tax profit is not significantly modified by subsidies.

The three figures show that the graphs are paralell which means that the subsidies per size unit are approximately identical in the different economic size classes. It proves that the Hungarian subsidy system was mostly independent from economic size in 2003. It is extremely important in case of specialist field crops farms which had 33 per cent more land-based subsidies below the economic size of 300 hectares. Therefore it is expectable that the difference between the graphs of pre-tax profit and pre-tax profit without subsidies is higher in case of farms below 300 hectares (55 ESU). The paralellism of the graphs can be explained by the fact that efficiency improves with the rise of economic size.

The three figures reveal that pre-tax profit per size unit without subsidies would be negative in all type of farming categories, so subsidies make a huge contribution to profitability.

Comparing the level of subsidies of the different farming types, the specialist field crops farms and specialist garnivores farms are subsidized almost equally, while the grazing livestock farms are donated approx. 30 per cent lower.
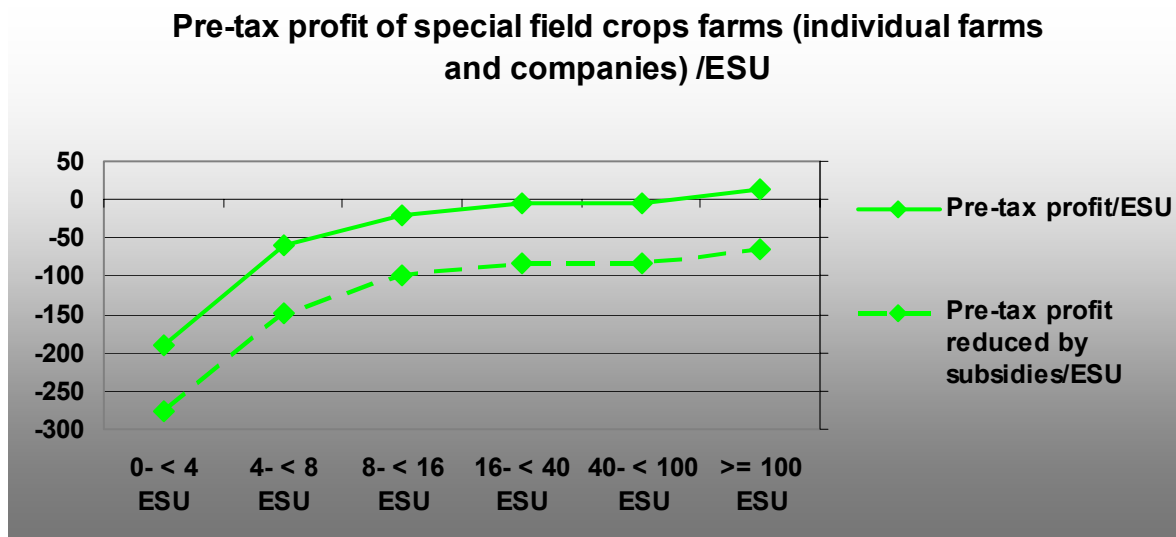

Figure 4: Pre-tax profit of specialist field crops farms per size unit (1000 HUF/ESU)

In case of specialist garnivore farms the agricultural subsidies were only for reducing the loss in each size class. These farms were in bad financial situation and were less competitive before the accession to the EU and due to this many garnivore farms had to be closed in 2004.
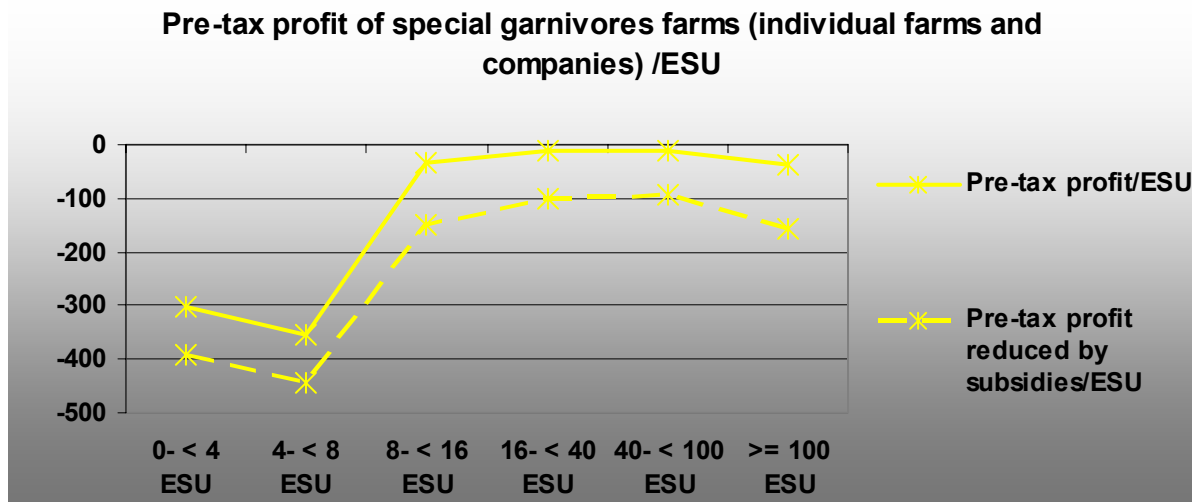
Figure 5: Pre-tax profit of specialist garnivores farms per size unit (1000 HUF/ESU)

