Importance of agro-food industry for small and medium-sized towns in EU countries; an inter-regional SAM analysis

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Abstract
This paper examines the importance of the agro-food industry for the local economy of thirty selected small and medium-sized towns sized towns in the EU. Calculations are based on inter-regional SAM analysis, which were constructed for each town. On the whole, it can be said that the higher the degree of integration of the agro-food sector in the local economy, the larger its role for the rural town and its hinterland. In addition, the SAM analyses show the impact of a demand change in the agro-food sector located in one zone of the town on the other zone of the town. It helps policy makers to understand the economic and social strengths and weaknesses of the agro-food industry in their towns.

Keywords: SAM / agro-food industry / EU small and medium-sized towns

1. Introduction

Background

Towns play a main role in economic development: due to its concentration of economic activities and people, towns are pre-eminently the place of economic transactions. Although at different scales, the relative density of economic transactions can be perceived both in metropolitan centres and in small rural towns. Traditionally, small and medium sized rural towns were linked with agricultural trade. Due to the process of economic transformation, in which the industries and services sectors took over the predominant position of the agricultural sector, economic activities related to agriculture weakened in rural towns. Although it is generally assumed that rural towns nowadays still act as a kind of economic pole for its surrounding countryside (Courtney and Errington, 2003), the size of the economic linkages between town and countryside is usually unknown.

In the 1990s, some studies on the economic linkages between small rural towns and their hinterlands were conducted in the UK (Courtney and Errington, 2000). The Marketowns project (2001-2004)[1] builds upon these studies and widens the scope to 30 small and medium sized rural towns in France, the Netherlands, Poland, Portugal and the UK. In order to collect data on the size and spatial distribution of economic transactions in these towns, postal and oral surveys were made of firms and households located in these towns and their 7 km hinterlands. It appeared that the spatial distribution of economic transactions in and around the studied towns rather varies, not only among towns, but also among different firm types (Courtney and Harrison, 2005). This finding reflects the fact that suppliers of firms' inputs and buyers of firms' outputs can be located both in the town itself, its hinterland and in places further away.

Within rural development policies, some shifts from agricultural towards territorial policies can be perceived. In many of the towns' hinterlands, the agricultural industry is still an important sector. It appears from the Marketowns project that the agricultural industry has a tendency to purchase locally, so changes in policy that affect the agricultural sectors in the hinterlands of these towns will then have an impact on the towns themselves. In this scope, it may be wondered to which extent changing agricultural support in rural towns affect the economy in the town or the hinterland. For example, an arable farmer can employ local workers and local suppliers of seeds, but workers and seeds can also be derived from outside the local economy. In the first case, the local economy benefits directly from agriculture through the related economic transactions,

[1] MARKETOWNS is the acronym for the research project 'The role of small and medium sized towns in rural development', which was financed under the Fifth Framework Programme of the European Commission (QLRT-2000-01923).

whereas in the second case the benefits leak out of the local economy. Whether the first or second case occurs, depends on the outcome of the interplay of economic forces. Hence, insight into the spatial distribution of the agricultural linkages in the local economy might be helpful to assess the degree to which extent the rural development initiatives spread out in the local economy. Such insights can be gained by means of the so-called multipliers of a Social Accounting Matrix (SAM). A SAM is a model of the local, regional or national economy, that generates multipliers. These multipliers indicate the effects on output, employment and income if a particular sector's output expands or extracts. As the Marketowns project intended to study the economic linkages within and between sectors and households of the local economy, it was necessary to create inter-regional models that could trace flows of goods, services and labour between the towns, its hinterlands and the 'rest of the world'. The Marketowns project provided inter-regional SAMs for 30 selected towns.

Objective of this paper

The objective of this paper is to examine the importance of the agro-food industry for the local economy and employment of 30 selected European towns by using inter-regional SAMs. These towns differ from each other concerning their size (small, medium-sized), type (agricultural, tourist, peri-urban) and country (Netherlands, France, Portugal, Poland and UK). On the whole, it can be said that the higher the degree of integration of the agro-food sector in the local economy, the larger its role for the rural town and its hinterland. The paper also provides some insight into the consequences of expected demand effects from e.g. agricultural policy reforms for the local economies. Finally, it is examined whether similar patterns exist for type of towns or size of towns regarding the agro-food linkages with economic agencies in the own location. The results can help policy makers to understand the economic and social strengths and weaknesses of the agro-food industry for a typical town.

Plan of this paper

The plan of this paper is as follows. In Section 2 the theoretical framework is elaborated. Successively the selection of towns, the definition of a local economy and the construction of inter-regional SAMs are discussed. Then, in Section 3 the economic structure of the agro-food industry in the small and medium-sized towns and the strength of its local economic integration is identified (for example, between town and hinterland, firms and households). This can clarify to what extent the agrofood industry is imbedded in the local economy and whether there are any consistent differences between towns in different countries or in different types of local areas. In Section 4 some concluding remarks are made.

2. Theoretical framework

This section elaborates on some theoretical concepts used in this study. First, we define the selection criteria for the small and medium sized towns, explain the specific considerations about our delimitation of the boundaries of the local economy, and summarize the collection of data on the spatial distribution of goods, services and labour. Then, we discuss the construction of the inter-regional SAMs, the derivation of SAM multipliers, and the assumptions and interpretations lying beyond the analysis.

Small and medium sized towns

France, the Netherlands, Poland, Portugal and the UK are the five countries included in the Marketowns project. In each of these countries, six small and medium-sized rural towns were selected for study on the base of the following three criteria (table 1):

1. the socio-economic context of the rural surrounding (located in a region with a high share of employment in agriculture or tourism respectively, or located in a peri-urban area);
2. no other town with more than 3,000 inhabitants in a hinterland of approximately 7 km;
3. population size of the town: small or medium-sized.

