Output and employment growth in primary agriculture and the food processing sector across the EU: Are some doing better than others?

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Abstract

The economic importance of agriculture and food production in EU Member States is in decline, yet the KBBE promises a better future for the agri-food and related sectors. Taking a high level approach, this exploratory paper uses official data to examine the development of output, gross value added and employment in the agri-food sector over the last decade. At the Member State level, the relationship between the agri-food sector's primary and processing sectors is examined. Comparing the performance of different Member States shows that substantially different agri-food economic developments are evident over the last decade. Solid explanations for the observed differences in the experiences of the Member States extend beyond the scope of the paper. Consequently, the tentative conclusion is that fundamental differences in the composition of primary agriculture between the Member States of the EU may mean that some Member States stand to benefit to a greater degree from the KBBE than do others.

Key words: Agriculture, Food Industry, Employment, Value Added, CAP, EU….

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1. Introduction

Agriculture and food processing remain important sectors, particularly in employment terms, in non-urban regions across the EU. Yet primary agriculture has long been perceived as a mature sector, consistent with the definition of a sunset industry (Radetski, 2008). However, this characterization of the sector was revised by policy makers (and many economists) over the last decade, with the emergence of strong food demand growth from developing countries, driven by rising incomes and population growth. This development led to a run-down of agricultural commodity stock levels, an overall tightening of agricultural commodity markets and a 75% rise in real food commodity prices over the period 2003 to 2008 (Erten and Ocampo, 2013). New demand for land, such as that required for the growth of biofuels, added to these pressures (Langeveld et al., 2013). At the same time, a lack of economic growth and employment opportunities has been a source of inequality affecting rural areas (Fresco and Poppe, 2016)

In the era of the "knowledge based bio economy" (KBBE), (European Council, 2000) a vibrant growing food processing industry would be expected to make innovative higher value added food products to satisfy rapidly growing numbers of increasingly sophisticated customers. In the KBBE paradigm, new scientific knowledge and technological innovation are the driving forces behind sustainable wealth creation, but only if society adapts to these imperatives. If the KBBE agenda is not embraced, Europe will fall behind globally in competitiveness and productivity gains (Birch et al, 2014). Farmers would enjoy the benefits via "thriving rural livelihoods" which would be expected to flow from additional demands for agricultural output arising from developments in the KBBE. That at least is the narrative set out in official policy documents **(**European Commission 2012**).**

This paper asks whether the available data on recent agricultural and food industry performance support this narrative as a fair reflection of reality? Is observed growth in output volume, output value, value added and employment in the food processing industry reflected in growth in the volume, output value and GVA of agriculture? Has there been a common experience across EU member states? Are income generating innovations arising in the food processing industry and reflected in growth in food industry GVA mirrored/offset by the presence/absence of innovation at the farm level?

The remainder of the paper is divided in four sections. Section 2 describes the theoretical framework. Section 3 describes the data used and method of analysis. Section 4 presents and discusses the results in detail. Conclusions are drawn in Section 5.

2. Theoretical Framework

The global economy has a host of unmet needs which are yet to be fulfilled. These needs include requirements which could be fulfilled, at least in part, by innovation in the agri-food sector identified by initiatives associate with the KBBE. If these currently unmet needs could be satisfied, this would create opportunities for additional employment and economic activity in the agri-food sector. The creation of additional economic activity and employment in the agri-food sector could slow or even arrest the long-term decline in employment observed in the agri-food sector. Additional benefits would also be expected as as a result of multiplier effects in the wider rural economy, where most of these jobs would be expected to be based.

The level of employment in a society is at least partially a function of the economic environment facilitated by government and consequently appropriate public policies can therefore help to raise the level of employment. Such policy measures include agricultural income support policies (including supply control measures), taxation measures and tariff and non-tariff protection. Significant KBBE related investments have been made recently by both EU and national sources with the objective of delivering research that will ultimately be expected to contribute to the generation of output and employment opportunities. It is incumbent on governments to assess whether such investment are delivering at least in some way on what they have promised.

In the agri-food sector, as in other sectors, technological development (via Schumpterian creative destruction) would be expected to destroy employment in the immediate sector where the technology is deployed, unless the aggregate output gains were of sufficient magnitude to more than offset the disruptive impact of the technology. In principle the KBBE paradigm promises more technical jobs and potentially higher paying jobs with greater purchasing power and knock on economic benefits for the wider economy via the multiplier effect.

Our expectation is that across individual EU Member States agriculture has over the last decade continued to decline in importance in terms of contribution to GDP and in the absolute and relative share of total employment it provides. The trends that should be expected a priori in terms of the food and beverage sector's contribution to GDP or the sector's absolute and relative share of total employment at the Member State Level is less clear.

Is it conceivable that via developments associated with the KBBE that growth in the food and beverage processing sector's value added could contribute to a stabilization or an increase in the food and beverage sector output and employment. Is there the potential that this could, to some degree, slow the rate of decline in the value added and employment contribution of the primary sector? The primary and food processing and beverage sectors of EU member states are heterogeneous. Furthermore, trade in primary products between the member states is increasing. What this means for the linkages between the primary sector and the processing sector within and across Member States is therefore worthy of investigation. Are some Member States' agri-food sectors doing better than others?. Is there any evidence to suggest that the KBBE actually contributes to the sustainability of the combined EU agri-food (agricultural and food processing) sector?

3. Methodology and Data

The paper relies primarily on an examination of the available Member State level Eurostat data on agricultural output, agricultural gross value added, food manufacturing output and food manufacturing value added, along with associated employment data in farm and food manufacturing industries.

Agricultural output and food processing output in several EU Member States are converted to indices to facilitate the comparison of growth rates. Similarly, the levels of income and associated agricultural employment are also analysed. Where differences at the Member State level are observed they are highlighted and possible explanations are explored. All of the data used for the analysis in the paper are available directly to download through the Eurostat website.

The paper explores whether at the Member State level there is evidence that primary agriculture has benefited in either income or employment terms from the growth in the level of economic activity in the food and beverage processing sector. Answering these questions is important given that some policy makers are content to draw sweeping inferences about the state of health of farm incomes and farm employment solely from their interpretation of data on food production growth and/or food export growth performance.

