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Estimating regional social accounting matrices to analyse rural development

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Abstract

This paper has two complementary objectives: on the one hand, it introduces the EURO method for the estimation of (regional) Social Accounting Matrices. This method is widely used by Eurostat for the estimation of missing national Supply, Use and Input-output tables but it has not been used before within the context of social accounting matrices or of regional statistics and/or regional impact analyses. On the other hand, this work discusses the possibility of producing non-survey-based regional Social Accounting Matrices that may eventually allow the user to carry out impact analyses such as those of rural development policies, among others. The analysis is carried out for 12 selected European regions based on clusters.

MSC: 97K80.

Keywords: Social accounting matrices, rural development, European regions, impact analysis.

1. Introduction

Social Accounting Matrices (SAMs) are datasets comprising economic transactions that allow the extraction of information on the different economic agents such as producers, consumers, the government and the foreign sector, as well as on the behaviour of productive factors and institutions. They complete the information provided by input-output tables. A Social Accounting Matrix can be defined (in a simplified form) as an extension of an input-output table with a more disaggregated structure of expenditures

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and income, integrating the relationships between institutional sectors, estimated with information from national accounting systems. In this way, the objective of closing the full economic flow is achieved. Thus, a SAM is a consistent framework for gathering national income data, product accounts, input-output tables, reflecting the monetary flows among institutions. Therefore, a SAM is a matrix representing in a comprehensive, flexible and disaggregated way all the transactions of a socio-economic system. It reflects the process of income generation by activities, of production, and the distribution and redistribution of income between institutional groups (Pyatt and Round, 1985; Pyatt and Thorbecke, 1976). Figure A1 in Annex 1 shows the standard structure of a SAM.

The interest in SAMs is based on the fact that they illustrate the production relationships between the economic sectors as well as the transactions that take place among the different institutions of a certain economic system in terms of revenues or expenses. Besides their statistical interest, which enables us to close the circular flow of income, SAMs have become a useful tool for evaluation of policy interventions in national or regional frameworks. In this sense, it is interesting to have regional SAMs to be able to analyse the effect and impact of regional development policies, especially in rural areas. But the difficulty of obtaining databases for this purpose is an important obstacle that we attempt to overcome with the methodology presented here.

Moreover, it is possible to carry out a complete analysis of the productive structure of the economy and to obtain a general perspective of changes that might occur in the event of any shock (e.g. key sectors). Below, we present the approach used for obtaining 12 NUTS 3 level[1] regional SAMs. The estimates of the NUTS 3 SAMs are obtained using a two-step process:

1. Input-output frameworks are regionalised (i.e. Supply, Use and Symmetric tables) from the NUTS 1 regions or countries concerned, using the EURO method (Beutel, 2002, 2008; Eurostat, 2008; Temurshoev and Timmer, 2011; Valderas et al., 2016).
2. The NUTS 3 SAM estimation is calculated using the regionalised SUT and some additional information to produce the input-output tables.

Regarding policies, the Rural Development Policy, often referred to as Pillar 2, has become one of the most significant elements of the Common Agricultural Policy (CAP), representing close to one third of the total CAP budget. Before integration of flexibility between pillars and other adjustments, the amount dedicated to rural development policies over the financial period of 2014-2020 is likely to reach EUR 95 billion out of a total of EUR 348 billion for both pillars of the CAP (27% of the total). In recent years,

1. NUTS: Nomenclature of Territorial Units for Statistics. The NUTS classification is a hierarchical system for dividing up the economic territory of the EU for the purpose of socio-economic analyses of the regions: NUTS 1: major socio-economic regions; NUTS 2: basic regions for the application of regional policies; NUTS 3: small regions for specific diagnoses. The NUTS 2013 classification is valid from 1 January 2015 and lists 98 regions at the NUTS 1 level, 276 regions at the NUTS 2 level and 1,342 regions at the NUTS 3 level.

several research programmes, scientific papers and policy reports have looked at ways to assess the impacts of Pillar 2 at country and regional levels. The European Commission and the Member States carry out periodic ex ante, mid-term and ex post evaluation of the rural development policy and of the Rural Development Programmes. Several FP7 and Horizon 2020 research programmes are dedicated to the evaluation of the impact of rural development policies.