Table 1. Overview of studied towns in the Marketowns project

	Small towns (5-10,000 population)	Inhabitants	Medium-sized towns (15-20,000 population)	Inhabitants
Area where employment in agriculture is well above national average	Dalfsen (NL)	7,900	Schagen (NL)	17,200
	Brioude (FR)	6,800	Mayenne (FR)	15,600
	Glogowek (PL)	6,300	Jedrzejow (PL)	18,000
	Mirandela (PT)	11,200	Vila Real (PT)	39,900
	Leominster (UK)	10,000	Tiverton (UK)	17,200
Area where employment in tourism is well above national average	Bolsward (NL)	9,400	Nunspeet (NL)	19,200
	Prades (FR)	7,300	Douarnenez (FR)	15,800
	Duszniki Zdroj (PL)	5,500	Ustron (PL)	15,800
	Tavira (PT)	17,500	Silves (PT)	26,400
	Swanage (UK)	9,500	Burnham-on-Sea (UK)	17,100
'Accessible' peri-urban area within daily commuting distance of metro-politan centre	Oudewater (NL)	7,800	Gemert (NL)	14,800
	Magny (FR)	6,500	Ballancourt (FR)	16,800
	Ozarow (PL)	7,200	Lask (PL)	20,300
	Lixa (PT)	13,700	Esposende (PT)	33,200
	Towcester (UK)	7,000	Saffron Walden (UK)	14,000

Source: Errington, A., P. Rodgers and S. Ford (2002).

Local economy

In the SAM analysis two main spatial zones are distinguished: the local economy and the rest of the world. It is difficult to give a precise definition of the geographical area covered by the 'local economy'. It may be related to travel-to-shop area, travel-to-work area or travel-to-engage-in leisure area. However, the boundaries of these areas differ among people, and may vary from a few kilometres to circles of 30 kilometres or more. The lack of a clear definition of the boundaries of the local economy implies that these have to be agreed in advance by the members of a study team. Usually, such a definition depends on the purpose of the study. In the Marketowns project, it was decided that the local economy covers the town itself plus a circle of 7 km around the town. This 7 km zone is referred to as 'hinterland'.

The local economy is not a closed entity: it has links with a wider regional, national or international economy. Hence, the local economy could be described as a bounded spatial form within the web of wider economic activities where both local income generation within and leakage through this pervious boundary is variable (Courtney and Errington, 2000). Thus, apart from defining the local economy, the Marketowns project defines other spatial zones, such as a circle of 16 km around the town, elsewhere in the province or elsewhere in the country. This facilitates the analysis of the spatial distribution of economic transactions. In the context of the SAM analysis, however, we only distinguish the 'local economy' and 'the rest of the world' (covering all other spatial zones outside the local economy). This distinction has been made for methodological reasons and has some major implications for the interpretation of the results: multiplier effects identified in the SAM analysis refer only to economic activities in the town and the 7 km zone. For example, whenever a labourer, who lives 10 km from the town, is employed due to an impulse in the local economy, this is considered as a leakage to the economy in the rest of the world. It could be argued that from a rural development perspective, spill-over effects to a somewhat wider area than the 7 km zone, make also sense. In fact, assuming that a labour market

area covers about a distance of 16 km around a town, effects of a rural development project in a town on this 16 km zone could be considered as spin-off. From this point of view, it is likely that the multipliers of the SAM analysis underestimate the role of rural towns as sub poles of economic growth for the surrounding countryside to some extent.

Surveys

To get insight into the spatial distribution of economic transactions in and around the towns, postal and oral surveys were conducted among (non-)agricultural firms and (non-)farm households in town and hinterland of the small and medium towns. The surveys especially focused on the following questions:

a. Where do firms buy their inputs and sell their products?
b. Where do firms' employees live?
c. Where do households earn their income and spend their income?

In order to facilitate the comparison of the spatial distribution of economic transactions among towns, we used a number of zones in and around each town. The findings of the surveys on the spatial distribution of economic transactions in the 30 studied towns are extensively discussed elsewhere (Courtney and Harrison, 2005). It appeared that quite large variations in the patterns of the spatial distribution of economic transactions can be perceived, and that it is difficult to find similar patterns in, for example, agricultural, tourist and peri-urban towns, or in small and medium-sized towns.

Inter-regional SAM construction

A SAM can be described as a general equilibrium data system of income and expenditure accounts, linking the production activities, factors of production and institutions (firms, households, government) in an economy. The industrial production generates value added payable to primary inputs like employed persons (which can be distinguished in wages and self-employed) and various types of productive assets (like land and financial assets) in the factor account. In turn, incomes generated in production are handed over to the institutional units such as households (which can be distinguished into various groups), firms and government. After a re-distribution process, incomes are either used for final consumption expenditures or saved. The circle is closed when the consumption and the savings result in additional industrial production (Pyatt and Round, 1985).

Most of the previous SAM studies focused on the economies of single countries. However, the Marketowns project was directed at the study of the economic linkages within and between sectors and households of the local economy in 30 towns in five EU countries. Therefore, it was necessary to create inter-regional models, where the flows of goods, services and labour can be traced between the towns, its 7km hinterlands and the 'rest of the world'. There has been some previous work using inter-regional SAM models, and our models are based upon the work of Round (1985). He used a similar approach to examine the rural-urban linkages in Malaysia. Roberts (1998) used the same approach for examining the rural-urban linkages in the Grampian region in Scotland.

The procedure to construct the inter-regional SAMs in the Marketowns project involved a number of stages on the basis of the Generating Regional Input-Output Tables method. This hybrid approach involves the application of 'non-survey' techniques (a combination of a mechanical reduction method using employment-based Cross Industry Location Quotients (CILQs) and regional secondary data) and 'survey' techniques. First, the national input-output coefficients were mechanically reduced with the CILQs to generate regional coefficients. Second, many of the mechanically-derived entries of these regional input-output tables were replaced with the 'superior' spatially-disaggregated survey information like incomes and expenditures of

households, input and output location patterns of sectors, and employment specifications (status, skill, salary and job number) of sectors. In addition, the survey data have been used to extend the regional input-output model framework to the inter-regional SAM framework. At both the town and the hinterland level, the firm survey data have been scaled and weighted with actual employment number per firm type, and the household survey data with actual household number per income group. In summary, different data sources have thus been reconciled within the defined consistent inter-regional SAM framework to estimate socio-economic pictures for the entire local area of each studied town.