Agricultural subsidies can make specialist grazing livestock farms profitable only over 40 ESU (approx. 60-65 milk cows).
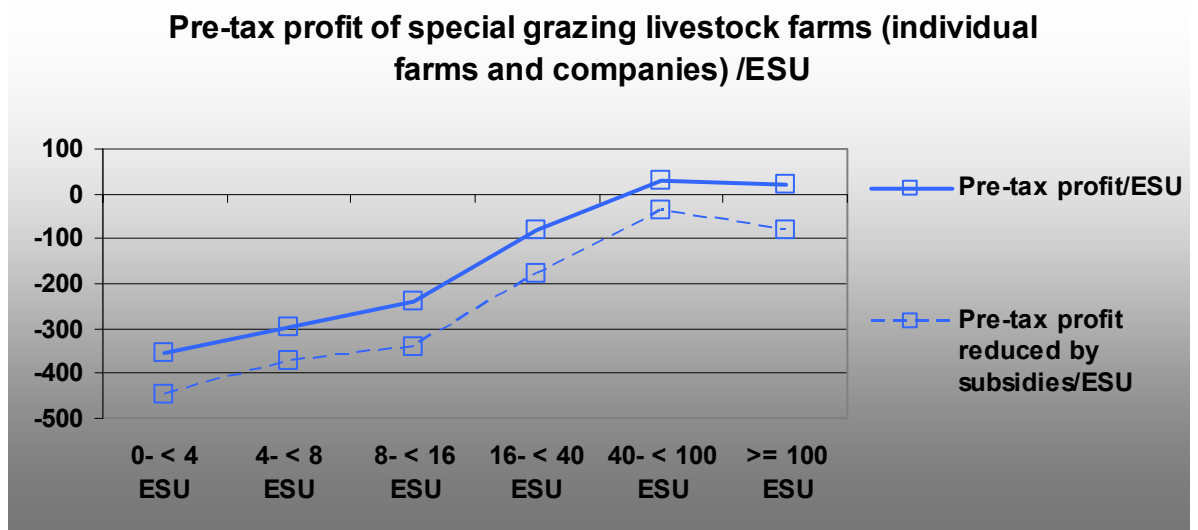

Figure 6: Pre-tax profit of specialist grazing livestock farms per size unit (1000 HUF/ESU)

Balance of payments and subsidies of agricultural enterprises

In this part of the study the balance of farms' payments to government and subsidies received from government were analysed in 2003.

The farms' payments per size unit involve the wage contributions, value added tax, fees, income tax of companies and persons and other types of taxes. The subsidies involve production based subsidies, interest subsidies and investment subsidies.

The next figure shows the value of payments per size unit and the balance of payments and subsidies per size unit in the different economic size classes. The companies and individual farms had to be analysed separately due to the different taxation rules.

In case of individual farms the payments per size unit decline when economic size increases. This can be explained by the fact that the efficiency of labour grows with economic size which means that the labour utilized per 1 ESU declines when economic size increases. Accordingly, wage contributions per ESU decrease and payments per ESU decrease.

In case of companies the payments go up in the 16-40 ESU size class which is caused by the high number of specialist horticulture and permanents crops farms in the sample in this size class. These farming types use more labour and pay more wage contributions and the value of payments is higher. All of this proves that the most significant factor of payments to government are wage contributions and not income taxes.

In case of individual farms the balance towards government is positive which means that value of subsidies is higher than the value of payments.

