

# **Economic and technical performance of Macedonian agriculture using FADN-type data**

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## Abstract

The objective of this paper is to provide an overview, analysis and discussion of the situation and performance of Macedonian farms. As a candidate country to the EU, Macedonia is obliged to put in place a functional, compatible and harmonized farm accountancy data system, in line with the EU Farm Accountancy Data Network. The Farm Monitoring System (FMS), an annual survey conducted in line with FADN methodology, is used as the primary source of data. Farm returns are preliminary in the sense that they are calculated up to the gross farm margin level, and analyzed for six regions within the country. Furthermore, the analysis takes into account the economic size of the farms and the type of farming.

## 1. Introduction

The objective of this paper is to provide an overview, analysis and discussion of the situation and performance of the farms in Macedonia<sup>5</sup> by using data from the Farm Monitoring System (FMS) - the national service that provides FADN type data. Panel data for agricultural holdings are an important source of information about the farm structure and income. Such data provide a basis for an analysis of the technical and economic farm performance over a certain period of time.

The major source of information regarding the agricultural sector in Macedonia is the State Statistical Office, which publishes annual yearbooks containing mostly physical data (land use, livestock numbers, yields and prices). The Economic Accounts in Agriculture, compiled since year 1998 in accordance with the EUROSTAT methodology, give insights of the value produced by the agricultural sector. Still, in order to get relevant information on the income and farm returns of agricultural holdings, microeconomic data are required from networks such as the EU FADN. In the European Union, FADN data are used for different types of analysis as well as monitoring the implementation and evaluating the impact of policy measures.

The results from this paper should be interpreted with caution, having in mind few limitations. First, this analysis only concerns privately-owned individual farms (defined as family agricultural holdings by the Law on Agriculture and Rural Development, 2007) and excludes data from agricultural companies and cooperatives. Family farms own or lease around 80% of agricultural land, whereas agricultural companies lease the remaining 20% that are in the ownership of the state (Ag Census, 2007). However, 46% of the value of purchased agricultural products in 2008 belongs to agricultural companies (SSO, 2009). Notably, in most of CEEC<sup>6</sup> countries that joined the EU in 2004, for instance Slovenia, the production potential of family farms in the pre-accession period was low, in particular due to the limited land and capital resources (Erjavec *et al.*, 2003). In addition, subsistence farming was largely practiced, which is to a large extent corresponding to the Macedonian situation. In this respect, the National Extension Agency (NEA) will include data from agricultural companies and cooperatives from 2010 onwards.

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<sup>5</sup> Macedonia's constitutional name is the Republic of Macedonia and this country is being provisionally referred within the United Nations system as 'the former Yugoslav Republic of Macedonia - FYROM' (UNSC Resolution 817/1993)

<sup>6</sup> CEEC stands for Central and Central and East European Countries

Second, the quality of data collected during the FMS survey was subjected to a detailed check. The original data were scrutinized and filtered following the principles of homogeneity, continuity and coherence. The deviations from the observations' mean were taken into account. Last but not least, an expert check was conducted, examining the plausibility of data, especially in terms of yields and prices. Costs were checked for each cost item and as aggregated on an enterprise level. Data were corrected or interpolated when required.

Third, complete FMS data were available from 2005 onwards. Fourth, the farm fixed costs were not complete for all farms within the FMS data set and were therefore excluded; hence, the farm returns can be calculated up to the gross farm margin level. However, it is important to stress that these farms use dominantly family labor<sup>7</sup> and use almost no external sources of financing. Moreover, a significant portion of farms generates off-farm income to supplement the household. A previous study showed that smaller farms are more dependent on supplementary sources of income and most likely practicing farming as part-time activity, while larger farms are more commercial-oriented (Martinovska Stojčeska *et al.*, 2008).

The data were processed in line with the EU-FADN methodology, and analyzed for six regions within the country, as well as per economic size of the farms and type of farming. Technical and financial results will be presented, with conclusions in the end.

## 2. Methodology

The Farm Monitoring System, an annual survey conducted in line with FADN methodology, is used as the primary source of data. The first FMS survey was conducted in 2001, followed by the Farm Business Data report (Kamphuis and Dimitrov, 2002). The findings from that report are used as a basis for comparison with the preliminary processed FMS data from 2005 to 2009. Similar format was adopted for this paper in order to ensure comparability.