SAM multiplier analysis

Our SAM model can show the impact of exogenous injections on included endogenous variables like output (5 agricultural types, 12 other sector types), factor payments (management, non-manual, skilled manual and unskilled manual functions) and household incomes (25% household income groups). Thus, capturing more of the elements in the matrix inversion process will not only show how an external change will impact upon production but also on household incomes and expenditure and therefore indicate more fully the nature of the interdependencies within the local economy. In general, multipliers are a convenient way of expressing how a change in one sector impacts upon the whole economy. Although our SAMs can produce a range of multipliers and coefficients, we restrict ourselves to the following set in this paper:

- *output multipliers*: show the adjustment in the towns' and hinterlands' total output that would be associated with a change of one unit of output from the agro-food sector;
- *income coefficients*: show the income generated throughout the local economy that would be associated with a change of one unit of output from the agro-food sector;
- *employment coefficients*: show the number of jobs generated throughout the local economy that would be associated with a change of one unit of output from the agro-food sector.

The multipliers and coefficients can be derived from the inter-regional SAM model with the following form:

$$\underline{x} = G\underline{x} + \underline{f} \tag{1}$$

where:

$$\begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ \hline x_4 \\ x_5 \\ x_6 \end{pmatrix} = \left(\begin{array}{ccc|ccc} B_{11} & 0 & C_{11} & B_{12} & 0 & C_{12} \\ V_{11} & 0 & 0 & V_{12} & 0 & 0 \\ 0 & Y_{11} & 0 & 0 & Y_{12} & 0 \\ \hline B_{21} & 0 & C_{21} & B_{22} & 0 & C_{22} \\ V_{21} & 0 & 0 & V_{22} & 0 & 0 \\ 0 & Y_{21} & 0 & 0 & Y_{22} & 0 \end{array}\right) \begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ \hline x_4 \\ x_5 \\ x_6 \end{pmatrix} + \begin{pmatrix} f_1 \\ f_2 \\ f_3 \\ \hline f_4 \\ f_5 \\ f_6 \end{pmatrix}. \tag{2}$$

For each sub-matrix (transactions from respectively town to town, town to hinterland, hinterland to town and hinterland to hinterland) we can define:

G: matrix of input-output and income coefficients
B : matrix of input-output coefficients
V : matrix of wage income coefficients
C : matrix of household expenditure coefficients
Y: matrix of coefficients representing the distribution of wage income between households
x : vector of total output

f : vector of exogenous account.

Rearranging, we can write equation (2) as:

$$\left(\begin{array}{ccc|ccc} I-B_{11} & 0 & -C_{11} & B_{12} & 0 & -C_{12} \\ V_{11} & I & 0 & -V_{12} & 0 & 0 \\ 0 & Y_{11} & I & 0 & -Y_{12} & 0 \\ \hline -B_{21} & 0 & -C_{21} & I-B_{22} & 0 & -C_{22} \\ -V_{21} & 0 & 0 & -V_{22} & I & 0 \\ 0 & -Y_{21} & 0 & 0 & -Y_{22} & I \end{array}\right) \left(\begin{array}{c} x_1 \\ x_2 \\ x_3 \\ \hline x_4 \\ x_5 \\ x_6 \end{array}\right) = \left(\begin{array}{c} f_1 \\ f_2 \\ f_3 \\ \hline f_4 \\ f_5 \\ f_6 \end{array}\right). \qquad (3)$$

Letting $A = \left(\begin{array}{ccc|ccc} I-B_{11} & 0 & -C_{11} & B_{12} & 0 & -C_{12} \\ V_{11} & I & 0 & -V_{12} & 0 & 0 \\ 0 & Y_{11} & I & 0 & -Y_{12} & 0 \\ \hline -B_{21} & 0 & -C_{21} & I-B_{22} & 0 & -C_{22} \\ -V_{21} & 0 & 0 & -V_{22} & I & 0 \\ 0 & -Y_{21} & 0 & 0 & -Y_{22} & I \end{array}\right)$ it is more simply expressed as: $A\underline{x} = \underline{f}$ (4)

Solving for the vector $\underline{x}$ and providing that A is non-singular, we find that $\underline{x} = A^{-1}\underline{f}$. In here, A^{-1} addresses the aggregate inter-regional multiplier:

$$A^{-1} = \left(\begin{array}{ccc|ccc} D_1(I-B_{11})^{-1} & D_1a_{12} & D_1a_{13} & D_1a_{14}(I-B_{22})^{-1} & D_1a_{15} & D_1a_{16} \\ D_2a_{21}(I-B_{11})^{-1} & D_2 & D_2a_{23} & D_2a_{24}(I-B_{22})^{-1} & D_2a_{25} & D_2a_{26} \\ D_3a_{31}(I-B_{11})^{-1} & D_3a_{32} & D_3 & D_3a_{34}(I-B_{22})^{-1} & D_3a_{35} & D_3a_{36} \\ \hline D_4a_{41}(I-B_{11})^{-1} & D_4a_{42} & D_4a_{43} & D_4(I-B_{22})^{-1} & D_4a_{45} & D_4a_{46} \\ D_5a_{51}(I-B_{11})^{-1} & D_5a_{52} & D_5a_{53} & D_5a_{54}(I-B_{22})^{-1} & D_5 & D_5a_{56} \\ D_6a_{61}(I-B_{11})^{-1} & D_6a_{62} & D_6a_{63} & D_6a_{64}(I-B_{22})^{-1} & D_6a_{65} & D_6 \end{array}\right). \qquad (5)$$

The matrix A^{-1} in equation (5) provides SAM multipliers for respectively output, wage income and household income for the whole region (hinterland and town). The closer a multiplier matrix is to the identity matrix, the weaker is the particular multiplier effect. If we look at the separate accounts in A^{-1}, we can interpret the potential impact of changes in the exogenous account *f* on different sectors, production factors and income groups. For example, the first sub-matrix $D_1(I-B_{11})^{-1}$ in the first column shows the impact of an exogenous change in the demand for town production sectors X_1 on the town production. On their turn, $D_2a_{21}(I-B_{11})^{-1}$ and $D_3a_{31}(I-B_{11})^{-1}$ show the impact of a change in the demand for town's production sectors X_1 on town wages and town household incomes respectively. $D_4a_{41}(I-B_{11})^{-1}$ depicts the impact of the change in the demand for town's production sectors X_1 on hinterland production, while $D_5a_{51}(I-B_{11})^{-1}$ and $D_6a_{61}(I-B_{11})^{-1}$ show their impacts on hinterland wages and hinterland household incomes respectively. Further, the first sub-matrix D_1a_{12} in the second column addresses the impact of an exogenous injection to the town factor accounts X_2 on the town production. D_2 and D_3a_{12} show the impact of this change on respectively town wages themselves and on town household income, etc. Interpretation of the other sub-matrices in our system is similar to the mentioned examples.

