Macedonian agriculture

- Preconditions for development of the agro-sector in Macedonia towards EU accession

Leida Sergo

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Supervisor: Yves Surry, Swedish University of Agricultural Sciences (SLU), Department of Economics

Assistant supervisor: Aleksandra Martinovska-Stojčeska, University Ss Cyril and Methodius – Skopje (UKIM), Institute of Agricultural Economics

Examiner: Clas Eriksson, Swedish University of Agricultural Sciences (SLU), Department of Economics

Swedish University of Agricultural Sciences
Faculty of Natural Resources and Agricultural Sciences
Department of Economics

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Leida Sergo

Abstract

The focus of the thesis is: how conditions for agriculture in the Republic of Macedonia today may form the basis for development of the agricultural sector towards conditions needed for future accession into the European Union. The method for investigating this question has been to look at newly available farm monitoring system (FMS) data from Macedonia. Also to look at the latest government policies created in the country for the agricultural sector and rural areas in relation to the requirements for EU accession. Articles and empirical studies published by other authors related to the questions which arise in this study have been reviewed and presented herein. Trade relations, trade patterns and national economic and agricultural trends are displayed to provide a background overview for the study of the agricultural sector. Improved competitiveness of the agricultural production sector and sustainable income sources and livelihoods for people in rural areas are interrelated questions. The types of farming which reveal the highest amounts of gross margin according to the used FMS sample from the years 2005-2008 are presented. The main agricultural exports reveal potential in some of the regions in the country and regional descriptions based on the sampled farms are presented. Gross margins for the different regions and types of farming per farm are presented to show suggestions for how the agricultural sector may increase competitiveness. Competitiveness is needed to be able to compete with other European producers in the European Union's single market which is needed when a significant share of Macedonia's GDP comes from agriculture. Wine, sheep, vegetables and fruit production are interesting for some areas of Macedonia. Mixed farming or mixed plant farming appear to be the most viable types of farming in areas where risk diversification may be needed due to climate conditions and fluctuating input and output prices.

Sammanfattning

Fokus for den här uppsatsen är: hur förhållandena för jordbruket i Makedonien idag kan ligga till grund för utveckling av jordbrukssektorn för de förutsättningar som krävs för ett framtida inträde i den Europeiska Unionen. Metoden för att utforska frågeställningen har varit att ta del av ny data från Makedoniens "gårdsdatainsamlingsprogram" (FMS). De senaste statliga policy dokumenten relaterade till jordbrukssektorn och EUs krav för medlemsskap har också gåtts igenom. Artiklar och empiriska studier som har publiserats av andra författare i de frågor som är av intresse för studien presenteras i kapitel 3. Handelsrelationer, handelsmönster och nationalekonomiska och agrara trender visas för att ge en bakgrund till studien av jordbrukssektorn. Förbättrad produktivitet i jordbruket och långsiktigt hållbara inkomstkällor for landsbygdsbefolkningen är frågor som hänger ihop. De produktionsinriktningar inom jordbruket som visar på högst marginaler mellan sina rörliga inkomster och kostnader är presenterade, enligt den data som har undersökts för åren 2005-2008. Makedoniens främsta agrara exportvaror visar på produktionsfördelar i några av landets regioner och de olika regionerna är beskrivna utifrån den data som har använts. Inkomstmarginaler för de olika regionerna och de olika produktrionsinriktningarna, per gård, är beskrivna för att ge förslag på hur jordbrukssektorn kan få ökad konkurrenskraft. Ökad konkurrenskraft krävs för att kunna konkurera med producenter på EUs interna marknad, vilket är relevant då jordbruk står för en signifikant andel av Makedoniens BNP. Vin-, får-, grönsaks- och frukt-produktion har potential i olika regioner. Djurhållning blandat med produktion av grödor och blandad produktion av olika grödor verkar ge störst avkastning där riskdiversifiering behövs på grund av klimatförutsättningarna och fluktuerande insatsvaru- och produkt-priser.

Abbrevations

CAP: **Common Agricultural Policy of the European Union**
ESU: **European Standard Unit**
EU: **European Union (*Austria*, *Belgium*, Bulgaria, Czech Republic, Cyprus, *Denmark*, Estonia, *France*, *Finland*, *Germany*, *Greece*, Hungary, *Ireland*, *Italy*, Latvia, Lithuania, *Luxembourg*, Malta, *the Nederlands*, Poland, *Portugal*, Rumania, Slovakia, Slovenia, *Spain*, *Sweden*, *United Kingdom*)**
EU-15:   **in *italics* under "EU"**
FADN: **Farm Accountancy Data Network**
FDI: **Foreign Direct Investments**
FMS: **Farm Monitoring System**
GAP: **Good Agricultural Practice**
HACCP: **Hazard Analysis and Critical Control Points**
MAFWE: **Ministry of Agriculture, Forestry and Water Economy of the Republic of Macedonia**
MKD: **Macedonian denar**
NEA: **National Extension Agency of the Republic of Macedonia**
New member states (EU):   **in bold (and not italics) under "EU"**
UN: **United Nations**
UKIM: **University Ss Cyril and Methodius - Skopje**
Western Balkans: **the group of countries which are former Yugoslav countries but not members of the EU and in an EU context usually Albania is included, otherwise it means Bosnia and Herzegovina, Montenegro, Croatia, Macedonia and Serbia (Rednak, 2008).**

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1 Introduction

Former Yugoslavian Republic of Macedonia herein called the Republic of Macedonia or Macedonia, is a transition economy that received candidate status to the European Union (EU) in 2005 (www, EU, 2009, 1). Reforms in the agricultural sector among other changes are needed to fulfil EU requirements for Macedonia to enter into negotiations for membership in the EU (MAFWE, 2008). It is therefore of interest for policy makers, agriculture advisors, researchers and other actors in the agricultural sector to get a good knowledge about today's situation to plan for fulfilment of policy goals in the reform process.

1.1 Problem background

Macedonia is a country with a multicultural population with part of the Macedonians living outside the country borders in neighbouring countries and people from neighbouring countries' ethnic groups living in Macedonia. The second largest ethnic group after the 64.2 % Macedonian population share is Albanian with 25.2 % share in the 2.02 million total population according to year 2002's population census data (www, SSO, 2009, 1). The total population today according to 2008 year data is 2.05 million (www, SSO, 2009, 2). Macedonia obtained independence from the Yugoslavian republic peacefully in 1991 (UD, 2006).

The Ottoman Empire is one of the main forces which have ruled the Macedonian lands historically. During that rule most of the regions in the empire were focusing on agricultural production (Inalcik and Quataert, 1994). The effects on the situation today are shown through the 12 % share of agriculture value added to the GDP of 2007 in Macedonia (www, WB, 2009, 1). The Socialist Federal Republic of Yugoslavia had private agriculture in contrast to most of the other Eastern European countries in the time period before independence (Kekic, 2001).

The country is located in a region with horticultural farming as the main farming system (FAO, 2008). The climate is influenced by Mediterranean, mountain and continental climate conditions since the country is landlocked but situated close to the Mediterranean Sea (MAFWE, 2008). The summer and autumn periods are warm and dry and the winters can bring a lot of snowfall (MAFWE, 2007). Special conditions affecting the production possibilities are droughts and the risk for temperatures below zero in the late spring and early autumn time periods (MAFWE, 2008). Mountains and lowlands are present in the country and 48.8 % of the land area was agricultural land in year 2005 (www, WB, 2009, 1). The country borders Serbia and the UN controlled Kosovo area in the north, Bulgaria in the east, Greece to the south and Albania to the west.

The political situation has been peaceful since the 2001 internal conflict initiated by armed Albanian groups from NAL (National Liberation Army) was solved (www, UD, 2009, 1). A goal for the country is to join the European Union and the candidate status received in 2005 has initiated national and EU supported work and projects to reform different government structures (MAFWE, 2008). New laws and policies to meet EU standards for agricultural practices, output quality and sustainability have been introduced in Macedonia. The implementation process has formed new institutions and new information to be available for policy decisions (*ibid.*). Instruments for Pre-Accession to support the development of institutions and to finance projects which aim to align Macedonian conditions towards those required by the EU came into use in 2007 (EC, 2009). IPARD funds are the pre-accession

funds for rural development which aim to support projects for development of sustainable livelihoods in rural areas in line with those required by EU policies (*ibid.*).

1.2 Problem

The challenge when EU accession is a goal is to change the agricultural sector towards sustainable practices which can bear the increased competition that EU accession may result in (Dimitrievski and Kotevska, 2008; Erjavec and Dimitrievski, 2004; MAFWE, 2007). Openness to trade in Macedonia has already increased the inflow of imported substitutes competing with national products (Hall *et al.*, 2001).

The focus of the thesis is: how conditions for agriculture in the Republic of Macedonia today may form the basis for development of the agricultural sector towards conditions needed for future accession into the European Union.

Production that has advantages today in Macedonia may need to be improved and areas with less favourable conditions for agricultural production may need to change activities towards commodities or farm structures which could be profitable and sustainable for those areas. This study is of interest to analyze newly available farm monitoring system (FMS) data, and to see how the preconditions are before changes can be implemented according to recently adopted policies for agricultural and rural development. Increased competitiveness for the agricultural sector and the food processing industry may be reached through investigating which products reveal beneficial production conditions. This study will focus on the agricultural sector but will not include the forestry and fishery sub-sectors.

The importance of agriculture in the economy gives a reason to investigate the advantages which may be used further to promote growth in the agricultural sector. Rural income levels need to increase through sustainable income activities which are adapted to different regional conditions. Performance data at micro level is not available through general accounting practices for private farms. It is not mandatory in Macedonia for private farm enterprises or family farms to keep accounting records. Therefore farm monitoring system (FMS) data is used to analyze the farm performances. The goal is to extract information about which types of farming reveal the largest gross margins. The gross farm income also called the gross margin is the difference between variable costs and the output from produced goods. FMS datasets are available for six different regions of the country. The regional perspective is useful to relate the analysis to the different agro ecological preconditions and it is of interest to know what different agricultural and rural development paths may be available in the different regions.

Since modernization of the supply chains is under way it is relevant to see what types of farming may have large potentials for export and trade on the future EU single market. EU membership will be granted for countries in the Western Balkans when they fulfil pre-accession requirements according to an EU – Western Balkan summit agreement in Thessaloniki 2003 which was settled before Macedonia received candidate status in 2005 (UD, 2006; Montanari, 2005). The EU accession process in Macedonia is taken as a given aim since national policy changes aim to comply with EU membership requirements.

1.3 Aim

The aim of the project is to analyze the farming sector in the Republic of Macedonia. The present conditions are investigated and six regions of the country are compared. The types of farming present in the country are analyzed to reveal which types of production that may

sustain future competition in the EU single market. It is also of interest to see in which regions that different types of production reveal advantages. The next step is to analyse the potential for changes in farming practices to reach national goals for the agricultural sector and for rural development. The national goals linked with plans for accession to the European Union have formed the basis for agricultural and rural development policies so changes in these areas will need to take place in preparation for negotiations about future EU accession (MAFWE, 2008).

The objective of the study is to get a clear picture of Macedonia's agricultural situation. Potential development paths are analyzed for the different regions towards development of the agricultural sector and the rural areas. The data available from farm accountancy data network (FADN) type data collected through the FMS in Macedonia will be used to see which types of farming provide the most farm income in which regions. Crops grown, income and cost structure are available data from the FADN type data surveys and farm income and performance is calculated from these sets of data. Farm performance will be analyzed in terms of gross margins related to types of farming in Macedonia and sizes of the farms. The policy environment is described herein to be able to analyze what development potentials that may be available for the rural areas.

The next section describes the outline of this study followed by a chapter describing the used method for this study.

1.4 Outline
The outline of this thesis is displayed in Figure 1. The sizes of the included boxes describe the amount of information provided by each chapter (chapter 1-7) and chapter descriptions follow after the figure.
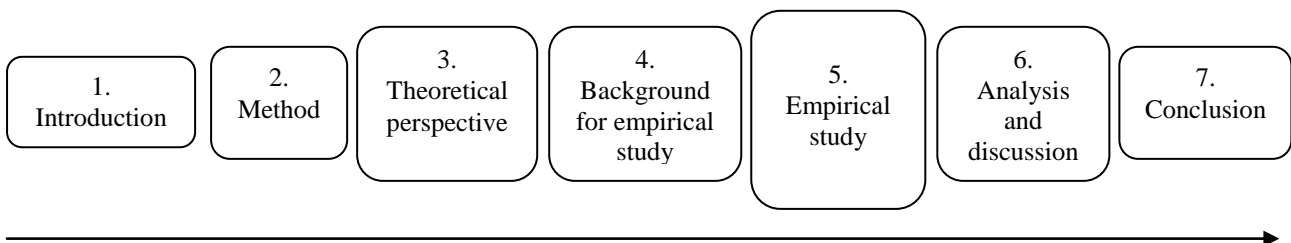
Figure 1. A graphical illustration of the thesis outline.

- Chapter 1 provides a broad background for the study.
- Chapter 2 mainly describes the method that is used.
- Chapter 3 describes previous research conducted within the questions that are expected to come up related to the problem formulation for this study within development both of the agricultural sector and rural areas. The chapter also includes information available about the development of Macedonia's trade position, relations to the EU and the potential for rural development.
- Chapter 4 describes further what conditions the study is conducted within and includes more information of Macedonian trade relations and historical events. Surrounding national economic conditions are included too.
- Chapter 5 includes empirical information and the field data and national policy references used for this study are displayed both in tables and writing. First the findings are displayed in aggregate numbers for all farms in the sample per the

different regions, farm sizes and the different types of farming. Then the types of farming which are represented by the most observations in the regions are investigated further followed by some comparisons to some EU country average values. The chapter is concluded with a focus on the latest agricultural and rural development trends in Macedonia.

- Chapter 6 analyzes the findings and develops the arguments which can be stated about the conditions today in Macedonia and potential development paths.
- Chapter 7 states the conclusions which can be drawn related to the problem formulations presented in Chapter 1. The epilogue including future research suggestions followed by the bibliography conclude this thesis.

2 Method

This chapter provides information about the method used to conduct the study. This thesis includes economic analysis of policies and FADN type data from the FMS of the Republic of Macedonia. The strategy is to search for viable opportunities and areas where changes need to be implemented. National policy documents are reviewed to analyze steps that have been taken so far. The study is descriptive to provide information about different types of farming in Macedonia. The membership requirements on Macedonia from the EU are normative for this study. Development is discussed and the meaning of the concept is herein assumed to be increased incomes from sustainable income sources and opportunities.

Data on farm performance is collected all over Europe in the Farm Accountancy Data Network (FADN) system to get information from a representative amount of farms in every EU member country (www, EU, 2009, 2). The data is categorized by the farms' economic size, main farm practice on the farms and region in the country (*ibid.*). These farms represent the countries and provide data which can be used by EU to form policies towards agriculture for example through the Common Agricultural Policy (CAP) (www, EU, 2009, 3). Systems to ensure correct transfers on money as farm support need to be created in Macedonia to comply with the CAP policy (MAFWE, 2008). Farm accounting data is collected annually throughout the European Union for the FADN. The Republic of Macedonia has collected FADN type data since 2001 to provide data over Macedonia's agriculture and to develop the system of data collection (*ibid.*).

The Farm Accountancy Data Network (FADN) was established among EU members in 1965 to provide additional statistical information to complement the statistics already collected for the EUROSTAT database (Doluschitz *et al.*, 2004). Farms in the FADN are commercial and over specific economic size limits which vary among different countries. Economic size is measured in European Standard Units (ESU) which changes over the years. One ESU is EUR1200 of gross margin (income from farm output – specific costs) for the studied time period (Doluschitz *et al.*, 2004; www, EU, 2009, 4). The data sets, collected nationally in the EU member countries, are sent to regional institutions, which in turn send it to national coordinating bodies (Doluschitz *et al.*, 2004). The samples are selected at national or sub national levels and national data sets are sent to the European Commission (Doluschitz *et al.*, 2004).

FADN type data for the years 2005 until 2008 from the National Extension Agency (NEA) of the Republic of Macedonia are analysed in this study to describe the prevailing situation in the agricultural sector. The data is collected through the Farm Monitoring System (FMS) which was established in Macedonia by European and Macedonian experts before the first use of the system in 2001 (Kamphuis and Dimitrov, 2002; Doluschitz *et al.*, 2004). The FADN system must be in place before accession to the EU (Doluschitz *et al.*, 2004). One motive for the use of FADN data for this study is that the data sets provide farm performance data which has not been available earlier. Farm level data has been scarce and this study includes the latest contributions to the sets of annual data. Meaningful time series and regional analyzes may be put together now when the number of annual data sets has increased.

FMS data used for this thesis is collected among private farms and not among agricultural enterprises (Cadikovska, 2008). Private family farms own or lease approximately 80 % of the cultivable lands (Ministry of Finance, 2009). Agricultural companies are usually former state farms which have been bought from the state by private enterprises, but they lease their lands

from the state and use approximately 20 % of the arable lands (Dimitrievski and Kotevska, 2008; Ministry of Finance, 2009). This implies that the FMS aims to represent 80 % of the land used for farming in Macedonia.

Problems with this data source in the start up period in 2001/2002 resulted from lack of time for double checking the data quality and lack of computerized methods to process and control the data (Kamphuis and Dimitrov, 2002). The farm data from the first FMS round were not weighted due to their size and representativeness in the sample, according to the true situation in Macedonia (*ibid.*). The improvement of representativeness is still under development to create a more reliable future sample (*ibid.*). The representativeness of the data for describing the regions and the different types of farming may be weak before the data sample has been updated according to the last Agricultural Census conducted in 2007 (Cadikovska, 2008). The sample farms change over time due to different reasons and the new farms included in the sample change the representativeness of the sample. The real situation is not presented, even though the farms change within the same regions (Kamphuis and Dimitrov, 2002).

As the guidelines for FADN data principles describe on the European Union's homepage about the method, there may be problems with getting fully random and statistically valid samples, since the farms participate voluntarily and since not all farms have the right data available (www, EU, 2009, 2). Accession to the FMSs takes place spontaneously among farms regionally which for example search for advisory services and due to these constraints it is hard to receive a sample that is constant over time (Paris and Arfini, 1999). Farms may also participate during a compulsory time period and then drop out of the sample while other new farms are included (*ibid.*). This is a concern for all countries collecting data for the FADN system (*ibid.*).

The values received from the NEA are collected annually and presented in nominal terms in Macedonian denars (MKD). The data is semi quantitative semi qualitative/case based due to the incomplete representativeness of the sample farms. Farms with zero farm income or zero reported total costs are excluded from the calculations conducted with the received data. The sample is not constant to begin with, and some farms have data presented in one year but change into having zero farm income for a following year. In the case when they still are in the sample, it affects the share of the sample which may be used for calculations. The quality of data for farm observations that are included affect the share of the sample that can be used, and how much of the sample that is changed, under the condition that the sample size should be kept as large as possible. As mentioned in both the PACIOLI 6 Workshop report and Martinovska-Stojčeska and Dimitrievski (2009) there is a need to ensure that anomalies are detected. Systems for their detection need to be set in place especially for accuracy of the feedback given to the specific farms in the sample on how their farms have performed over time (Paris and Arfini, 1999). Another information part which is not included in the FADN method is the quantities of used inputs and techniques used for production on the farm, for example when harvesting crops (*ibid.*). The NEA in Macedonia collects data for the FMS among farms that they provide with advisory services and they require accession to the system to provide the advice (Ilievska and Kostov, 2005).

Problems with using the FADN data for general analysis of agriculture exist but it is the only harmonized farm accountancy system which is used all over the EU (www, EU, 2009, 3). Therefore it is the second best solution to easily access farm output data. The data may be used with caution to analyse and compare agricultural activities in different EU and pre-accession EU candidate countries. The best solution would be to use more detailed and

statistically random data (but still by regions, farm economic size and types of farming). Since this type of data is used for analysis of the effects of the EU CAP, it is herein assumed to be good enough for analysis of the regions in Macedonia to look at the present conditions and recent historical trends in agriculture. To ensure reliability when using the sampled observations, decision rules for which farms in the sample that have been included in the calculations have been chosen, and each of those are described in this method chapter.

The averages presented in this study are not weighted and extrapolated to represent the country as a whole, but the results represent the farms in the sample. Comparisons to how well the sample represents the national population of farms according to the 2007 Agricultural Census of Macedonia will be presented herein with few comparison measures. This approach is used to avoid exaggeration of the ability to generalize the results. This Macedonian FMS is still accepted, among EU representatives, as a good start for the future implementation of the FADN in Macedonia (MAFWE, 2007). The data received from the National Extension Agency (NEA) is specified in Table 1.

Table 1. Headings for data in the NEA of Macedonia FMS output translated to English (NEA, 2009).

Income crop							
Region	Advisor	Farm ID	Code crop	Ha/crop	Farm yield	Unit price	Per ha yield
Income livestock							
Region	Advisor	Farm ID	Code livestock	Months of age	Number of head	Farm income	Per head income
Costs crop							
Region	Advisor	Farm ID	Code crop	Ha/crop	Code cost item	Farm cost value	Per ha cost value
Costs livestock							
Region	Advisor	Farm ID	Code livestock	Months of age	Number of head	Code cost items	Farm cost value	Per head cost value

Calculated data based on the NEA base data presented by headings in Table 1 are categorized by the headings shown in Table 2. These headings help to analyze the FMS data according to FADN methods also at the Institute of Agricultural Economics in Skopje[1] (Faculty of Agricultural Sciences and Food), Macedonia at University Ss. Cyril and Methodius in Skopje. The codes for crops, livestock and cost items are gathered into a codebook. The codebook is also completed with type of farming per farm after calculations according to FADN methods, adapted to Macedonian conditions, in a separate Excel work sheet. All calculations are conducted in Excel by first entering all data into database sheets for costs, incomes and gross margins. Then "Pivot tables" are created which give easy access to all combinations of the available database values and headings. The "type of farming" headings are adapted to Macedonian conditions which is a common practice among EU member countries for the national FMSs (Martinovska-Stojčeska, 2009, pers. mess.).

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[1] In the research project 2008-2010: Cost of production for Macedonian agriculture using FADN data, conducted by A. Martinovska- Stojčeska, Y. Surry, D. Dimitrievski and H. Andersson, within the framework of the SIDA funded UniCoop project between the Department of Economics at the Swedish University of Agricultural Sciences (SLU) and the Institute of Agricultural Economics, Faculty of Agricultural Sciences and Food, University Ss Cyril and Methodius - Skopje (UKIM).

Table 2. Data headings for FADN calculations.

Title crop	Title livestock	Livestock units (LU)	Farm income crops/livestock (ls)	Per ha income	Per LU income
Title cost items crops/livestock (ls)	Per LU cost value	Gross margin (income – costs)	Total specific costs crop/livestock (ls)	European Standard Units (ESU)	Farms size categories (related to ESU)

European standard units are calculated to compare economic sizes of farms when crop and livestock specific costs are subtracted from incomes. The data from the NEA is in Macedonian denars (MKD), and the ESUs are calculated by transforming the MKD into Euros and dividing by 1200, according to the EU standard for calculation of ESUs. The conversion rate for the Macedonian denar (MKD) versus the Euro that is used herein is 61 MKD = €1 and according to recent data for the investigated years it is a stable approximate average (Ažderski *et al.*, 2009, table 2).