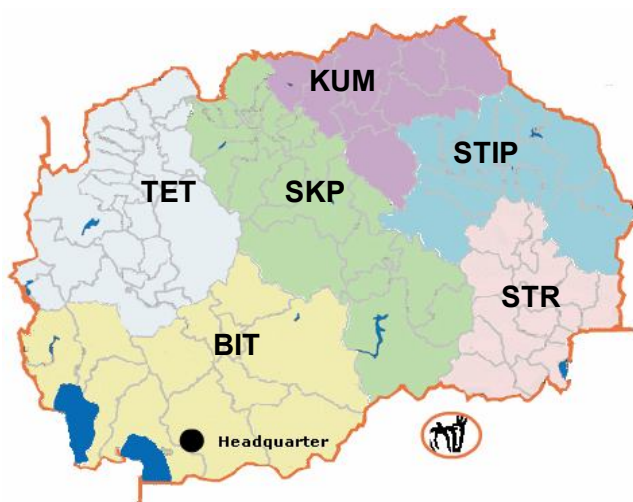


Figure 1. Regions as determined by NEA

The **regional analysis** provides a perspective of the farms' economical and technical performances. NEA has determined six regions within the country according to the agricultural and climatic conditions. Hence, Bitola region (BIT) is in the South-West of the country, comprising the lakes of Ohrid and Prespa and also the Pelagonia plain; Kumanovo region (KUM) is in the North of the country; Skopje region (SKP) is the central region of the country stretching along the Vardar river basin; Stip region (STIP) is in the Eastern part of the country with semi-arid climate and the Ovce Pole plain; Strumica region (STR) is in the

<sup>7</sup> The only exception is sheep farms.

South-East of the country, with fertile soils; and Tetovo region (TET) is in the North-West of the country that is highly mountainous, comprising the fertile Polog plain.

The FADN methodology was applied for developing the farm typology, studying economic (farm) size and calculating the gross margin. The **economic size of the farms** is calculated in accordance to the FADN methodology (RI/CC 1256, 2008). Taking into considerations the relatively small size of Macedonian farms, whereas the average size of the individual farm ranged from 1.7-2.8 ha (State Statistical Office Census, 1994) to as low as 1.37 ha (State Statistical Office, Ag. Census, 2007), the farms in this study are grouped into six farm size groups, as shown in table 1.

The **type of farming (TF)** is the other classification criterion, defined as the production system of a holding which is characterized by the relative contribution of different enterprises to the holding's total gross margin (GM). The general type of farming level is applied and adjusted in this study, as presented in table 2.

**Table 1. Classification of farms by size, adopted by FADN**

Farm size (FS)	ESU class	Farm size 6 groups
Very small farm	< 2 ESU	VSF1
	2-<4 ESU	VSF2
Small farm	4-<8 ESU	SF
Medium-low farm	8-<12 ESU	MLF1
	12-<16 ESU	MLF2
Medium-high farm	> 16 ESU	MHF

\*ESU=European Size Unite, equivalent to gross margin of €1,200 (FADN)

**Table 2. Classification of farms by type, adopted by FADN**

Type of farming (TF)	Methodology
Mixed farm	total livestock gross margin and total crops gross margin are less than 2/3 of the total farm gross margin
Fodder crops	total fodder gross margin is greater than 2/3 of the total farm gross margin
Fruit	total fruit gross margin is greater than 2/3 of the total farm gross margin
Vegetables	total vegetables gross margin is greater than 2/3 of the total farm gross margin
Industrial	total industrial crops gross margin is greater than 2/3 of the total farm gross margin
Mixed crop	total crops gross margin is greater than 2/3 of the total farm gross margin
Mixed livestock	total livestock gross margin is greater than 2/3 of the total farm gross margin
Cereals	total fodder gross margin is greater than 2/3 of the total farm gross margin
Grapes	total grape gross margin is greater than 2/3 of the total farm gross margin
Goats	total goats gross margin is greater than 2/3 of the total farm gross margin
Bees	total bees gross margin is greater than 2/3 of the total farm gross margin
Sheep	total sheep gross margin is greater than 2/3 of the total farm gross margin
Pigs	total pigs gross margin is greater than 2/3 of the total farm gross margin
Cattle	total cattle gross margin is greater than 2/3 of the total farm gross margin

The data derived from the survey were processed using a model for farm business data analysis, specifically developed for this purpose in *MS Excel*. The data were originally gathered in two databases: (i) database for incomes and (ii) database for costs, with an associated codebook containing the codes of farms, regions, advisors, type of crop or livestock and costs items. Additionally, another database containing the farm gross margins was developed, and supplementary codes of farm size and typology were added. The result tables were derived with a pivot table support. The gross margin of farms has been calculated as the difference of the total value of output and the total specific costs.

The prices used are taken as nominal, with conversion rate of 61.2 Macedonian denars to one euro.

### 3. The Farm Accountancy Data Network (FADN) in Macedonia

The first attempt to create a set of data concerning income and costs of agricultural holdings in the Republic of Macedonia was channeled through the Ministry of Agriculture, Forestry and Water Economy (MAFWE), under the umbrella of the World Bank Private Farmers Support Project. In this framework, the Farm Monitoring System (FMS) was established at the National Extension Agency (NEA) in 2001.