In addition, employment multipliers can provide important information about the different impact of changes on the employment for each sector. The employment multipliers *e* can be expressed as a combination of the output multipliers $\underline{x}$ and the direct employment coefficients *e'* (employment per sector output):

$$e' = E\,(X)^{-1} \quad (6)$$

$$E = \hat{e}\,A^{-1} f \quad (7)$$

in which E reflects the employment number in respectively town and hinterland sectors, and $\hat{e}$ is the matrix with employment coefficients on the diagonal. This model will produce employment multipliers for the whole local economy (hinterland and town).

Assumptions and interpretation of the SAMs

As with all analyses based upon input-output models or SAM models, general basic assumptions are being made and these must be born in mind when considering the models and the results. Examples are the existence of linear production functions, the homogeneous output from industrial sectors, the single input structure within each industrial sector, and the average propensities of the household expenditure behaviour.

In addition, some limitations exist on the size of the local economy models that have been built in the Marketowns project. One of the major problems is the relatively small proportion of the total inputs and outputs from firm production that is retained within the local economy. This makes the coefficients very small, and more prone to statistical error if we are using the models to forecast policy changes. The restrictiveness of the assumptions suggests that the results should best be interpreted as *ex-post indicators* of the interdependencies, rather than as *ex-ante predictors* of the impacts of changes. From this point of view, the policy significance of the models seems somewhat limited. However, from a broader perspective, the SAM models can have important policy sense. They in fact provide us with an unique insight into the functioning of the small and medium-sized towns and the inter-relations with their hinterlands. No other methodologies are able to incorporate the whole picture of flows and different nature of linkages in the way that these models do.

3. Results

This section examines the importance of the agro-food industry for the local economy of the studied towns using inter-regional SAM analyses. Traditionally, the agricultural sector is narrowly linked to the food industry in terms of their sales and purchases. Hence, we will aggregate both industrial types in this paper, and call them the 'agro-food industry'. First, insight is given into industries' contribution to output and employment of the towns according to the statistics. Second, the perspective is broadened in the sense that the output and employment impacts of sectors that directly and indirectly deliver goods and services to the agro-food industry will also be regarded (downstream linkages). Third, it is investigated how the impact on output and employment of the agro-food industry in one zone (town centre or 7km hinterland) will affect the other zone (7km hinterland or town centre).

Output and employment of agro-food industry

Table 2 addresses the importance of the agricultural and food industry for the local economy in the studied towns, where 'local' covers the town centre and its 7 km hinterland. The corresponding national average share levels in the five European countries are also inserted, and can be considered as benchmarks for the town shares. Except for France, the contribution of the agricultural sector to the local output value and employment in the agricultural towns is above the national average. The same applies for several tourist and peri-urban towns. The share of the food industry in local employment and output in the studied towns fluctuates in a much larger range around the national average, without showing a common pattern. Moreover, it is striking that the share of food industry in local output and its share in local employment are sometimes rather

close to each other and sometimes deviate considerably, which may be explained by differences in the type of food and labour intensity of production. Although the share of the food industry in output value exceeds that of agriculture at national level, in about half of the studied towns the opposite appears. On the other hand, the pattern of a higher share of agriculture in employment relative to that of food industry at national level is reflected in most of the studied towns, except for the majority of French and UK towns.

Table 2. Share of agriculture and food industry in local output value and employment of studied small (S) and medium sized (M) towns (%)

	% in local output		% in local employment	
	Agriculture	Food industry	Agriculture	Food industry
Dalfsen: agriculture-S	11	8	13	3
Schagen: agriculture-M	8	5	9	2
Bolsward: tourist-S	8	14	9	5
Nunspeet: tourist-M	2	14	2	5
Oudewater: urban-S	2	6	3	2
Gemert: urban-M	13	15	12	2
Netherlands	***2***	***5***	***5***	***2***
Mirandela: agriculture-S	11	13	15	5
Vila Real: agriculture-M	5	5	7	1
Tavira: tourist-S	8	4	12	1
Silves: tourist-M	6	5	8	1
Lixa: urban-S	3	3	3	1
Esposende: urban-M	6	4	8	1
Portugal	***4***	***8***	***5***	***3***
Jedrzejow: agriculture-S	13	15	35	5
Glogowek: agriculture-M	36	10	47	1
Duszniki: tourist-S	4	17	12	9
Ustron: tourist-M	8	20	30	10
Ozarow: urban-S	21	18	26	13
Lask: urban-M	6	18	25	9
Poland	***8***	***14***	***28***	***3***
Leominster: agriculture-S	8	5	9	4
Tiverton: agriculture-M	3	3	4	3
Burnham: tourist-S	2	2	1	1
Swanage: tourist-M	1	8	2	8
Towcester: urban-S	3	6	4	6
Saffron: urban-M	1	2	1	2
United Kingdom	***2***	***5***	***2***	***2***
Brioude: agriculture-S	2	6	3	6
Mayenne: agriculture-M	2	7	2	7
Prades: tourist-S	3	6	3	5
Douarnenez: tourist-M	3	6	3	5
Magny: urban-S	5	1	5	1
Ballancourt: urban-M	5	2	1	1
France	***3***	***7***	***4***	***3***

Source: Courtney and Harrison (2005).

Impact of agro-food industry throughout local economy

Table 3 shows the contribution to output and income of the studied towns that is generated by the final demand (like demand for consumption and export) for agricultural and food processed commodities. Calculations are based on SAM multiplier analysis and hence also include indirect and induced effects.