However, the diversity of rural situations across Europe has complicated the empirical studies of these impacts of rural development and often makes any comparison between regions rather trivial. Also, rural development policies do not only aim at supporting specific sectors (such as agriculture); indeed several measures are focused on non-farm actors, and others are related to the improvement of quality of life in rural areas. Hence, it is necessary to use multi-sectoral models, requiring a significant amount of data, in order to capture the full economic impact. In this sense, well-known linear multiplier models and computable general equilibrium (CGE) models use SAMs to develop their analysis. Also, given the nature of rural development (regional implementation through Rural Development Programmes and the existence of menus offered to the beneficiaries in each region), the need for modelling at a sub-regional level has led to the application of these models at the NUTS 3 level with models going as deep as modelling the rural area and the urban area of NUTS 3 regions. The challenge of such work is that it requires extensive effort in the construction of NUTS 3 SAMs, especially if the rural-urban split is modelled.

In this context, this paper builds NUTS 3 SAMs for 12 regions, following a detailed analysis of the source data rather than using an automatic approach, which would derive regional SAMs directly from superior level tables, using an optimisation method and some regional proxies. It aims to cover all types of NUTS 3 regions with significant participation of rural areas, so that the impact of rural development policies can be studied for most of the types of regions receiving aid, thus allowing the evaluation of their effectiveness. The selection of these NUTS 3 regions uses an empirical classification of NUTS 3 regions (Raggi et al. (2013)), which reflects the heterogeneity of NUTS 3 characteristics in the EU. This multidimensional classification is based on the following set of four criteria: Rural character; Accessibility; Actual economic diversification; and Total gross domestic product per capita.

So, this paper has two complementary objectives: it introduces the EURO method for the estimation of (regional) Social Accounting Matrices and illustrates the possibility of producing non-survey-based regional Social Accounting Matrices for rural development policies' impact analyses.

The rest of the paper is structured as follows: Section 2 discusses the methodology used in the regionalised SAM estimations and its application in some European Union regions. Section 3 presents the main results and, finally, Section 4 provides conclusions. Some tables and aggregated versions of the estimated SAMs are included in the Annex.

2. Methodology and data

2.1. The EURO method for estimating supply and use tables

The general balancing problem of matrices basically consists of only knowing one single base table (be it a Supply and Use Table (SUT), Symmetric Input-Output Table (SIOT) and/or Social Accounting Matrix (SAM)) and at least the row and column totals for the unknown table that has to be estimated[2]. There are different ways to approach this under-determined problem where unknowns (e.g. elements of the interior tables) outnumber external constraints (e.g. RAS[3] or bi-proportional scaling methods, Lenzen, Gallego and Wood, 2009, among others).

However, none of these methods allows the estimation of SUTs and SIOTs whenever row and column totals are not given and with the minimum amount of information possible. Actually, to the knowledge of the authors, the EURO method is the only existing method that allows the estimation of SUTs and SIOTs without given row and column totals. The EURO method typically aims at updating SIOTs at basic prices from one year to another and is based on a previous version initially developed by Beutel (2002) for input-output tables and further explained by the Eurostat Manual of Supply, Use and Input-Output Tables (2008, Ch. 14).

The EURO method is a robust update procedure which is inexpensive and has limited data requirements. It exclusively uses official data and integrates all quadrants of SIOTs. Row and column totals for intermediate consumption and output and the corresponding final demand structure are derived endogenously, not allowing for arbitrary changes of input-output coefficients. The method is fully consistent with supply and demand through the Leontief quantity model (Eurostat, 2008). Therefore, it is sustained on economic grounds rather than on optimisation and/or pure mathematical techniques.

Recently, Temurshoev, Webb and Yamano (2011) formalised a SUT variant of the EURO method based on Beutel (2008). Beutel and Rueda-Cantuche (2012) elaborated a more detailed version to be used by Eurostat. And, in line with the pioneering works of Hewings (1969, 1977), we formulate an adapted version of the latter to be used in this project for the regionalisation of supply and use tables.

The EURO method is used in this paper as a method for regionalisation for the first time. Below, we present an adapted and more detailed explanation of the EURO method for SUT regionalisation, mostly based on Temurshoev et al.'s (2011) description of the EURO method for updating SUTs.

The initial SUTs (typically at the NUTS 1 or NUTS 2 level) consist of the following components all expressed at basic prices: domestic and imported intermediate use matri-

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2. Mínguez, Oosterhaven and Escobedo (2009) and Oosterhaven and Escobedo (2011) consider several known tables as base tables but the lack of information at NUTS3 level makes this analysis inappropriate for our purpose.

3. In the original presentation of this method (i.e. working paper), the vector of row multipliers was designated by r, the table of inter-industry transactions in coefficient form in the base year by A and the vector of column multipliers by s. Hence the juxtaposition of the notation led to the nomenclature RAS (as originally in Stone, 1961).

ces (commodity × industry); domestic and imported final demand matrices (commodity × category of final use); supply matrix (commodity × industry); vector of total value added of industries (industry × 1); and a vector of total taxes less subsidies on products by industries and final use categories. The projected SUTs require the following macroeconomic statistics for the SUTs at the NUTS 3 level, based on regionalisation rates[4] of macroeconomic variables: value added by industry; total final demand by use; total taxes less subsidies on products; and total imports. The listed data requirements mean that the vectors of value added per industry, totals of final demand categories and aggregate values of taxes less subsidies on products and imports need to be known at the NUTS 3 level too.