Type of farming (TF) is also calculated for all sample farms by the criteria described in Table 3, in line with the FADN method but with categories adapted to the Macedonian conditions. The gross margin (GM) between direct variable incomes and costs per farm is the base for these calculations.

Table 3. How type of farming (TF) is calculated.

Type of farming	Method
Bees	total bees GM is greater than 2/3 of the total farm GM
Cattle	total cattle GM is greater than 2/3 of the total farm GM
Cereals	total fodder GM is greater than 2/3 of the total farm GM
Fodder crops	total fodder GM is greater than 2/3 of the total farm GM
Fruit	total fruit GM is greater than 2/3 of the total farm GM
GM=0	the farm total GM is zero (0)
Goats	total Goats GM is greater than 2/3 of the total farm GM
Grapes	total grape GM is greater than 2/3 of the total farm GM
Industrial	total industrial GM is greater than 2/3 of the total farm GM
Mixed farm	total livestock GM and total crops GM are less than 2/3 of the total farm GM
Mixed livestock	total livestock GM is greater than 2/3 of the total farm GM
Mixed plant	total crops GM is greater than 2/3 of the total farm GM
Pigs	total pigs GM is greater than 2/3 of the total farm GM
Sheep	total sheep GM is greater than 2/3 of the total farm GM
Vegetables	total vegetables GM is greater than 2/3 of the total farm GM

There are six regions specified in the FMS data from the NEA but the State Statistical Office (SSO) of Macedonia presents data divided into 8 regions which are not the same as in the FMS (www, SSO, 2009, 1). The FMS regions were chosen during the establishment of the system to represent different agricultural regions of the country, and the regions are organized around the NEA's regional offices (Kamphuis and Dimitrov, 2002). The regions are Bitola (BIT), Skopje (SKP), Stip (STIP), Kumanovo (KUM), Tetovo (TET) and Strumica (STR)[2].

Data errors which have been recognized have been corrected through new contact with the data collectors. Technical matters as errors in column headings have been corrected by

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[2] See Figure 13 for the location of these six regions.

assuming that the format has to be as it has been in other data sheets which have been received from the NEA. A detail which does not match the methods in the FADN-coded calculations is that manure is included as a fertilizer. Manure is included in the fertilizer costs since it is unsure if it is either bought from other farms or measured as a cost but produced on the own farm, in every case farm. The most accurate way to conclude the farm direct costs has therefore been to include costs for manure into fertilizer costs (Martinovska-Stojčeska, 2009, pers. mess.). Another more significant difference to other data sources used for FADN calculations within the EU is that data on depreciation, average annual work units and fixed costs are not available since they are not collected and reported by the NEA.

Average cost of production per kilogram, for different crops included in the farm sample, was in the first step calculated through calculating average yield per crop for all farms with reported yields over zero for each crop. The next step was to calculate the average of per hectare costs per farm from those farms that had reported costs over zero. Then the average costs per hectare were divided by the average yields per hectare resulting in the most representative value for costs of production per kg for the different crops. Average farm gate prices for the produced crops were calculated through calculating an average of prices per kg for farms with reported prices over zero for the included crops. This was done by adding up all per farm unit prices for a crop, from farms with sufficient data, and dividing that sum by the number of farms in the specific calculation. The regional data numbers and all averages of gross margins include values for farms which have reported values over zero. Some farms have reported zero costs or zero unit prices for some yields for some production types and those values are not included in the calculations for specific crops. As mentioned earlier in this chapter, the zero total farm income and zero reported total farm specific cost farms in the NEA sample are excluded while the other farms are included for calculations of unweighted averages. Costs, income and gross margins per hectare and livestock unit (LU) are calculated from regional yearly averages for all farms with reported data, divided by average hectares and LUs for the regions and years displayed in the tables. Livestock units are used to make different species more comparable. For example 1 LU=cow or 10 sheep, according to the FADN method, while bees and bee hives are not measured in LUs but make up a category among the Macedonian types of farming.

The analysis is conducted at the whole sample level and for the regions present in the data sets. The regions with too few sampled farms for some types of farming are not analyzed as much as the regions with larger samples of farms for specific types of farming, since the representativeness is weaker with less sampled farms. The literature and information sources which are reviewed are limited to references in English and hence no Macedonian language literature is used. Values on crop incomes, costs and gross margins per hectare for Macedonian farms from 2001/2002 and 2004 are extracted from other reports. These reports have analyzed FMS data from Macedonia but those data sets have not been available during the work period for this study.

The alternative method to use for this broad analysis of the agricultural sector could be to look at the Agricultural Census report from 2007 together with the SSO's yearbooks much more in detail and use more price information and total area per crop in the country (www, SSO, 2009, 3; SSO, 2008). An article written by Hynes, Karyn and O'Donoghue (2006) describes how the authors have developed a model to coordinate national farm survey data in Ireland with the Irish census of agriculture. The FMS in Macedonia would be the data up for coordination with Macedonia's Agricultural Census but as mentioned above the difference in

regions used by the SSO and the NEA may create obstacles to overcome before that kind of matching can be possible.

The expected results are to see that some production branches reveal larger gross margins and consistent incomes in some regions of the country. The farm sizes are expected to be small and focused on the same products that are exported from Macedonia. The policies are assumed to be directed towards EU accession as a goal and the study of these may show how far the process has come.

3 A theoretical perspective

To describe the present conditions, how they have evolved and what the consequences are many components are important. The goal is to describe the preconditions for development of the agricultural sector and the rural areas. Therefore section 3.1 in this chapter starts with comparisons to some other newly accessed EU member countries. A regional description of trade with geographically close countries to Macedonia is conducted. Section 3.2 describes Macedonian conditions in relation to the EUs requirements for candidate countries in the pre-accession period. Section 3.3 describes opportunities for agricultural and rural areas generally and related to Macedonian conditions.

3.1 Trade conditions for newly accessed EU countries related to Macedonia's conditions

Comparative advantage is used for comparison of trade trends and potentials between different countries and Balassa (1965) is usually cited as the original source for these analyses. See for example Katz, Bruneau and Schmitz (2008) where Balassa's methods are modified to be used for estimation of regional comparative analysis for specific agricultural sub-sectors. Revealed comparative advantage is used to analyze actual trade flows as in the following case example including Hungary and Slovenia in section 3.1.1. This thesis will include a regional approach for Macedonia which will not include the above-mentioned method due to lack of specific regional trade pattern data. It will therefore be a comparative analysis section included but not along the traditional comparison methods. The comparison will be made through comparing gross margins for different types of farming and regions as described in chapter 2.

EU accession has resulted in increased trade volumes for new EU member states, but some Balkans and Central Europe countries have experienced a shift from being a net agro-food exporter to a net importer. As an example this is the case for Bulgaria in 2007 while Poland has become a net exporter after year 2002 (Bojnec and Ferto, 2009). Bulk raw agricultural food products are exported from the newly accessed EU countries into the former EU markets in larger quantities than what the former EU market exports the same type of produce into the newly accessed EU countries (*ibid.*).

3.1.1 Example of Hungary and Slovenia

Research about Hungary and Slovenia shows, that Hungary produces groups of commodities which have revealed comparative advantage towards the EU-15 market. Slovenia does not have revealed comparative advantages in trade with agricultural commodities with the EU-15 market within the EU common market (Bojnec and Ferto, 2006). The consequences are assumed to be continued trade in the advantaged product groups for Hungary and restructuring of the production of the disadvantaged commodities towards other income sources for the rural communities (*ibid.*). Slovenia will need to mainly focus on diversified agricultural practices. These could be organic farming and specialized products, alongside more non-agricultural entrepreneurship in the rural areas and off-farm income sources together with more tourism to increase rural income levels (Bojnec and Ferto, 2006). The reviled comparative advantage calculations have not been made for Macedonia. And the revealed comparative advantage calculations are based on actual trade quantities, which require availability of the appropriate data. The two country cases provide examples of which alternatives that are available to develop the agricultural sector and the rural areas. Hungary

and Slovenia show what could be made with and without advantaged agricultural production sub-sectors, while it will be influenced by local opportunities and conditions in Macedonia.

3.1.2 Regional and international trade relations

The former Yugoslavian market included over 20 million people but independence for Macedonia resulted in today's 2 million people national market. Conditions for Macedonian producers have changed radically due to different political changes during the last decades. Trade cooperation agreements were settled between Macedonia and the EU in 1996, but trade with agricultural and industrial products was restricted (Montanari, 2005). The Stabilization and Association Process (SAP) agreements were launched for the Western Balkans in year 2000 at a summit in Zagreb (*ibid.*). These put forward conditions that the Western Balkan countries have made a commitment to follow to prepare for EU accession summarized by the "Copenhagen Criteria" from 1993 (*ibid.*). The Stabilization and Association Agreement (SAA) that Macedonia has towards the EU, signed in 2001, is a formal contract taking the process towards EU accession further (*ibid.*). Western Balkan countries have received access to the EU markets with few limits and in agricultural goods there have been quotas for a part of wine, beef and fish products (Montanari, 2005). The EU Commission decided in 2006 that the Copenhagen criteria must be fulfilled by Western Balkan countries before accession and it covers political, economic and legislative alignment with the EU (Ministry of Finance, 2009).

More trade creates dependence among trade partners to uphold the possibilities for economic gains from trade and it nourishes peaceful relations, cooperation and more stabile politics (Tasic, 2007; Montanari, 2005). Balkan exporters have focused on trade with the EU in belief that the largest opportunities are available accordingly. Regional trade still bares further potential for expansion as described by Tasic (2007) in an econometric analysis of the convergence of price levels in the Balkan region. The price levels in the Balkans have yet to converge. Nontariff barriers as lack of information of trade opportunities and bureaucratic routines have limited the speed of that process (Tasic, 2007). There may be a need for governments in the Balkans to promote regional trade. Not only to liberalize the trade possibilities but to inform about them and make administration of trade and business transactions easier is of importance (*ibid.*). The potential may therefore be realized by Macedonian producers and foreign investors in the coming years. A stable investment climate attracts foreign direct investments (FDI), and increased trade with the EU may provide more investor confidence to the Western Balkan region (Montanari, 2005).

Trade between the Western Balkans and the EU is largely influenced by the distance to trading partners, and exports from Greece to Macedonia are exceeding its estimated trade potential according to Montanari (2005). There is a potential for expanded trade between Macedonia and the EU market and also on an average level (Montanari, 2005). The EU allows largely free trade of goods from the Western Balkans into the EU while the Western Balkan countries have gradual increase of inflow of EU goods (*ibid.*). Still the EU may benefit from the trade relation due to the positive trade balance towards the Western Balkans and stronger markets may lead to increased future EU exports into the area (Montanari, 2005).

The examples set by Romania and Bulgaria show that policies for expanded exports from these countries into the EU while gradual increase of EU imports to these countries expands the trade potential (Montanari, 2005). Romania and Bulgaria have expanded their exports to the EU more than the EU has fully expanded their export potential towards these countries (Montanari, 2005). This implies that policies matter for the Western Balkan countries, Macedonia included, to increase exports and overall trade (*ibid.*). Macedonia is compared to

those countries since all three were affected by the Yugoslavian conflicts even though neither country was involved directly in war (*ibid.*). This emphasizes that the policies and distance to trade partners has mattered for how trade patterns have developed after the trade disrupting conflicts took place (*ibid.*). The new EU member states which joined the EU in 2004 and 2007 generally experienced increased trade in the time periods before and after accession due to free trade agreements, and the EU membership (Herderschee and Qiao, 2007). The pre-accession agreements have for example been the Europe Agreements between the Central and Eastern European countries (CEECs) and the EU (Montanari, 2005). Trade during these agreements generally increased EU exports more than EU imports, for total trade (Herderschee and Qiao, 2007).

The common characteristics of the Western Balkan countries are the small farms alongside the state-owned enterprises, low productivity and low competitiveness due to outdated processing facilities in the food supply chains (Rednak, 2008). Reformation plans in the food supply chains are part of the plans to increase competitiveness to prepare for EU accession. Lack of appropriate data over the farm sector situation has been a problem for reform planners (Rednak, 2008). One of the challenges with adjustment to EU data methods is to compile data according to the EUROSTAT standards (*ibid.*).

Evidence from Bulgaria, Romania and other newly accessed EU countries suggest that the EU single market provides opportunities to improve agricultural production. This comes through financial support measures and competition which increases the demand for quality goods (Bojnec and Ferto, 2009). Meanwhile the challenge is to develop the supply chains, the growth in number of and growth in agro businesses is largely up to investments, in the rural areas. Rural development may come from the possibility to diversify the agricultural products supplied and sustained competitiveness of the traditional products (Bojnec and Ferto, 2009). Support from EU may support development but which measures that may be available are described further in section 3.2.

3.2 Targets in the EU accession process

EU member states have national manuals for farmers about how to apply for farm support which include what conditions that must be fulfilled to be eligible for support. The criteria will change when the CAP is changed after 2013 depending on the EU budget structure and the share that will be allocated to agriculture. Environmental services provided by farmers, rural development measures and food quality concerns will probably increase in importance to be eligible for future support measures.

3.2.1 EU's Common Agricultural Policy (CAP) as a moving target

The CAP will change after 2013 and Macedonian academics try to estimate changes and benefits that will be realized for Macedonia by accession (Erjavec and Dimitrievski, 2004). Market support measures are assumed to disappear except for the case when market shocks risk the continuation of agricultural businesses (*ibid.*). Direct payments are assumed to continue in relation to area per farm but even more coupled to the realization of public benefits related to how the farms are managed (Erjavec and Dimitrievski, 2004). Rural development will be the focus related to agriculture after 2013 but the overall EU budget for all agriculture related measures is assumed to decrease at least by 25 % (*ibid.*).

The structures that Macedonia is building for administration of EU support measures and information collection are still assumed to be relevant at the time for accession (Erjavec and Dimitrievski, 2004). The agricultural sector is one of the sectors which need to be harmonized

with the EU rules and conditions before the start of accession negotiations (*ibid.*). There is need for a stable policy environment in the agricultural sector to create steady development (Rednak, 2008). The agricultural situation in the EU differs from the conditions in Macedonia, so the importance of increasing national agricultural policy measures towards those of the CAP bring difficulties. The financial means for these policies are lower in Macedonia and the budget will remain constrained (Rednak, 2008). Macedonia has to improve the agricultural practices from a much lower level than the EU average (*ibid.*). The budget for agricultural policies and rural development will be increased according to government plans in Macedonia to align national policies with the CAP and to co-finance the IPARD programme (Dimitrievski and Kotevska, 2008). Too low funds may not give the expected outcome, hence sufficient financing should be allocated before new measures are implemented (Rednak, 2008). The CAP will be affected by the size of the total EU funds collected to agricultural or rural development measures, but also by environmental goals, priorities and WTO negotiations (Ministry of Finance, 2009).

3.2.2 EU information about Macedonia's accession process

Agricultural policy compliance must be reached in the pre-accession process for alignment with the CAP and the requirements on information collection and payment distribution institutions. Rural development measures are included in the pre-accession funds from the EU and Macedonia's national funds for rural development so far have been used to increase competitiveness of agricultural enterprises with farm level investments (Dimitrievski and Kotevska, 2008).

The Copenhagen criteria from 1993 must be fulfilled by candidate countries to start the negotiations for EU membership. Democratic rule ensured by stable institutions and the rule of law needs to be fulfilled according to the Copenhagen political criteria (Ministry of Finance, 2009). Also human rights and minority rights need to be acknowledged. Corruption must be fought and state institutions must be competent to handle their tasks. The regional contacts must be respected and the former Yugoslavia's crime tribunal requests must be fulfilled (*ibid.*). Relations to other EU countries must be worked on towards positive outcomes. The economic criteria require a working market economy which may bear competition from the other countries in the EU internal market upon accession (*ibid.*).

3.3 A wider perspective of Macedonia's development paths

There are several conditions which affect the rural areas and some key aspects which may be related to the following more empirical chapters will be described in this section.

3.3.1 Trade and rural development

EU requirements affect the policies established in Macedonia and this section describes how changes in farm size due to policy or other reasons may affect rural development.

Studies conducted by Goldschmidt between the 1940s and 1970s showed empirical evidence for a negative relationship between the numbers of large corporate agricultural holdings in communities and rural welfare (Welsh, 2009). That was set in contrast to a majority of family owned farms with smaller or medium sized operations (*ibid.*). This implies that the industrialization of the agricultural sector today for example in the United States (US) could affect the rural communities' welfare negatively. The study and review of studies made by Welsh (2009) suggest that the situation is more differentiated. Other factors as type of available markets, possibility to bargain in cooperation with other farmers and how the structure of farms is, with diversification and variation in sizes, affect the welfare of

communities too (*ibid.*). The earlier findings focused on size effects opposed to just type of organization running the farms which was the focus before that. Subsequent changes in the agricultural sector draw attention to the effects of how the farmers may diversify their production (Welsh, 2009).

Type of market access available for the farmers is another factor, if there for example are just multinational buyers integrating the farms into industrial food chains or if there also are green markets and possibilities to sell agricultural products directly to consumers (Welsh, 2009). Different available market contacts and different legal support for farm associations may offset the negative effects of the presence of mainly large corporate farms on rural welfare (*ibid.*). Examples in the US show that laws hindering corporate ownership of farms may be constitutionally in defendable due to the interference with market competition (Welsh, 2009). Research is needed on the changed conditions and how they affect rural welfare when mostly large, small and very small farms have sustained their activities while medium size farms have decreased (Welsh, 2009). Examples from for example Poland and Romania show that the modernization of supply chains and their increased power did not exclude as many small holding farms as expected (Ministry of Finance, 2009).

The high share of agricultural value added to GDP and the high level of expenditure on food in the household budgets show that the level of economic development is low in some Balkan countries including Macedonia (Rednak, 2008). The infrastructure for social and health services is weak in rural areas but the road network and communication possibilities cover the whole country (MAFWE, 2007). The access to markets in rural areas is made possible mainly through green markets in most of the municipality centres (*ibid.*). Isolated villages have barriers to reach the markets since half of the local roads are unimproved or soil based resulting in long travel times to the markets (*ibid.*). Municipalities are the responsible institutions for local roads and market functions in the country (MAFWE, 2007).

Over employment in agriculture and small farm sizes are partially due to weak social safety networks (Ministry of Finance, 2009). Pensions and unemployment support payments are low, keeping people in semi-subsistence farming (*ibid.*). EU principles require basic levels of pension and unemployment support measures (Ministry of Finance, 2009). Farmers with the smallest holdings also complement their farm income the most with social security transfers which also shows that they cannot produce enough on their farms to provide fully for their living (Martinovska-Stojčeska *et al.*, 2008). Agriculture has worked as a social safety net to avoid social unrest during crisis and industrial restructuring in Macedonia (MAFWE, 2007). Solutions for rural development do not only come from agricultural and land policies but must be started by broader reforms (Ministry of Finance, 2009). Non-agricultural incomes must be stimulated for the initially less skilled persons through education, and market access is to be ensured for farm goods by improved infrastructure (*ibid.*). Land consolidation may take place when there are sufficient alternative income possibilities for the semi-subsistence farmers (*ibid.*). EU member states have reduced the levels of over employment in agriculture through increased growth in other sectors of the economy (*ibid.*).

Type of income activity decisions are based on the assets that individuals and farm families have access to (Winters *et al.*, 2009). Education generally leads to increased focus on non-agricultural income sources, including rural non-agricultural employment while access to a larger land area is linked to less non-agricultural activities and on average higher agricultural incomes (Winters *et al.*, 2009). Access to education, infrastructure and nearby urban areas

increases the likeliness of non-agricultural income while farmers with access to infrastructure and urban areas also may earn more on farming than other farmers on average (*ibid.*).

Infrastructure investments improve conditions for agriculture more than transfers to farmers and focus should therefore be on non market distorting measures to use government resources efficiently and to align measures with the future CAP measures (Ministry of Finance, 2009). Focus on only education or infrastructure is not a goal to strive for since these investments promote different paths for development in the rural areas (Winters *et al.*, 2009). The assets and opportunities that individuals in the rural areas face will affect which paths they choose to increase their wellbeing (*ibid.*).

3.3.2 Opportunities for increased rural income

Subsistence and semi-subsistence farming is common all over the Western Balkans and the farmers sell their produce mainly to local and nationally regional markets (Erjavec and Dimitrievski, 2004). Studies suggest that infrastructure investments and non-agricultural employment should be supported to improve incomes and living conditions in rural areas (*ibid.*). Infrastructure investments stimulate non-agricultural work and self-employment (Winters *et al.*, 2009). New income opportunities for the rural population are also vital when informal markets with trade of goods and services for other goods and services disappear (Erjavec and Dimitrievski, 2004).

Agricultural incomes may be increased during the process towards EU membership with improved fruit and vegetable production in Macedonia and less focus on livestock (Erjavec and Dimitrievski, 2004). The preconditions are far away from the required standards in the livestock production subsector (*ibid.*). The situation is similar in the newly accessed member states since the EU technology standards for livestock processing are more demanding than those for crop products and demand more time to adapt to (Rednak, 2008). The registers for land, animals and payment schedules need to be implemented with precision to avoid wasted resources and to gain the largest value out of agricultural investments (Erjavec and Dimitrievski, 2004). Farm business models can be used to plan farm activities to use financial and material resources sustainably, and farm accounting data is useful for these models. Farm performance may increase due to record keeping and improved management of farm businesses (Martinovska-Stojčeska *et al.*, 2008).

Food safety standards is another area where development is needed in Macedonia. The implementation of high quality standards may increase competitiveness of goods in the long run even though the adaption of new standards will lead to costs and potential short term reductions in competitiveness (Henson and Jaffee, 2008). Regional origin used as a trademark creates marketing possibilities for farmers in specific areas since the trademark often is available to all producers of a certain regional good (Moschini *et al.*, 2008). Food standards as government introduced quality signalling tools increase information about quality goods too but this can be complemented by geographical indicators labelling and brand development among private producers (Moschini *et al.*, 2008). Once a regional brand the production of the goods included will be protected under international WTO intellectual property rights law (TRIPS – Agreement on trade related aspects of intellectual property rights) (*ibid.*). Geographical indicators available for all producers within certain restrictions result in competitive conditions for production and this can motivate high quality to protect the brand (*ibid.*).

Potential downsides can be limited supplies of input factors or increased costs due to very specific production methods required to fulfil the criteria for a specific labelling (Moschini *et al.*, 2008). The EU wine makers use these types of regional geographical indicators in many locations but increased production of wine has led to restrictions on plantation of new vine (*ibid.*). These factors affect the Macedonian plans for wine exports within the EU market after accession and the potential to update old vineyards which must be acknowledged during future accession negotiations between the EU and Macedonia. Marketing potential can be strengthened by the use of geographical indicators. The performance of wine in export markets will also be affected by the information flows through distribution channels which need to be established (Karelakis *et al.*, 2008). These will be vital to inform the Macedonian producers about the demand and price conditions on the foreign markets continuously (*ibid.*).