Table 3. Importance (direct, indirect, induced) of agriculture and food industry for local output, wage and household income in small (S) and medium-sized (M) towns (%)

	Output value		Wage income		Household income	
	Agriculture	Food	Agriculture	Food	Agriculture	Food
Dalfsen: agriculture-S	12.8	5.9	9.7	2.0	4.9	1.0
Schagen: agriculture-M	9.0	3.6	6.7	1.1	3.0	0.5
Bolsward: tourist-S	9.9	12.3	6.9	3.4	3.7	1.4
Nunspeet: tourist-M	2.5	13.0	1.7	3.6	1.2	2.5
Oudewater: urban-S	2.4	5.4	1.6	0.4	0.6	0.2
Gemert: urban-M	14.9	11.9	9.8	2.2	6.2	1.4
Mirandela: agriculture-S	13.5	9.2	23.2	1.7	12.2	0.9
Vila Real: agriculture-M	4.3	2.5	9.1	1.3	6.0	0.8
Tavira: tourist-S	8.2	1.8	13.7	0.6	7.0	0.3
Silves: tourist-M	5.9	3.3	6.8	1.1	3.9	0.7
Lixa: urban-S	2.8	1.6	9.8	0.3	3.5	0.1
Esposende: urban-M	7.0	1.5	12.2	0.4	6.5	0.2
Jedrzejow: agriculture-S	16.3	13.2	30.9	0.6	18.4	0.2
Glogowek: agriculture-M	45.3	3.8	49.0	0.1	9.3	0.0
Duszniki: tourist-S	3.7	16.2	9.3	5.6	3.6	2.5
Ustron: tourist-M	10.2	16.8	16.0	4.1	9.8	1.9
Ozarow: urban-S	22.0	15.8	15.5	3.6	2.8	0.5
Lask: urban-M	8.8	10.1	21.3	1.9	4.4	0.4
Leominster: agriculture-S	8.7	4.6	3.7	2.1	0.8	0.4
Tiverton: agriculture-M	5.0	2.4	2.4	1.3	0.5	0.2
Burnham: tourist-S	1.4	0.0	0.5	0.0	0.1	0.0
Swanage: tourist-M	1.7	7.4	1.1	2.1	0.2	0.3
Towcester: urban-S	3.2	5.8	1.9	2.0	0.3	0.1
Saffron: urban-M	1.8	0.2	1.1	0.1	0.2	0.0
Brioude: agriculture-S	3.0	6.3	1.3	2.4	0.4	0.7
Mayenne: agriculture-M	2.9	6.4	1.6	2.1	0.6	0.6
Prades: tourist-S	1.3	3.5	0.4	0.9	0.1	0.2
Douarnenez: tourist-M	4.1	18.8	1.9	7.2	0.8	2.0
Magny: urban-S	7.3	0.5	1.8	0.1	0.6	0.0
Ballancourt: urban-M	0.9	2.5	0.3	0.4	0.1	0.1

Source: own calculations.

In general, the agricultural industry seems to have more linkages (or larger multiplier effects) with local firms and households than the food industry, which results in larger output inducing impacts for agriculture. This can be concluded from the point that the share of agriculture in total output in table 3 is mostly higher than it's respective share in table 2, whereas the reverse is often

visible for the food industry. Also, the local income effects from the demand for agricultural commodities are much more significant than the effects from the demand for food processed commodities. The income generated by the food industry is likely to leak out of the local economy via imported or migrant labour. These findings are valid for all types of towns in all studied countries.

Figures 1 to 5 show similar information on output, wage and household income, but now in absolute financial terms for the aggregate of agriculture and food processing. IN addition, the figures include the importance of the agro-food industry for employment throughout the local economy. For example, the agro-food industry in the peri-urban town of Gemert (the Netherlands) generates 2,500 jobs throughout the local area, whereas it generates about 700 mio euro for output and income (figure 1). On the other hand, the contribution of the agro-food industry in the agricultural town of Dalfsen is with 1,100 jobs and 200 mio euro for output and income relatively small. The figure also shows that the agro-food industry in Dalfsen generates more jobs per mio euro output and income than the agro-food industry in Gemert. This is mainly due to different types of agricultural production in both towns: dairy farming in Dalfsen is relatively more labour intensive than the intensive farming in Gemert. Another issue refers to the contribution of output, wage income and household income to total economic impacts of the towns. The induced impact from wage and household income seems to be rather low in Oudewater, which implies that relatively much income 'leaks away' outside the region. People living outside the 7km surrounding of Oudewater commute to the Oudewater area to work in the agro-food industry, but they spend their earnings in the own region.

In the other four studied countries, the agro-food industry of the small agricultural towns in Poland, Portugal and (more or less) the UK generates the highest values to the local economy in output and income terms, whereas in France the tourist town of Douarnenez generates the highest value (figures 2 to 5). The total number of jobs linked to the agro-food industry seems to be most significant for the Polish studied areas, followed by the Dutch and Portuguese towns.

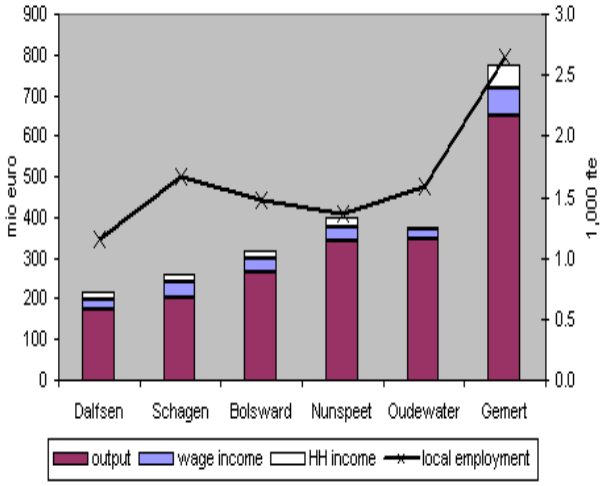

Figure 1. Importance of agro-food industry for local economy and employment, the Netherlands

Figure 2. Importance of agro-food industry for local economy and employment, Portugal

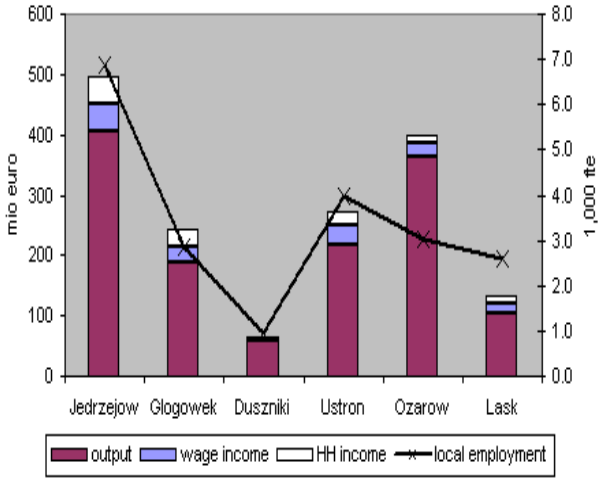

Figure 3. Importance of agro-food industry for local economy and employment, Poland