Both for individual farms and for companies the balance towards government per size unit goes down in the largest size class. It can be explained by the fact that the proportion of specialist livestock farms is higher in larger size classes in the sampe and livestock farms received less subsidies in 2003 because of the Hungarian subsidy system. So the decrease of balance in the largest size class is caused by the proportion of farms in the sample.
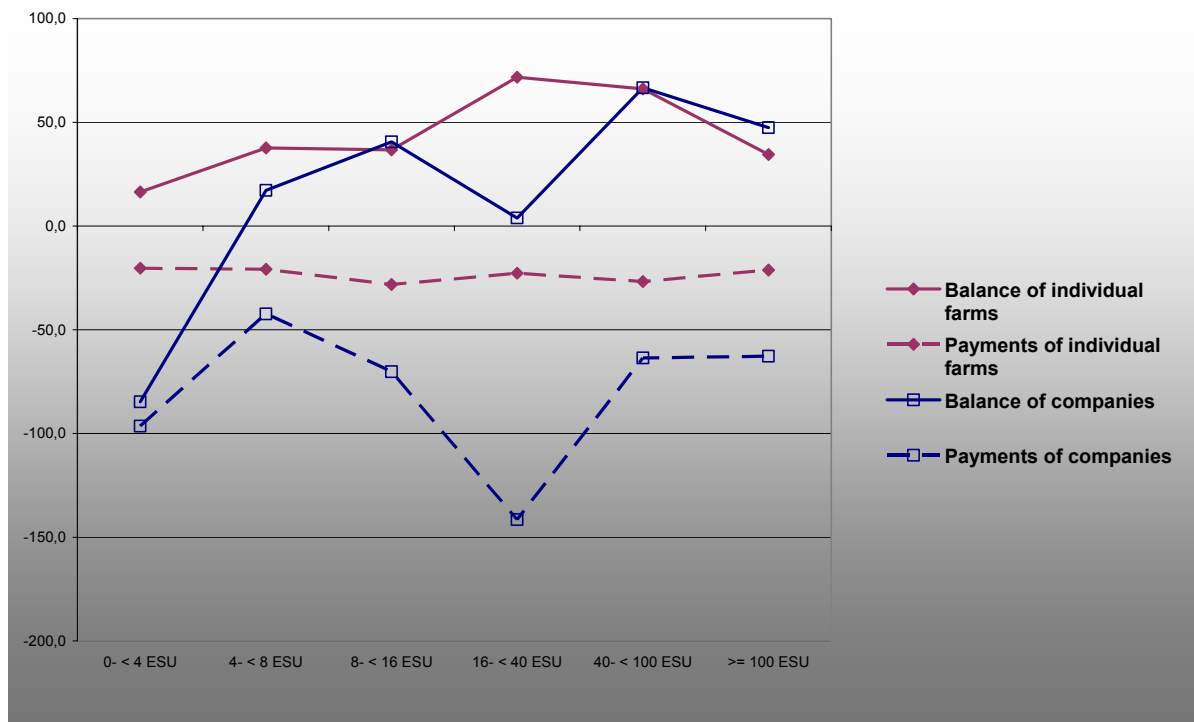

Figure 7: Payments to government and balance of payments and subsidies (1000 HUF/ESU)

The next two figures show the relationship of Hungarian farms with central budget in 2003 (subsidies, payments, balance). The first column of the diagram consists of factors determining the balance and the second column is the sum of the factors, the balance towards government. The subsidies based on production, the interest subsidies and the investment subsidies move the balance to a positive direction, while the wage contributions, taxes, fees and income tax move the balance to a negative direction.

The figure shows that the balance depends on the type of farming and it is also important that the factors determining the balance, the payments and the subsidies are significantly higher for companies than for individual farms.

Both for companies and for individual farms the most important factor of payments is wage contributions, it has the largest impact on the balance.

The livestock farms realized less investments in 2003, so their value of investment subsidies per size unit is lower.

Except for two categories the balance is positive in all types of farming. Only the specialist horticulture individual farms and the special permanent crops companies had to pay more money to the central budget than the value of subsidies they received.

Companies had higher wage contributions in all types of farming, it is especially true for the specialist permanent crops farms with more labour utilized. The companies employ more labour force officially, therefore wage contributions are higher.

It is also considerable that companies were more active in receiving investment subsidies, particularly the specialst horticulture and permanent crops farms.

The value of production based and interest subsidies is higher for companies because these farms have larger debts with larger interest subsidies received in 2003. (Keszthelyi, Kovács 2004)
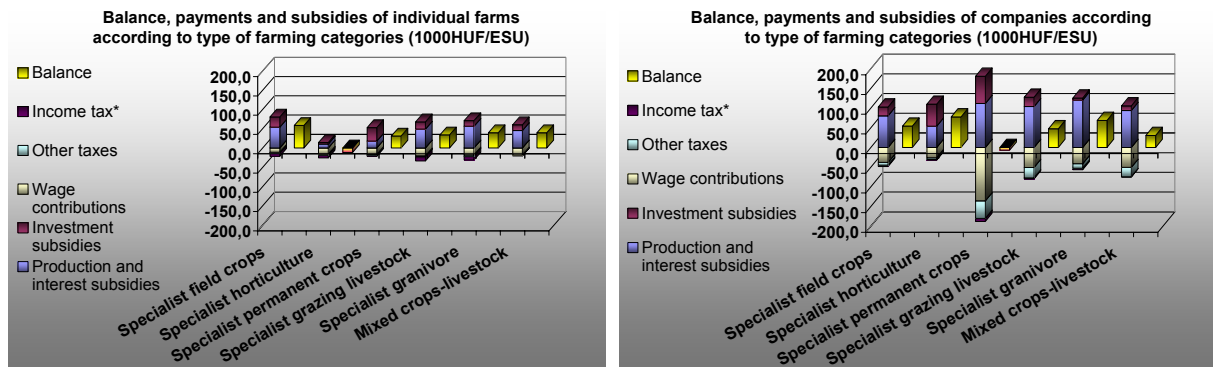