Following Thissen, Diodato and van Oort (2010), we have used information on interregional transport flows to estimate regional imports and exports. We have used the Eurostat data on road freight transport loading (exports) and unloading (imports) in physical terms and have calculated a ratio over the whole country (in physical terms). The method uses these official statistics as exogenous inputs, and replicates them in the derived SUTs. This method involves minimum data requirements, which is appropriate given the lack of macroeconomic data at the NUTS 3 level.

Each of the iterations of the EURO method consists of two steps (see Figure 1). The first step of the first iteration defines domestic and imported intermediate and final uses, the vector of value added, the vector of taxes less subsidies on products, and the supply matrix of the projected SUTs. This first estimation of the (unbalanced) use table is basically a cell-wise arithmetic average resulting from multiplying the corresponding regionalisation rates by the rows and columns of the initial use table. Subsequently, the total commodity output (from the estimated use table) is allocated row-wise proportionally to the initial supply table (i.e. constant market shares) in order to obtain the first estimation of the supply table at the NUTS 3 level. The total industry outputs and inputs are not equal after this first step (column sums of projected supply and use tables). To make the derived SUTs consistent, it is assumed that the domestic and imported input structures of industries and the totals of commodities' final uses from the first step are valid. Given this assumption, the so-called fixed commodity sales structure model determines consistent industry output and input levels (Eurostat, 2008, Model D, p. 351). This second step ensures the consistency of the industry outputs and inputs, and commodity supply and demand, but it deviates from macroeconomic statistics, i.e. value added per industry, final uses of categories, total value added and total imports.

The regionalisation rates initially used are then adjusted in an iterative procedure in order to make the difference between the actual and projected (in each of the iterations) regionalisation rates minimal (less than 1%). The observed deviations are used to correct these rates in such a way that it should ensure that if the model overestimates (underestimates) the available macroeconomic statistics, the corresponding regionalisation rates