Figure 4. Importance of agro-food industry for local economy and employment, UK

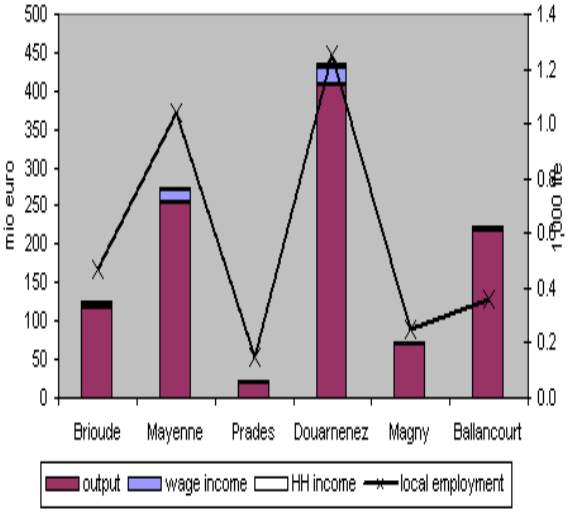

Figure 5. Importance of agro-food industry for local economy and employment, France

Impacts on the other zone

It is interesting to examine how a particular impact on output or employment in one zone (town centre or 7km hinterland) may affect the other zone (7km hinterland or town centre). We found that for the agro-food industry any impact in the hinterland has a much greater socio-economic impact on the town centre than vice versa. This implies that any investment in the hinterlands will affect the industries in the town centre to a greater extent than any investment in the town centre has on the hinterland. For the Dutch studied areas, figures 6 and 7 show that an initial demand impulse in the agro-food industry of the hinterlands mostly appears to have the largest financial impacts on the town centres. In relative terms, the agro-complex in the 7km hinterlands of Dalfsen, Gemert and Nunspeet stimulate the other zone most (see figure 7).

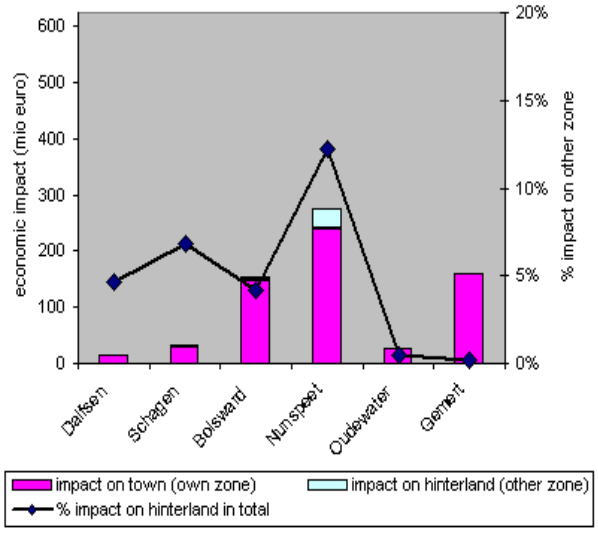

Figure 6. Economic impact of agro-food industry located in town (mio €) and impact on hinterland (%), the Netherlands

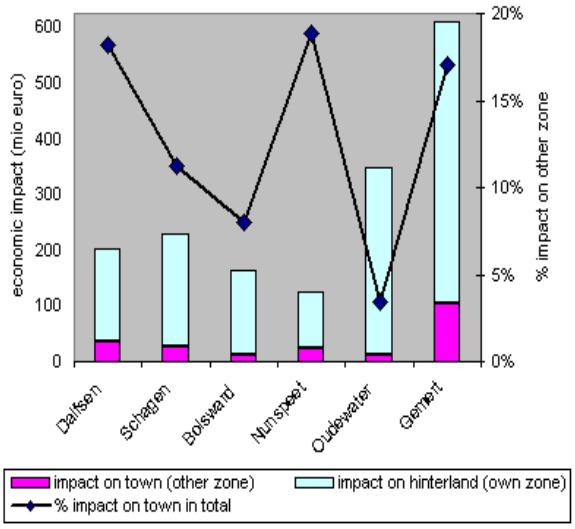

Figure 7. Economic impact of agro-food industry located in hinterland (mio €) and impact on town (%), the Netherlands

Except for the Polish town of Duszniki, figures 8 to 13 show that economic impacts on the other zone are generally larger when the initial impulse is in the hinterland of the Portuguese, Polish and UK towns. In absolute terms, the agro-food sectors in the hinterland of Mirandela and Vila Real in Portugal, Jedrzejow in Poland and Leominster in the UK stimulate the other zone most. In France, the towns of Mayenne, Douarnenez and Ballancourt show an opposite pattern, in the sense that the impact of the agro-food industry located in the town centre on the hinterland is larger than vice versa. This can be explained by the fact that the food industry in the town centre of these towns is much larger in terms of employment and output value than that in the hinterland. For example, in Douarnenez the food industry employs over 800 people in the town centre, whereas it offers only 21 jobs in the hinterland.

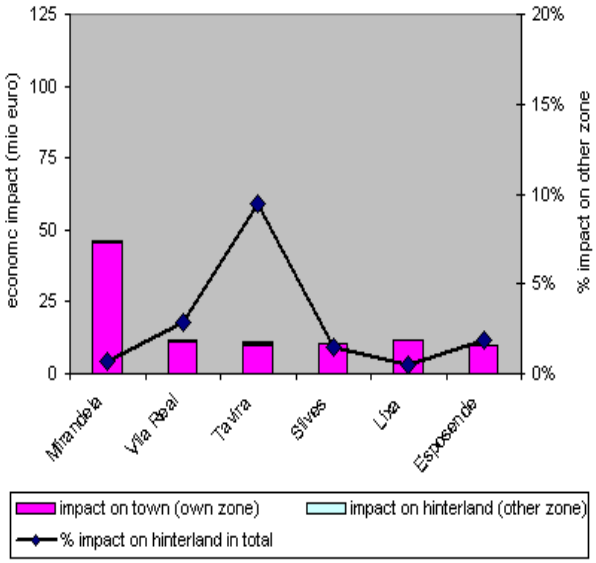

Figure 8. Economic impact of agro-food industry located in town (mio €) and impact on hinterland (%), Portugal