The adoption of the Law on establishing a network for collection of accounting data from farms in 2007 provided a legal foundation for a formal set up of a farm accountancy data network in Macedonia. The Law defines the objectives of this network to be intended for determination of the farms' annual income and economic analysis of the farms, as well as evaluation of the conditions in the agriculture and the markets of agricultural products (Off. Gaz., 2007).

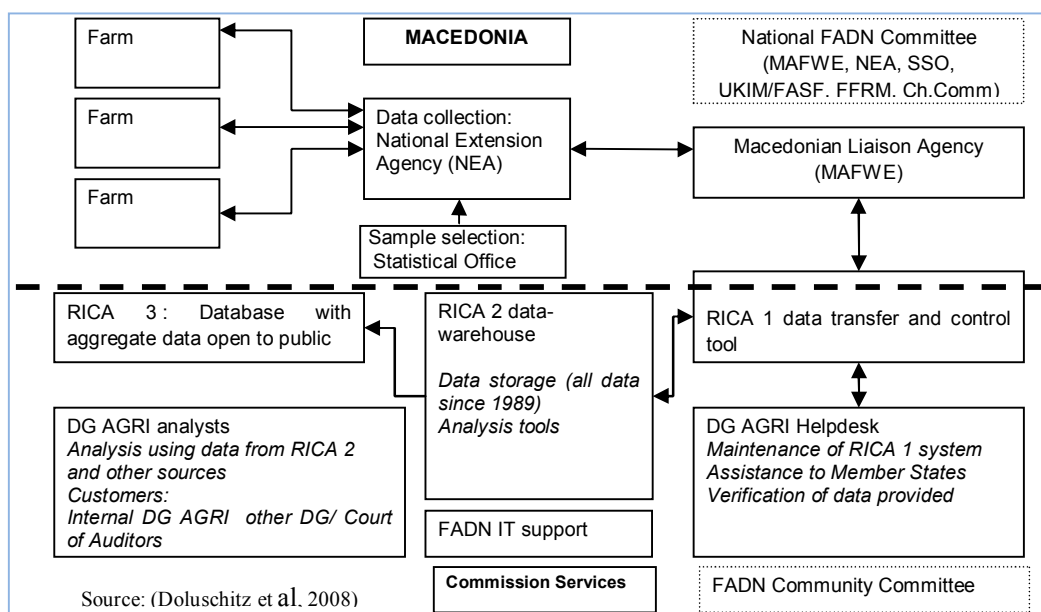


Figure 2. The farm accountancy data flow in Macedonia

The network is comprised of the following entities and institutions: the Ministry of Agriculture, Forestry And Water Economy (MAFWE); the National Committee for network for accounting data from farms; the Farm Accountancy Data Unit within MAFWE, as Liaison Agency; the State Statistical Office; the National Extension Agency, collecting the accounting data at farm level; and the agricultural holdings (farms). Once gathered and checked at national level, the data are to be forwarded to the RICA data-warehouse (Figure 2).

The **Farm Monitoring System (FMS)** is a survey conducted by the National Extension Agency of the Republic of Macedonia. NEA advisors carry out the data collection and data entry of around 300 family farms every year throughout the country. The FMS data collection network is organized through six regional and around 30 local NEA units. Approximately 60 advisors are engaged in the process.

Data are collected directly from the farmers, using standard forms in line with the EU-FADN Farm Return questionnaire. The advisors usually visit the farmer several times per year in order to gather all necessary data. The data are then entered into specifically designed software. The FMS system not only provides aggregated data per household, but also includes detailed income and cost data per each farm enterprise, which enables calculation of analytical crop and livestock enterprise budgets (NEA, 2007).

The original selection of farms to be included in the FMS survey was based on a provisional farm typology, following the Standard Gross Margin (SGM) approach as defined by FADN (RI/CC 882, 2008) and therefore not statistically representative, which can thus be regarded as an approximation (Kamphuis and Dimitrov, 2002). The reasons behind this provisional approach are due to the fact that the annual Statistical Office survey is not representative; the SGM were calculated based on available reports and expert calculations; and the selection was restricted to farmers who already had contacts with NEA (ibid). The Agricultural Census carried out in 2007 provided grounds for determination of a representative sample for all agricultural holdings within the country, to be used from year 2010.

The number of farms included in the FMS survey is also given in this section, along with regional typology and farm size structure (see table 3). In the first year of the survey (2001), 417 farms were included. The number of farms has steadily decreased in the following years, mainly due to financial difficulties to meet the costs of the survey. However, since 2009 the situation has stabilized and the number of farms increased to the original level.