4. They are calculated as regional/national ratios.

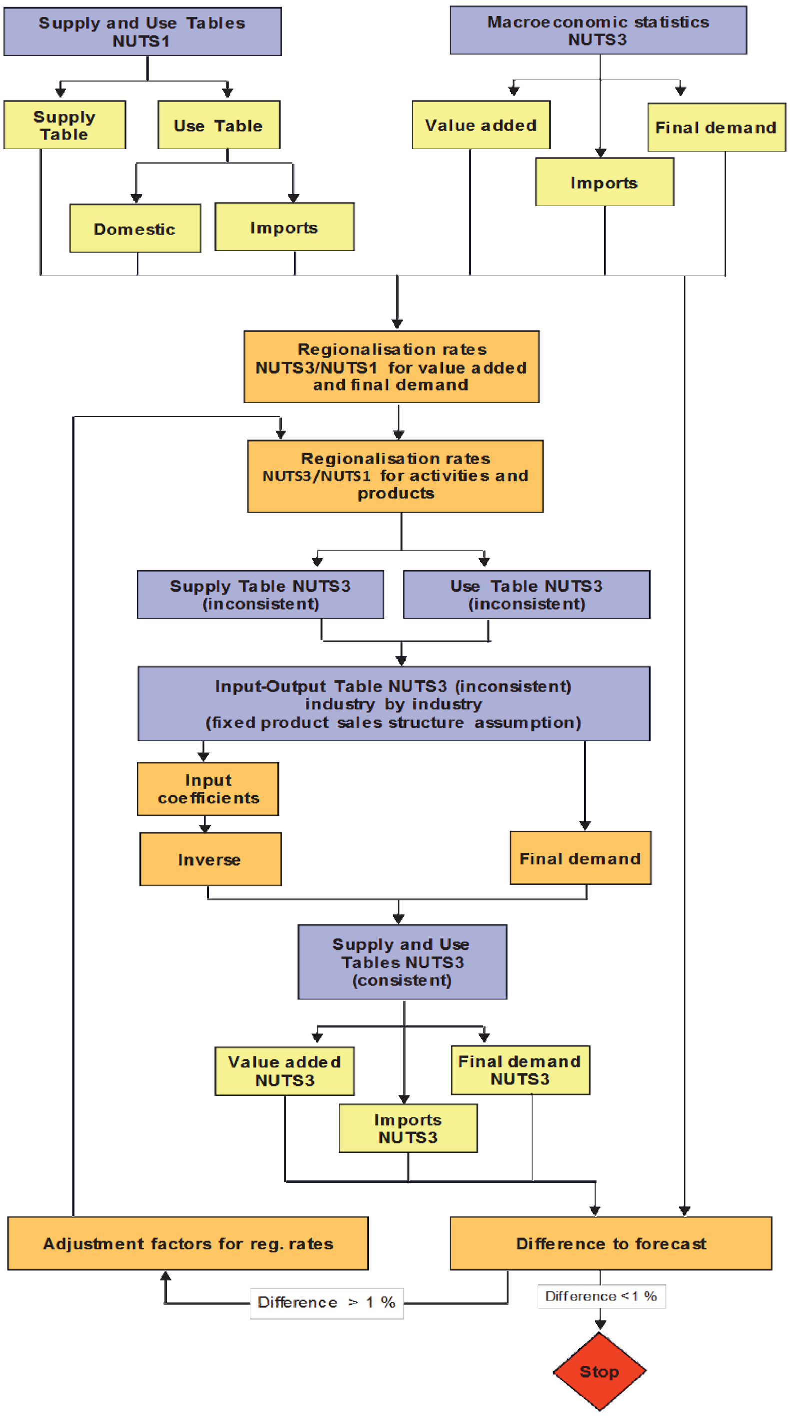

Figure 1: *EURO method for regionalising SUTs.*

Source: Own elaboration based on Beutel and Rueda-Cantuche (2012).

are decreased (increased). This is done through correction factors (see Eurostat, 2008). Then, the first step of the second iteration computes the projected SUT components as in the first iteration, i.e. domestic and imported intermediate and final uses, the vector of value added, the vector of taxes less subsidies on products, and the supply matrix of the projected SUTs. As was the case with the first step of the first iteration, the results do not ensure the equality of industry outputs and inputs. The consistent industry outputs and inputs are again found using the fixed commodity sales structure model, which is then used to derive the consistent SUTs of the second iteration in exactly the same manner as defined earlier for the first iteration.

However, note that now the domestic and imported input structure matrices are derived from the outcomes of the first step of the second iteration. As a result, one obtains a new deviation vector, which quantifies the difference between the projected regionalisation rates and the macroeconomic statistics.

If the difference between the actual and projected regionalisation rates is acceptable, the resulting SUTs are the final outcome of the EURO projection. Otherwise, the steps of the second iteration are repeated until the projected variables resemble (closely or perfectly) those of the macroeconomic statistics.

It is important to note that each such subsequent iteration begins with the computation of new correction factors, which are then used to correct the regionalisation rates from the previous iteration. The convergence in the EURO method can always be found by changing the tolerance level until convergence is reached. The last important point concerning the EURO method is that it requires that the number of industries and commodities are equal. Thus, even though the EURO method distinguishes between products and industries, it does not allow for the estimation of rectangular SUTs[5].

The data requirements of the EURO method are the following for the NUTS 3 case studies: gross value added by industry; taxes less subsidies on products (total); final demand components (totals), including exports; and total imports. The following sections explain the data sources and methods used in the calculation of the necessary data for the projections.

Gross value added by industry. It is not very common or easy to find detailed data on gross value added by industry at the NUTS 3 level. In this paper, we use a breakdown of 6 products/sectors (see below), which will be split up into 13 products/sectors according to the NUTS 1 or NUTS 2 shares, depending on the available information (see Table A2 in Annex 1 for details about the 13 products/sectors).

Taxes less subsidies on products (total). Provided that the GDP is available for the NUTS 3 regions, its difference with respect to the total sum of gross value added at basic prices (also available) makes the overall total of taxes less subsidies on products.

5. In this paper, the EURO method is programmed in the Eviews software and Excel templates are used to adapt the results to the standard Eurostat format.

Table 1: *Example of a final demand estimation using NUTS 2 or NUTS 1 data.*

	Baden-Württemberg	**Konstanz**
	Share of GDP final demand components	Values (million EUR)
GDP	**100%**	**7,961.68**
Consumption of households	54.4%	4,328.71
Consumption of Public Administration and NPISH	15.3%	1,221.22
Gross capital formation	18.4%	1,463.84
Net exports	11.9%	947.91

Source: Own elaboration.

Final demand components and imports. Gross domestic product (GDP) is defined as the sum of: final consumption of households; final consumption of government and non-profit institutions serving households; gross capital formation (investment); and net exports (exports minus imports).