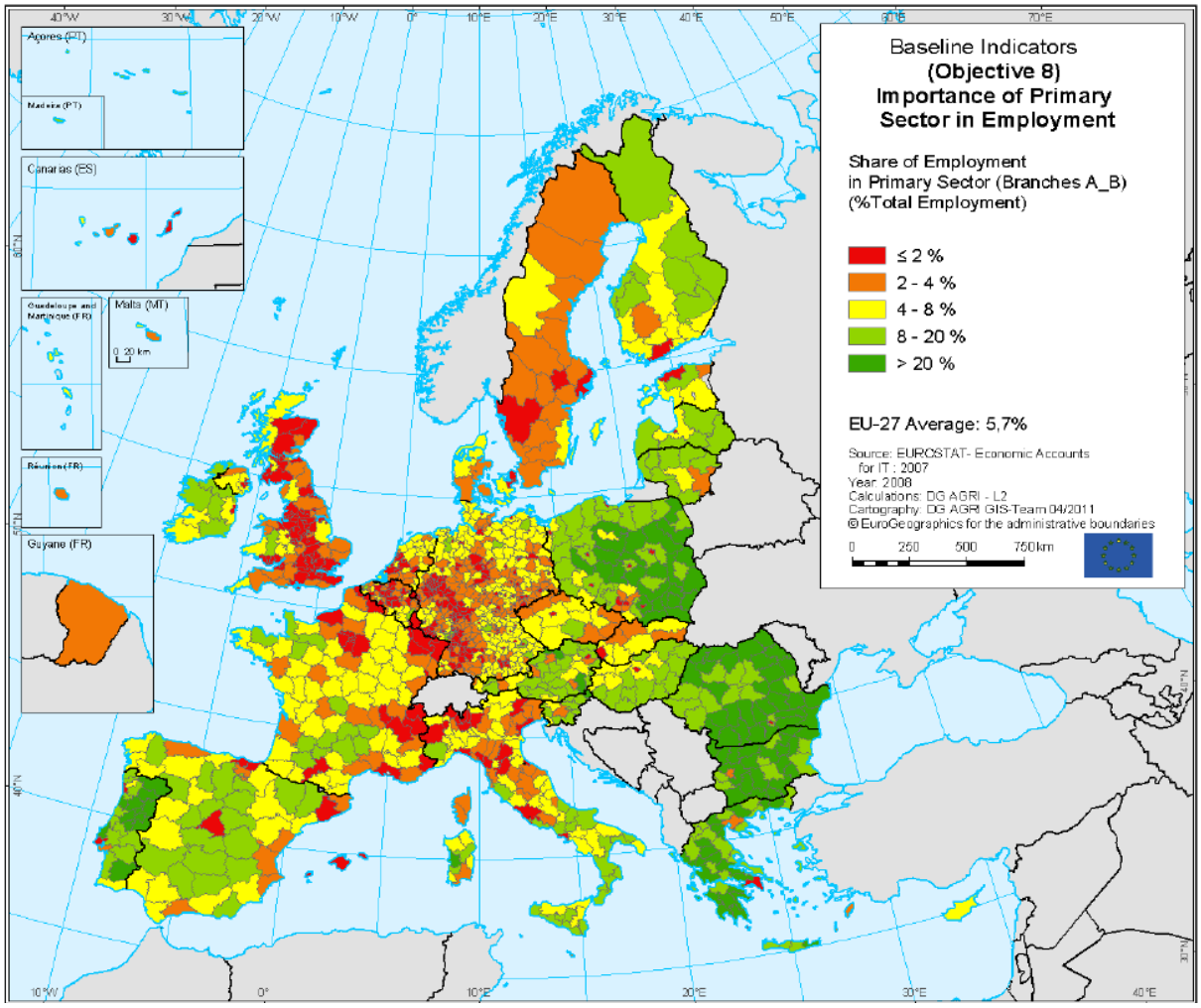
It is recognized that the definition of the KBBE extends beyond that of the agri-food sector but the breadth of the definition of what constitutes the KBBE remains less than clear, making it difficult to define for the purposes of data analysis. In this paper the agricultural sector and

the food and beverages manufacturing sectors, as defined by standard national accounting rules, are used rather than still somewhat undefined framework known as KBBE.

4. Results

An overview of the diversity in the contribution of agriculture to the economies of different EU Member States can be gleaned from an examination of the importance of the sector in employment terms across the NUTS 2 regions of the EU.

Figure 1: Share of Employment in Primary Sector as a % of total Employment in EU27

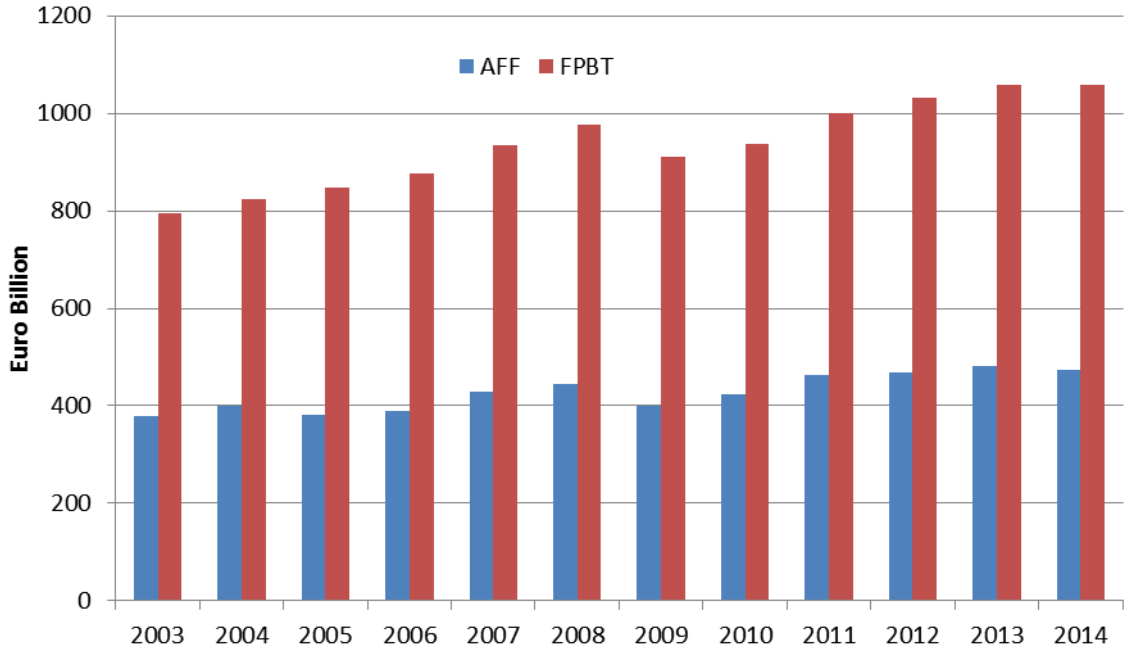


Source: Eurostat

It is evident from Figure 1 that despite the generally low share of national employment accounted for by primary agriculture, employment in agriculture still remains important in many regions of the EU.