In a regional context, during the period 2005 to 2009 most farms included in the survey were from the Skopje and Bitola regions, with about a quarter of the total number each. Strumica farms represent 18%, Tetovo farms 14%, Kumanovo 11% and Stip 9% of the total sample.

The regional structure of the FMS survey in terms of number of individual agricultural holdings is generally reflecting the structure recorded at the latest Agricultural Census (2007), as shown in the following table.

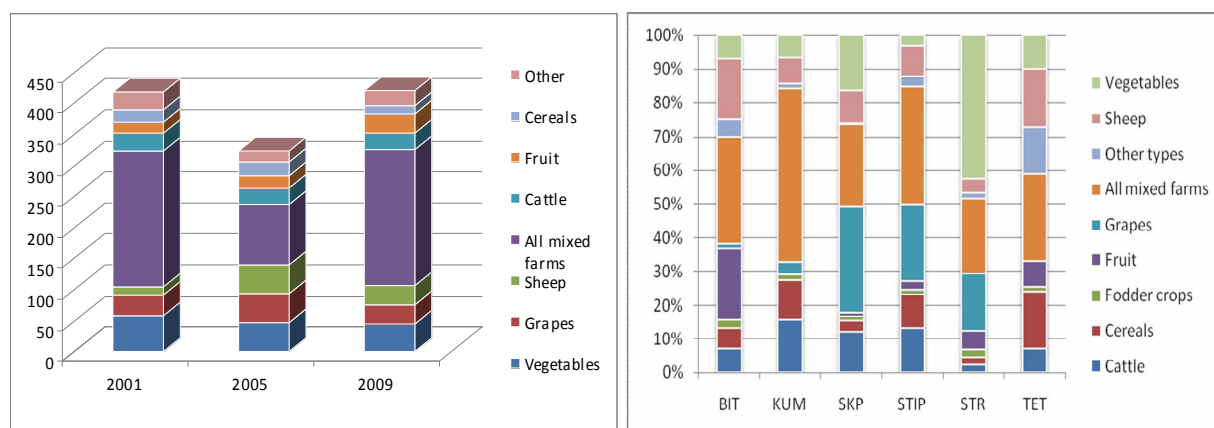
**Table 3. Number of farms in the FMS survey per region**

Region	2005	2006	2007	2008	2009	All years	Structure	SSO*
BIT	71	67	44	48	110	340	23%	20%
KUM	61	30	26	23	25	165	11%	11%
SKP	73	66	63	69	94	365	25%	22%
STIP	27	15	16	13	59	130	9%	14%
STR	47	36	57	61	69	270	18%	14%
TET	43	32	34	30	62	201	14%	18%
All regions	322	246	240	244	419	1471	100%	100%

\* Source: SSO, Agricultural Census 2007, Book III

#### 4. Farm structure of Macedonian farms

The farm structure of the FMS sample with regard to typology is illustrated in the following figures. In the 2001 sample, more than half of the farms are classified as mixed; in 2005 the share of farms with mixed crop and livestock production falls to 30%, and then it increases to 53% in 2009. Mixed farms are, without any doubt, an important segment of Macedonian agriculture, given that farms are small and usually choose a diverse production structure with a wide range of products.



**Figure 3. Number of farms per farm type** **Figure 4. Structure of farms, per region and type**

Vegetable farms are represented with a relatively stable share, ranging from 11% in 2009 to 15% in 2005; grape farms are present with around 7-8% in years 2001 and 2009 and with 14% in 2005, respectively. Cattle farms have a steady share from 6-8% throughout the years.

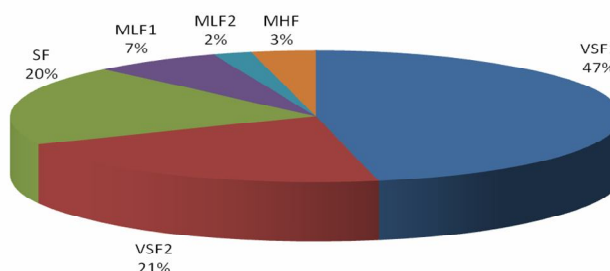
Analysed per region for the period 2005-2009, one-third of the farms in Bitola are regarded as mixed farms (including mixed crop and livestock farms); around 20% each share belongs to fruit farms (mostly apple farms in the Resen area) and sheep farm (typical for this region). In Kumanovo half of the farms are mixed, followed by cattle, cereals and sheep farms. One-third of the Skopje farms are producing grapes as their main crop, since the Vardar basin river being the most important grape area belongs to this region. Mixed farms take the second place, followed by vegetable farms, cattle farms and sheep farms. Stip region is featured with mixed and grape

farms. Strumica region is typical for vegetables. Tetovo region has a rather even structure of mixed farms, combined with cereals in the Polog plain and sheep farms in the highlands.