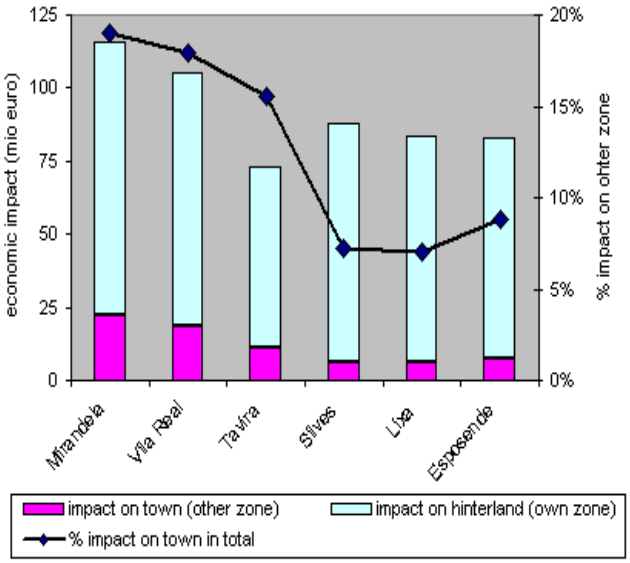

Figure 9. Economic impact of agro-food industry located in hinterland (mio €) and impact on town (%), Portugal

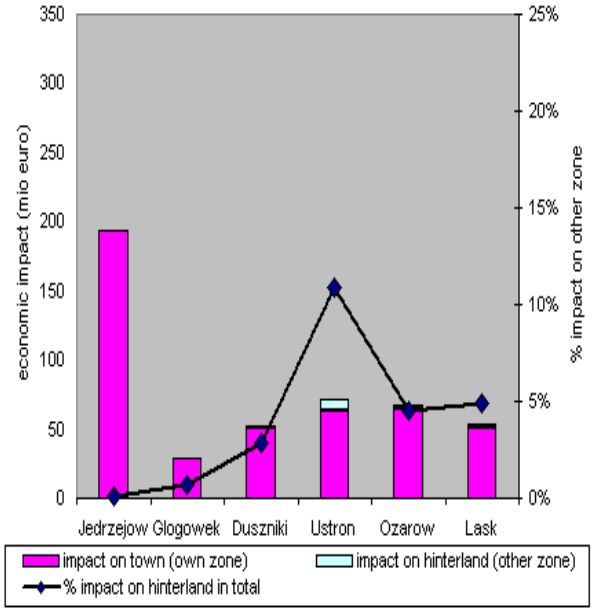

Figure 10. Economic impact of agro-food industry located in town (mio €) and impact on hinterland (%), Poland

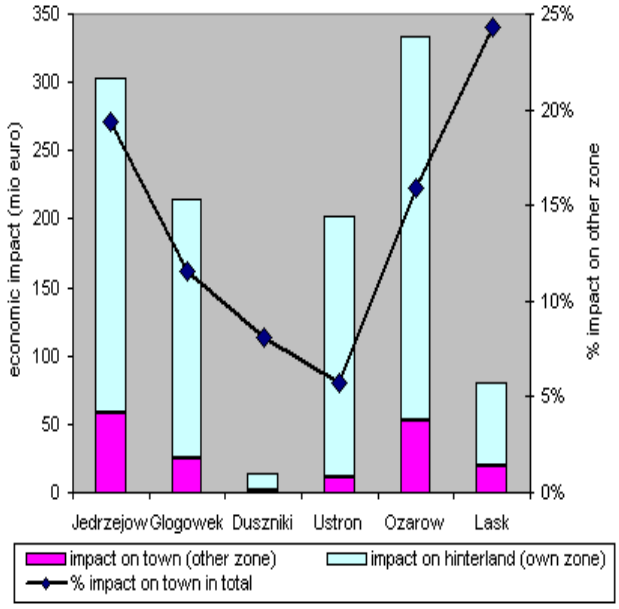

Figure 11. Economic impact of agro-food industry located in hinterland (mio €) and impact on town (%), Poland

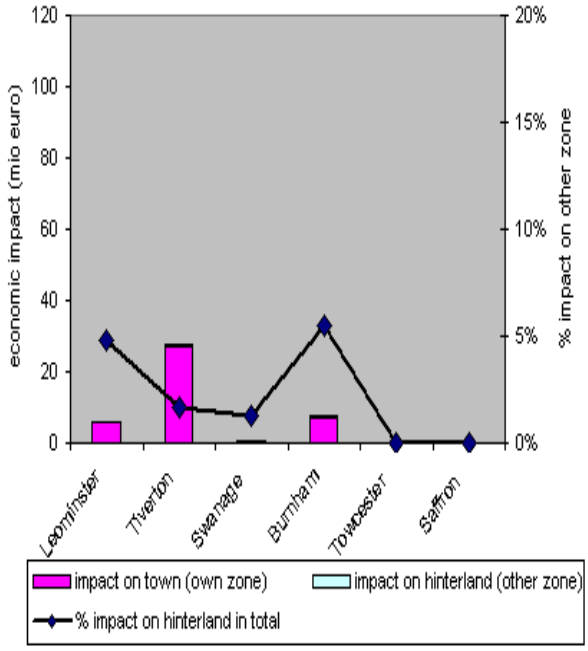

Figure 12. Economic impact of agro-food industry located in town (mio €) and impact on hinterland (%), UK

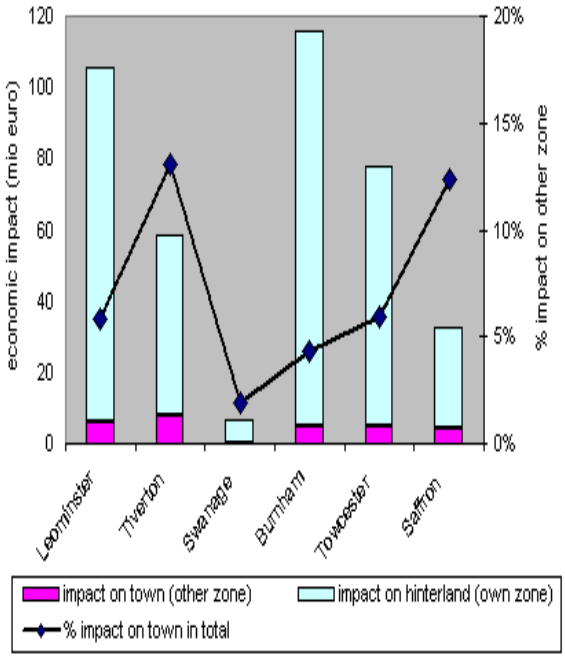

Figure 13. Economic impact of agro-food industry located in hinterland (mio €) and impact on town (%), UK