Diversification of farms, agribusinesses and rural enterprises can provide more rural income opportunities if investments, quality certifications and marketing practices increase. The potential for tourism is high in Macedonia due to richness in historical sites, traditional culinary practices and natural features such as lakes and mountains. This field is assumed to be a viable path for development of small enterprises and income opportunities for the rural population and the rural areas (MAFWE, 2007). Therefore one objective of the National Development Plan (2007-2009) is that the tourism sector should expand (MAFWE, 2007). The Ministry of Finance report on convergence with the EU also stresses the importance of increased tourism (Ministry of Finance, 2009). The amount of tourism today, is lower than it was in the 1980s, which indicates a potential for growth in this sector (*ibid.*). Diversification of farm activities and access to natural resources is related to environmental conditions that need to be conserved or enhanced for sustainable use.

EU politics in the agricultural area includes several directives concerning environmental effects by farm practices, and the environmental laws include: "(i) protection of water and air quality; (ii) waste water and solid waste management; (iii) management of chemical substances; (iv) radioactive contamination of foodstuffs and radiation protection; and (v) management of genetically modified organisms" (Ministry of Finance, 2009, p. 28). The second pillar of the CAP also includes measures for support of environmental care taken by farmers. Macedonia's government works for the goal that the EU requirements for the agricultural sector should be reached in 2010 (Ministry of Finance, 2009, p. 8). The environmental laws were implemented gradually by the newly accessed EU countries in preparation for and after the time for accession due to the large set of regulations that need to be implemented (Ministry of Finance, 2009).

The next chapter will provide further background for the conditions in the agricultural sector, rural areas and Macedonian trade relations.

4 Background for the study of Macedonian agriculture

Trade relations, production of agricultural goods in Macedonia, national economic conditions and the most traded goods are presented in this chapter. This is useful to understand the context in which the Macedonian farmers provide for their livelihoods and to see later in chapter 5 and 6 what development trends seem to be possible to focus on.

4.1 Macedonia's trade relations

Trade relations to neighbouring countries have been affected by the political tensions in the past as mentioned in the introduction. Greece had an embargo on Macedonian goods as a protest after 1991 when Macedonia received independence from Yugoslavia because one region in Greece is called Macedonia (Mardas and Nikas, 2008). Greece protests against Former Yugoslav Republic of Macedonia's claim on the name "Republic of Macedonia" since they perceive the name to be Hellenic and a part of Greek history (www, CIA, 2009, 1). The 20 month embargo was lifted in 1995 but the name dispute is still present (www, CIA, 2009, 1; Mardas and Nikas, 2008). The signing of an Interim Agreement for stable political relations between Macedonia and Greece put an end to the embargo (Slaveski and Nedanovski, 2002).

When the UN had an embargo on trade with Serbia and Montenegro in 1992 it also affected the Macedonian trade possibilities and their natural former transport route of goods out from the country (Kekic, 2001). This was a problem because trade with the Yugoslavian market was important for Macedonia before independence and an embargo on trade with Serbia's and Montenegro's markets reduced trade with the previously most important markets (Kekic, 2001). The Kosovo war also disrupted regional trade and reduced trade volumes exchanged with the EU (Montanari, 2005). The 2001 conflict with the Albanian minority resulted in the 2001 change of the constitution (www, CIA, 2009, 1). Minority rights were addressed as an important part of national politics and the "Framework Agreement" was signed (*ibid.*). The agreement named the "Ohrid Agreement" was created with support and pressure from international organizations as the EU (UD, 2006). Fulfilment of it is required by the EU since minorities' rights must be respected, and laws have been created based on the agreement framework (UD, 2006).

Trade with the European Union has a large share in Macedonian exports and imports today with a 47 % share in exports and a 60 % share in imports (www, EU, 2009, 1). Agricultural exports and imports are around 40 % made up by trade with the EU (Ministry of Finance, 2009, p. 63). Trade with the EU is regulated by the "Interim Agreement" which came into force in 2001 as part of the "Stabilization and Association Agreement" between the EU and Macedonia (EU, 2001). The current agreement between the EU and Macedonia governing the overall relationship between the two parties is the Accession Partnership with the most recent update done in 2008 (Ministry of Finance, 2009). Gradual decline of tariffs and other trade barriers between Macedonia and the EU were decided for some agricultural products and some processed agricultural products meanwhile goods without exceptions were to be facing zero tariffs according to the SSA (Ministry of Finance, 2009). In the trade policy alignment part of the EU regulations to be adapted, Macedonia mainly has the single market measures left to implement, which will happen during accession, since the Stabilization and Association Agreement (SSA) has enforced most of the other required measures (Ministry of Finance, 2009).

Trade with the Western Balkans and the Central European states has been regulated by large amounts of bilateral agreements previously, which now have been transformed into the Central European Free Trade Agreement (CEFTA) with Macedonia as a member since 2006 (Herderschee and Qiao, 2007). The CEFTA has been gradually implemented in the member countries and all former agreements will be fully replaced by the CEFTA in 2010 (*ibid.*). The Western Balkans is the most important agricultural product market for Macedonia absorbing 50 % of the agricultural product exports and sending 30 % of the agricultural product imports (Dimitrievski and Kotevska, 2008). Regional trade relations increase competition in the domestic market of Macedonia which encourages improved product quality and consistency in supply (*ibid.*). The main export goods are tobacco and wine, followed by tomatoes and lamb (MAFWE, 2008).

The path towards liberalized markets was initiated by the stabilization and structural adjustment programme in 1994 through advice from the WB and IMF towards privatization of state owned enterprises and changes in the banking sector (Dimitrievski and Kotevska, 2008). Macedonia became a member of the WTO in 2003 and prices in the agricultural sector have fluctuated slightly more due to the more liberalized market conditions (*ibid.*).

FDI is sensitive to political instability and the 1991-2001 period in Macedonia started off with low levels of investments with an increase in 1997 (Slaveski and Nedanovski, 2002). 1997 was followed by increasing FDI levels during non-conflict years and abrupt reductions of investments during conflict years (*ibid.*). FDI flowed into the country due to privatizations of former state owned companies registered on the Macedonian stock exchange and reforms in the banking sector but most of the FDI is concentrated in industries (Slaveski and Nedanovski, 2002). Greece has the largest share of FDI in Macedonia and that is affected by the common boarder since proximity affects the amount of FDI exchanged (*ibid.*). FDI is promoted by the law but land may not be owned by foreign investors (*ibid.*). Greek investments are dominant in the Balkans for example through low competition from other investors, historical relations to the region of which it is a part and because of opportunities due to low salaries (Slaveski and Nedanovski, 2002). In the beginning of the 2000s Macedonia also served as a link to other Eastern European countries for Greek investors, which may have decreased in importance after the EU enlargements in 2004 and 2007. The Greek investments are positively perceived by Macedonian residents according to a survey among students in year 2000 (Slaveski and Nedanovski, 2002).

There is a need for increased investments in the country to create GDP growth and due to recent international financial turbulence it may have to come from national sources. The food processing industries are an example of where technologies need to be updated to support increased trade already in the pre EU-accession period (Ministry of Finance, 2009). The awareness of the need for quality production has to increase to improve supply chains and production of the raw materials (*ibid.*). The production chain improvements need to be supported by the availability of financing, with micro loans, contracting and trade credits (Ministry of Finance, 2009). The latest agricultural policy trends and challenges for the agricultural sector are described in the next section (4.2).

4.2 Trends and challenges in the agricultural sector

Agricultural policies developed after independence have been dominated by market interventions as tariffs and price support measures (Dimitrievski and Kotevska, 2008). A shift towards more liberalized agricultural trade policies in line with EU and WTO demands has

resulted in strategies for agricultural development which focus on competitiveness, food quality, sustainable use of resources and rural development (*ibid.*). The market support measures are still used but a farm level investment support scheme under the rural development plan part controlled by MAFWE was established in 2004 (Dimitrievski and Kotevska, 2008). MAFWE received the role to manage and to be the national coordinative body for rural development policies and pre-accession rural development funds, by the Macedonian government in 2005 (MAFWE, 2007). One challenge is to absorb as much pre-accession funds as Macedonian actors are eligible for (Ministry of Finance, 2009). There needs to be awareness of how and for what projects the funds may be accessed since this has been a problem in the newly accessed EU countries (*ibid.*). The information also needs to address what the minimum standards are to be eligible for support (*ibid.*). Support should not be market distorting with preferential treatment for some goods (*ibid.*).

To receive the present national agricultural support measures a cereal farm has to have at least 0.3 hectares of land under cultivation and that limit is 0.2 hectares for perennial crops and vegetables (Ministry of Finance, 2009, p. 68). Up to 20 hectare it is the same support measures that are available, but for farms over 20 hectares of size the support declines per unit of hectares or output which are eligible for support (*ibid.*). The level of support in Macedonia is lower than the EU levels on average (Ericson *et al.*, 2009). The share of GDP that is used for agricultural support is higher for Macedonia though, compared to the average EU level (*ibid.*). When the commodities which receive support are investigated it is revealed that the livestock sector receives more support than crop producers do even though the crop production sector ads a larger share of value to GDP than the livestock sector does (*ibid.*). The limit for support to commercial EU member country farms has been set at different levels in different countries but in, for example, Romania it is set at 1 ESU as the lowest level which is the lowest limit in the EU. The size limit is also defined in hectares and support is only provided for farms which are larger than one hectare (Ministry of Finance, 2009, p. 68). Half of the farms in Macedonia are of less than 1 ha in size (Ministry of Finance, 2009). To provide support to farms smaller than 1 ha after EU accession too, in Macedonia, would mean more equal access to development measures but it would demand more administration than if the present EU limit of one hectare is followed (*ibid.*). The challenge for change is that the Macedonian support measures are focused on price and input cost support as mentioned earlier. EU support measures are mainly decoupled to avoid market distortions from the use of agricultural support measures and less related to production costs and price interventions (Ericson *et al.*, 2009).

The years 2000-2005 have witnessed increased crop production but yields are low compared to EU levels especially for cereals and industrial crops (Dimitrievski and Kotevska, 2008). Livestock production has decreased during the same time period but yields improve continuously (MAFWE, 2008). A significant share of the feedstuff used are imported including both raw feed stuff and prepared mixtures (*ibid.*). Two thirds of the agricultural value added to GDP is from crop production and one third is from livestock production (Cadikovska, 2008). The trade balance in agricultural goods is negative for Macedonia but the trade is stable due to the large trade partners realized in EU and the Western Balkans (Dimitrievski and Kotevska, 2008; Rednak, 2008). The share of trade with the Western Balkans out of total EU exports and imports is small (Rednak, 2008).

Orchards have decreased due to lack of investments when half of the areas, owned by the state farms, have changed their ownership and management structure and the decreased demand when the relations to the former Yugoslavian markets have been disrupted (Dimitrievski and

Kotevska, 2008). The agricultural sector in Macedonia uses older, more outdated machinery, less fertilizer and lower yielding crop varieties than the average use in the European Union (*ibid.*). The climate conditions affect the outcomes since irrigation, for example, is not used enough during droughts (Dimitrievski and Kotevska, 2008). Crop rotation and water resource use have also been issues raised by authorities in Macedonia investigating the agro-sector as things that have to be improved to increase sustainability in the agricultural production (MAFWE, 2008). Education and training opportunities are missing in rural areas overall and especially among small holding farmers and available info from branch journals or programs and info channels in the media about agricultural practices are not available (MAFWE, 2007). The share of the national agricultural support measures in Macedonia that go to general services for the sector are lower in Macedonia than in the EU (Ericson *et al.*, 2009). There is a lack of financing for research and development, marketing support and agricultural education in Macedonia in comparison to the EU levels in the years 1999-2004 (*ibid.*). Macedonia's agricultural general support funds are more focused on inspection agencies and infrastructure projects (Ericson *et al.*, 2009). Input quality, farm level investments, education, resource use and mitigation of climate effects are in focus policy wise and for development of the sector. The changes have taken place in both turbulent and more beneficial surrounding macroeconomic conditions which are displayed further in the section 4.3.

4.3 National economic conditions

This section presents macroeconomic indicators for the time periods during which there are data related to questions which are of interest in relation to the data analyzed in this thesis.

Inflation has been modest in Macedonia while growth rates have been positive and unemployment has stayed at a high level during the 2000s (Rednak, 2008). Inflation during the period from 1995 until 2007 is presented in Figure 2.
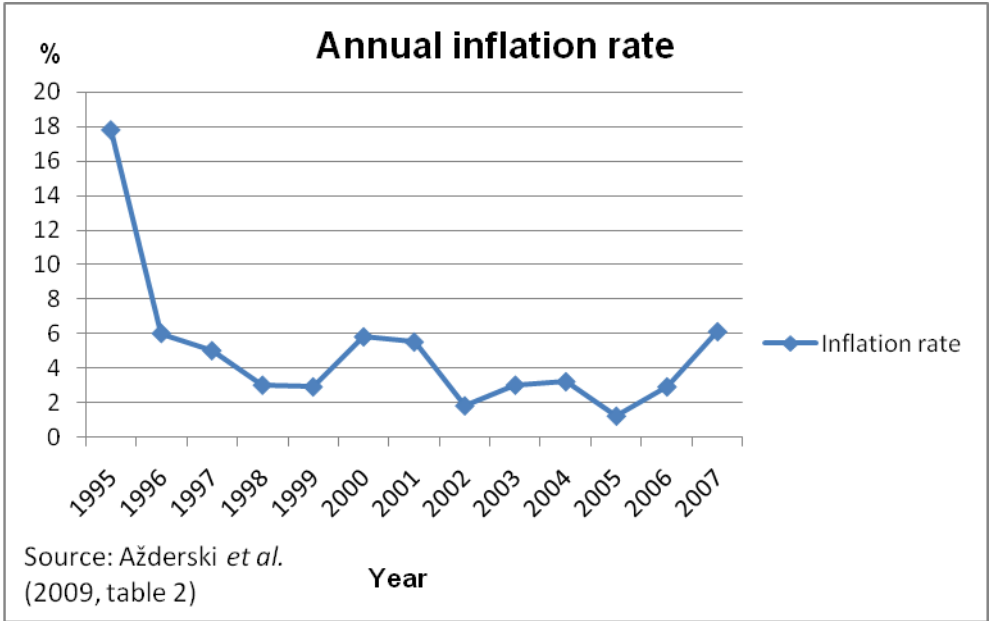
Figure 2. Inflation in Macedonia 2001-2007.

Inflation has stabilized after the abrupt reduction of inflation after 1995 even though year 2007 showed an increase and the 2008 data is not available yet. The inflation will be assumed to not affect the data conclusions in any major way but the issue has to be addressed since the data sets are nominal and annual.

For a macroeconomic description of the surrounding conditions, Figure 3 and 4 depict the development of some factors. The data included in these figures are real GDP growth and share of agriculture value added and agriculture plus agricultural food industry's value added to GDP in percent for the period 1995-2007 and also in 2008 for real GDP growth and agricultural value added to GDP. The real changes in GDP are displayed in Figure 3.
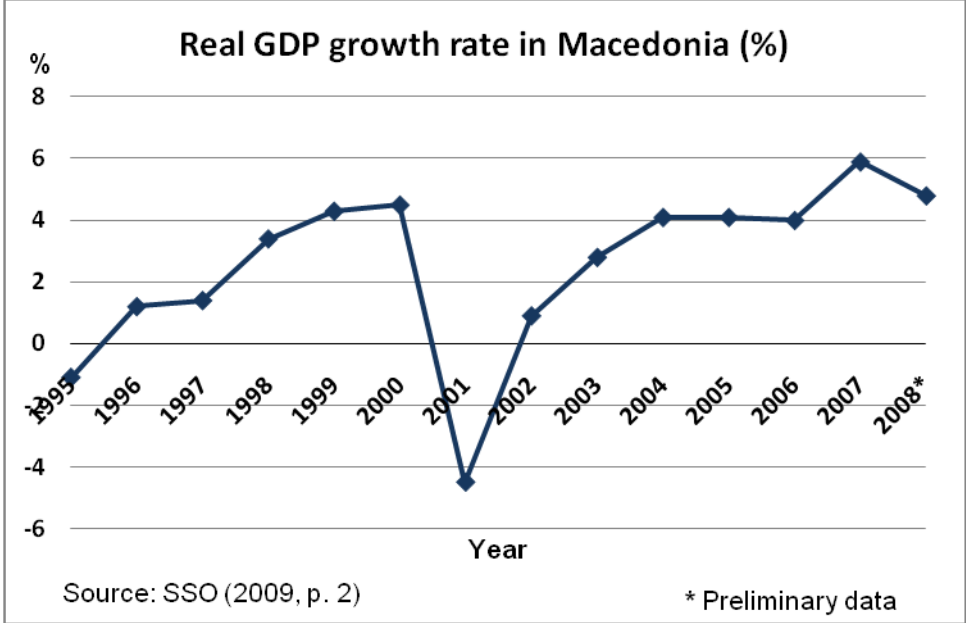
Figure 3. Real GDP growth in Macedonia (%).

The 2001 year crisis with internal conflicts is Macedonia show effects on GDP in that year and the following years in Figure 3.

Value added to GDP by Agriculture &
Value added to GDP by agriculture and the food and tobacco
industry in Macedonia

Source: SSO (2009, p. 3) & Ažderski *et al.* (2009, table 2)

* Preliminary data from SSO (2009)
** No data presented herein on food and tobacco in 2004
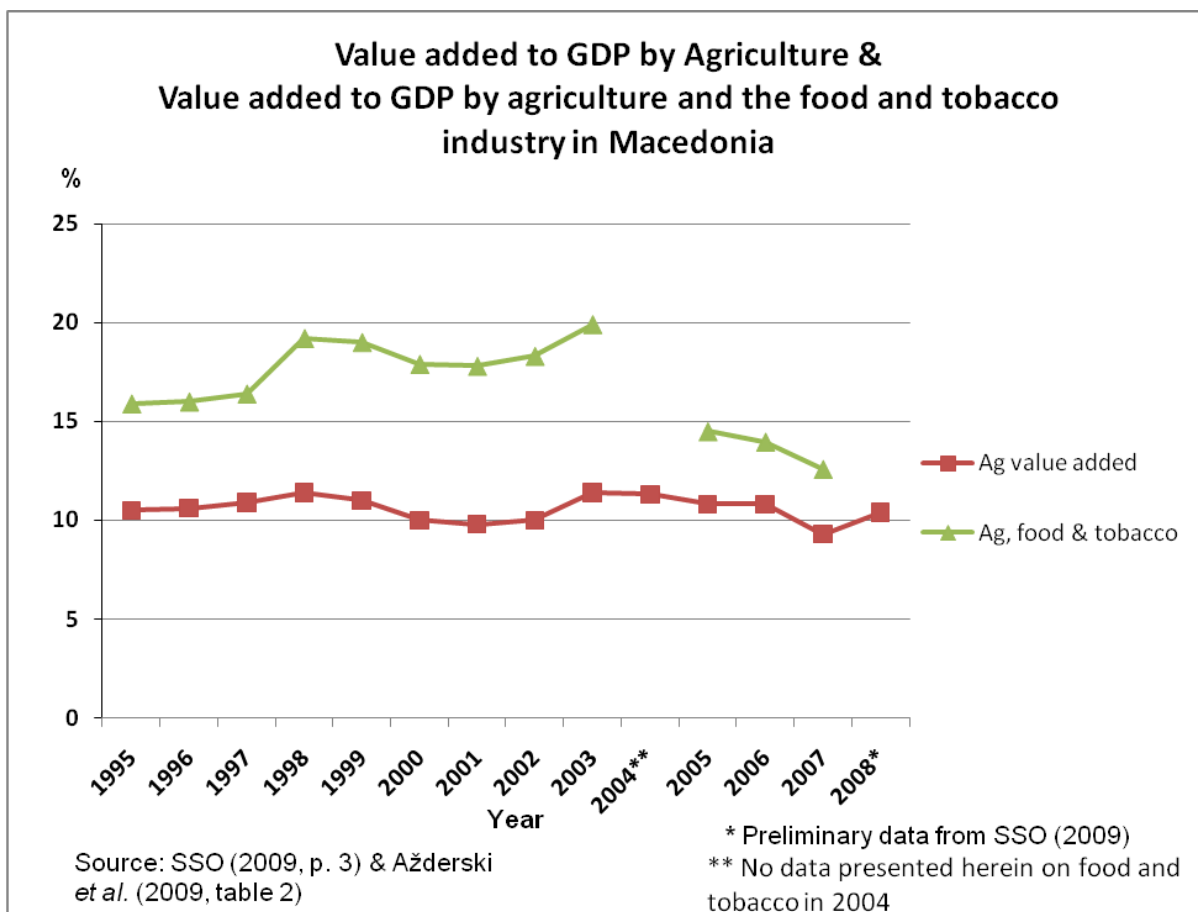
Figure 4. Value added to GDP by agriculture (agro-food) and agriculture plus food industries in percent (%).

The change in value added by the food and tobacco industry after the 2004 break in the time series in Figure 4 is dramatic. Either there are big changes which have taken place in the industry, or the measurement methods have changed or there is an error in the reported data. In year 2007 the increased GDP growth was accompanied by a reduction of the value added to GDP by the agricultural and food processing sectors according to the data presented in Figure 3.

Another factor of interest for analysis of the agricultural sector has been the large participation of labour in the sector and share of the labour force participating in agriculture is presented in Figure 5 for the years 1995-2007.

Labour participation in the Agricultural sector, share of the total labour force

Source: Ažderski *et al.* (2009, Table 2)
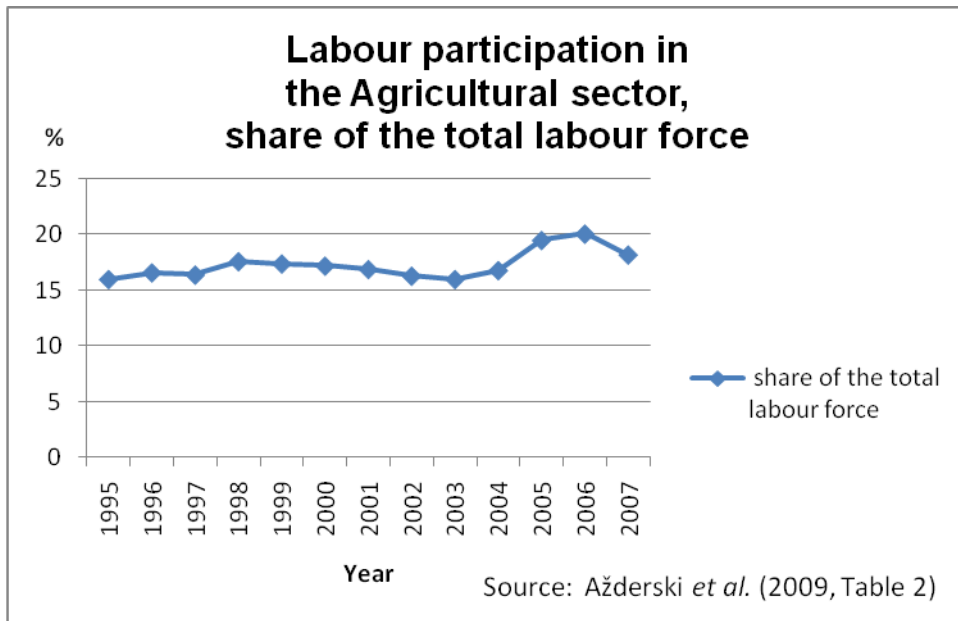
Figure 5. Share of labour force in agriculture.

After year 2000 Figure 5 seems to show that labour force participation in agriculture is decreasing when real GDP growth increases according to Figure 3. During the 1990s when restructuring took place in the state owned enterprises and industries the trend is slightly positive while the period after the 2001 conflicts shows quite a flat trend when GDP also had a stabile but non accelerating growth rate.