Most of the farms included in the FMS survey 2005-2009<sup>8</sup> belong to the very small farms category of economic size, reflecting the structure of family farms in Macedonia (see table 4 and figure 5). The largest share of farms are those with farm gross margin of less than 2 ESU (VSF1), followed by farms with farm gross margin from 2 to 4 ES (VS2). Small farms with farm gross margin between 4 to 8 ESU comprise 20% of the surveyed farms. Medium-sized farms account for 12% of the total sample.

**Table 4. Structure of farms by economic farm size (number of farms)**

Region	All years	Share
VSF1	687	47%
VSF2	314	21%
SF	290	20%
MLF1	100	7%
MLF2	30	2%
MHF	50	3%



**Figure 5. Number of farms per economic farm size**

The development of the farm size in terms of number of hectares of cultivated land remained stable throughout the years and no significant changes occur. The majority of the farms cultivate less than 2 ha of land (48-52%), followed by farms that cultivate 2 to 5 ha (32-35%). Based on these statistics, less than 20% of the farms cultivate more than 5 ha of land (table 5).

The average number of hectares per FMS farm is around 3-3.5 ha (table 6). The highest portion of land cultivated on a farm is on mixed farm, mixed crop and cereal farms. Mixed farm cultivated land has increased in the past period by 44%, whereas the area under cereals has experienced a decrease by 42%.

The area under more profitable cash crops has experienced a positive trend. The average farm size of vegetable farms has grown from 2.39 ha in 2001 to 2.87 ha in 2005 and finally reached 3.39 ha in 2009. The area of grape farms has also increased from 1.31 ha/farm in 2001 to 1.77 ha/farm in 2009.

The livestock numbers on an average FMS farm, converted as into Livestock Unit coefficients (LU)<sup>9</sup>, were 5.82 LU in 2001, then decreased to 4.56 LU in 2005 and increased significantly to 7.65 LU in 2009 (table 7). During this period the cattle numbers follow the same trend within the sample; many farms purchased milking cows in the period from 2005-2008 as a result of the then growing number of dairies. Sheep numbers vary significantly; this situation is probably due to the selection of farms in the sample; an average farm would have 324 sheep in 2009.

<sup>8</sup> No data are available for 2001 FMS survey in this respect

<sup>9</sup> The Livestock Unit coefficients (LU) are used for conversion of the average number of animals per category. For instance, one dairy cow is converted to 1 LU, one sheep to 0.1 LU etc. (RI/CC 882, 2008)



**Table 5. Structure of farms by farm size (ha of cultivable land)**

Farm size	2001		2005		2009	
<2 ha	200	48%	167	52%	203	48%
2-5 ha	146	35%	103	32%	134	32%
5-10 ha	45	11%	33	10%	54	13%
10-15 ha	26	6%	18	6%	28	7%
Fruit	417	100%	322	100%	419	100%

**Table 6. Size of farms by farm type (ha of cultivated land)**

TF	2001	2005	2009	2005-2009	2005/2001	2009/2001
Vegetables	2.39	2.87	3.39	2.71	1.20	1.42
Mixed crop	4.40	3.73	3.09	3.64	0.85	0.70
Grapes	1.31	1.69	1.77	1.81	1.29	1.35
Sheep	1.04	1.53	3.47	2.00	1.47	3.34
Mixed farm	4.05	5.07	5.83	4.40	1.25	1.44
Cattle	2.93	3.47	2.55	2.67	1.18	0.87
Fruit	2.10	3.13	2.46	2.49	1.49	1.17
Cereals	7.28	3.49	4.25	3.34	0.48	0.58
Other	2.60	3.07	2.93	2.51	1.18	1.13
Total farms	3.52	3.00	3.26	3.11	0.85	0.93

**Table 7. Size of farms by farm type (livestock units - LU)**

TF	2001	2005	2009	2005/2001	2009/2001
Vegetables	0.27	0.25	0.27	0.92	1.00
Mixed crop	1.91	2.29	0.93	1.20	0.49
Grapes	0.00	0.00	0.00	/	/
Sheep	46.31	17.60	32.41	0.38	0.70
Mixed farm	7.70	5.73	11.48	0.74	1.49
Cattle	13.67	8.73	15.87	0.64	1.16
Fruit	0.20	0.00	0.04	0.00	0.20
Cereals	0.10	0.90	0.43	9.00	4.30
Other	18.22	4.58	18.56	0.25	1.02
Total farms	5.82	4.56	7.65	0.78	1.31

## 5. Gross margins and income of Macedonian farms

The gross margins of the most important crops in the country generally decrease over the years. Overall, this situation stems likely from increasing input prices, and decreasing producer prices. It is important to state that these gross margin results do not include the income from subsidies, which became an important component since 2004.