Figure 2 illustrates the value of output (in nominal terms) generated in the Agriculture, Forestry and Fishing (AFF) sector and in the Food Processing, Beverage and Tobacco (FPBT) sector for the EU28 over the period 2003 to 2014. It is evident that there has been an increase in the value of output in both sectors over the period, but that in percentage terms the growth in output value in the AFF sector has lagged behind the growth in output value in the FPBT sector. Over the period considered, the output value in the AFF increased by 25%, whereas output growth in the FPBT was 33%.

Figure 2 EU 28 Value of Output of AFF and FPBT



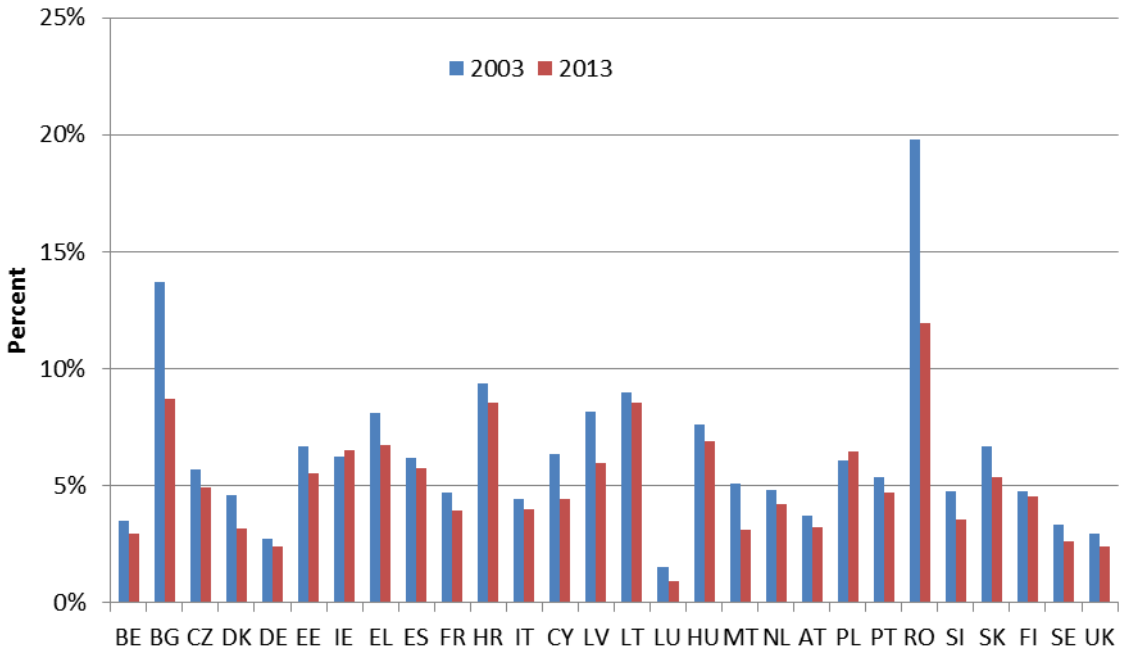
Source: Eurostat
Notes: AFF = Agriculture, Forestry and Fishing
FPBT = Food Products, Beverages and Tobacco

GDP per capita by Member State across the EU varies considerably reflecting the different stages of economic development of the various Member States. The economies of some Member States have evolved to the point where GDP is dominated by service sector activity, which has long superseded manufacturing and primary agriculture as the driver of most economic activity. This service sector dominance is particularly evident in urban areas and increasingly common even in rural areas. At the Member State level the joint GVA contribution of the combined AFF and FPBT sectors (hereafter the agri-food sector) to EU Member State GDP is generally quite small and might be expected to decrease in all Member States over time as economies develop.

Figure 3 shows the GDP share of the agri-food sector by Member State in 2003 and 2013. Perhaps, unsurprisingly, the contribution of the agri-food sector to GPD was highest in the two Member States with the lowest national GDP per capita, Bulgaria and Romania. In general terms the GVA contribution of the agri-food sector to national GDP is found to be higher across Central and Eastern Europe than in Western Europe.

Across the EU28 there has been a decline in the GVA contribution of the agri-food sector over the period 2003 to 2013, with a sharper rate of reduction in Central and Eastern European Member States. Again this might be expected, given the different stages of economic development in Western and Central and Eastern Europe. In many EU Member States, the overall agri-food sector now represents less than 5% of GDP.