The agricultural labour force is significant since it is around 17 % of the total labour force when value added to GDP by the agricultural sector is around 12 % (Ažderski *et al.*, 2009). There are areas with an agricultural over population leading to poor conditions in providing a livelihood meanwhile other areas lack skilled agricultural labour resulting in land abandonment and under used resources (*ibid.*). The sector has provided social security for unemployed labour when industries have closed down (Ažderski *et al.*, 2009). Increased efficiency in the agricultural sector will release even more labour who may work in industries and the service sector, which will result in social and economic changes (Ministry of Finance, 2009). The development of official unemployment numbers is shown in Figure 6.

Unemployment according to ILO data

Source: Ažderski *et al.* (2009, table 2)
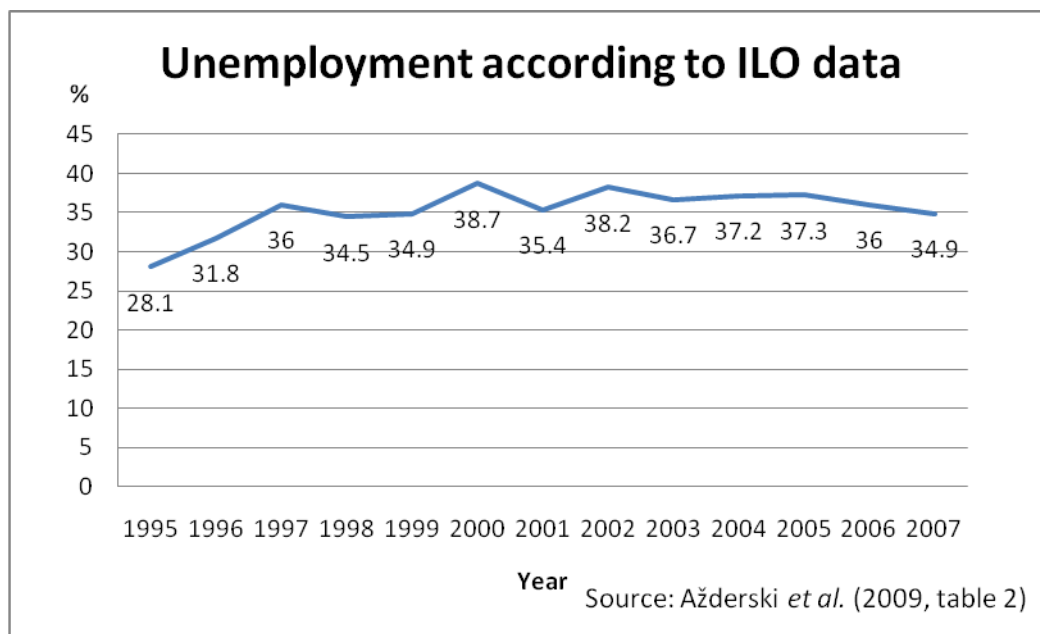
Figure 6. Unemployment in Macedonia according to ILO data (in %).

Unemployment is high in Macedonia as seen in Figure 6 as reported by the International Labour Organization (ILO). Efforts to increase economic growth through national economic growth and development plans in general and for the agricultural sector aim to reduce unemployment. Literacy at a national level is 96 % in Macedonia but the population in the rural areas has 10.5 % illiteracy and 37.9 % have no or little primary education so there is lack of education in the rural areas according to the 1994 Population Census (MAFWE, 2007). The unemployed part of the population included 38 % unskilled individuals in the Census (*ibid.*). Lack of skilled labour is a common limit for expansion of the work force at companies which implies a need to educate unemployed persons (Ministry of Finance, 2009). The official unemployment data do not include unofficially employed labour which may be common in the rural areas and due to informal markets. This is relevant information for the development of the rural areas and for reduction of the agricultural overpopulation towards inclusion in rural businesses or employment. The surrounding conditions have been described in this section and section 4.4 will describe the most important agricultural products grown and traded in Macedonia.

4.4 Structural conditions and trade in the agricultural sector

This section describes what is produced on the agricultural lands and which products dominate in different product categories as cereals, vegetables and internationally traded agricultural goods.

Before the complete transition of agricultural companies towards market competition oriented strategies they were less productive, than family farms with small holdings, but they have caught up in productivity gradually (Dimitrievski and Kotevska, 2008). This situation prevailed even though family farms increased in numbers and received reduced plot sizes during the same period (*ibid.*). The family farms have produced approximately 80 % of all the agricultural output under these conditions (Dimitrievski and Kotevska, 2008).

Wheat is the most common crop, used both as feed and for food, followed by barley and maize used mainly as food crops (Dimitrievski and Kotevska, 2008). The pastures are mostly

25

state owned since the agricultural lands formerly used by state owned agro-enterprises still belong to the state (*ibid.*). This situation prevails since these lands were not privatized due to the goods of special interest and national treasure label put on agricultural lands by national laws (MAFWE, 2007). Change of size of cultivated lands distributed over meadows, vineyards, orchards and arable land and gardens is presented in Figure 7.
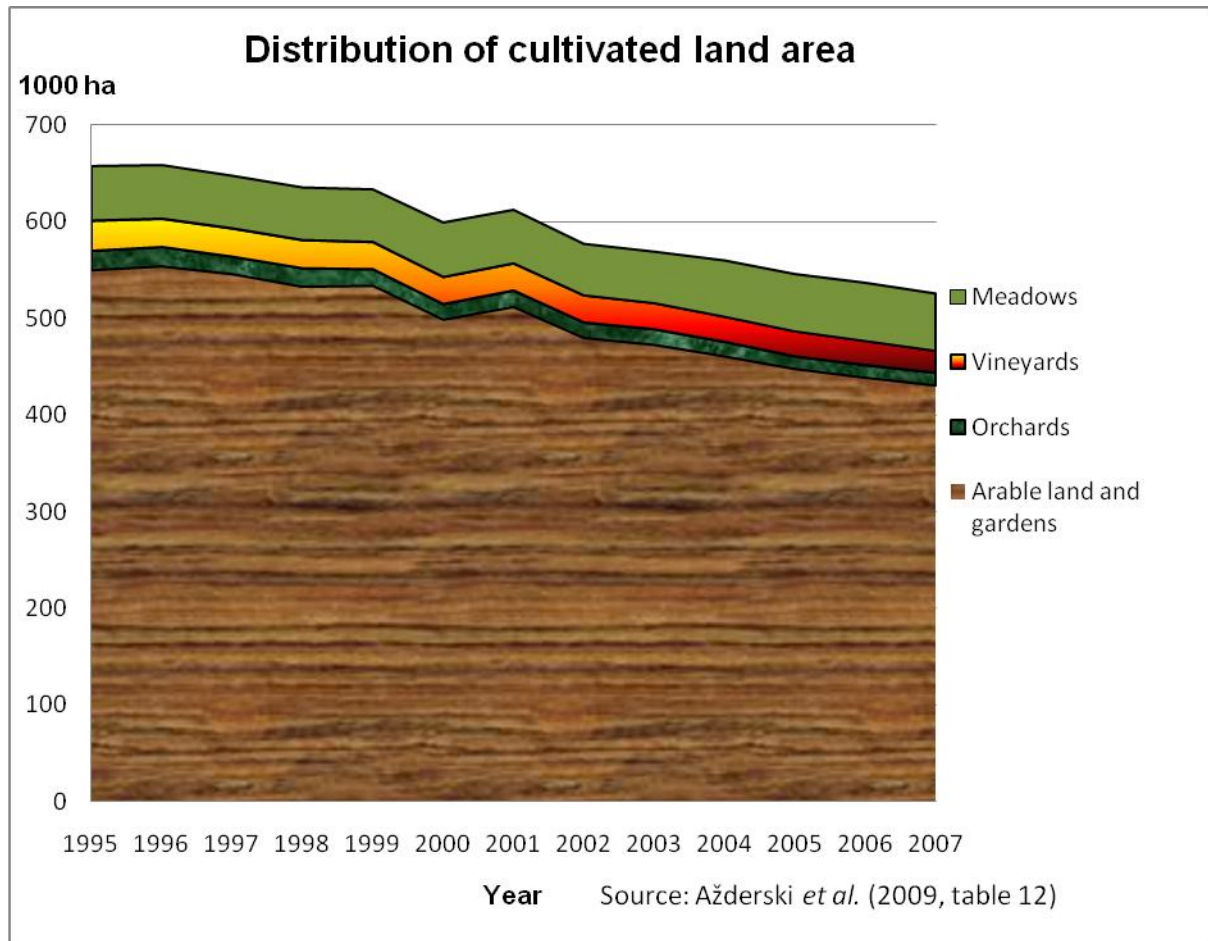
Figure 7. Cultivated area in Macedonia distributed over meadows, vineyards, orchards and arable land and gardens (1000s ha).

The total area of cultivated lands has decreased between 1995 and 2007 as shown in Figure 7. Arable lands and gardens have decreased the most while vineyards and orchards have decreased some. The area under meadows has remained stable over the presented years. The upward bump in year 2001 in the overall downward trend implies use of more cultivated lands during the year of the national conflicts. The next Figure (8) shows shares of different vegetables on lands where vegetables and decoration plants are grown according to the 2007 Agricultural Census of Macedonia.

Area under vegetables, flowers and decorative plants, Census of Agriculture 2007

Strawberries 1%
Other vegetable 3%
Flower and decorative plants 3%
Melons 2%
Tomatoes 9%
Peppers 22%
Watermelons 15%
Cabbage 5%
Cucumbers 2%
Carrot 1%
Onion 5%
Beans 8%
Garlic 1%
Potatoes 23%

Source: SSO (2009, 3)

Out of 22 744 hectar
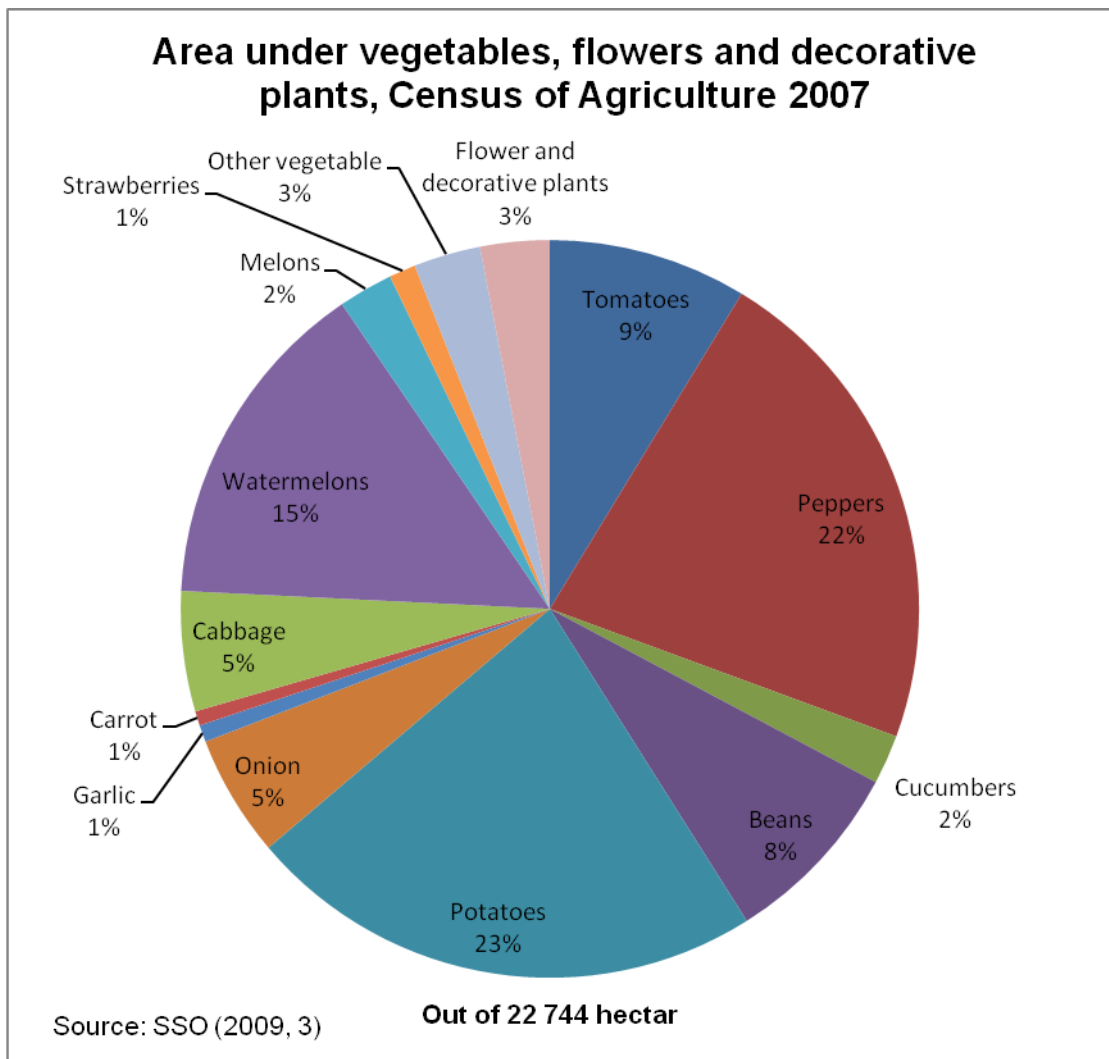
Figure 8. Share of different vegetables and decorative plants out of the total area of these crops according to the 2007 Agricultural Census of Macedonia.

Potatoes and peppers are the most grown crops in 2007, followed by watermelons, tomatoes and beans. The area of these crops is presented as shares in the total 22 744 hectar area under vegetables and decoration plants in Figure 8. Figure 9 shows the size of the area where wheat, barley and maize are grown.
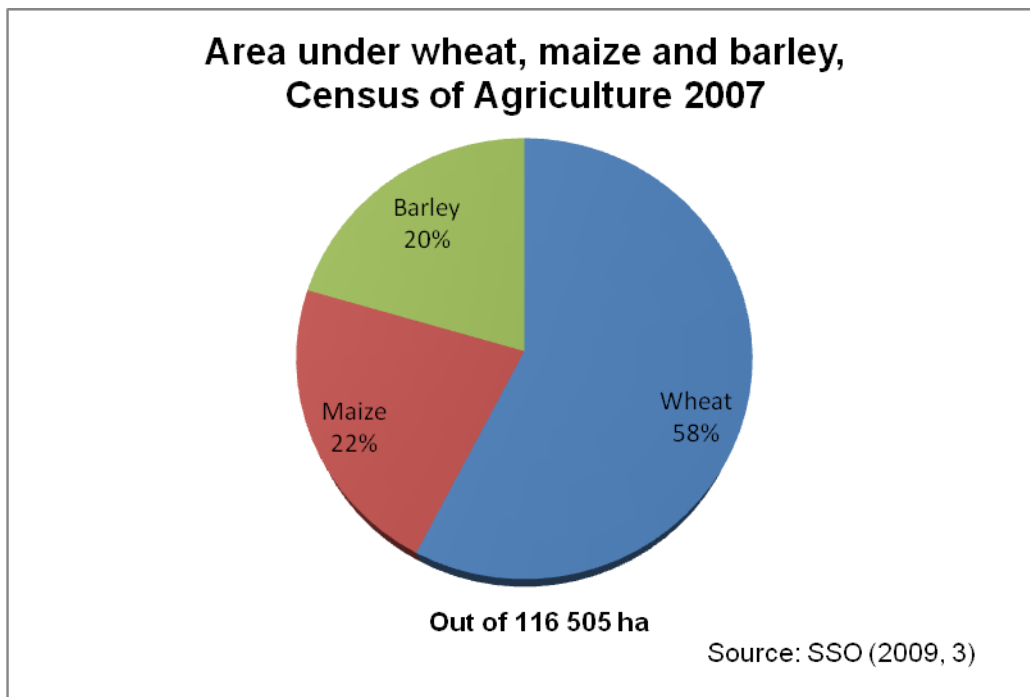
Figure 9. Area under the cereals wheat, maize and barley according to the 2007 Agricultural Census in Macedonia.

As presented earlier, wheat is the most common cereal followed by maize and barley in 2007. The area under cereals is 116 505 hectare while the area under vegetables and decoration plants was much smaller with 22 744 hectares. These numbers present how much of the 431 000 hectares of arable land and gardens in year 2007 were cultivated with vegetables and the main cereals nationally (www, SSO, 2009, 3). Agricultural products have a 14 % share of Macedonian exports mainly including wine, fruits and vegetables, and a 12 % share in imports mainly made up by cereals, meat and sugar (Ministry of Finance, 2009, p. 63). Figure 10 and 11 present the 20 top export and import goods among agricultural products, respectively.
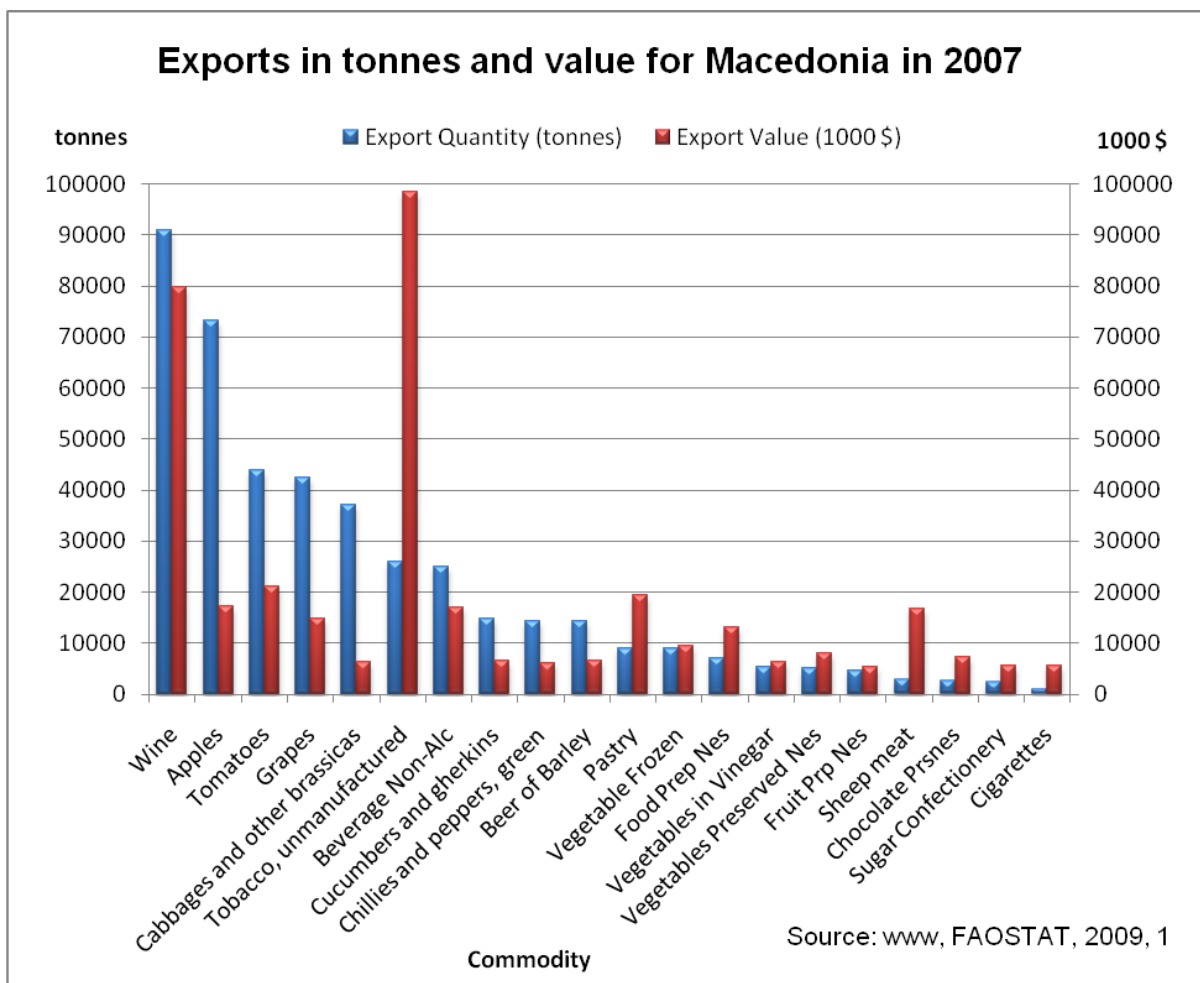
Figure 10. Agricultural trade exports, the top 20 commodities by falling export quantities in tonnes paired with export value per commodity in $1000.

The 20 main export goods in 2007 shown in Figure 10 show that the quantity of wine and apple exports are dominant and the value of unmanufactured tobacco followed by wine are dominant in value. The following goods with quite similar values among the unprocessed agricultural goods are tomatoes, apples, sheep meat and grapes. Sheep meat has one of the higher values but it is number 17 in quantity of exports. Imports are important both for consumers and as feed and the top 20 import goods are presented in Figure 11.
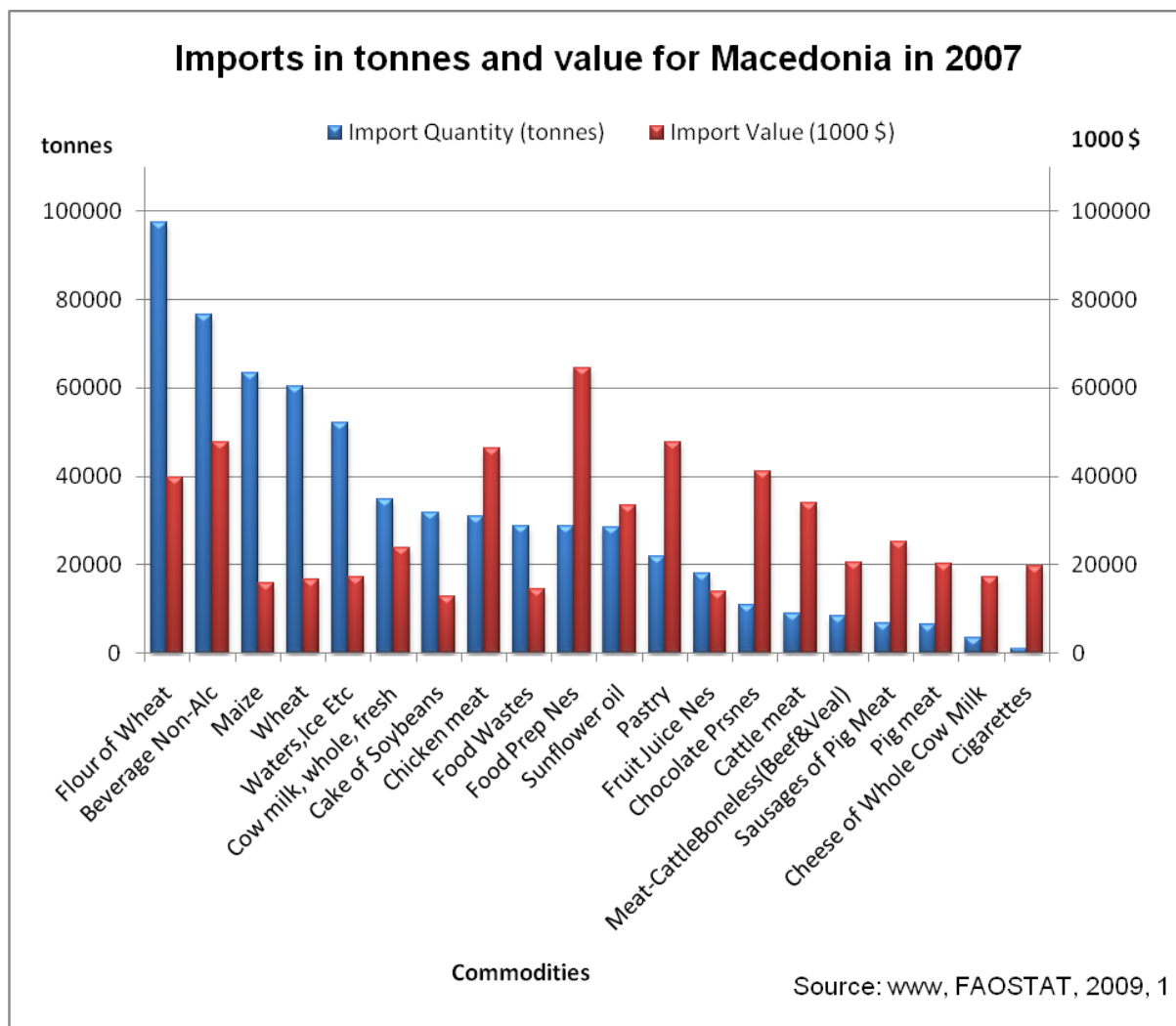
Figure 11. Agricultural trade imports, the top 20 commodities by falling import quantities in tonnes paired with import value per commodity in $1000.