Table 8 provides an overview of the gross margin calculation for some major crops in 2001 (extracted from Kamphuis and Dimitrov, 2002); weighted averages from FMS in 2005 and 2009;

as well as a recently calculated aggregation of Standard Output in 2009 (calculated by MAFWE for FADN sample determination).

The gross margins of cereals have declined substantially. The index 2009/2001 is particularly low for these crops, primarily due to the low producer prices in 2009. The gross margin of barley, for instance, is just one-fifth of the 2001 level; the five-year average (2005-09) is around 40% lower than the 2001 gross margin. The gross margins of fruits have also decreased in the past period. Apples have the highest gross margins in the Strumica and Bitola regions, ranging from 5 to 6.5 thousand euros/ha in year 2007 and 2008. The gross margins of vegetables have dropped by at least half in the past period, except for cabbage where significant increase is noted. The inputs' and producer prices of these commodities also influenced this decline.

**Table 8. Gross margin calculation for some major crops 2001, 2005 and 2009 and aggregation of Standard Output 2009 (in euros/ha)**

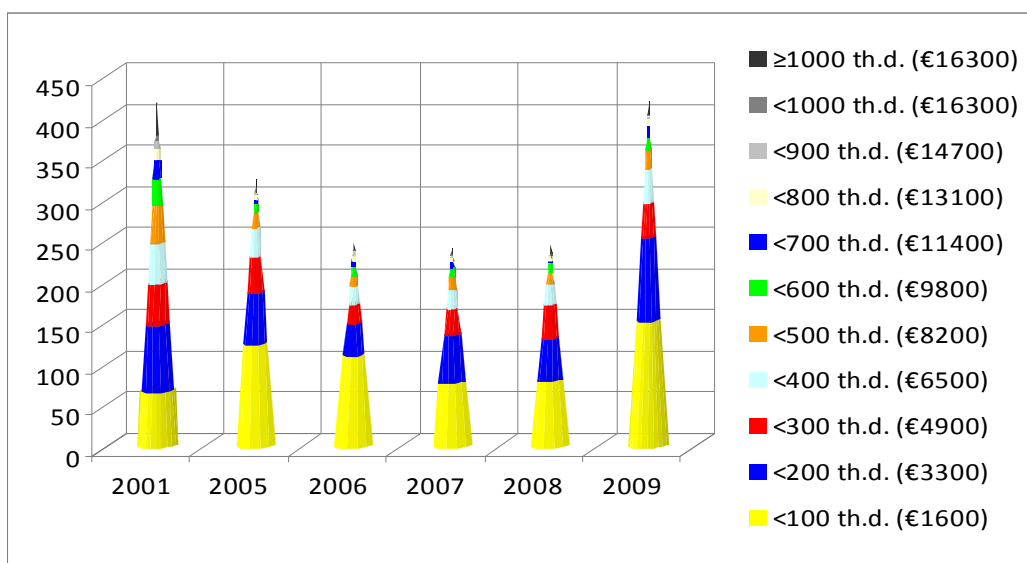
Crops	SGM 2001*	2005	2009	2005- 09	2005/2001	2009/2001	SSO 2009**
Barley	410	211	76	247	0.51	0.19	396
Maize	1,213	679	454	536	0.56	0.37	554
Tomatoes	14,674	4,795	7,424	6,952	0.33	0.51	34,197 <sup>(1)</sup>
Peppers	7,411	3,468	4,380	4,239	0.47	0.59	5,555
Watermelons	4,123	696	2,491	1,114	0.17	0.60	5,555
Potatoes	3,640	1,923	3,029	2,167	0.53	0.83	2,646
Onion	4,544	3,025	4,274	1,961	0.67	0.94	5,555
Cabbage	2,787	3,843	4,666	4,585	1.38	1.67	5,555
Beans	2,163	3,061	1,131	2,180	1.41	0.52	1,421
Apples	4,805	1,853	2,201	3,277	0.39	0.46	3,366
Wine grape	2,459	1,807	1,086	1,278	0.73	0.44	3,316
Tobacco	3,258	3,203	3,501	2,730	0.98	1.07	2,536
Alfalfa	1,668	955	480	623	0.57	0.29	503
Wheat	327	243	100	237	0.74	0.31	544

Source: \* Kamphuis and Dimitrov (2002); \*\* MAFWE (2010)

<sup>(1)</sup> An average SO for group of fresh vegetables, under protective cover: tomato GH, tomato PH, cucumber GH, cucumber PH, cabbage PH, pepper PH (MAFWE, 2010)

The gross margin value of farms has changed significantly during the course of the years. In year 2001, only 16% of the farms had less than 100,000 denars (€1,630) of the total gross margin per farm (figure 6). This percentage has increased to around 36% in the period 2005-2009, meaning that a significantly larger portion of the farms got lower farm gross margin value and relatively speaking the farm gross margin has decreased for a large number of Macedonian farms in the last decade. It is important to stress here that no minimum threshold was set for inclusion of farms in the FMS survey. In addition, holders of very small farms practice agriculture as part-time activity.