Figure 3 AFF + FPBT GVA as a % of GPD by EU MS 2003 and 2013



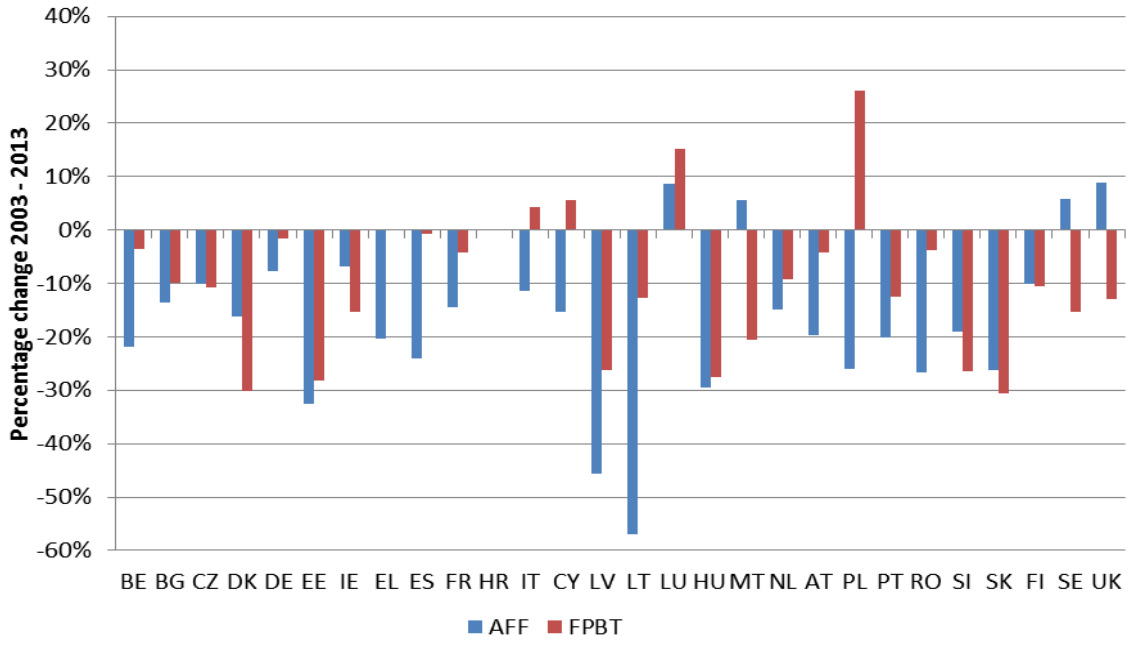
Source: Eurostat

Trends in employment in the AFF and FPBT sectors across the EU Member States over the period 2003 to 2013 are illustrated in Figure 4. In keeping with the observed declining trend in GVA contribution, there has been a general decrease in the absolute level of employment in these two sectors in many Member States. In several Member States AFF employment has fallen by between 20% and 55% between 2003 and 2013. However, there have been some exceptions to this general downward trend. In some cases, over the period 2003 to 2013, AFF absolute employment is reported to have increased, notably in Malta, Sweden and the UK.

Whether the reported increase in primary sector employment in these three countries reflects reality or whether it is a statistical anomaly is not clear.

Over the period 2003 to 2013, FPBT sector employment has fallen in most EU Member States. The largest declines in employment have been observed in in Hungary and Sweden where employment declined by as much as 30%, more generally the decline in the FPBT industry across most other Member States has ranged from 10% to 20%. The level of FPBT employment has either remained stable in Greece and Spain. In the case of of Italy, Cyprus, Luxembourg and particularly Poland employment in the FPBT industry has increased.

Figure 4 Evolution of AFF and FPBT employment in EU MS (2003 to 2013)



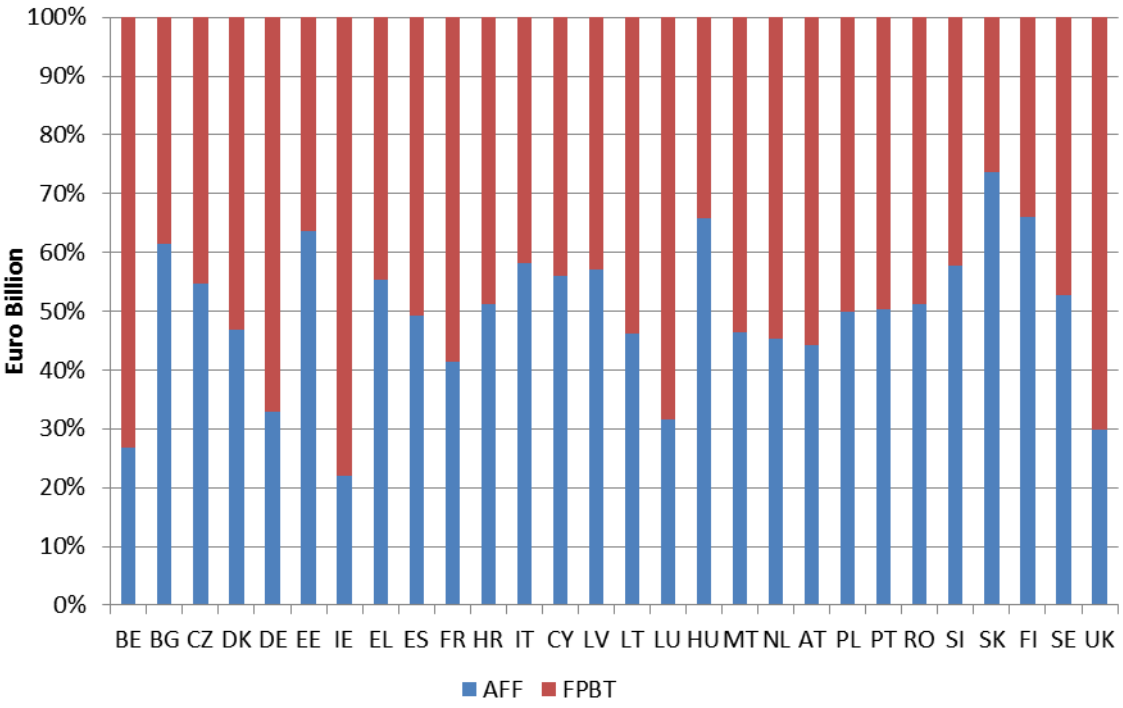
Source: Eurostat

Figure 5 illustrates the relative contribution of AFF and FPBT to overall GVA in the agri-food sector in 2013. This is an imperfect and somewhat crude measure, but it provides some indication of whether the FPBT sector in a given MS is adding value to the output of its primary production sector. Agri-food sectors with a smaller share of their total aggregate GVA provided by the AFF sector are typically those adding more value to their primary production at the processing stage.

The capacity to add value to primary production will depend to some degree on the nature of the primary production in a given MS. In MS where much of agricultural production is of fresh produce such as fruit and vegetables, the capacity to add value in the processing stage may be more limited than in MS where there is a higher proportion of agricultural

output is made up of livestock or livestock products with a greater potential for conversion to higher value added processed food items. A low share of AFF GVA in total agri-food sector GVA may also be an indicator that a significant share of primary production is being exported to other countries for further processing.