Figure 11 shows that the imports are made up by more processed goods than the exports and they have higher import values. Wheat flour and non-alcoholic beverages are imported in the largest quantity while "prepared food not elswhere specified", non-alcoholic beverages, chicken meat and pastry have the highest values. Both exports and imports of agricultural and food products have increased during the 2000s but the negetive trade balance has not changed as presented in Figure 12.

Trade in the agriculture and food processing sector of Macedonia
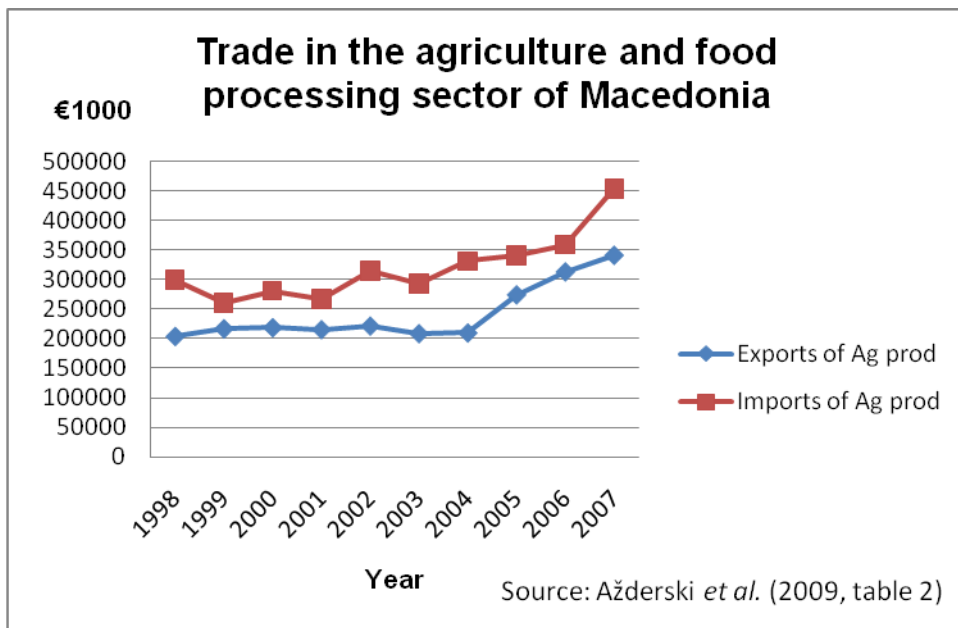
Figure 12. Value of imports and exports between 1998 and 2007 in Macedonia (in €).

Trade volumes have increased and the macroeconomic indicators have not changed dramatically during the years 2005-2008 which will be investigated further in chapter 5. The crops grown in Macedonia in year 2007 represent goods which are both exported from and imported to the country. The empirical study in chapter 5 will go into the different types of farming which are the most common in Macedonia.

5 Empirical study of the agro-sector

This chapter goes into the datasets which are made available through the NEA about farm performance. The data from the farm monitoring system (FMS) from the years 2005-2008 is presented in aggregate at first followed by a more in depth presentation of the types of farming which are represented by the most observations in the sample. A comparison is included between averages from the studied Macedonian FMS sample and some EU average values. A broad picture of the farming sector and the rural development trends will conclude the chapter.

5.1 The farm sample

The farms are coded with Farm IDs and every farm has been attached with the same number over the years in the samples received from the NEA from 2005-2008. It is therefore possible to calculate how many farms that are the same between the years and that is shown in Table 4.

Table 4. Farm samples compared between the years.

Same 2006 as 2005: 81%	Same 2007 as 2005: 69%	Same 2008 as 2005: 60%
Same 2007 as 2006: 65%	Same 2008 as 2006: 58%	Same 2008 as 2007: 76%
Farm IDs which are included in all samples, 2005-2008 2005　　　　2006　　　　2007　　　　2008 30 %　　　　40 %　　　　43 %　　　　42 %　　of sample per year		
Farms from the FMS sample used per year (zero farm income or costs and zero gross margin (GM) farms excluded, but negative GM farms still included)		

2005	2006	2007	2008
324	241	226	230

Total number of farms in the data received from the NEA			
2005	2006	2007	2008
337	295	284	251

 The farms in the sample are on average larger than the average size of farms in Macedonia calculated in hectares per farm (www, SSO, 2009, 3). Table 5 presents the average values for different farm sizes in the used data by farm production indicators and regions.

Table 5. The farm sample 2005-2008 by regions and farm sizes for different indicators based on NEA data and own calculations (NEA, 2009).

The farm sample from the FMS 2005-2008	Region	(< 4 ESU) Very small farm (VSF)	(4–< 8 ESU) Small farm (SF)	(8–< 16 ESU) Medium-low farm (MLF)	(> 16 ESU) Medium-high farm (MHF)	Total
Structure in sample (# farms)	BIT	126	54	31	12	223
	KUM	101	26	5	4	136
	SKP	186	49	23	8	266
	STIP	58	8	1	1	68
	STR	141	34	9	9	193
	TET	114	10	7	4	135
	Total	726	181	76	38	1021
Structure in sample (%)	BIT	12%	5%	3%	1%	22%
	KUM	10%	3%	0.5%	0.4%	13%
	SKP	18%	5%	2%	1%	26%
share in the total number of farms in all regions over all the 4 years	STIP	6%	1%	0.1%	0.1%	7%
	STR	14%	3%	1%	1%	19%
	TET	11%	1%	1%	0.4%	13%
	Total	71%	18%	7%	4%	100%
Average value per agricultural holding, years 2005-2008						
Total UAA (Utilized Agricultural Area) per farm (ha)	BIT	4.2	8.4	5.4	7.1	5.4
	KUM	4.0	10.3	17.8	17.9	6.1
	SKP	2.0	4.2	6.4	35.4	3.4
	STIP	2.2	5.1	29.0		3.0
for farms with hectare size over zero	STR	2.0	3.3	4.1	28.2	3.6
	TET	1.4	3.8	4.0	4.3	1.7
	Total	2.6	6.2	6.8	19.4	4.1
Total livestock units	BIT	9.6	12.4	17.5	16.1	11.8
	KUM	7.8	10.2	28.6	7.9	8.9
	SKP	13.8	9.6	15.5	50.6	14.1
for farms with the amount of livestock units (LU) over zero	STIP	6.4	9.5		38.3	8.3
	STR	5.5	16.6	31.5	9.3	8.4
	TET	22.7	22.7	36.9	232.7	40.4
	Total	11.1	11.5	20.9	65.4	14.6
Total output crop production (in 1000s)	BIT	203	443	761	2 585	455
	KUM	138	384	648	1 399	241
	SKP	162	337	744	4 001	303
	STIP	99	397	1 281	-	155
	STR	212	628	1 126	5 375	573
	TET	106	234	316	115	120
	Total	165	438	782	3 426	357
Total output livestock production (in 1000s)	BIT	409	602	1 181	1 584	628
	KUM	276	509	853	1 277	378
	SKP	427	659	1 079	2 262	677
	STIP	296	636	-	3 776	486
	STR	297	737	2 729	335	461
	TET	654	845	2 505	14 101	1 589
	Total	406	624	1 365	4 209	714
Total output (in 1000s)	BIT	409	771	1 337	2 946	762
	KUM	350	800	1 160	2 675	534
	SKP	257	739	1 286	3 132	521
	STIP	191	775	1 281	3 776	328
	STR	244	656	1 304	5 412	607
	TET	381	770	2 641	14 129	934

	Total	308	745	1 426	4 740	634
Crop specific costs (in 1000s)	BIT	104	147	205	847	164
	KUM	72	139	207	143	92
	SKP	82	108	233	1 440	122
	STIP	51	146	416	-	69
	STR	105	244	325	3 170	287
	TET	52	38	136	14	54
	Total	83	153	229	1 548	151
Livestock specific costs (in 1000s)	BIT	388	340	658	470	412
	KUM	216	265	431	452	241
	SKP	362	312	551	837	391
	STIP	252	329	-	2 520	346
	STR	318	344	1 756	782	400
	TET	647	483	1 682	6 326	1 039
	Total	369	325	797	1 829	460
Total specific costs (in 1000s)	BIT	311	360	533	941	388
	KUM	243	379	465	595	288
	SKP	166	309	542	1 138	254
	STIP	142	375	416	2 520	208
	STR	145	260	484	3 257	326
	TET	342	406	1 741	6 330	597
	Total	224	333	635	2 103	344
Gross farm income (in 1000s)	BIT	98	412	805	2 005	375
	KUM	107	422	695	2 081	247
	SKP	91	430	744	1 993	267
	STIP	49	400	866	1 256	120
	STR	99	396	820	2 155	281
	TET	38	364	900	7 799	337
	Total	84	412	790	2 636	290

Highest or one of two high values for income or low for costs	Lowest in the row or column for income, GMs and high costs	The value differs from the trend indicated in the Total row where max and min are green

*TET; MHF; incl one very large farm

Since the farm sizes are based on economic gross margins, the output and production factors are increasing when investigated by increasing economic sizes, as seen on the horizontal rows in Table 5. This trend is consistent for most of the factors displayed in Table 5 for the total averages except for livestock costs where small farms have lower total average livestock costs than very small farms. The number of livestock units is also higher for medium large farms than medium high farms for some of the regions. The Bitola region seems to have moderately high crop output levels while Tetovo has large livestock farms and high output in that type of farming. The costs are lower for Bitola for their output since they end up with the highest average gross margin even if they have lower average output levels. The average size of all farms in the sample is 4.1 hectares in a simple average calculation. The total area of utilized agricultural land in Macedonia is 334 226 hectares and divided by the total number of farm holdings which is 192 675, according to the 2007 Agricultural Census, it gives an average of 1.73 hectares per farm for Macedonia (www, SSO, 2009, 3). This means that the sampled farms are on average larger than the average of all farms in the country. This may be related to how representative the sample is for the whole country. The average is unweighted though

which affects the average since there is not more representation for the small more common farm sizes towards the few very large farms in the sample.

The initial data tables have revealed initial outputs from the gross margin calculations and this may be related to the macroeconomic conditions for the sample years and the time period before that. The values in the previous tables were calculated from nominal annually collected values which may be analyzed together with the inflation data provided in section 4.3.

Table 6 shows gross margins per region and type of farming to visualize how the average gross margin values are distributed among the different types of farming and regions in the Macedonian FMS as an average calculated for the years 2005-2008.

Table 6. Farm sample gross margins (GM) per type of farming (TF) and regions along with average total income and costs and GM (NEA, 2009 and own calculations).

Average totals per farm 2005-2008 per TF and region in 1000s of MKD.

Region	BIT	KUM	SKP	STIP	STR	TET	Totals		
Type of farming (TF)	Gross margin	Gross margin	Gross margin	Gross margin	Gross margin	Gross margin	Average total income	Average total specific costs	Average total gross margin (GM)
Bees		265		36		189	244	58	185
Cattle	194	138	243	77	20	209	571	389	182
Cereal	78	149	1 067	160	483	14	390	203	187
Fodder crops	557	55	60		58	221	589	279	310
Fruit	448		228	48	186	79	566	251	315
Goats	478	422				180	503	155	348
Grapes	- 17	67	176	33	240		281	117	164
Industrial	158		8		156		305	157	148
Mixed farm	410	297	378	252	81	157	641	318	323
Mixed livestock	268	204		366		- 300	536	343	193
Mixed plant	300	217	368	138	221	112	457	217	240
Pigs	241	169	21	36			179	62	117
Sheep	459	278	506	240	174	1 093	1 536	966	571
Vegetables	529	660	171	211	366	84	619	297	321
Grand Total	375	247	267	120	281	337	634	344	290

Highest value horizontally
Highest value horizontally and vertically
Highest value vertically
Negative/lowest GM/income or highest costs
Over average GM

The highest gross margins per region among the different types of farming are presented vertically in the columns of Table 6. The rows in Table 6 present gross margin for every type of farming, per region. The last three columns present average total income, cost and gross margin for all the farms in the sample. The Bitola region includes most of the highest gross margins per type of farming when compared to the other regions. Fodder crops reveal the highest gross margin both for the region and for that type of farming in the Bitola region. Vegetables show the same situation in Kumanovo, cereals in Skopje and the same is shown for sheep in the Tetovo region. Grapes in Bitola and mixed livestock in Tetovo reveal negative gross margin in the calculated averages. The total average gross margin for the whole sample shows the highest gross margin for sheep production and the lowest for pigs.

Table 7 presents the standard deviation from average gross margin values for the full FMS sample from the years 2005-2008. This shows how much the gross margins fluctuate between different types of farming in the six regions as an average for the years 2005-2008.

Table 7. Standard deviation from average values of gross margins for the farm sample, years 2005-2008, per type of farming and region, in %.

StdDevp/Average farm GM (%)	Region						
TF	BIT	KUM	SKP	STIP	STR	TET	Grand Total
Bees		0%		0%		60%	61%
Cattle	243%	128%	100%	212%	357%	190%	168%
Cereal	133%	142%	192%	165%	133%	1024%	381%
Fodder crops	137%	53%	44%		111%	9%	187%
Fruit	159%		121%	55%	75%	66%	182%
Goats	34%	0%				1%	49%
Grapes	663%	82%	134%	127%	198%		179%
Industrial	49%		0%		58%		59%
Mixed farm	90%	111%	59%	79%	61%	72%	93%
Mixed livestock	0%	66%		16%		0%	104%
Mixed plant	59%	69%	64%	41%	110%	78%	82%
Pigs	0%	0%	0%	0%			79%
Sheep	100%	199%	92%	178%	346%	296%	287%
Vegetables	104%	119%	174%	101%	157%	119%	162%
Grand Total	138%	151%	176%	183%	174%	486%	254%

The values are affected by how many observations there are for the presented combinations of characteristics and by changes in the size of gross margins for very large gross margin farms along smaller ones. Among the types of farming with observations for all regions (the marked totals in the last column) mixed farming and mixed plant have the lowest deviations followed by vegetables and cattle. Bitola has the lowest deviation value among the regions while Tetovo gross margins vary the most in this sample.

Values for comparing the different crops grown by the sampled farms in terms of yields, costs, incomes and margins on an average sample level are presented in Table 8. The crops in Table 8 are chosen since they approximately both represent export goods from Macedonia and the crops which were grown on the largest shares of hectares in the sample. They are backed up by different observations and are of relevance for national markets and trade.

Table 8. Yields, incomes, cost of production, farm gate prices and gross margins for some of the most grown crops among the sampled farms (NEA, 2009 and own calculations).

2005-2008 average

Crop Titles	Yield per ha (1000s)	Per ha income (1000s)	Per ha SC (1000s)	Per ha GM (1000s)	Per kg COP	Per kg farm-gate price	Per kg average GM
Alfalfa	7	88	20	69	3.0	26.2	23.2
Apples	31	373	166	207	5.5	12.5	7.0
Barley	3	37	16	21	4.7	11.2	6.4
Cabbage	45	538	186	352	3.5	12.9	9.5
Maize	6	72	24	47	3.8	11.1	7.3
Potatoes	23	309	116	193	4.9	13.1	8.2
Red peppers	26	408	117	290	4.6	18.8	14.2
Red tomatoes*	84	1 772	349	1 423	4.5	20.6	16.2
Wheat	3	36	25	11	7.3	10.8	3.5
Wine grape	15	180	83	97	5.0	12.2	7.2

*no observation of red tomatoes 2006 which makes it a 3 year average

Some prices have increased over the four years and some have decreased but most of the prices have fluctuated among the crops included in Table 8. Alfalfa gross incomes per kg may be incorrect due to the high reported values and it may be that the yields have been reported in some other unit than kilograms. Another reason may be that the farms reporting income from alfalfa receive higher prices and that the ones growing it for their own use have not reported income from it. The yields are the highest per hectare for red tomatoes followed by cabbage and apples. The gross income is the highest for alfalfa followed by red tomatoes and red peppers. Wheat has the highest cost of production among the crops in Table 8 resulting in the lowest gross income. Apples, barley, cabbage, maize, potatoes and wine grapes have a similar level of margin per kg of produce between 6.4 and 9.5 MKD per kg with barley at the lowest level in this group and cabbage at the highest.

Table 9 presents average income, costs and gross income/margin per livestock units and hectares for different types of farming including all farms in the used Macedonian FMS sample for the years 2005-2008.

Table 9. Average livestock units (LUs), hectares (ha) and total farm incomes, specific costs and gross margin (GM) per LUs and hectares for the different types of farming (NEA, 2009 and own calculations).

TF	Average of LU	Average of Tot livestock farm income/LU (1000s)	Average of Tot livestock specific costs/LU (1000s)	Average of GM (ls incomes-ls costs)/LU (1000s)	Average of Farm GM/LU (1000s)
Bees	N/A				
Cattle	8.5	59	42	18	21
Goats	7.1	68	20	47	49
Mixed farm	8.1	53	30	23	40
Mixed livestock	8.5	52	34	18	23
Pigs	2.8	60	18	42	42
Sheep	30.5	49	31	18	19
Grand Total	17.1	49	31	18	21
TF	Average of ha	Average of Total farm income/ha (1000s)	Average of Total specific costs/ha (1000s)	Average of GM (crop incomes-crop costs)/ha (1000s)	Average of Farm GM/ha (1000s)
Cereal	6.9	48	19	29	27
Fodder crops	4.5	88	15	73	68
Fruit	2.6	213	94	119	119
Grapes	2.3	123	51	72	72
Industrial	5.7	39	12	27	26
Mixed farm	5.2	42	15	27	62
Mixed plant	4.7	74	25	49	51
Vegetables	3.2	196	92	104	102
Grand Total	3.8	106	44	62	67

Table 9 shows the highest per livestock incomes for goats among the livestock farms followed by pigs and cattle. The lowest costs per livestock unit are shown by pigs and goats farming and the highest margin per livestock unit is shown by goats. Sheep farming has the lowest income per livestock unit and the lowest margin per livestock unit while cattle's farming reveals the highest costs per livestock unit. Among the crop farms fruit farming has the highest income per hectare and the highest margin per hectare. Industrial farming has the lowest costs per hectare but also the lowest income per hectare which gives that type of farming the lowest gross margin. Vegetables have the highest costs per hectare but also the second highest income and gross margin per hectare.

The numbers presented in Table 9 are averages for all farms in the sample and the next section will investigate the types of farming with the most farm observations by regions.

5.2 A deeper look at the FMS sample farms

Since the previous section in this chapter presented the averages for the whole sample, this section will present more in depth data on the type of farming groups which have the most data available in the sample. There are 8 types of farming spread over different regions which have the most data available which makes more general conclusions from these groups potentially more valid. The regions which have over 16 farm observations for the years 2005-2008 in any of the types of farming are included in this data section. The number of 16 is chosen since it gives at least on average four observations per year, region and type of

farming and it includes a reasonable amount of in depth analysis cases of 2-3 regions per type of farming. The sample groups which are chosen are presented in Table 10.

Table 10. The number of observations per region and type of farming (NEA, 2009 and own calculations).

Count of farms per regions and types of farming, FMS sample years 2005-2008

Type of farming	BIT	KUM	SKP	STIP	STR	TET	Grand Total
Bees		1		1		19	21
Cattle	22	25	37	8	5	8	105
Cereal	13	19	7	9	3	27	78
Fodder crops	13	2	5		5	2	27
Fruit	47		4	5	12	13	81
Goats	2	1				2	5
Grapes	3	4	100	22	35		164
Industrial	9		1		5		15
Mixed farm	18	31	25	4	3	7	88
Mixed livestock	1	7		2		1	11
Mixed plant	29	22	6	4	24	9	94
Pigs	1	1	1	1			4
Sheep	48	12	31	8	8	32	139
Vegetables	17	11	49	4	93	15	189
Grand Total	223	136	266	68	193	135	1021

   the observations included in the regional type of farm analysis

Table 10 has the types of farming highlighted which will be presented further by the regions where there are the most observations, out of the total 1021 number of farms in the sample. Cattle and sheep farming are presented first in Tables 11 and 12.

Table 11. Cattle farming (1000s of MKD except for ha and LUs) (NEA, 2009 and own calculations).

Average 2005-2008 (stddevp in %)	Region			For the selected regions		Total average for the sample, all regions
Type of Farming (TF) – **CATTLE**	BIT	KUM	SKP	Max	Min	
Average of ha per farm	7.7 (170%)	5.4 (95%)	3.5 (57%)	62.4	0.5	4.9
Average LU per farm	8.6 (68%)	5.9 (45%)	11.6 (105%)	45.0	1.2	8.5
Average crop output	161 (95%)	82 (36%)	100 (58%)	660	11	105
Average livestock output	678 (97%)	325 (74%)	574 (72%)	2 894	41	506
Average total output	795 (88%)	388 (66%)	631 (67%)	2 990	60	571
Average crop specific costs	52 (79%)	43 (87%)	54 (46%)	194	7	46
Average livestock specific costs	558 (87%)	208 (71%)	357 (88%)	1 933	8	355
Average total specific costs	601 (80%)	250 (62%)	388 (79%)	1 984	43	389
Average of GM per farm	194 (243%)	138 (128%)	243 (100%)	1 697	- 366	182

The Bitola region has the highest average amount of hectares per farm holding and the highest output levels. Kumanovo has the lowest average costs but also the lowest gross margin.

Skopje has the highest average of livestock units but medium high income and cost levels but the highest average gross margin for cattle farming.

Table 12. Sheep farming (1000s of MKD except for ha and LUs) (NEA, 2009 and own calculations).