Farms with higher gross margins i.e. over 1 million denars (€16,300) had a 10% share in 2001, compared to the relatively low share of 5% in years 2005-2009.



**Figure 6. Number of FMS farms in terms of GM per farm in thousand denars (th.d) and euros**

The average gross margins of farms, region-wise, have shown certain changes over the period 2001-2009. The highest farm gross margin of €5,613 is reached in the Bitola region, followed by farms in the Skopje and Strumica region (table 9).

The farm gross margin per farm size groups, in terms of farm economic size, is understandably higher for larger farms, ranging from €595 for very small farms (with less than 2 ESU) to over €30,103 for medium-high size farms.

The total value of output on all farms is on average €9,238, being highest at sheep, mixed livestock and cattle farms. The specific costs per farm, with regard to its typology, are presented as an average sum of the period 2005 to 2009. Highest costs occur at sheep, industrial crops, cattle, vegetable and mixed farms, whereas grapes and pigs farms are characterized with lowest costs per farm (see table 10). Highest crop specific costs occur expectedly at vegetable and fruit farms, and highest livestock specific costs at sheep, cattle and mixed livestock farms.

The highest gross margin per farm is observed for industrial crops farms (usually growing tobacco), followed by sheep and goat farms, and mixed farms. Vegetable and fruit farms also produce a gross margin that is noteworthy. The lowest gross margin is met at cereals and fodder crops farms.

**Table 9. Average GM per farm, per region and per economic size in 2005-09, in euros**

Region	2005-09	Farm size	2005-09
BIT	5,613	VSF1	595
KUM	3,868	VSF2	3,360
SKP	4,798	SF	6,487
STIP	3,432	MLF1	10,654
STR	4,010	MLF2	15,188
TET	2,575	MHF	30,103
All farms	4,313	All farms	4,313

**Table 10. Per farm total specific costs, value of output and gross farm income 2005-09 (in euros)**

Category	Total value of output (SE131)	Crop specific costs (SE285-305)	Livestock specific costs (SE310-330)	Total specific costs (SE281)	Gross margin (SE131-SE281)
Cattle	10,265	514	6,547	7,061	3,204
Cereals	6,168	1,808	1,427	3,235	2,933
Fodder crops	6,472	1,544	3,336	4,879	1,593
Fruit	9,071	3,980	23	4,002	5,069
Goats	8,217	198	2,341	2,538	5,678
Grapes	4,053	1,541	4	1,544	2,508
Industrial	9,521	2,615	1,697	4,312	5,209
Mixed crop	6,568	1,839	1,212	3,050	3,517
Mixed farm	10,912	1,391	4,280	5,672	5,240
Mixed livestock	12,319	770	6,509	7,279	5,040
Pigs	2,852	258	1,309	1,567	1,285
Sheep	19,031	747	10,946	11,693	7,338
Vegetables	9,250	4,072	176	4,248	5,002
Grand Total	9,238	2,001	2,901	4,902	4,313

The agricultural holdings in the European Union are on average more than seven times the size of the agricultural holdings in Macedonia. The average economic size of EU farms in 2007 was 28.5 ESU, while the Macedonian match for the period 2005-09 was determined to be 3.8 ESU (a previous study on a sample of Macedonian farms determined it at 5.9 ESU in 2004; Martinovska-Stojčeska et al, 2008).

The average utilized agricultural area (UAA) per agricultural holding shows high variability among the 27 EU member countries; only the EU countries in South-East Europe are included in table 11. In this respect, the average UAA/farm is the highest in Hungary with 54.1 ha, and the lowest in Greece with 7 ha in 2004. The average derived from the Macedonian sample farms is 3.1 ha UAA/farm, which is higher than the official statistical mean of 1.37 ha per farm (State Statistical Office, 2007), meaning that the farms included in the sample were slightly larger than

the average. The livestock units per agricultural holding in the EU in 2007 in average reach 25.5, whereas the Macedonian average equals 6.3 LU/holding.

Macedonian farms reach lower wheat and maize yields per hectare than the EU average; according to the FMS data 2005-09, the Macedonian average is 3.2 t/ha for wheat and 5 t/ha for maize; compared to the EU average of 5.2 t/ha for wheat and 7.4 t/ha for maize, respectively. However, Macedonian farmers got higher wheat yields than farmers in the Bulgaria, Greece and Romania; and higher maize yields than farmers in the Bulgaria and Romania (Sergo, 2010).