Figure 5 Relative share of EU MS GVA contributed by AFF and FPBT in 2013



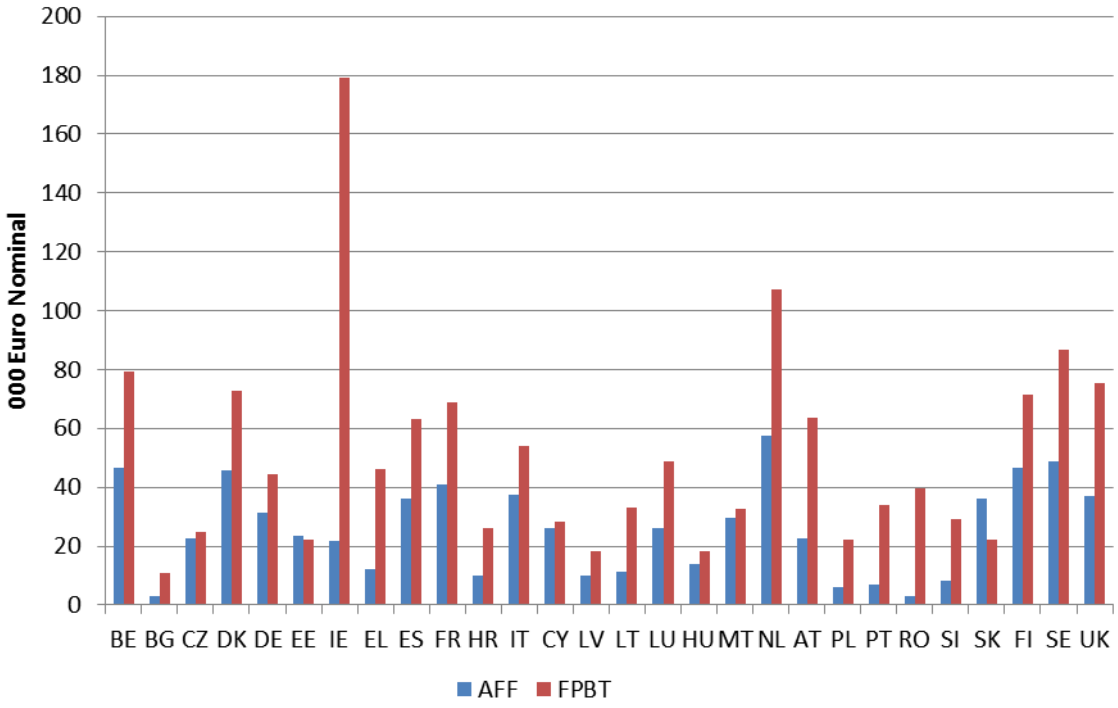
Source: own elaboration based on Eurostat data

The contribution of AFF to overall agri-food sector GVA varies significantly across the EU's Member States, ranging from as low as 22% in Ireland to as high as 74% in Slovakia. Examination of this variable across Member States illustrates that there is no discernible dichotomy between Central and Eastern Europe and Western Europe. However, what is evident is that Member States which have a substantial livestock sector tend to have a low share of AFF GVA within total agri-food GVA. For example, some of the lowest shares of AFF GVA are found in Ireland, Belgium, Denmark, France and the UK. In Member States where crop, fruit and vegetable production dominate agricultural output, AFF GVA tends to contribute more than half of the overall agri-food GVA. This suggests that the dominance of particular agricultural activities in the agricultural sector output of a Member State is a factor in determining the size and profitability of the food processing sector in different Member States relative to the size of the Member State's primary agriculture sector. Does this apparent relationship between agricultural sector output composition and the size of the food

processing sector in turn mean that the KBBE has less capacity to deliver additional output, employment and value added than in other MS?

Figure 6 shows the nominal GVA per worker employed in the AFF and FPBT sectors across the Member States in 2013. The GVA contribution per worker in the AFF varies from as low as €3,000 per worker in Bulgaria and Romania to as high as €57,000 in the Netherlands. In general the GVA per worker in AFF is around €40,000 in Western Europe and less than half that in Central and Eastern Europe. There are exceptions to this general West/East divide, with a relatively high level of GVA per worker in Slovakia at €36,000 and a comparatively low level of GVA per worker in parts of the EU15 such as Ireland, Austria, Greece and Portugal.