Therefore, by using this definition of GDP, we split up the value of GDP for NUTS 3 regions using the shares of GDP components from the NUTS 2 or NUTS 1 regions (wherever available). As an example (see Table 1), the Baden-Württemberg (NUTS 2) shares of GDP components are given below as well as the GDP of Konstanz (NUTS 3) for 2007 and the corresponding calculation of its final demand total by category.

However, we are interested in calculating exports and imports separately and not as net exports. In order to do so, we estimate NUTS 3 exports and NUTS 3 imports according to the NUTS 3/NUTS 1 share of the Eurostat data on road freight transport loading (exports) and unloading (imports). As a result, in a second step, net exports are recalculated and the other final demand components adjusted accordingly.

2.2. Estimation and selection of representative regional SAMs

For the construction of NUTS 3 SAMs, we initially develop a basic SAM linking the input-output framework previously estimated, closing economic flows between productive sectors, commodities and institutional sectors. To do this, we use additional information, most of it from Eurostat in order to achieve greater uniformity in the estimation of the matrices for all the NUTS 3 analysed. However, when more specific information is necessary, we obtain it from local or national statistical offices. The basic sources[6] used are:

- allocation of primary and secondary income account of households by NUTS 1 and NUTS 2 regions (e. g. Baden-Württemberg/Freiburg-Konstanz) - Eurostat;

6. All Eurostat data can be found in http://ec.europa.eu/eurostat/data/database.

- income of households by NUTS 2 region (e.g. Freiburg-Konstanz) - Eurostat;
- compensation of employees by NUTS 2 region (e.g. Freiburg-Konstanz) - Eurostat;
- employment by NUTS 3 regions - Eurostat;
- non-financial transactions (e.g. Germany-Konstanz) - Eurostat;
- gross domestic product (GDP) at current market prices by NUTS 3 region - Eurostat;
- gross value added at basic prices by NUTS 3 regions (NACE_R1) - Eurostat;
- disposable income of households - national statistical offices (e.g. Konstanz: VGR der Länder: Regionaldatenbank Deutschland);
- Input-output tables at NUTS 1 or country level (e.g. Germany 2005) - Eurostat and OECD[7].

This information is incorporated into the input-output framework provided, obtaining a first version of the matrix for each NUTS 3 region. Small discrepancies that may arise in the estimation process are corrected by using a simple technical adjustment through RAS[8]. The result is a NUTS 3 level basic SAM composed of the accounts presented in Table A3 (see Annex 1).

Basic SAMs for each NUTS 3 region can be extended to successively incorporate the accounts and sectors needed to perform the required analysis of the corresponding regions. For this, the basic SAM accounts are disaggregated by block, using new information, almost entirely from Eurostat, to achieve the greatest possible homogeneity:

- farmland: number of farms and areas by economic size of farm (ESU) and NUTS 2 region;
- agricultural accounts according to EAA 97 Rev.1.1 by NUTS 2 region;
- average annual earnings by economic activity, sex, occupation - country level;.
- employment by occupation and economic activity - country level;
- structure of consumption expenditure by degree of urbanisation (COICOP level 2) (1 000) - country level;
- mean consumption expenditure by degree of urbanisation (in PPS) - country level;

7. OECD (2015).

8. The only exception in this initial procedure is the SAM for Huesca (Aragon, Spain), which comes from a previous expert's version for 2005 (elaborated by the authors) and which has simply been updated to 2007 using basic information from Eurostat and the RAS adjustment.

- household characteristics by degree of urbanisation - country level;
- population in rural areas (NUTS 2-3 level) - Eurostat Regional Statistics; Rural Development Indicators;
- employment (in persons) by rural/urban typology (NACE R1) - country level;
- gross value added at basic prices (NACE R1) - country level.

In selected regions, SAMs are estimated following an innovative methodology which allows reliable kind of database to be obtained despite the great difficulty of procuring data at this level of disaggregation, combining regionalisation and updating methods with the use of Regional and National Accounts and other socio-economic and business statistics.

The aim is to provide SAMs that are representative of rural regions of the EU, so first it is necessary to select an adequate list of NUTS 3 level regions reflecting the actual heterogeneity. With this in mind, regions have been chosen following first a cluster classification of European NUTS 3 regions (Raggi et al., 2013). This cluster classification divides the set of NUTS 3 regions into six groups with the following characteristics (the percentage of the total NUTS 3 regions is shown in brackets):

- Cluster 1 includes NUTS 3 regions classified as intermediate urban/rural, which are economically diversified, with high accessibility and a high GDP (28.2%);
- Cluster 2 contains rural NUTS 3 regions, which are dependent on agriculture, with good accessibility and a high GDP (25.8%);
- Cluster 3 takes into account NUTS 3 regions that are predominantly rural and dependent on agriculture, with low accessibility and a low GDP (13.7%);
- Cluster 4 considers NUTS 3 regions that are predominantly urban and not reliant on agriculture, with high accessibility and a high GDP (12.8%).
- Cluster 5 contains rural NUTS 3 regions, which are strongly economically dependent on agriculture, with the lowest accessibility index and a low GDP (11.3%);
- Cluster 6 consists of urban and intermediate NUTS 3 regions with a low GDP, intermediate accessibility and intermediate economic diversification (8.2%).