Average 2005-2008 (stddevp in %)	Region			For the selected regions		
Type of Farming (TF) – **SHEEP**	BIT	SKP	TET	Max	Min	Total average for the sample, all regions
Average of ha per farm	8.2 (367%)	4.1 (68%)	2.7 (63%)	175.0	0.2	5.7
Average LU per farm	18.2 (37%)	26.3 (87%)	62.0 (172%)	556.3	6.0	30.5
Average crop output	78 (81%)	106 (69%)	163 (118%)	568	4	111
Average livestock output	855 (59%)	1103 (63%)	3239 (169%)	24 739	147	1 485
Average total output	899 (57%)	1151 (58%)	3270 (168%)	24 739	159	1 536
Average crop specific costs	60 (123%)	87 (64%)	56 (146%)	385	2	82
Average livestock specific costs	429 (55%)	606 (78%)	2163 (166%)	16 415	18	945
Average total specific costs	440 (55%)	645 (72%)	2177 (165%)	16 415	7	966
Average of GM per farm	459 (100%)	506 (92%)	1093 (296%)	13 919	- 2 355	571

Sheep farming in Table 12 is affected by one large farm in Tetovo which has 556.3 livestock units on its farm in the year 2006 and the Bitola region has the highest average of hectares due to one large farm with 175 hectares which are not grown with crops for sale in year 2007. Bitola and Skopje have average gross margin levels close to each other. Standard deviation values in percent compared to the average levels are at the highest level in the Tetovo region, affected by the difference in economic size among the farms in this region. Table 13-17 show indicators for cereal, fruit, grape, vegetables and mixed plant farming.

Table 13. Cereal farming (1000s of MKD except for ha and LUs) (NEA, 2009 and own calculations).

Average 2005-2008 (stddevp in %)	Region		For the selected regions		
Type of Farming (TF) – **CEREAL**	KUM	TET	Max	Min	Total average for the sample, all regions
Average of ha per farm	8.2 (90%)	1.5 (112%)	25.0	0.2	6.9
Average LU per farm	6.0 (44%)	8.2 (0%)	10.9	2.2	7.9
Average crop output	270 (106%)	66 (130%)	1 068	0.010	330
Average livestock output	209 (61%)	110 (0%)	426	45	258
Average total output	379 (88%)	70 (132%)	1 149	0.010	390
Average crop specific costs	114 (98%)	51 (277%)	769	2	130
Average livestock specific costs	201 (67%)	132 (0%)	417	8	306
Average total specific costs	230 (75%)	56 (254%)	769	2	203
Average of GM per farm	149 (142%)	14 (1024%)	686	- 629	187

The Tetovo region shows a very large variation in gross margins for cereal farming due to many farms with negative gross margins over the last three years as minimum values in the sample and a negative value as the average in 2008. The Tetovo region has on average smaller

farms in cereal farming both by hectares and economic size. Livestock are rare among the cereal farms in Tetovo and this sample included one observation of livestock at one farm in year 2008 while livestock are more common in Kumanovo. The presented average calculated among farms with reported values is higher at 8.2 than the Kumanovo value at 6.0 but the Kumanovo value is calculated among more farms.

Table 14. Fruit farming (1000s of MKD except for ha and LUs) (NEA, 2009 and own calculations).

Average 2005-2008 (stddevp in %)	Region		For the selected regions		
Type of Farming (TF) - **FRUIT**	BIT	TET	Max	Min	Total average for the sample, all regions
Average of ha per farm	3.5 (207%)	0.7 (132%)	38.0	0.2	2.6
Average LU per farm	2.0 (2%)		2.0	1.9	1.5
Average crop output	805 (182%)	145 (64%)	10 118	57	563
Average livestock output	80 (35%)		108	52	55
Average total output	808 (181%)	145 (64%)	10 118	57	566
Average crop specific costs	356 (225%)	67 (122%)	5 642	12	249
Average livestock specific costs	88 (11%)		98	79	54
Average total specific costs	360 (222%)	67 (122%)	5 642	12	251
Average of GM per farm	448 (159%)	79 (66%)	4 476	- 46	315

Tetovo has only 13 observations for the years 2005-2008 but the region is included in Table 14 for comparison. The Tetovo region has no livestock on their fruit production farms. The Bitola region has 47 sampled farms and reveals slightly higher variation in average income and gross margin compared to the variation values presented so far in this section. The average income and gross margin are higher in the Bitola region than in the Tetovo region.

Table 15. Grape farming (1000s of MKD except for ha and LUs) (NEA, 2009 and own calculations).

Average 2005-2008 (stddevp in %)	Region			For the selected regions		
Type of Farming (TF) – **GRAPES**	SKP	STIP	STR	Max	Min	Total average for the sample, all regions
Average of ha per farm	2.5 (142%)	0.6 (151%)	2.7 (196%)	29.0	0.2	2.3
Average LU per farm			0.5 (0%)	0.5	0.5	0.5
Average crop output	293 (103%)	74 (108%)	411 (152%)	3 767	0.008	281
Average livestock output			36 (0%)	36	36	36
Average total output	293 (103%)	74 (108%)	412 (152%)	3 767	0.008	281
Average crop specific costs	117 (108%)	41 (130%)	171 (164%)	1 312	2	117
Average livestock specific costs			23 (6%)	25	22	23
Average total specific costs	117 (108%)	41 (130%)	172 (162%)	1 312	2	117
Average of GM per farm	176 (134%)	33 (127%)	240 (198%)	2 843	- 196	164

Grape farming has the lowest level of livestock combined with their crop farming compared to the other crop farming practices described in this section. Some farms have negative gross margins among the minimum values for 2006-2008. The Strumica region has the highest

incomes and gross margins. Stip has the smallest farms and the lowest margins for grape farming.

Table 16. Vegetables farming (1000s of MKD except for ha and LUs) (NEA, 2009 and own calculations).

Average 2005-2008 (stddevp in %)	Region			For the selected regions		
Type of Farming (TF) – **VEGETABLES**	BIT	SKP	STR	Max	Min	Total average for the sample, all regions
Average of ha per farm	2.6 (46%)	0.6 (203%)	4.4 (219%)	47.0	0.1	3.2
Average LU per farm	0.9 (23%)		1.3 (66%)	2.5	0.6	3.6
Average crop output	809 (81%)	275 (156%)	833 (203%)	10 032	21	618
Average livestock output	38 (7%)		20 (0%)	40	20	130
Average total output	766 (86%)	275 (156%)	833 (203%)	10 032	21	619
Average crop specific costs	234 (80%)	104 (141%)	467 (261%)	8 422	2	291
Average livestock specific costs	26 (61%)		26 (32%)	41	10	74
Average total specific costs	237 (78%)	104 (141%)	467 (261%)	8 422	2	297
Average of GM per farm	529 (104%)	171 (174%)	366 (157%)	2 984	- 308	321

The Strumica region has the highest crop income levels for vegetables as seen in Table 16 on average but the Bitola region has the highest average gross margin. Skopje has the lowest cost level but also the lowest income level, no livestock and a lower gross margin.

Table 17. Mixed plant farming (1000s of MKD except for ha and LUs) (NEA, 2009 and own calculations).

Average 2005-2008 (stddevp in %)	Region			For the selected regions		
Type of Farming (TF) - **MIXED PLANT**	BIT	KUM	STR	Max	Min	Total average for the sample, all regions
Average of ha per farm	5.1 (74%)	6.4 (89%)	3.2 (166%)	25.6	0.4	4.7
Average LU per farm	5.5 (68%)	3.7 (59%)	1.7 (4%)	13.4	0.9	4.2
Average crop output	458 (49%)	312 (66%)	315 (86%)	1 059	47	346
Average livestock output	318 (78%)	238 (62%)	100 (9%)	834	41	263
Average total output	628 (49%)	474 (66%)	323 (84%)	1 197	47	42 985
Average crop specific costs	156 (82%)	122 (80%)	93 (69%)	580	15	117
Average livestock specific costs	294 (82%)	212 (59%)	115 (27%)	790	39	235
Average total specific costs	328 (72%)	257 (71%)	102 (63%)	918	18	217
Average of GM per farm	300 (59%)	217 (69%)	221 (110%)	911	- 103	240

Bitola has the most livestock units, income both from crops and livestock and the highest margin between output and specific variable costs. Kumanovo has the largest average number of hectares per farm and Strumica has the lowest costs and thereby a slightly higher level of gross margin than Kumanovo for mixed plant farming.

Mixed farming includes both livestock and crop farming as main farm activities and the indicators for this type of farming in Macedonia are presented in Table 18.

Table 18. Mixed farming (1000s of MKD except for ha and LUs) (NEA, 2009 and own calculations).

Average 2005-2008 (stddevp in %)	Region			For the selected regions		
Type of Farming (TF) - **MIXED FARM**	BIT	KUM	SKP	Max	Min	Total average for the sample, all regions
Average of ha per farm	5.9 (101%)	7.2 (127%)	3.8 (47%)	37.2	0.6	5.2
Average LU per farm	9.5 (63%)	10.1 (106%)	5.8 (122%)	57.2	0.3	8.1
Average crop output	291 (69%)	212 (94%)	227 (54%)	1 119	8	219
Average livestock output	686 (82%)	376 (108%)	413 (45%)	2 372	47	429
Average total output	961 (77%)	588 (100%)	640 (43%)	3 491	145	641
Average crop specific costs	91 (75%)	89 (103%)	75 (49%)	440	12	71
Average livestock specific costs	460 (78%)	203 (100%)	187 (56%)	1 407	19	245
Average total specific costs	551 (74%)	291 (93%)	262 (45%)	1 647	39	318
Average of GM per farm	410 (90%)	297 (111%)	378 (59%)	1 929	- 108	323

The Bitola region has the highest income levels both for crop and livestock production in mixed farming and the highest average level of gross margin. Skopje has the lowest costs for both crop and livestock production and the middle level of gross margin over Kumanovo and the total sample average. Kumanovo has the largest average number of hectares and livestock units but the lowest level of gross margin among the farms in Table 18.

The earlier information in section 5.1 in Table 9 described that fruit and mixed farming had advantageous average values per hectare and livestock unit for income and gross margins. The results for goats and pigs farming were not backed up by more than 0 up to 2 farms per region which does not make them valid enough for any regional conclusions. All types of farming in this section have some farms with negative gross margins.

Efficiency measures based on the values in Tables 11 to 18 are presented in Table 19 and 20. The values present average gross margin per hectare and livestock unit for the different types farming in the regions with the most observations.

Table 19. Gross margins per livestock units for cattle and sheep farming per the regions which have the most observations (NEA, 2009 and own calculations).
(in 1000s per regions)

	Efficiency measures		BIT	KUM	SKP	All regions
Cattle	Average GM/Average LU per farm	2005	54	42	17	37
		2006	16	4	42	23
		2007	3	22	13	10
		2008	9	35	16	16
	Average 2005-2008		23	23	21	21
	Efficiency measures		BIT	SKP	TET	All regions
Sheep	Average GM/Average LU per farm	2005	39	32	31	31
		2006	21	27	8	12
		2007	31	20	5	21
		2008	9	11	0.391	10
	Average 2005-2008		25	19	18	19

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As shown in Table 19, the average gross margins per livestock unit have decreased between the years 2005 and 2008. Kumanovo and Bitola and Skopje have very similar averages for the four years in cattle farming but Kumanovo has higher numbers for the last two years. Sheep farming has the highest average gross margin in Bitola even though all three regions have had decreasing numbers over the four years. Crop farming gross margins per hectare are displayed in Table 20.

Table 20. Gross margins per hectare for cereal, fruit, grapes, vegetables and mixed plant farming per the regions which have the most observation (NEA, 2009 and own calculations).

(in 1000s per regions)

	Efficiency measures		KUM	TET	All regions	
Cereal	Average GM/Average ha per farm (1000s)	2005	15	33	17	
		2006	25	29	32	
		2007	0.449	35	18	
		2008	22	- 47	29	
	Average 2005-2008		18	9	27	
	Efficiency measures		BIT	TET	All regions	
Fruit	Average GM/Average ha per farm (1000s)	2005	103	57	101	
		2006	147	19	84	
		2007	103	225	106	
		2008	199	231	199	
	Average 2005-2008		128	114	119	
	Efficiency measures		SKP	STIP	STR	All regions
Grapes	Average GM/Average ha per farm (1000s)	2005	111	101	102	100
		2006	12	121	30	15
		2007	94	27	40	77
		2008	89	54	201	113
	Average 2005-2008		69	58	90	72
	Efficiency measures		BIT	SKP	STR	All regions
Vegetables	Average GM/Average ha per farm (1000s)	2005	104	218	100	95
		2006	146	140	53	56
		2007	282	532	76	115
		2008	243	251	174	191
	Average 2005-2008		205	277	84	102
	Efficiency measures		BIT	KUM	STR	All regions
Mixed plant	Average GM/Average ha per farm (1000s)	2005	55	40	94	50
		2006	56	21	40	40
		2007	67		89	59
		2008	61	32	133	64
	Average 2005-2008		59	34	68	51

Among the "all regions" values cereal, fruit, vegetables and mixed plant farming have experienced increased gross margins per hectare among the sampled farms. The gross margin levels per hectare for grapes have fluctuated but ended up at the highest levels in 2008. For specific regions Kumanovo has the average highest gross margin levels for cereal, Bitola for fruit, Strumica for grapes, Skopje for vegetables and Strumica again for mixed plant farming. Mixed farming between crops and livestock is presented in Table 21 and the gross margins are displayed both by hectares and livestock units.

Table 21. Gross margins per hectare and livestock units for mixed farming per the regions which have the most observation (NEA, 2009 and own calculations).

	Efficiency measures		BIT	KUM	SKP	All regions
Mixed farm	Average GM/Average ha per farm	2005	58	42	87	56
		2006	249	40	151	95
		2007	31	28	62	39
	(1000s)	2008	49	64	103	76
	Average 2005-2008		70	41	99	62
	Efficiency measures		BIT	KUM	SKP	All regions
	Average GM/Average LU per farm	2005	46	75	98	58
		2006	48	24	61	40
		2007	43	29	30	27
	(1000s)	2008	24	15	105	28
	Average 2005-2008		43	29	66	40

The same values on gross margin for mixed farming in Table 21 show lower values per livestock unit than per hectare. Skopje has the highest average level of gross margin per hectare and livestock units.

To compare how the conditions for production of the main crops has developed over time, data has been collected from earlier reports displaying Macedonian FMS data from the years 2001/2002 (the first round) and 2004 and presented in Table 22.

Table 22. Income, costs and gross margin (GM) per hectare for 10 crops 2001-2008 (NEA, 2009; Kamphuis and Dimitrov, 2002; MAFWE, 2006 and own calculations).

		Crop									
	Year	Alfalfa	Apples	Barley	Cabbage	Maize	Potatoes	Red peppers	Red tomatoes	Wheat	Wine grape
Income per ha	2001/2002	-	373	31	188	85	284	480	969	30	169
	2004	-	549	29	258	57	260	204	494	39	205
	2005	78	265	33	395	60	206	331	609	33	148
	2006	87	374	34	834	86	369	293	-	27	224
(in 1000s)	2007	69	450	30	622	77	323	395	2 278	33	159
	2008	120	405	50	301	64	337	611	2 429	51	189
Costs per ha	2001/2002	-	79	6	18	10	61	26	71	10	18
	2004	-	132	17	101	18	136	73	153	20	57
	2005	18	160	16	137	20	96	211	297	18	38
	2006	28	211	11	494	22	137	111	-	16	189
(in 1000s)	2007	15	163	17	46	21	120	76	527	24	43
	2008	19	131	18	68	34	109	72	223	41	64
GM per ha	2001/2002	-	294	25	171	74	223	454	898	20	150
	2004	-	417	12	157	39	124	131	341	19	147
	2005	61	105	18	258	40	110	120	312	15	110
	2006	60	163	22	340	63	231	183	-	11	36
(in 1000s)	2007	54	286	13	576	55	203	320	1 751	9	116
	2008	101	274	32	233	30	227	539	2 205	9	125

The comparison is made for crop incomes, costs and gross margins per hectare, since it was not easily available what unit (per head or per livestock unit) the other data sets were calculated in for their return to livestock production. Data for alfalfa was not available in 2001 February until 2002 February and nor in 2004 and the data for red peppers and red tomatoes

during 2001-2004 comes from the headings for peppers and tomatoes. Wine grapes in the table come from the heading "grapes" in the 2001/2002 and 2004 data reports. The data sets from 2001/2002 and 2004 are less reliable due to lack of information on if the data sets have been cleaned from errors and anomalies. When put together there are some trends as for example for cabbage, with increasing incomes between 2001 and 2007 and increasing gross margin between 2004 and 2007 per hectare. Maize has increasing costs per hectare from 2001-2006 and until 2008 and decreasing gross margin 2006-2008. Tomatoes/red tomatoes have had increased incomes 2004-2008. For wheat both incomes and costs have increased 2006-2008 while the gross margin has decreased from 2001-2008 per hectare. Wine grapes have experienced decreasing gross margin between 2001 and 2006 followed by an increase 2007-2008. Overall the incomes and costs have fluctuated as have the gross margins. Many of the crops have the highest incomes per hectare in 2008 and the highest costs in the middle of the presented years and gross margins seem to fluctuate but appear at medium levels in 2008. The potential for incomes and trade in the investigated crops is affected by prices on markets which Macedonia has extensive trade relations with. To see what production conditions that compete with Macedonian producers on the EU market which Macedonia will be a part of eventually section 5.5 will provide some information.

5.3 A comparison with EU agricultural indicators

Between the years 2000 and 2005 the price of wheat and maize per ton were higher in Macedonia on average than the average prices recorded in the EU-15 countries, while the average price for sugar beet and beef were below the EU-15 average levels (Rednak, 2008). For pig and sheep meat, eggs and milk the average price levels are similar during this time period (Rednak, 2008). This picture of the price conditions suggests that the price levels are quite high and under little competition during the time period (Rednak, 2008). Price levels have not increased in the EU member countries after their accession to the EU for producers and not homogenously for consumers either, since increased competition has lead to decreased consumer prices for some goods and modestly increased prices for other goods (Ministry of Finance, 2009).

The yields per hectare have been low for crops in Macedonia compared to EU average levels as described earlier according to information from other literature sources. Greece sharing a border with Macedonia and countries which are newly accessed to the EU including Romania which has the lowest economic size limit for commercial farms are compared to Macedonia in Table 23. Gross margins for types of farming which are the in-depth analyzed ones in section 5.2 except cereals are the seven compared types.

Table 23. Gross margins for seven European types of farming in five EU countries compared with the Macedonian average values (www, EU, 2009, 5; NEA, 2009 and own calculations).

2007 for 5 EU countries	Average Gross Farm Income (GM in Euro) per type of farming						
	Specialist other field crops/ M - vegetables	Specialist wine	Specialist orchards - fruits	Specialist sheep and goats/ M - sheep	Specialist cattle	Mixed crops/ M - mixed plant	Mixed crops and livestock/ M - mixed farming
Bulgaria	5 782	22 785	7 804	4 481	-	7 154	5 744
Greece	20 092	17 352	18 254	25 058	19 370	18 943	21 483
Hungary	33 965	11 148	10 095	20 215	-	18 504	30 723
Romania	7 340	44 020	15 714	7 096	-	4 078	3 432
Slovenia	18 338	22 116	6 080	7 704	10 732	7 122	9 791
Macedonia (M) (05-08 average)	5 267	2 694	5 158	9 357	2 981	3 934	5 288

The headings for the European standard types of farming from the "TF14" FADN category dividing all farming into 14 types are paired with the investigated Macedonian categories in Table 23. Vegetables, wine, fruit, cattle and mixed plant farming seem to have lower average gross margins per farm than farms in the presented EU countries. Sheep farming has higher average gross margin in 2005-2008 in Macedonia compared to 2007 values in Bulgaria, Romania and Slovenia but lower values than those of Greece and Hungary. Mixed farming has a higher average level in Macedonia than Romania but lower than the other comparison countries. A crop which is common to compare to estimate use of inputs and production conditions is wheat and hence wheat and also maize are compared in Table 24.

Table 24. Wheat and maize yields per hectare in 5 EU countries compared to Macedonia (kg) (www, EU, 2009, 5; NEA, 2009 and own calculations).

2007	Yield of wheat per ha (kg)	Yield of maize per ha (kg)
Bulgaria	2 074	1 236
Greece	2 918	11 630
Hungary	3 625	4 057
Romania	2 180	2 952
Slovenia	4 358	8 695
Macedonia (05-08 average)	3 312	6 454

Wheat yields according to the data in Table 24 show higher yields for Macedonia than for Bulgaria, Greece and Romania per hectare. Hungary and Slovenia show higher yields per hectare than Macedonia. For maize Greece and Slovenia have higher yields than Macedonia, while the other countries in the table have lower yields. These Macedonian numbers are based on the farm monitoring system (FMS) results and the state statistical office (SSO) average yields values are lower than these (Martinovska-Stojčeska, 2009, pers. mess.).

Wheat is imported to Macedonia while sheep meet is exported. World trade data on sheep meat exports by value place Bulgaria at 11th place with value at $40 828 000 and 7 075 tonnes and Macedonia stays at place 16 with value of $16 646 000 and 2 863 tonnes in 2007 (www, FAOSTAT, 2009, 2). Among the top 20 importers of sheep meat in the world, sorted by value of imports many EU countries are present (www, FAOSTAT, 2009, 2).

Income from goods with export potential may increase rural welfare and section 5.6 will describe policy changes concerning agriculture and rural areas and requirements for agricultural production.

5.4 Macedonian agricultural and rural development trends

Rural areas are classified in the EU in the different member countries due to local conditions and population densities, but this type of classification has not been conducted yet in Macedonia (Dimitrievski and Kotevska, 2008). These regional classifications will be needed for the administration of the IPARD plan and the system to conduct these classifications is under development (*ibid.*). One law from 1994 is in place which after a decision in 2006 defines 64 % of all villages in Macedonia as underdeveloped areas to be encouraged to develop (MAFWE, 2007).

Development for economic growth is a key goal for policy makers in Macedonia. National policies are structured to be business friendly to stimulate GDP growth and development (Ministry of Finance, 2009). The average time to start a business in Macedonia is reviewed by the World Bank through the World Development Indicators (WDI) and their findings reveal

that it took on average: 48 days in 2005, 18 days in 2006 and 15 days in 2007 (www, WB, 2009, 1). One of the resources available for rural businesses is land. Land parcels are small and land fragmentation is extensive due to former maximum land ownership and inheritance laws and informal land markets (Dimitrievski and Kotevska, 2008). The land laws today do not allow further parcelling and consolidation is promoted, but the situation has not changed yet since agricultural lands still are very fragmented and the land markets are not active (Ministry of Finance, 2009).

FADN data which gets processed by the Institute of Agricultural Economics at UKIM will be directed back to the National Extension Agency organization which may become an important factor for developing farm enterprises towards increased competitiveness. Farmers who take part in the Farm Monitoring System annual surveys can receive feedback on their farm performance if they wish to follow their own farm trends and get a comparison to other farms' performance related to the used inputs (Kamphuis and Dimitrov, 2002). This can take place since all farms in the FMS are numbered but the farmers are not identifiable.