Figure 6 GVA per worker in AFF and FPBT employment in EU MS in 2013



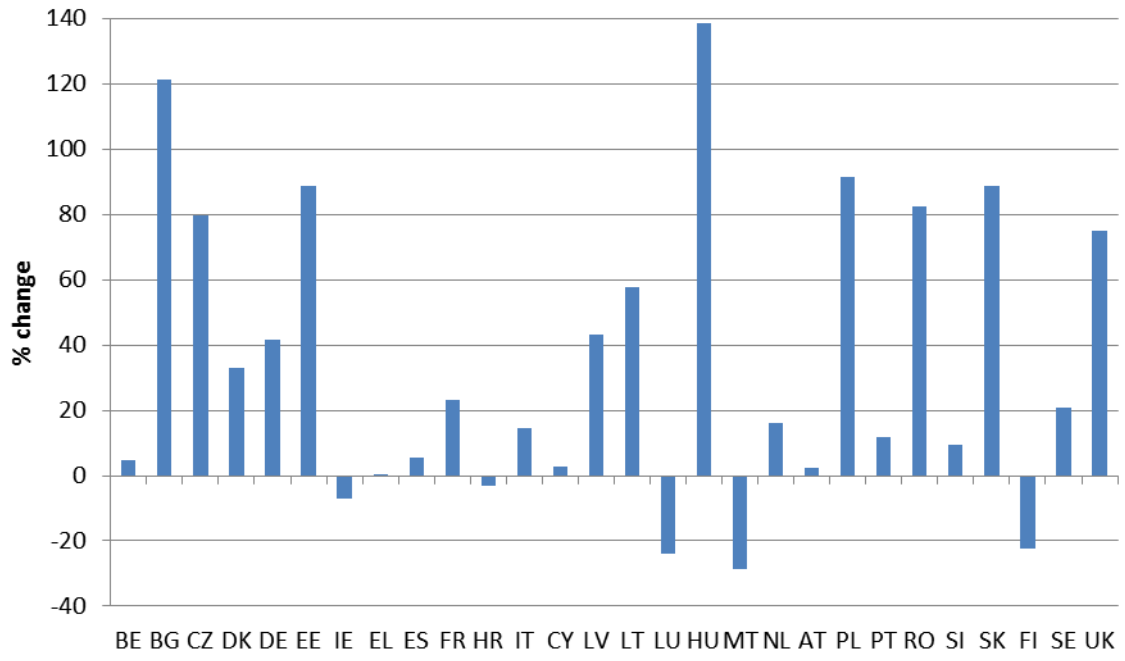
Source: Eurostat

The range in GVA per worker in the FPBT sector across the Member States is vast. GVA includes both the profit of the enterprise as well as the wages and salaries of employees. This means that GVA per worker should not be conflated with FPBT income per worker. FPBT GVA per worker is highest in Ireland at €180,000, while FPBT GVA per worker is just €11,000 in Bulgaria. In general the GVA per worker in Western Europe is around double that of the GVA per worker in Central and Eastern Europe.

With few exceptions across the Member States, the GVA contribution per worker in the AFF sector is lower than in the FPBT sector. However, within Member States the ratio of GVA per worker in the FPBT relative to the AFF sector differs considerably, at over 8:1 in Ireland and as low as 1:2 in Slovakia.

Figure 7 shows the percentage change in the real income per worker in agriculture over the period 2005 to 2013. Since the data are presented in euro, changes in exchange rate over time complicate comparisons between Eurozone and non-Eurozone countries.

Figure 7: Indicator A: % increase in real income of factors in agriculture per annual work unit (2013 relative to 2005)

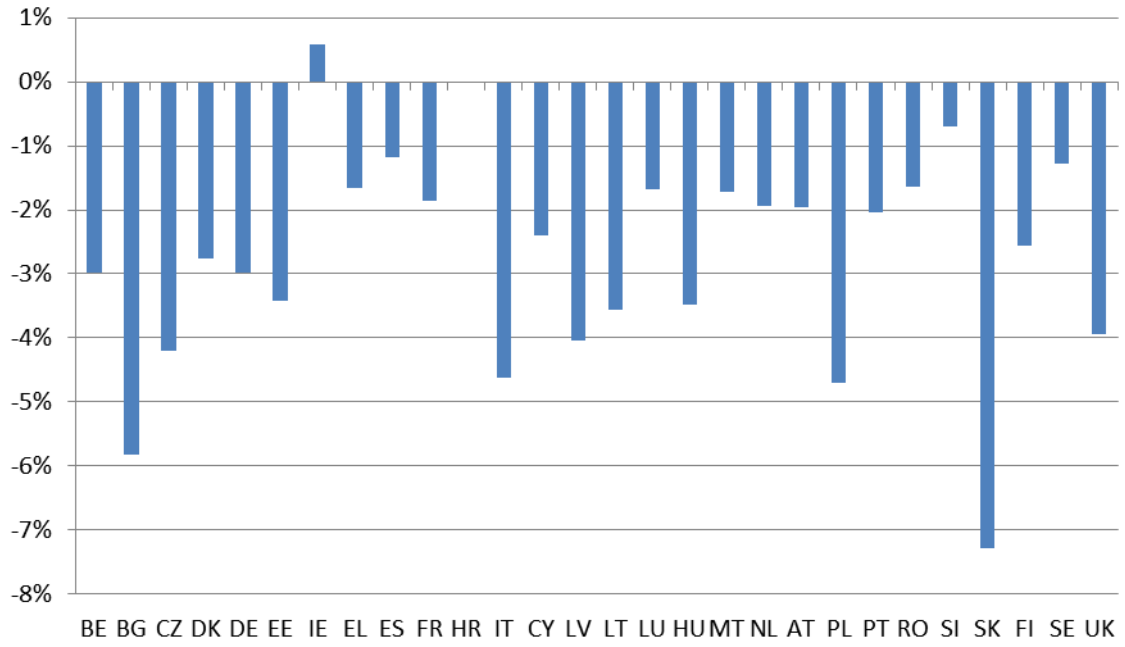


Source: Eurostat

In general small percentage changes are observed in those Western European agricultural economies that are dominated by highly subsidised livestock agriculture (e.g. Ireland, Belgium and Austria), whereas real income growth in France, Germany, Denmark and the UK has been stronger. It is possible that following EU accession, the higher rate of exit from primary production in Central and Eastern Europe countries has facilitated greater productivity improvements in these Member States and has contributed to the large increase in real income per worker in agriculture observed. The rate of exit from agriculture, proxied by the reduction in the number of holdings, is illustrated in Figure 8. In the period 2003 and

2013 Central and Eastern European Member States also gained from the addition of CAP direct payments and complementary nationally financed payments.

Figure 8 Percentage change in the number of agricultural holdings by member state (2013 relative to 2005)



Source: Eurostat
Note: Croatia not included

Table 1 shows agricultural subsidies as a share of agricultural sector value added for selected years. It demonstrates the wide variation in the contribution of subsidies to agricultural GVA across the EU. In general the Western European Member States where livestock and livestock product production (milk, beef, sheep) dominate, have a higher share of subsidies in GVA (e.g. Ireland, Denmark, Austria, Germany and the UK), while Western European Member States with an emphasis on crop, fruit and vegetable production tend to have a lower share of subsidies in GVA (France, Italy and Spain). The share of subsidies in GVA in the Netherlands is especially low, and this is explained by the intensive, large scale market gardening, flower and plant activities in the Netherlands, which generate considerable value added, but attracts little in the way of CAP subsidies. At the other extreme, the very high subsidy share for Finland is explained by the high levels of additional subsidies from the Finnish national government which were permitted under the terms of its accession to the EU.