After discussion, and taking into account the data availability and the weight of each cluster, regions have been selected. The objective of this selection is to have significant representation of each cluster, so all the different typologies of regions will be well represented. Given that the purpose of the study is to provide databases (SAMs) to study measures of rural development, Cluster 4 regions have been excluded from the selection (no rural or agricultural component type). The selected list of regions and clusters are presented in Table A1 in Annex 1.

Here it is necessary to specify the information required to distinguish between rural and urban activities. The former are those carried out in rural areas, while the latter are those that are based in urban areas. To distinguish between urban and rural areas, we take as a reference the DGURBA2011[9] database which provides information on new classifications of urbanisation[10]. The LAU 2[11] types 1 or 3 are directly classified as urban or rural, respectively, while type 2 is classified using a threshold of 30 000 inhabitants (below this threshold is classified as rural and above is classified as urban). This typology allows fitting the objectives of the study to better distinguish between cases within 'intermediate' areas.

It is very difficult to obtain aggregated and homogeneous accurate information for this split for all cases. We have therefore used an estimate based on a private database (Orbis, developed by Bureau van Dijk) from companies at the highest level of geographical disaggregation. This database distinguishes the number of businesses by industry (NACE R1-R2) at the equivalent of the LAU 2 level or similar. We have completed the necessary information base with LAU 2 demographic data and other official statistics from Eurostat on predominantly rural, intermediate and predominantly urban areas.

With this data, the percentages of companies in rural and urban areas in each sector in each NUTS3 region are obtained, which allows the disaggregation between rural and urban sectors in the corresponding SAMs. This disaggregation based on the number of companies gives an adequate representation of the economic reality of each region.

With this statistical information, the percentage representing economic activities in rural and urban areas for each sector can be identified for each NUTS 3 region. This disaggregation criterion considers that companies that have their head office in a LAU 2 (or similar) regarded as rural (urban) are entirely allocated to the "rural" ("urban") part of the corresponding NUTS 3 region. This creates a division between rural and urban activities within each sector and NUTS 3 region. Obviously, economic activities in intermediate areas are classified as rural or urban based on the previous decision on the allocation of their place of establishment.

For the distinction between large and small farms, we have used data on the number of farms and areas by the economic size of farm (ESU) and NUTS 2 region, and agricultural accounts according to EAA 97 Rev.1.1 by NUTS 2 region, both available from Eurostat. The threshold of 16 ESU is used to distinguish between large and small farms for all regions. While we acknowledge that such an assumption may lead to inaccuracies in the description of farm sectors across the EU, it is necessary to protect a strong degree of data homogeneity.

9. http://ec.europa.eu/eurostat/ramon/miscellaneous/index.cfm?TargetURL=DSP_DEGURBA

10. The classification we use is: 1: densely populated (urban); 2: intermediate (small towns and suburbs); and 3: sparsely populated (rural). We also use population at level LAU 2 (completed with data from national statistical offices).

11. LAU: Local Administrative Units. The lowest LAU level (LAU level 2, formerly NUTS level 5) consists of municipalities or equivalent units in the 28 EU Member States.

Regarding the SAM estimations, we have also had to take into account that the time periods for which we have additional statistical information do not always coincide with the reference year (2007). In such cases, the nearest periods have been taken and we have used ratios because they are more stable than absolute values.

Next, once the accounts have been disaggregated, we have applied the Cross-Entropy Method to achieve the final adjustment for the final version of the SAMs at the NUTS 3 level. The Cross-Entropy Method (CEM) has been developed and adapted, among others, by Golan, Judge and Robinson (1994), Thissen and Lofgren (1998) and Robinson, Cattaneo and El-Said (2001). In comparison with the RAS estimation method, CEM is more flexible, cost-efficient and consistent with all the information provided by national accounts and other resources. This method has been extensively used in the literature and can also consider relationships to be incorporated into the estimation model as additional restrictions[12].