**Table 11. Comparison of FMS results with EU countries in South-East Europe**

	Economic size (ESU)	Utilised agricultural area UAA (ha)	Livestock units (LU)	Wheat yield (kg/ha)	Maize yield (kg/ha)	Gross Margin (SE131-281)	Gross Farm Margin per ha UAA (SE131-281/025)
FADN code	(SE005)	(SE025)	(SE080)	(SE110)	(SE125)	(SE131-281)	(SE131-281/025)
Bulgaria (2007)	8.1	25.3	8.3	2,074	1,236	12,246	483
Greece (2007)	10.8	7.0	4.4	2,918	11,630	14,246	2,024
Hungary (2007)	22.9	54.1	20.9	3,625	4,057	37,967	702
Romania (2007)	3.0	10.2	5.0	2,180	2,952	6,467	636
Slovenia (2007)	8.7	11.6	12.1	4,358	8,695	12,075	1,044
EU-27 (2007)	28.5	30.6	24.5	5,198	7,352	39,770	1,300
Macedonia (2005-2009)	3.77	3.1	6.3	3,232	4,993	4,313	1,391

Source: FMS Survey 2005-2009 and own calculations based on the FADN public database

The gross margin at Macedonian farm holdings is significantly lower as compared to some of the countries that joined the EU in 2004 (such as Hungary) and closer to the countries that have joined in 2007 (e.g. Romania). Although this analysis lacks data about depreciation and external factors costs, previous studies argue that the margin between the gross farm income (SE410) and the farm net value added (SE415) in Macedonian conditions is small (Martinovska-Stojčeska *et al*, 2008). Namely, land is mostly owned by the farmers; family labour is dominant and seasonal labour is only occasionally hired; and furthermore farmers are rarely using borrowed capital (only 1.46% of the total farms in the country prepared loan application business plan in the past decade, MAFWE, 2007).

Macedonian farms achieve the lowest average value of €4,313, whereas the calculated EU-27 average in 2007 was €39,770 per farm. Linking the farm income to the utilised area, as a land productivity notion, the country has high farm income per 1 ha, only surpassed by Greece.

## 6. Concluding remarks

Having a farm accountancy data system that provides farm income information is without any doubt an important tool for policy analysis and evaluation. In this respect, the Farm Monitoring System (FMS) of the National Extension Agency provides valuable data to determine the economic and technical performance of Macedonian farms. The FMS is now officially providing data for the Macedonian network for collection of accounting data from farms, as defined by Law in 2007. The objective of this network is determination of the farms' annual income, as well as evaluation of the conditions in the agricultural sector and the markets of agricultural products.

FMS data provide a significant outlook of the family farm structure. With regard to typology, mixed farms are an important segment of Macedonian agriculture, given that these farms are small and usually choose a diverse production structure with a wide range of products. Vegetable farms are represented with a relatively stable share, ranging from 11% in 2009 to 15% in 2005; grape farms are present with around 7-8% in years 2001 and 2009 and with 14% in 2005, respectively. Cattle farms have a steady share of 6-8% throughout the years.

Analysed per region, farms in Bitola are regarded as mixed farms, fruit (apple) farms and sheep farms. In Kumanovo the majority of the farms are mixed, with occurrence of specialised cattle farms, cereals farms and sheep farms. Skopje farms are producing grapes as their main crop, since the Vardar basin river being the most important grape area belongs to this region. The Stip region is very diversified featuring mixed farms, grape farms, followed by cattle farms, cereal farms and sheep farms. Strumica region is typical for vegetables. Tetovo region has rather even structure of mixed farms, followed by cereals in the Polog plain and sheep farms.

The average number of hectares per FMS farm is around 3-3.5 ha, higher than the statistical average of 1.37 ha (SSO, Ag. Census, 2007). Most of the farms included in the FMS survey 2005-2009 belong to the very small farms category of economic size. The largest share of farms are those with farm gross margin of less than 2 ESU (VSF1). This structure remained stable throughout the years and no significant changes occurred.

The gross margins of the most important crops in the country generally decrease over the years. Overall, this situation comes mainly as a result of the increasing input prices, and decreasing producer prices. It is important to state that these gross margin results do not comprise the income from subsidies, which became an important component since 2004.

The highest gross farm margin is noted at industrial crops farms (usually growing tobacco), followed by sheep and goat farms and mixed farms. Vegetable and fruit farms also produce a gross farm margin that is noteworthy. The lowest gross farm margin is met at cereals and fodder crops farms. The farm gross margin ranges from €595 at very small farms to over €30,103 at medium-high farms.

The agricultural holdings in the European Union are on average more than seven times the size of the agricultural holdings in Macedonia. Macedonian farms reach lower wheat and maize yields than the EU average. The gross farm margin at Macedonian holdings is significantly lower as compared to some of the countries that joined the EU in 2004 and closer to the countries that joined in 2007.

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