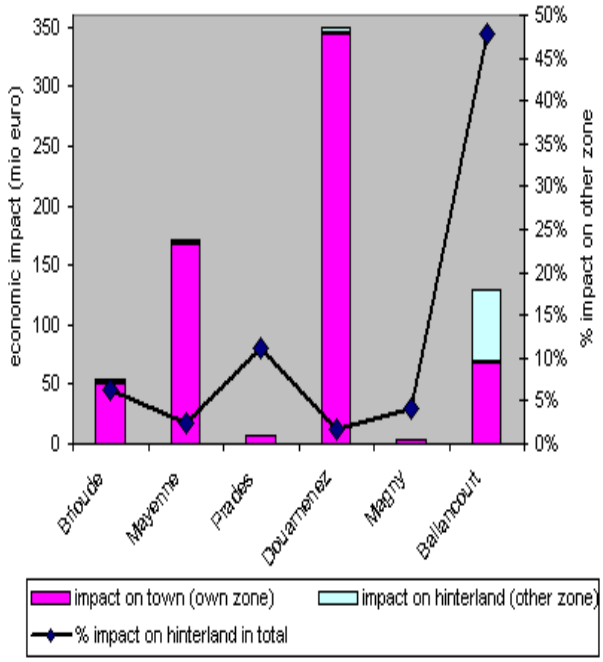

Figure 14. Economic impact of agro-food industry located in town (mio €) and impact on hinterland (%), France

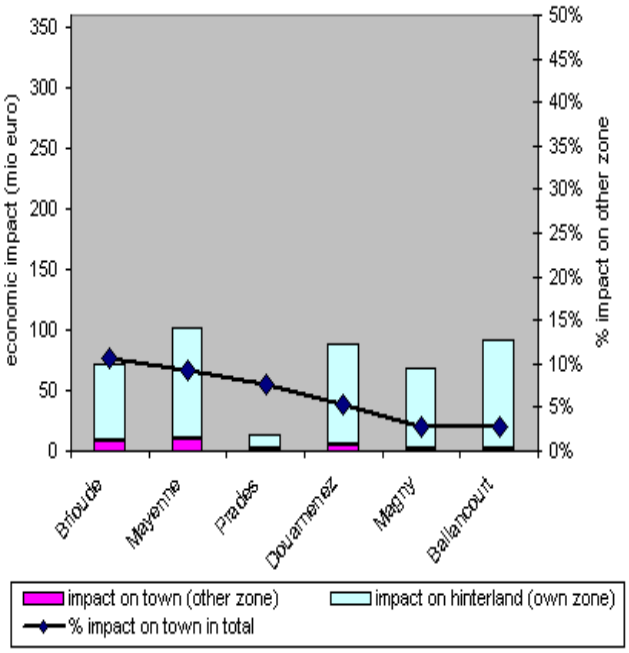

Figure 15. Economic impact of agro-food industry located in hinterland (mio €) and impact on town (%), France

In relative terms, for all studied areas except the French ones the impact of the hinterland on the town centre varies from 5% to 25%, whereas the impact of the town on the hinterland ranges from 0% to 10%. In absolute terms, the agro-food industry located in the town centre of the agricultural towns affects the local economy the most in all countries, the towns in the Netherlands the exception. Apart from France, the town centre of the medium-sized tourist towns has large financial spill-overs upon their hinterlands in relative terms (small tourist town for Portugal). Except for the French case, the agro-food industry located in the hinterlands of the peri-urban medium-sized towns has the largest relative impacts on the town centre. In absolute terms, the agro-food industry located in the hinterlands of the agricultural Portuguese, Polish and French towns gives relatively major effects on the entire local economy.

Finally, most of the medium-sized towns show a larger relative impact on the other zone than the small towns, whereas there is no clear pattern regarding the absolute impacts.

4. Conclusions

This paper examined the importance of the agro-food industry for the local economy and local employment of thirty selected small and medium-sized towns in Europe. Calculations were based on the use of inter-regional SAMs. The agro-food industry has been defined as the agricultural industries and the food industries. The interplay of economic forces and the spatial distribution of economic agricultural linkages determine to what extent the benefits from the agro-food industry remain within the own region or leak out. On the whole, it can be said that the higher the degree of integration of the agro-food sector in the local economy, the larger its role for the rural town and its hinterland. The results can help policy makers to understand the economic and social strengths and weaknesses of the agro-food industry in their towns, and their linkages to the local surrounding.

On the whole, the contribution of the agro-food industry to employment and output in the local economy largely varies among the studied towns. We found that the agro-food industry of the small agricultural towns in Poland, Portugal and UK, the medium-sized peri-urban town in the Netherlands and the medium-sized tourist town of Douarnenez in France generate the highest value to the local economy in output and income terms. The total number of jobs linked to the agro-food industry seems to be most significant for the Polish studied areas, followed by the Dutch and Portuguese towns.

For the town centres of the studied towns, the food industries contribute more to local employment and local economy than the agricultural industries, whereas the hinterland of the towns show the reverse. This is because farms are mostly located in the hinterlands, and not in the town centre. The food industry is more important for the entire local economy than the agricultural sector in terms of output value, whereas agriculture relatively generates a higher share of employment in the local economy. In addition, the agricultural industries seem to have larger economic and employment multiplier impacts compared to their equivalents for the food industries. Many farm employees are family members living close by, while other paid workers often live nearby too. On the other hand, the income generated by the food industry is likely to leak out of the local economy via imported labour. These findings are valid for all types of towns in all studied countries.

Due to the inter-regional character of the SAMs, the impacts of the agro-food sector in one zone on the other zone could be calculated. Except for three studied towns in France, any impact of the sector located in the hinterland had a much greater impact on the town centre in terms of output and income than vice versa. Any investment in the agro-food industry located in the hinterlands will thus affect the economy in the town to a greater extent than any investment in the town centre's agro-food industry has on the hinterland.

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