The Cross-Entropy approach involves projecting technical coefficients instead of total SAM flows. Once the new coefficients have been obtained, the new SAM can be derived in the usual way. Because CEM aims directly at estimating technical coefficients, the scaling method does not work. The problem would consist of the following minimisation problem:

$$d\left(\mathbf{A}^0, \hat{\mathbf{A}}^1\right) = \sum_{i=1}^{n}\sum_{j=1}^{n}\left(\hat{a}_{ij}^1/X_j\right)\left(\ln\left(\hat{a}_{ij}^1/X_j\right) - \ln\left(a_{ij}^0/X_j^0\right)\right) \tag{1}$$

s.t.

$$\sum_{j=1}^{n}\hat{a}_{ij}^1 = X_i \quad \forall i$$

$$\sum_{i=1}^{n}\hat{a}_{ij}^1 = X_j \quad \forall j$$

$$a_{ij}^0 = 0 \rightarrow \hat{a}_{ij}^1 = 0$$

where $\mathbf{A} = (a_{ij})$ represents a matrix in a set $\mathbf{A}_n$ of $(n \times n)$ non-negative matrices with no row or column full of zeros. Considering a matrix $\mathbf{A}^0 \in \mathbf{A}_n$, a positive vector $\mathbf{x} \in \mathbb{R}_+^n$ and a loss function $\boldsymbol{d} : \mathbf{A}_n \times \mathbf{A}_n \rightarrow \mathbb{R}$, then $x_j^0 = \Sigma_i a_{ij}^0$ is the value for the j-th row and column sum in the original matrix; and a_{ij}^0/x_j^0 and $\hat{a}_{ij}^0/x_j$ the initial and updated technical coefficients, respectively.

Many other distances from metric spaces, besides the RAS and Cross Entropy (CE) minimands, are available to minimise the loss function but either they do not seem to

12. For further details, see Cardenete and Sancho (2004).

outperform RAS or their interpretation is not straightforward in terms of information theory or economic content (see Jackson and Murray, 2003). A possible complement to RAS and CE is suggested by classical information retrieval theory, a branch of computer science concerned with developing efficient methods of retrieving information from a data bank (Salton and McGill, 1983). Whenever a query for data is formulated, a retrieval algorithm fetches documents in a data bank that are closely related to the query in some way. The greater the similarity between the query and the information contained in the retrieved documents, the more successful the algorithm. Notice that a base SAM can be seen as a query for the true but unknown SAM document and an information retrieval algorithm will fetch from the data bank (the set of feasible SAMs) one with information content closely matching that required by the query. For a technical description of the procedure, see Cardenete and Sancho (2004).

Finally, it is necessary to stress that the final structure of the SAM accounts should be unique and wide enough to collect specific circumstances of a particular regional economy. For this reason, we leave in the SAMs accounts such as Agriculture or Forestry in urban areas, which in an ad hoc analysis of many economies would be considered negligible but are modelled for homogeneity reasons. Furthermore, the structure of the NUTS 3 SAMs comprising 63 accounts is as shown in Table A4 (see Annex 1).

In order to analyse changes in technical coefficients, the first idea is to measure some indicators of statistical distances between the I/O or SAM tables. When pairs of Input-Output or SAM tables are compared, it is possible to compute the Le Masné Index (Le Masné, 1990) for the sector j:

$$S_j = 100 * \left(1 - 0.5 \sum_i \left|a_{ij}^A - a_{ij}^S\right|\right) \tag{2}$$

The Le Masné Index will be close to 100 in cases of high similarity, and is therefore one of the many statistical distance indicators that can be analysed for the purpose of studying the similarity between tables. Table 2 shows the Le Masné index for Huesca, Konstanz and Lüneburg for analysing the similarities between a SAM built with an automatic procedure and a SAM built with an expert procedure.

Table 2: *Le Masné Index (average values) - Automatic procedure vs. Expert procedure.*

	Huesca	Konstanz	Lüneburg
Activities accounts	**90.63**	**91.78**	**91.42**
Commodity accounts	**79.07**	**86.96**	**88.73**
Rest of accounts	**81.04**	**72.97**	**77.02**
All accounts	**83.76**	**84.68**	**86.34**

Source: Own elaboration.

Table 2 shows that the total average similarity between procedures is 83.76% for Huesca, 84.68% for Konstanz and 86.34% for Lüneburg. In the case of the average for activities, it shows 90.63% for Huesca, 91.78% for Konstanz and 91.42% for Lüneburg. The similarity is higher than average for commodities: 79.07% for Huesca, 86.96% for Konstanz and 88.73% for Lüneburg. There is a high degree of similarity in the majority of accounts, with it being higher in Lüneburg and lower in Huesca. However, the case of Huesca is slightly different and the similarity indicator is the lowest. This may be due to the specific characteristics in the construction and later updating of this database. The NUTS 3 SAM of Huesca has been constructed with specific data which was available in regional statistical accounts, while the two other NUTS 3 SAMs are ultimately derived from the German national accounts.