Figure 8: Balance, payments and subsidies of individual farms and companies in the different types of farming

It is worth to mention that analysing the different size classes, all classes had a positive balance to the government except for the companies smaller than 4 ESU (ca. 20 hectares arable land). This is caused by the low number of companies under 4 ESU economic size in the sample. The figures per economic size show that companies pay a lot more wage contributions. This is one of the reasons of the slightly positive balance of companies with economic size between 16-40 ESU. The extremely high wage contributions in this category are caused by the fact that more than the half of the companies with this size are specialist permanent crops companies with high demand of labour.

The companies receive higher volume of subsidies which is reasoned by the higher amount of debts and interest subsidies.

Individual farms with economic size over 40 ESU are more similar to companies with the same size and the balance towards government is also similar.

The investment subsidies increase over 16 ESU both for companies and for individual farms.
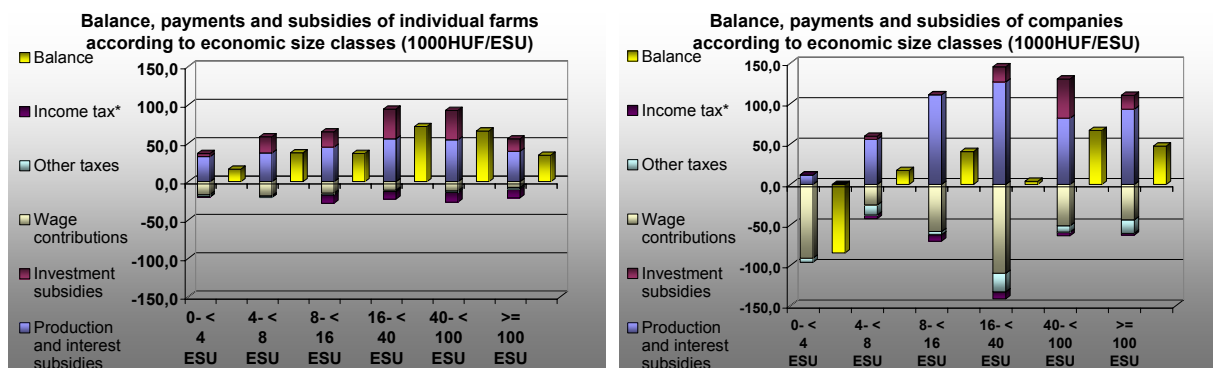

Figure 9: Balance, payments and subsidies of individual farms and companies in the different economic size classes

Conclusions

According to the micro-economic data of Hungarian FADN, the number of profitable farms rises if economic size increases both for individual farms and for companies.

Examining the pre-tax profit we made the conclusion that with the increase of economic size not only the proportion of profitable farms rises, but the profit per ESU increases and the loss decreases.

The low profitability of agricultural production is reflected by the fact that the farms had a loss in almost all size classes and type of farming categories, the farms could realize profit only over 40 ESU size (ca. 220 hectare arable land or 30 hectare permanent crops or 60 milk cows). In the highest size class (over 100 ESU) the specialist field crops farms, the specialist grazing livestock farms, the specialist horticulture farms and the specialist permanent crops farms could achieve positive pre-tax profit. It means that the optimal farm size of these types of farming is over 100 ESU.

Analysing the effect of production based subsidies and interest subsidies on the pre-tax profit we made the conclusion that the sum of subsidies received from government per size unit is almost equal in all economic size classes. It proves that the Hungarian subsidy system was mostly independent from economic size in 2003.

The analysis of balance of payments to government and subsidies received from government revealed that the most significant factor of payments to government are wage contributions and not income taxes. In case of individual farms the balance towards government is positive which means that the value of subsidies is higher than the value of payments. Only the balance of companies below the size of 4 ESU have a negative balance which means that these farms pay more to government than they receive as subsidies.

The balance of payments and subsidies depends on the type of farming, specialist horticulture farms are less subsidized, besides the factors of balance are higher for the companies, they have higher payments and higher volume of subsidies than individual farms. It is also considerable that companies were more active in receiving investment subsidies, particularly the specialst horticulture and permanent crops farms.

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