Recent initiatives for the agriculture and food sector's development in Macedonia are for example MAASP and their development of a manual with Good Agricultural Practice advice for Macedonian conditions. MAASP is an organisation created in 2004 with SIDA funding, and one of their projects has been to develop the advisory services and the policies for advisors and the connection to the MAFWE's structures (MAFWE, 2007). Good Agricultural Practice (GAP) for Macedonia is prepared by MAASP to provide advice for farmers and advisors on good resource management and practices. The advice includes information about appropriate fertilizer use, crop rotation, manure storage arrangements and irrigation among several more areas. Another initiative is that the government of Macedonia provided education for inspectors and launched an information campaign about the HACCP system before the 2009 deadline for mandatory implementation of the system (Ministry of Finance, 2009). The deadline has only been met by large companies and a wider implementation is needed for improved quality standards in the food supply chains (Ministry of Finance, 2009). More standardization will be requested by large suppliers of consumer goods (Erjavec and Dimitrievski, 2004). That may provide a motive for change to national actors, for their ability to supply larger supply chain actors with agricultural produce of national origin. The Faculty of Agriculture at UKIM has written a report on their project about HACCP which was conducted to establish an info centre for HACCP in Macedonia (UKIM, 2004).

Macedonia has received support from the EU in the form of Instruments for Pre-Accession Assistance (IPA) since 2007 (EC, 2009). This is in place to support increased administrative strength and more recently to cope with the financial crisis through investments in transportation and environmental projects (EC, 2009). A World Bank 15 million Euro loan was approved in 2007 for an "Agriculture Strengthening and Accession Project" to improve government institutions following EU requirements (Ministry of Finance, 2009, p. 69). The Macedonian government also aims to establish farm and land registers by 2010 for better control over payments and actors owning land (*ibid.*).

A lot of information has been published in recent years and reports with data concerning the agricultural and rural development areas have been made available also in English. There is a need now to both improve the information collection methods and quality of the data but also to analyze the sector and use all newly available data for improving the conditions. Chapter 6 will analyze and discuss the information presented herein so far.

6 Analysis and Discussion

The presented information so far has provided a broad description of the production conditions in Macedonia and more in depth descriptions through the farm sample presented in chapter 5 with the methods described in chapter 2. Trade relations which affect the potential for trade in agricultural goods have been described both in chapters 3 and 4. The rural development potential has been described in chapter 3 with examples from other countries. Requirements for rural development and opportunities have also been described in chapter 3 and the relation to Macedonian policies has been presented in chapter 5. A comparison to countries within the EU has also been done in chapter 5, to test the Macedonian gross margins for some of the types of farming towards five EU country values in 2007. The agricultural and rural development policy environment has been presented in relation to the questions which rise from the question how the agricultural sector may develop. This chapter will start with a review on the information herein on the production of agricultural goods. That will be followed by an analysis and discussion about the policies relating to the study.

6.1 Agricultural production conditions

This section presents findings related to crop and livestock production followed by a description of challenges which may be present for farmers in Macedonia.

6.1.1 Crop farming

The main crops are vegetables, cereals, grapes and tobacco in size of used land and value. According to the calculations presented in chapter 5 Strumica has the highest total average crop farm income followed by Bitola. Crop farming reveals larger gross farm incomes than livestock farming. That may be related to the higher costs for imports due to imported feed stuff as shown in the information about value of imports. It may be that world market prices and national prices have increased for crops while support and/or prices have been reduced/dropped for meat and milk. Otherwise the earlier mentioned steady increases in efficiency both in crops and livestock farming are only revealed by crops in this sample. Crop rotation and other good agricultural practices need to be used in line with extension agency recommendations but the used data does not reveal farm technologies.

In Table 8, 10 crops from the 2005-2008 farm samples are presented and red tomatoes and red peppers show the highest yields per hectare. That may be affected by the situation that a small share of these crops is grown on fields and in green houses. Most of the tomatoes at least are grown under plastic tunnels (Martinovska-Stojčeska, 2009, pers. mess.). These production types may not require large areas for receiving high yields per area unit. Apples, cabbage and potatoes also reveal high yields followed by wine grapes at 15 000 kg/ha. The next group with lower yields includes alfalfa, maize ending with barley and wheat at 3 000 kg/ha on average. Gross margins per hectare follow the same trend while the alfalfa data seems to be incorrectly compiled. It is the reported values of per kilogram prices which have been the base for the farm gate price calculations. It seems like a group of farms in the years 2006, 2007 and 2008 among the alfalfa producers have obtained values which represent prices per bale of 10-12 kilograms. Since not all farms have this report error present the income per hectare value does not match that high per kilogram average gross margin values. Alfalfa is one of the main fodder crops but the margin may need to be 10 MKD lower per kilogram. Red peppers and red tomatoes have the highest per kilogram gross margins. The next group around 8 MKD/kg includes cabbage, potatoes, maize, wine grapes, apples and barley. Wheat has the lowest per kilogram average gross margin at 3.5 MKD. Wheat still is the most common cereal and

cereals are grown on a larger total area than vegetables, wine and fruits. Since wheat is used both for consumption and feed it may be that some of the yield is used as feed on the farms, or for household use, reducing the incomes.

Fruit farming reveals the highest incomes per hectare on average shown in Table 9 followed by vegetables and the both types of farming also reveal the highest gross margins per hectare. Fruit farms may be assumed to provide high yields on quite small areas of land but these numbers reveal that also small fruit farms may reveal sufficient incomes. Cereals show the lowest average gross margin levels per hectare.

Trends over time between the years 2001 and 2008 have been presented in Table 22. As described earlier the alfalfa values seem to be too high while apples actually have the fourth highest gross margins per hectare after red tomatoes, red peppers and cabbage. Costs for barley fluctuate more than the income which has led to fluctuating average gross margins per years. Cabbage has had increasing incomes per hectare from 2001-2007 while the gross margins have increased between 2004 and 2007. Maize costs per hectare have decreased but related to a decline of incomes per hectare too from 2001 to 2005 and then from a higher value in 2006 to be reduced in 2007 and 2008, the gross margin also has decreased. Potatoes reveal medium high gross margins per hectare. The numbers for red peppers are fluctuating both in incomes and costs which must be due to the sample, climate or market conditions. Red tomatoes have the largest incomes and gross margin per hectare, which also have increased between 2004 and 2008.

Wheat has witnessed increased incomes per hectare but costs have increased too which has led the gross margins to decrease between 2001 and 2008. The results for wheat may be affected by how the data has been compiled. Some farms seem to present costs for wheat while using it as feed since they do not report any yields and prices. It is an average that is calculated though so the costs just end up in the average cost calculation without participation in the income calculation. If feed prices increase internationally it may be useful to use feed crops grown on the farm with more inputs and higher costs per hectare. There may be another explanation which may be described by analyzing the sample more. When looking at the crop specific cost items per hectare for wheat, year 2007 has the highest costs for hired labour, fuel and lubricants. Year 2008 has the highest costs for the cost items "other crop costs", transports and fertilizers. The costs for pesticides have decreased from 2005-2008 while the costs for seeds have increased some. A farm in 2008 seems to have one error value for fertilizer costs and these types of entries come up as the sample gets more and more processed. Another farm has enormous costs for hired machinery in 2008 which springs from the small plot at 0.3 hectares used for wheat for which the costs calculated in per hectare averages becomes very high. The gross margins may not have decreased in years 2007-2008 on average since these costs are distorting the averages but the average gross margin per hectare for wheat is the lowest among the 10 crops described between 2001 and 2008. Barley and maize have higher gross margin values than wheat but wheat is the most common cereal.

Wine grape has shown decreasing gross margins from 2001-2006 and increased values from the 2006 low until 2008. Weather and farm sizes and the number of farms in the sample may affect the values but the profits for grape farming seem to be beaten by vegetables. The reason for the low 2006 gross margins per hectare seems to be that 16 farms in the Skopje region have negative gross margins for that year while the other sample years just have a few negative gross margin farms. The other regions growing grapes in 2006 just have up to four negative gross margin farms. It can be that it was a bad year for grapes in the Skopje region.

Most of the grape farms are very small and especially the small farms sometimes also grow vegetables or cereals. Most of the grape farms grow wine grapes while three farms in Strumica out of 35 and one in Skopje out of 100 farms for the years 2005-2008 grow one hectare each of table grapes too (NEA, 2009).

Compared to the five EU countries presented in Table 24, the yields for wheat and maize lie on an average high level in Macedonia. Slovenia has higher wheat yields than Macedonia, while Greece and Slovenia have higher maize yields than Macedonia. The farm plots are very small though in Macedonia so the incomes from wheat and maize are low anyway for many farms. Since the plots are very small, the average per hectare yield values often come from observations from less than a hectare sized farms and farming plots. Commercial farms in the European FADN database probably have larger farms on average. The conditions for comparing the values are therefore not optimal.

6.1.2 Livestock farming

Livestock production has lower margins than crop production according to the investigated observations. Tetovo has the highest average livestock farm income followed by Skopje for the years 2005-2008. Average of gross margins per type of farming for all types of farming included in the FMS show that goats and pig farming have good average results per livestock unit, while these types of farming do not have representation by as many observations as the other types of livestock farming in the used sample.

Sheep farming suffers in the calculations in Table 9 since the large number of livestock units at one farm affects the average number of livestock units. The smaller farms' incomes get divided by a too high average number of livestock units which draws down the average of income and gross margin per livestock unit. When the farm IDs 416 and 388 are removed which have 250 livestock units in 2005, 556.25 in year 2006 and 260.19 in 2005 (ID 388), the numbers for sheep farming are as follows in Table 25.

Table 25. Sheep farming income, costs and average gross margins (GM) per livestock unit (LU) in an updated version without the largest number of livestock farms (NEA, 2009 and own calculations).

Type of farming	Average of LU	Average of Tot livestock farm income/LU (1000s)	Average of Tot livestock specific costs/LU (1000s)	Average of GM (ls incomes-ls costs)/LU (1000s)	Average of Farm GM/LU (1000s)
Sheep	23	49	30	19	20

The changed values that the reduced average number of livestock units led to are presented in Table 25. The average number of livestock units became 23 (30.5 before) which reduced the average costs with approximately 1000 MKD per livestock unit which in turn increased both margin calculations with 1000 MKD. The farms which had around 100 livestock units were kept in the calculations since one of them had another annual observation at 60 livestock units. The next level of the most common number of livestock units in the sample for sheep farming is around 40-60 livestock units. The next group is around 20 livestock units followed by 10-15 livestock units as the largest group. Sheep farms have several observations with negative gross margins which also affects the averages. The other livestock types of farming still perform better on average. But sheep farming may beat cattle and mixed livestock farming when focus is put on the per livestock unit related incomes and costs for the farms. Mixed farms perform better per livestock unit since they also have crop incomes.

Sheep graze on mountain pasture areas and sheep farms therefore have very small areas of own land which also was shown in Table 5 in chapter 5 where Tetovo has the smallest farm sizes on average even though they have one very large sheep farm (Kamphuis and Dimitrov, 2002). When calculations at first were conducted with the zero cost sheep farms included it seemed to be an on average low cost production branch. The question is though if the zero costs were errors or if the costs are not there due to grazing on pasture commons and only family labour. Grazing sheep may need improved feed practices but the choice of what feed to use would be affected by high feed stuff prices. It may be the feed costs that give the best margins to mixed farming since they may provide their own feed to their livestock.

Sheep milk cheese for the domestic market will be in constant demand due to the traditional consumption of it. Since milk products stay high in consumption also with increased incomes the livestock sector may have some long-term potential even though all meat products from Macedonia do not qualify for entry into the EU market today. Pre-accession funds may support fulfilment of EU requirements in the meat supply chains too. Meat consumption may increase in the country following increased income levels due to the focus on economic growth.

It may be that some farms which grow their own fodder end up in other farm categories if the livestock incomes are not high enough since the margins for crop production seem to be larger than they are for livestock production. This has effects since the type of farming is determined by how large shares of the farms' gross income that come from specific farm activities.

6.1.3 How incomes fluctuate

Average total farm income is highest in Tetovo affected by their very large sheep farm followed by Bitola which has high crop farm income and average high livestock farm income on average as shown in Table 5. When considering the specific costs, the average gross margin is the highest in Bitola where crop farming is dominant. Tetovo has the second largest average gross margin for this sample from the years 2005-2008 and livestock farming is dominant there. The types of farming (as shown in Table 6) which reveal the highest gross margins in Bitola in total averages are: fruit, goat, industrial, mixed farm, pigs and fodder crops. Fodder crops are also the most profitable type of farming in Bitola according to these numbers. The high fodder crops value may be from the very high prices revealed for alfalfa in chapter 5 which may be incorrect as described in section 6.1.1. Bees are just observed with one farm per region in two regions and 19 farms in Tetovo but it has the largest margin in Kumanovo. Kumanovo's most profitable type of farming with the highest value among all the regions too is vegetables. Cereals are at the highest gross margin level in Skopje and the highest gross margin production in that region. Cattle and mixed plant also present their highest margins in Skopje. Mixed livestock has the highest gross margin in Stip representing the highest margin production in that region. Grape farming has the highest gross margin in Strumica while cereals represent the highest margin type of production in the region. Tetovo has the highest values for sheep which is the highest gross margin production type in the region. Mixed livestock has on average negative gross margin in Tetovo while grape farming has a similar but not as negative situation in Bitola. Sheep farming reveals the highest average gross margin among the different Macedonian types of farming but the result is affected by the very large sheep farm in the sample from Tetovo. The second highest gross margins are presented by a group of types of farming which reveal similar average levels around 320 000 MKD/farm and year: fodder crops, fruit, goats, mixed farm and vegetables, while fodder crops may have a too high result according to these numbers.

As seen in the standard deviation percentages in Table 7, the Tetovo region which has many negative gross margins for cereal farming showed the highest fluctuation. Sheep gross margins fluctuate largely due to the difference in economic size among the sampled farms. The second highest variation levels are among cattle farms and vegetables among the farms with the most observations. Cattle farming may be affected by the prices of imported feed which present high values among the goods imported to Macedonia by maize, wheat and soy bean cake among other feeds. Vegetables may be affected by the variety of sizes for farms in the Skopje region which reveals the highest variation in gross margins, but also by weather conditions affecting yields. Some farms may not harvest crops when market prices have dropped which also affects incomes but they may do that to avoid labour intensive harvesting procedures which may require short time hired labour (Martinovska-Stojčeska, 2009, pers. mess.). Also price levels on the domestic market depending on the amount of imports competing with the national products may affect both cattle and vegetable farm incomes. Mixed farming and mixed plant farming have the lowest variation in gross margins for the sampled years. This may come from the possibilities that they have to reduce their risks when they sell goods both in crop and livestock market sections. Also it could spring from the possibility to avoid fluctuating feed input prices through using own produced feeds at mixed farms.

A shift may take place towards larger production farms when supply chain coordination increases and the demand for standardized output from farms increases. Meanwhile family farms will play an important role in continuing to supply the domestic market with agricultural products while also increasing their quality levels, traceability and productivity, using more sustainable farm practices. When the farms receive sufficient incomes from their farm businesses, the gross margins may be used for investments to increase productivity on the farms. Self sufficiency farming may be effective since the farmer works full time and uses all available resources, but it may not be shown in the data if the produce is not sold. As seen by the yields for the used sample, the values are not the lowest compared with comparable EU countries.

FMS data will be reported back to farmers through the NEA to increase productivity on farms and increase incomes. If gross margins increase, the possibility to co-finance investments on farms increase, which may provide collateral to receive bank loans. Improved farm practices through GAP guidelines and certification may improve production, profits and eligibility for support funds. Investment levels are not included in the data which was available from the FMS. A question rises if too low investments affect the gross margins to fluctuate and decrease in cereal production and somewhat in grape farming. In a regular enterprise, it could be assumed that investments would be made to keep output levels sufficient and to invest before output levels get affected by insufficient machinery and lack of overall investments.

6.1.4 Regional opportunities

The regions which had over 16 observations for different types of farming according to Table 10 were included for the calculations which are presented in section 5.4 in chapter 5. Figure 13 presents the map over the FMS regions for an overview of the location of different regions.

Figure 13. Map over the NEA's data regions in Macedonia and the location of the NEA headquarter (www, NEA, 2009, 1).
BIT=Bitola; SKP=Skopje; STIP=Stip; KUM=Kumanovo; TET=Tetovo; STR=Strumica.

The Bitola region is situated in the south-west part of Macedonia by the largest lakes. The climate turns into the Mediterranean type in this region but there are mountains present which divide the landscape. Bitola has the highest income levels for cattle farming and the largest average size (number of hectares) for cattle farms. The gross margin is not the highest though since the region has medium high costs accompanying the highest incomes in cattle farming. Bitola presents the highest average level of hectares for sheep farms but that is a distortion coming from especially one farm which has large reported lands for wheat and fodder crops which do not have any reported yields or incomes. The lands seem to have been used for grazing on the alfalfa fields and wheat and common vetch must have been harvested since there are reported costs for the crops at this farm. The hectares seem to be used for feed but it is unusual to have 175 hectares for feed in Macedonia and the high value may be an incorrectly reported one which might need to be 17.5 hectares instead. Sheep farming reveals the double amount of average gross margin compared to cattle farming in Bitola.

Fruit farm observations are available mainly in the Bitola region in the FMS. The number of hectares per farm on average for fruit farming in this region is 3.5 hectares while livestock are rare on these farms. Incomes are the highest in this region, for fruit farming and the gross margin is in level with that for sheep farming on average. Bitola has the highest gross margin for vegetable farming and this production is favoured by the climate conditions. The possibility for earlier harvests from vegetables in green houses than in neighboring countries already in January is profitable for vegetable farming (MAFWE, 2008). The railway goes from Bitola to the North-East which should favour market access to the northern neighboring countries. Bitola has the highest number of livestock units per farm among mixed plant farmers and the highest output and gross margin levels. The average mixed plant gross margin

is higher than for cattle farming in Bitola but lower than the average levels for sheep, fruit and vegetables farming. Mixed farming reveals the highest output levels both for crops and livestock and the highest gross margin on average, in Bitola. Incomes and costs vary with the same percentages approximately and not much less than the gross margin varies so costs should follow incomes quite closely. Mixed farming has a higher level of average gross margin than cattle and mixed plant farming but lower than vegetables, sheep and fruit farming in Bitola.

The Skopje region goes through the middle of Macedonia from north to south in the NEA's classification of regions. The climate is both continental and Mediterranean and the region includes mountains, plateaus and one lake. Skopje has the highest average level of livestock units per cattle farm together with the highest average gross margin from cattle farming. Sheep farming reveals several times higher average gross margins than cattle farming in this region. Grape farming in this region has medium high level of gross margin compared to Strumica and Stip. The margin for grape farming is lower than for cattle and sheep farming. There may be a potential to increase output if the average number of hectares per farm at 2.5 hectares could be used more effectively. The unsecure weather conditions may affect output in this region among grape farmers. Vegetable farming has the lowest average costs per farm in the Skopje region but the farm sizes are the lowest and so is the gross margin. The average gross margin for vegetable farms is in level with that for grape farming but lower than for sheep and cattle farming. Mixed farming has the lowest costs in the Skopje region but the average gross margin level is medium high compared to Bitola's and Kumanovo's.

Stip is situated in the Middle-East part of the country with mountainous landscapes to the North and to the South in the region. The region has the lowest average costs for grape farming but also the lowest gross margin. The number of farm observations is the lowest for this region and types of farming which are represented by too few farms for in-depth analysis, as bee keeping, mixed livestock and pigs are present in this region.

The Kumanovo region is located in the North-Eastern part of the country with lower lands in the Western part of the region and mountains closer to the Serbian Northern border and the Bulgarian Eastern border. Kumanovo has the lowest average costs per farm for cattle farming but also the lowest incomes and therefore the lowest gross margin for this type of farming. Cereal farming has the highest average number of hectares per farm in the Kumanovo region. Cereal farming in this region includes some livestock per farm on average. The incomes and the gross margin for cereal farming are at the highest level in this region. Mixed plant farming has the highest average number of hectares per farm in this region while the gross margin is the lowest but not extremely below Bitola's which is the highest and quite close to Strumica's average level. Incomes vary the least among the mixed plant farms while specific costs vary slightly more among the sampled farms in this region. The gross margin for mixed plant is higher than those for cereals and cattle farming. Farm sizes on average in hectares seem to be the largest in Kumanovo while the productivity levels are lower than for the other regions. Either lack of machinery, inputs as fertilizers and pesticides, labour or skills may affect the gross margins to be low together with climate conditions. Mixed farming has the highest average number of hectares and livestock units in this region. The incomes are the lowest while the costs are medium high compared to the Bitola and Skopje regions whereby the gross margin ends up as the lowest level among the regions for mixed farming. The gross margin is the highest in Kumanovo though, which means that it is higher than those for cattle, cereal and mixed plant farming.

The Tetovo region includes the highest mountains of the country in the North-Western part of Macedonia and is the most mountainous region out of the six regions in the FMS system. Tetovo has the highest incomes and highest average livestock costs per farm for sheep farming due to several large and medium large sheep farms. The region also has the lowest average costs for crop production in sheep farming, which may spring from the use of grazing in mountainous areas and on meadows as feed and focus on only sheep production on the sheep farms. Tetovo had 27 observations of farms which were cereal farmers. The cereal farms had no livestock with one farm exception. The gross margins varied a lot since almost half of the farms had negative gross farm incomes. The region is mountainous so it may be that the harvests were used on the farms in subsistence farming since the farms sizes were very small, on average 1.5 hectares. The low number of hectares and the low yields for cereals as shown in both section 5.1 and 6.1.1 tell that the amount of cereals sold seem to be low on average. Fruit farming had only 13 observations in Tetovo but it was included to provide a comparison region for Bitola. For the observed farms, the farm sizes were very low on average in the region, for fruit farming, while the average gross margin was five times higher than for cereal farming. Tetovo has 19 observations of bee farms but those farms get less presentation due to their position both outside crop farming and since they are not calculated in livestock units. Bee farming is represented among the types of farming due to the Macedonian conditions. Honey is a product which may be exported and sold to national markets and it does not require very advanced processing facilities or distribution chains. This may be a favourable product to produce in Tetovo due to the small farm sizes and low yields in crop farming, as a complement to sheep farming, and the average values for bee farming are presented in Table 26.

Table 26. Average livestock (ls) income, specific costs, direct livestock specific margin and average farm gross margin (GM) (NEA, 2009 and own calculations).

Type of farming	Average tot ls income (in 1000s)	Average of tot ls spec costs (in 1000s)	Average margin (ls costs-ls incomes, in1000s)	Average tot farm GM (in 1000s)
Bees	239	56	183	185

The average values for bee farming in Table 26 represent all observations of bee farming, but 19 of the 21 farms are located in Tetovo while there was one in Kumanovo and one in Stip. The average gross margin for bee farming is higher than the average gross margin for both cereal and fruit farming in Tetovo but lower than that for sheep farming.

Strumica includes the non elevated areas around the Vardar River before the river flows into Greece. The region also shares the third largest lake with Greece at the South-Eastern border and is the least elevated region, under Mediterranean climate conditions. The farm sizes for grape farms are on average the largest in Strumica with 2.7 hectares and livestock units are rare in grape farming. This region has the highest income and gross margin from grape farming. The climate conditions must have a positive influence for this region's potential in grape farming. Vegetable farming has the highest average number of hectares and level of output in this region. The numbers of livestock alongside vegetable production are low. The region does not have the highest gross margin for vegetables since Bitola has that due to lower costs. The gross margin for vegetables is higher than for grape farming. Mixed plant farming has the lowest costs in Strumica compared to Bitola and Strumica but the gross margin is medium high. Mixed plant farming has a lower gross margin than grape and vegetable farming in this region. Livestock are kept by over two thirds of the farms in mixed plant farming in the Strumica region.