Table 1: EU MS agricultural subsidies (less taxes) as a % of agricultural GVA in selected years

	2000	2005	2010	2011	2012	2013	2014	2015
				%				
EU28	NA	33.2	34.8	32.9	31.9	30.5	32.0	32.0
BE	11.6	18.7	33.0	38.9	27.8	30.3	33.3	35.3
BG	0.3	5.5	42.5	36.3	47.7	62.7	60.4	54.2
CZ	13.8	63.6	115.2	80.9	86.0	73.1	80.6	80.1
DK	27.5	37.4	32.0	33.5	24.2	30.7	28.2	34.9
DE	35.6	42.6	45.2	37.6	44.7	34.0	42.5	54.0
EE	14.8	43.9	72.1	56.9	52.8	58.5	49.2	46.8
IE	61.7	132.7	121.3	97.4	91.3	73.7	66.8	58.8
EL	34.8	35.4	52.9	52.7	49.7	44.8	44.3	37.6
ES	24.8	31.4	30.2	30.9	30.3	27.4	28.9	29.1
FR	27.4	38.7	30.9	29.9	27.1	29.5	26.9	28.7
HR	NA	30.9	40.6	38.1	36.8	25.1	39.9	39.5
IT	12.6	10.4	11.9	12.8	12.2	13.3	17.0	14.0
CY	-1.2	10.4	7.6	7.6	8.3	7.2	15.9	18.3
LV	2.8	75.4	114.0	101.9	84.1	109.8	136.7	113.3
LT	1.0	55.7	69.1	49.0	37.2	47.4	54.3	52.5
LU	45.0	62.5	74.0	78.5	46.0	59.3	51.4	77.3
HU	8.7	59.5	70.0	55.8	63.4	58.8	55.4	63.2
MT	1.6	43.5	53.6	35.3	37.9	35.7	39.3	32.5
NL	2.3	6.1	6.1	8.3	8.0	8.2	6.4	6.7
AT	57.3	72.1	58.7	46.8	46.9	50.4	48.3	46.1
PL	-2.4	34.3	61.7	55.8	40.6	43.8	47.4	42.6
PT	24.0	41.7	39.4	44.0	49.3	36.5	34.7	31.0
RO	1.5	8.7	16.0	14.5	21.5	18.9	25.6	23.2
SI	22.8	57.3	63.0	53.1	65.5	63.1	50.5	47.5
SK	70.6	53.0	151.9	90.2	76.9	70.6	74.3	92.2
FI	235.6	284.5	191.2	159.8	157.1	213.6	315.0	429.8
SE	81.0	91.5	70.8	68.7	62.1	69.2	63.1	63.6
UK	59.2	62.7	50.9	40.1	37.5	35.1	29.6	33.2

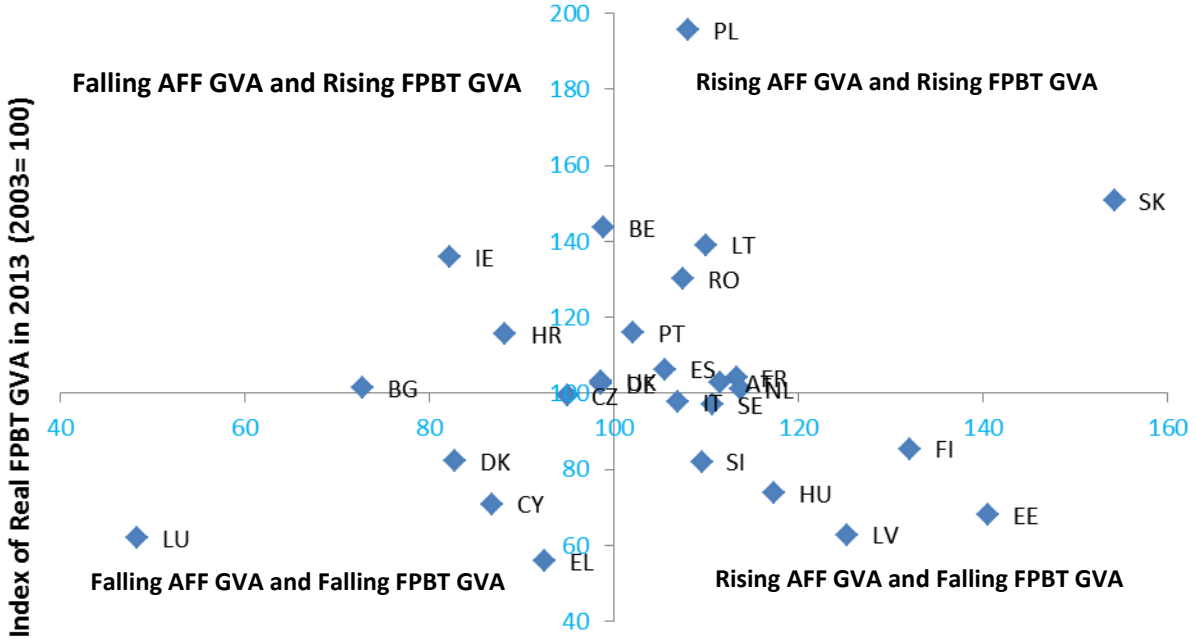
Source: own elaboration based on Eurostat data

In general, in Central and Eastern Europe the share of subsidies in the GVA of agriculture in now higher than it was in the year 2000, reflecting the admission of these countries to the EU and access to CAP funding. Broadly, the level of subsidies as a share of GVA is higher in Central and Eastern Europe than in Western Europe, albeit that the absolute income and subsidy levels in Eastern Europe are considerably lower than in Western Europe.

Figure 9 presents a scatter plot of the growth in real GVA in AFF and FPBT over the period 2003 to 2013. From this it can be observed which Member State' AFF and FPBT industries have been growing or contracting and whether growth in the FPBT sector has in general been supportive or antagonistic to the growth in the AFF sector at the MS level.

Generally, there is a cluster of countries with modest levels of growth in both AFF and FPBT GVA, but there are also quite a number of Member States which are dispersed some distance from this cluster. For example we see that in Poland there has been an increase of just 8% in real AFF GVA, but an increase of 95% in real FPBT GVA. In this sense Poland represents an outlier and suggests that its FPBT has either dramatically improved its capacity to add value to Polish primary production, or alternatively that Poland is increasingly importing primary products from elsewhere for further processing.

Figure 9 Scatter plot of Index of Real AFF GVA in 2013 against Real FPBT GVA 2013 (2003 = 100)



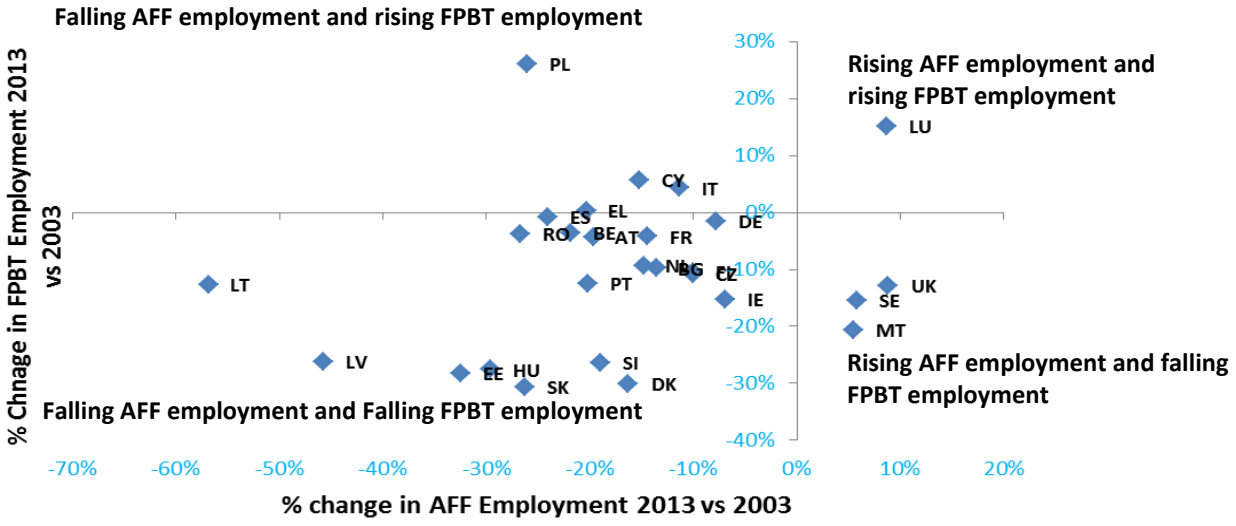
Source: own elaboration based on Eurostat data

Slovakia is also an outlier in that it shows an increase of over 50% in both real AFF GVA and real FPBT GVA, a much stronger rate of growth than observed across much of the EU. Greece, Cyprus and Denmark appear to have performed less well over the period, with appreciable contractions in both real AFF and real FPBT GVA.

Hungary, Latvia and Slovenia have seen an increase in their real AFF GVA, but a contraction in their FPBT GVA. In geographic terms these are small countries and perhaps this development indicates that agricultural raw materials and relatively unprocessed commodities are being exported to other Member States for further processing.

Figure 10 presents a scatter plot of the percentage AFF and FPBT employment over the period from 2003 to 2013. Unsurprisingly most Member States are shown to have declining levels of employment in both the AFF and FPBT sectors. Most Western European Members States have experienced a reduction in both AFF and FPBT employment of between 10% and 20%. The Baltic countries, Hungary and Slovakia have experienced the largest percentage reductions in employment in both the AFF and FPBT sectors. Surprisingly, there has been an increase in AFF employment in the UK, Sweden and Malta, however the FPBT sector in these countries have continued to shed employment. Poland is again an outlier in that there has been a considerable reduction in AFF employment, while employment in FPBT has grown considerably.

Figure 10 Scatter plot of percentage change in AFF and FPBT employment (2013 vs 2003)



Source: own elaboration based on Eurostat data

5. Conclusions

In this paper we have seen that in the EU28 the growth in the output value and GVA of the FPBT sector has outpaced the growth in the AFF sector. We have also seen that in spite of this growth, there has been a general decline in the employment arising in both sectors in the EU28.

We have also seen that the level of subsidisation of the agriculture sector has increased in Central and Eastern Europe following EU accession and access to CAP support, and that in Western Europe agricultural income in some Member States, especially those with significant livestock sectors, remain very dependent on subsidies.

We are surprised to note that the contribution of AFF and FPBT GVA to overall agri-food GVA differs considerably across EU Member States. In Ireland AFF GVA represents a little over 20% of overall agri-food GVA, whereas in Slovakia AFF GVA represents over 70% of agri-food GVA.

What can we conclude from these trends and relationships? They may suggest that the FPBT sector is some Member States are particularly good at adding value to primary inputs and that the FPBT sector in other Member States is seemingly less able to do so. However, this conclusion ignores the possibility that EU enlargement may have facilitated greater trade in primary products, which has allowed the FPBT sectors in some Member States to import primary products from neighbouring countries for further processing. In employment terms it is easy to see how such a trade development has both positive and negative implications for the level of FPBT employment in the respective importing and exporting countries engaged in such trade. A large range in real agricultural incomes per worker continues to be observed across the EU, with typical EU15 incomes levels about twice those of Central and Eastern European Member States.

At the Member State level we observe considerable divergence across the EU in terms of the growth rate in AFF GVA and FPBT GVA. In some Member States, both sectors have grown over the last decade, elsewhere both sectors have contracted, and there are even individual Member States where there AFF and FPBT GVA growth is moving in opposite directions. The large variation in performance between Member States is not easy to account for. The explanation for the apparent absence of a consistent relationship between developments in Member State AFF and FPBT GVA is likely to lie in the extent to which trade in primary

agricultural products has allowed GVA growth rates of FPBT sectors to diverge from those of the AFF sector.

Does the composition of primary agricultural output in some Member States limit the growth that Member States can hope to derive from developments in the KBBE? If this is the case, does this suggest that this natural handicap should be taken into consideration in the future when decisions are being made regarding the overall division among the Member States of the EU support provided to the agri-food sector? This is especially a concern for policy if the KBBE is going to be the engine which drives future development of the agri-food sector.

Overall, we can say that this exploratory examination of the available data suggests that there has been a heterogeneous growth experience across the Member States over the last decade or so. Subsequent work could include an examination of intra EU MS agri-food trade patterns, given that such trade is likely to be an important factor in explaining the divergence in growth rates between the AFF and FPBT sectors of individual Member States..

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