To look at the efficiency measure of gross margin per livestock unit and hectare among the types of farming which have been described more in depth per the regions in Tables 19-21 is useful. The gross margins for cattle farming were not close on average but per livestock unit the value shows the same gross margin per livestock for Bitola and Kumanovo, quite closely followed by Skopje. Sheep farming has a 2 000 MKD higher level of gross margin per livestock unit in Bitola than cattle farming had. Skopje follows Bitola in sheep farming and Tetovo has the lowest gross margin per livestock unit. For crops, cereals are more profitable per hectare in Kumanovo than in Tetovo, which has half of Kumanovo's gross margin per hectare. Cereal farming on the whole country average level provides more gross margin per hectare on average but the other regions did not have enough observations which does not ensure that they represent their respective region or the country average. Fruit farming has the highest profitability in Bitola but Tetovo's value is not more than 11 % lower per hectare. Grape farming reveals much higher gross margin per hectare in Strumica than in Skopje and Stip and this type of farming is the most profitable per hectare for Strumica according to the used data. Vegetables reveal the highest margin per hectare in Skopje followed by Bitola and these levels are the highest per hectare gross margins among all regions and types of farming. Mixed plant farming has the highest value per hectare in Strumica. It also shows the lowest gross margin per hectare for Bitola among all the types of farming which are represented in that region among these eight most observed types. Kumanovo has the lowest margin per hectare for mixed plant compared to both Strumica and Bitola but it reveals fairly high gross margins per hectare for the region. Mixed farming provides the most gross margin per hectare on average for Kumanovo while Skopje followed by Bitola have higher gross margins per hectare and per livestock unit for mixed farming.

The summary of all the highs and lows for the regions in this section is as follows in Figure 14. Bee farming which had over 16 observations only in Tetovo has an average gross margin of 44 563 MKD per hectare in that region and that is included in the figure.
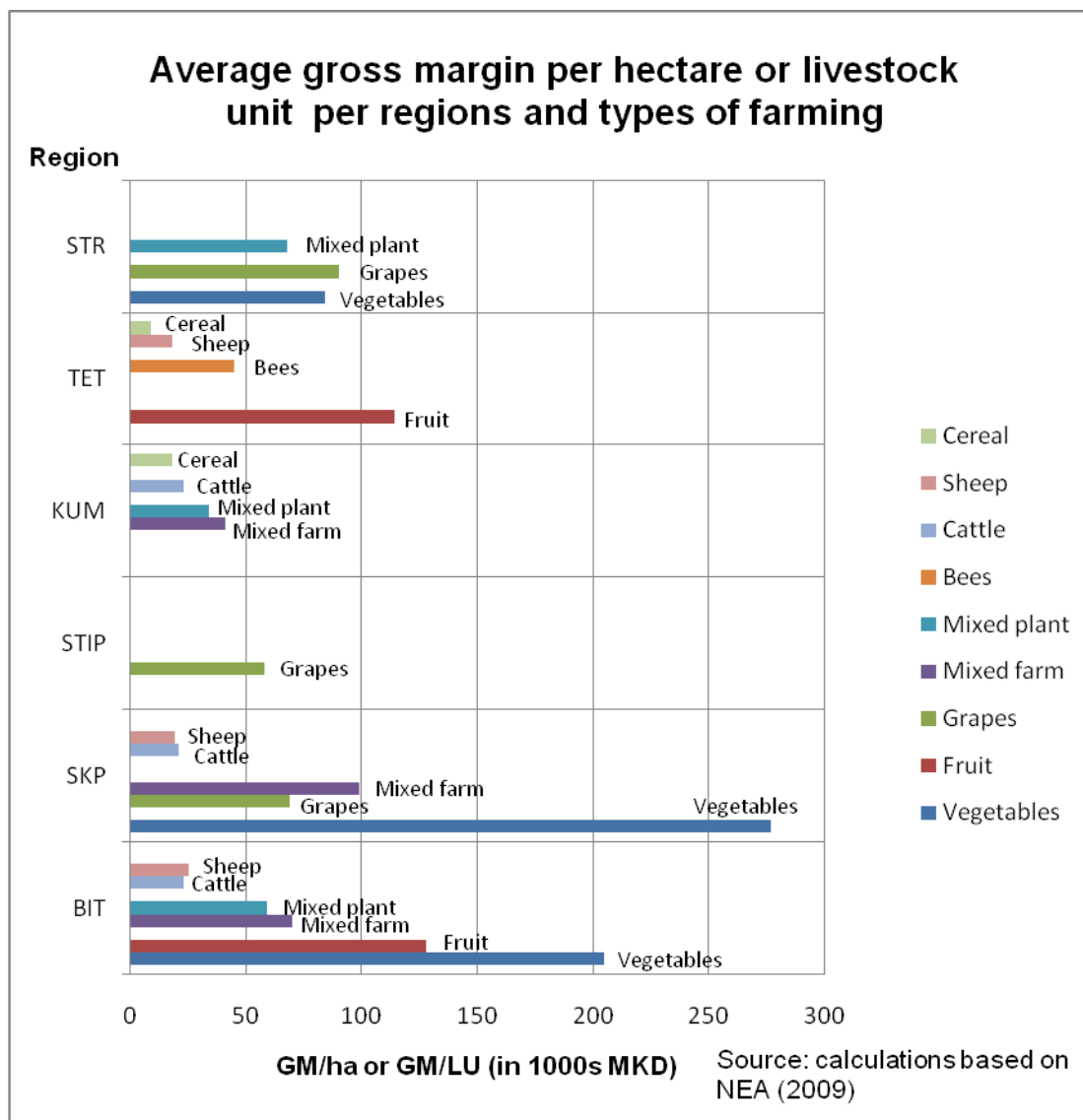
Figure 14. Gross margin (GM) per hectare (ha) or livestock unit (LU), for the six regions and the main types of farming.

As the summary above has shown vegetables, fruit, mixed farms, bees and grapes are the highest yielding types of farming among the six different regions per hectare or livestock unit depending on type of farming. For an overview, the crop farms' per hectare values were included and mixed farms and bee farming are presented by hectares too while livestock farms are presented per livestock unit. This shows that the small farms are used for providing high yields per hectare and livestock unit among the sampled farms. This chapter has so far given average sample results, results per region and type of farming with the most observations available and gross margin values per hectare and livestock unit. The results from the different approaches towards the farms in the sample have shown different results. The latest summary provided in Figure 14 seems to be the most accurate one, since the types of farming with the most observations in their regions are included and since the values are presented in a per hectare and livestock unit format.

6.1.5 Problems and concerns for farmers
Farm size in hectares in this sample is linked to larger economic size of the farm's gross margin. The farms in regions with dominance of specific crops use larger lands on average for

those types of farming. That may be linked to the ideas from Winters *et al.* (2009) that activities are motivated by the available assets.

The agricultural products in Macedonia are produced mainly by small farms. Observations in the used data sets include many small farms which would not have qualified as commercial in the EU FADN system. The gross margins are negative and minimal for several farms and those are included in this study since the aim is to investigate the sector to describe the conditions and look for potential development paths. Many farms in the sample are not larger than the 1 ESU economic limit for being considered as commercial in for example Romania. Romania's limit is the lowest within the EU. The commercial limit matters since CAP producer support only is available for commercial farms. It is a characteristic of the Macedonian farms to be very small and the country has many micro climate areas. Mountains, valleys and the small size of the country probably affect the farm sizes. If the analysis would have been conducted to mainly investigate competitiveness of the commercial farms, then the data would have been cleaned from negative gross margin farm observations. A potential limit for the economic size of included farms could be set at for example 1 ESU, or 2 000 Euro of gross output according to updated FADN standards (Martinovska-Stojčeska, 2009, pers. mess.). If a farmer mainly produces goods to sell it can qualify as commercial even though the economic size limit is not surpassed.

The marginal costs per hectare might be reduced if the plots were larger since rented machinery for a 0.3 hectare plot probably is not proportionally smaller than the cost for harvesting a 2 hectares large plot. The competitiveness of the gross margins could increase if farm and plot sizes increase. Increased productivity would uphold or increase per hectare yields on farms which increase their size. Gross margins would also increase on the small farms with increased productivity if for example input quality is increased and improved farm practices are used.

The interesting result in this aspect is that the yields among the farms included in the calculations do hold reasonable levels compared with average levels for comparable EU countries. The calculations are done with directly calculated averages while the EU FADN database values from 2007 are representative for the whole countries weighted for different farm types, economic sizes and regional conditions. A goal should be to use the available data sets even though they are not perfect in all aspects. When the FMS sample is updated according to information from the fairly recently conducted 2007 Agricultural Census it will be improved. The work with results from the Census which now is available also in English online on the SSO website has started whereby improvements will take place.

Farm incomes do not deviate from gross margins as much as they do among EU countries since the investment costs and tax levels are low (Martinovska-Stojčeska *et al.*, 2008). Therefore the gross margins are fairly representative of the farm incomes even though the farms with the smallest economic sizes receive more income from transfers and work more to receive off farm income than farmers with economically larger holdings do (Martinovska-Stojčeska *et al.*, 2008).

The comparison to five EU countries in Table 23 shows that average gross margins are lower for Macedonia in field crops versus vegetables, wine, fruits, cattle and mixed plant farming than for the EU member countries. The Macedonian average gross margin is higher than for Bulgaria, Romania and Slovenia in sheep farming. The average Macedonian gross margin

also exceeds Bulgaria's and Romania's in mixed farming. The next section will describe the policy pre-conditions for development of the agricultural sector and the rural areas.

6.2 Agricultural and rural development policy conditions

This section will describe the policy environment of today, the future policy requirements related to the questions which have been raised in this thesis and the problems which may arise.

6.2.1 Today's situation

Wine, sugar and veal meat exports to the EU market are restricted (Ministry of Finance, 2009). The trade restrictions which have been reduced over different time periods for different goods between the EU and Macedonia will not be a problem in the future single market. The restrictions have restricted the trade possibilities into the EU market for goods as wine which is one of the main Macedonian export goods. EU policies aimed at their internal over production of wines within the single market, may be a concern for Macedonia, but planting of new vine which is restricted today within the EU may become non-restricted after 2013 (www, EU, 2010, 6). Needed investments in new vine for wine production in Macedonia may need to be done sooner than later anyway. Accession negotiations may provide openings for exceptions from EU requirements for specified time periods. To work for a fast track towards full membership it may be wise though, to reduce the need for exceptions and to adapt the agricultural sector fully towards today's CAP requirements. Although room for changes made after the new EU budget is put in place after 2013 must be taken into the plans.

IPARD funds are provided as pre-accession support from the EU for rural development and it gets co-financed by national funds. Rural development funds are allocated nationally for administration by the MAFWE as described earlier. The importance will be to build for increased sustainability of rural income sources. Infrastructure and education programmes are of importance alongside land consolidation programmes. As described earlier, the reason for small farm sizes spring from the large number of subsistence farmers which must use their lands to provide for their living to for example complement low pensions or unemployment payments. These farmers will not leave their lands if they cannot provide for their living with new income sources. IPARD funds will have an important role in Macedonia to improve rural livelihoods, since up to 90 % of Macedonia may be considered to be rural areas (Martinovska-Stojčeska, 2009, pers. mess.).

6.2.2 What more will be required by the policies

The production support measures which the Macedonian policies aim for today may be in-optimal since the CAP will change after 2013. CAP compliance relates to the moving target concept since the sector should build up a sustainability of its own without significant production subsidy support in case that the EU agricultural budget decreases drastically after 2013. Lack of coordination in the establishment of environmental and agricultural support measures may be a problem too since the focus on environmental measures within the agricultural sector probably will increase in the EU. The direction for the CAP is assumed to be away from any production support and towards sustained environmental public goods goals and rural development support. Most public organizations in Macedonia are either updated, reformed or newly established in the area of agricultural and rural development as seen in the MAFWE agricultural and rural development report for 2007 (2008). It may be useful to integrate the environmental policy requirements early. Otherwise there may be a need to reorganize when the environmental requirements must be fulfilled upon and after accession.

Information about export possibilities to markets where Macedonia has unexploited trade potential must be spread to actors within the agriculture and food sectors. There are standards for signalling quality which should be used. Regional trademarks are an opportunity for several Macedonian products. If full rights to specific products are not acquired, the traditional goods of Macedonia as sheep cheese, aijvar, local varieties of peppers and tomatoes and other products, should be marketed more anyway both nationally and towards international markets. The regional trademarks are meant to be used under competitive market conditions but they do exclude other non-eligible producers from using the same trademarks.

A practical issue related to the gathering of information which is under improvement is the FMS sample. The sample size may need to expand when EU accession comes closer since populations which are smaller than the Macedonian have larger samples than Macedonia has today. On average 255 farms per year are presented as fully presented farms through the FMS between 2005 and 2008 as shown in Table 4. The formal number of the number of farms in the FMS is 450 but the farms are not that many and many of the ones reported from the NEA do not have reported incomes or costs. For example Estonia and Cyprus have smaller populations but larger farm samples reported to the EU FADN database (www, EU, 2009, 2). The fact that agricultural enterprises in Macedonia which have grown from the former state owned enterprises are not included in the FMS of Macedonia also affects the representativeness of the sample. The private farms produce the largest share of the agricultural output as presented earlier (80 %) but it needs to be evaluated if they should be a part of the FMS.

6.2.3 Problems and concerns

It is of importance for Macedonian conditions to investigate how policies for rural development and agriculture affect small farmers. Several goals aim towards reducing the over employment in the agricultural sector and to consolidate farm plots and create more productive farm practices and the results of these changes should be monitored. As Welsh (2009) pointed out, the increasing size of farms, although described in United States conditions with enormous farms present, may have negative effects on rural welfare but that is also affected by how much control over their production and sales that the smaller farmers and rural actors have. Policies need to address not only business oriented farms but also small farms which provide a large share of the Macedonian agricultural output today.

Lack of available land to increase the economic size of farms may be a problem. There is a need for land consolidation since the number of small farms is in majority while the variable costs and incomes may be constant per output unit up to medium large farm sizes. Larger lands are on average related to greater gross margins as presented in Table 5 according to the data used herein. Higher gross margins provide more room for investments. This relation is not linear though, since many farms also reveal higher gross margins with smaller farms and since the hectare values in Table 5 are averages. Interaction between public policies must be taken into concern for education, infrastructure, micro loan and land consolidation projects as described earlier. The assets which are available for farm households will affect their choice of income sources as Winters *et al.* (2009) has described.

It may be useful to conduct a population census in Macedonia to investigate and map where rural communities are situated, to be able to target the least developed areas with support. It needs to be signalled to these communities what kind of projects that they may apply for pre-accession funds for, to improve the livelihoods. Labour movements between different rural

areas and to urban areas also affect the availability of labour in different areas. As long as farm incomes provide good enough livelihoods and no other income opportunities are available, people will remain in farming. Increased income opportunities outside agriculture will reduce the agricultural population overall or the rural population working within agriculture at least. Skill acquirement may help people to be able to make use of more income opportunities outside agriculture as described earlier about investments in education.

6.3 Potential development trends

Increased trade in the goods which are exported today with a focus on the high value products would be positive. Sheep meat has a high unit value as has wine, especially when bottled. Tobacco is affected by trade policies which this study has not investigated further since there were few observations of industrial crop farms in the used sample. Sheep meat for exports and national markets and sheep cheese dominantly for the national market have potential. Macedonia is the 16th largest exporter of sheep meat measured in total value in the world. Increased implementation of quality standards as the HACCP system and reliability of supplies in the supply chain may increase the number of markets where this product may be exported. As mentioned earlier Tasic (2007) made analysis of trade potential for Macedonia towards different EU and Western Balkan countries. Several countries which were among the top 20 importers of sheep meat in 2007 also were the countries which had large unrevealed trade potential with Macedonia. These countries were for example Sweden and Denmark in the northern parts of the EU. Trade has traditionally mainly been conducted between geographically close countries but sheep meat is already exported from New Zealand among other large exporters of that good. There is a need to establish supply chains with proper information flows which inform Macedonian producers about price and demand conditions. The potential for this type of farming should be investigated further also to inform farmers about where their exports are most demanded and in what quantities during which seasons.

Cereals are grown on large areas in Macedonia but the used sample mainly included low yielding cereal farms in the Kumanovo region. The areas in the south of the country where all crops seem to grow the best may need to be used for high yielding vegetables and for grape production. Of course there is a need for cereal production to supply the livestock sector with feed and to provide the large quantities of wheat needed for consumers. There needs to be a balance between the export incomes from vegetables among other goods and import costs for cereals as it seems. The equation may be balanced if livestock production is less prioritized, but fresh milk is another good which may be hard to mainly import. The northern regions of the country seem to have potential for continued livestock production, where crop yields are lower and sheep may graze. Improvement of meat supply chains may increase incomes from meat products, provide increased competitiveness for the livestock sector and hinder dependence on only meat imports. Mixed plant farming and mixed farming seem to be suitable in areas where risks need to be diversified and climate conditions may affect yields. Green markets which are organized by municipalities are of importance to provide diverse possibilities for market access, for farmers which produce for the national market.

6.4 Concluding discussion about the study

The value of the data used herein is not the best since the sample is not large enough to describe all the regions and all types of farming. Some trends seem to come forward though as presented in this chapter. Annual data was available for 2005-2008 but the values are affected by the change of farms included in the sample. It is hard to distinguish income and cost trends from sample change induced fluctuations due to the large number of observations when the annual data are put into one database. As mentioned the data may be cleaned from

negative gross margin farms and so on but the sample decreases with every new exclusion rule so decisions had to be made about what to prioritize. When there is lack of data and the aim is to get a picture of the agricultural sector, it was important to keep as many observations as possible.

The problems with the availability of information and administration and control of information sources are shown in the data sets used for the calculations in this thesis. Errors which are easily avoided if the farm survey results are entered into computers and then double checked should be corrected earlier in the information chain. The positive side is that there is a possibility to communicate about the reported data values if they seem incorrect. The advisors which have completed the survey for every farm are reported together with the farm IDs and data sets so that new contact may be established if questions occur.

Reliability in this study was ensured through describing what parts of the sample that were excluded through decision rules for the different calculations. Validity of the results is not totally secured since the excluded farms reduced the sample size. The representativeness was therefore reduced further along with the fact that the sample is used for simple averages and not weighted ones. Another factor is that the errors found may not have been all errors occurring in the sample. Some entries were incorrectly inserted by the NEA even though the data sets were the final double checked ones from the agency. This confirms the need for Macedonia's both internationally and nationally funded projects to improve information paths. Both in regard to validity of the data provided and the reliability of supplied data by collection with consistent methods and digitalization of the techniques.

The conclusion which still is possible to draw from this study is presented in chapter 7.

7 Conclusion

Market access to both national and international markets is of importance for farmers since there is unrevealed trade potential to explore both regionally with neighbouring countries and nationally for goods that now are imported. Increased trade and export quantities would increase the demand pressure on Macedonian producers. Quality levels may then rise due to increased demand and competitive pressure from foreign producers. If production inputs, quality controls and profitability improve, increased gross margins can be used to make larger investments. The Macedonian producers which still are active upon EU accession will be able to bear the competitive pressures in EU's internal market if sustainability for the agricultural sector is achieved. Some products and strategies would support this path:

- Sheep is a branch with potential due to the high export value. Sheep meat holds the 17th place among the top 20 export commodities from Macedonia. The export quantity to neighbouring countries varies with season but more export markets could be available if sanitary quality in the meat supply chain is improved.

- Vegetables have potential in several regions especially in the southern half of the country.

- Wine, grapes and fruits have potential since they represent the most exported goods today.

- Mixed plant farming and mixed livestock farming may provide diversification of farm practices when there is a need to lower the production risks from changing climate conditions and fluctuating input costs (for example for animal feed).

- Livestock products in general probably will continue to be imported while cattle and sheep farming have potential in some regions. Pig and poultry output have not been covered with any empirical information herein but are common agricultural import goods.

- Environmental concerns are important when the competence levels and institutions for administration of farm support funds are built up.

- Farm sizes affect the incomes received by farms while per hectare yields could compete with those of some other EU member countries. Farm consolidation programmes may therefore be beneficial.

- Infrastructure and education support information flows about prices, market trends and good agricultural practices. Investments in these areas also increase market access and supports rural areas towards diversified income activities.

- Tourism is an income source to be exploited in rural areas.

This study provides general agricultural data results to support previous studies and reveals several development potentials. Also presented are the most favourable types of farming per region to develop the production activities. The quality of the data and the sample size do not allow exact conclusions to be drawn about the level of gross margin for different regions and types of farming, but it provides support to rank different alternatives for different regions.

Epilogue

One aspect that has not been discussed in the thesis is the development of organic farming in Macedonia. The farm technologies and whether farmers practice conventional, organic or good agricultural practice farming is not revealed by the FMS data. The number of "organic" farmers has increased in Macedonia during the past few years (EC, 2009). Since subsidies are received by farmers in the EU for organic farming, it may be of interest to look into more for Macedonian conditions as a possibility for increased farm incomes.

In line with the article written by Bojnec and Latruffe (2007) about farm business efficiency in Slovenia, a similar study on farm efficiencies could be made for the Macedonian FMS sample farms. Their study uses data that still is not included in the Macedonian farm monitoring system survey for collection of FADN type data. The additional data needed are value of present assets as capital levels, depreciation costs, annual work units used per farm and intermediate consumption. Utilized agricultural area and costs for hired labour are already presented in hectares and monetary units in the Macedonian data. The efficiency calculations present the type of farming that uses its full potential given the technical conditions that are present. The efficiencies calculated in the study are: technical efficiency, scale efficiency, allocation efficiency and economic efficiency (Bohnec and Latruffe, 2007). The farm types which use their resources the most efficiently are assumed to cope with competition in the EU market and in world trade in the best way (*ibid.*). The missing data for these calculations in Macedonia will have to be collected in the future before accession to the EU to follow the FADN guidelines. The calculations can then be done to more specifically measure how well farmers use their resources and which branches that have the best possibilities to survive increased competition.

The article by Welsh (2009) described under the theory section described interesting suggestions about how policy impacts and differentiated farming structures could be measured econometrically. Macedonian farms will change their structures by consolidating more farm plots and through absorbing IPARD funds. This will be done to develop the agricultural and rural areas, so these types of calculations could be useful to see what effects the changes have on rural welfare measured by incomes and poverty prevalence. The supply chains will be improved toward international market standards. These types of calculations can be useful to see if integrated supply chains support diversified rural businesses by providing income, not only to large companies but also to small rural business owners.

Another study made on Dutch dairy landscapes uses modelling of positive external effects from agriculture to calculate the optimal farm practices for different regions. That kind of studies could be conducted when the ecological relationships between agriculture and ecological effects have been mapped further in Macedonia (see Parra-López, Groot, Carmona-Torres and Rossing, 2007).

Work with the FMS data is under way in Macedonia, a lot of interesting areas for research are available and the amount of available material for development of valuable indicators will increase when the information systems are improved.

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Personal messages

Martinovska-Stojčeska, A., Assistant Professor*, Institute of Agricultural Economics, Faculty of Agricultural Sciences and Food – Skopje, University Ss Cyril and Methodius*
Telephone, 2009-12-15, e-mail, 2009-12-25