3. Results

Following the methodology presented, the 12 SAMs for the selected regions are estimated, all referring to 2007 (for reasons of data availability at the time of the completion of paper). Such matrices are available in full upon request to the authors; Annex 2 shows only an aggregation.

However, to illustrate the validity and importance of the SAMs obtained, a summary is given in Table 3 including some of the main ratios derived from the estimated SAMs and reference to the rural or urban character of the NUTS 3 region; the importance of the activities in rural areas in general, and agricultural activities and (rural and urban) food processing industries in particular; and the trade relationship established outside the regions. The results presented in Table 3 correspond largely with the characteristics that define each of the clusters, demonstrating the importance of the rural economy and the need for its development and the importance of investment and public support (for example through Pillar 2).

Some interesting results can be obtained as illustrative examples of potential analyses that could be further developed with the estimated regional SAMs, for example to identify the economic structure of these regions.

Apart from the classification of NUTS 3 regions in one cluster or another, the importance of the economy of rural areas is fundamental, especially in the units classified in Clusters 5 and 6. With the exception of the low value in Noord-Drenthe (NL) (due to the diffuse criterion that sometimes separates both activities in this type of region), the percentage of GVA is high, surpassing 50% in all other regions except Lüneburg (DE), Norfolk (UK) and Slupski (PL), where it stands at around 40%.

Another significant aspect is the weight of public (government) investment, especially high in the provinces or regions of Cluster 1. The only low values are found in Huesca (ES) and Gorenjska (SI). The different role of trade with other regions is also remarkable, showing a possible cross-hauling effect with simultaneous imports and ex-

Table 3: *Some summary ratios of the NUTS 3 SAMs for 2007.*

Cluster	Country	NUTS 3 region	Rural activities share in total GVA	Agriculture and food (Rural + Urban) share in total GVA	Government investment/ Total investment	Imports/ GDP	Exports/ GDP
(1)	DE	Lüneburg	0.392	0.029	0.351	0.363	0.474
(1)	UK	Norfolk	0.388	0.030	0.386	0.495	0.409
(1)	DE	Konstanz	0.739	0.032	0.399	0.350	0.404
(2)	FR	Finistère	0.677	0.052	0.182	0.392	0.340
(2)	SI	Gorenjska	0.780	0.039	0.031	2.670	2.342
(2)	NL	Noord-Drenthe	0.063	0.051	0.129	1.204	1.256
(2)	SE	Örebro	0.605	0.036	0.244	0.673	0.747
(3)	HU	Heves	0.610	0.087	0.286	1.172	1.218
(3)	EE	Lääne-Eesti	0.586	0.096	0.287	1.134	0.897
(3)	PL	Slupski	0.477	0.091	0.121	0.826	0.538
(5)	ES	Huesca	0.801	0.133	0.031	0.625	0.483
(6)	PT	Setúbal	0.711	0.042	0.198	0.713	0.584

Source: Own elaboration. (GVA: gross value added; GDP: gross domestic product).

ports of the same goods, with trading totals being especially high in Gorenjska (SI), Heves (HU) and LääneEesti (EE).

Comparing the results by NUTS 3 territories, the share of Agriculture and food activities in Cluster 1 regions (Lüneburg, Norfolk and Konstanz) only represents 3% of their regional GVA with high shares of public investment, i.e. around 35-40% of the total gross fixed capital formation. Besides, the ratio of exports and imports on GDP shows similar behaviour. These results suggest strong dependency on the public sector with weak links with the rest of the national and international economies.

Regarding regions of Cluster 2, the behaviour is not so homogeneous. The agri-food activities in Gorenjska and Örebro are almost 4% of their total regional GVA, while Noord Drenthe and Finistère are over 5%. Public investment is not so important in these regions except in Örebro, where it is 24% of the total regional investment. Greater disparities are observed in the trade links with the rest of the economy provided that Gorenjska and Noord Drenthe have trade flows well above their respective regional GDP; opposite to Finistère and Örebro, where they are much lower, especially in the French region.

In Cluster 3 regions, agri-food activities represent almost 10% of their regional GVA, with public investment around 30% of total regional investment, except in Slupski. Only the Polish region shows both ratios of imports and exports below one.

In Huesca (Cluster 5), the agri-food activities represent 13% of its regional GVA, with a very small public sector share in its total regional investment (i.e. 3%) and around 40-60% of its GDP traded with other territories.

Finally, the agricultural sector and the agri-food industry in Setúbal (Cluster 6) represent together 4% of its regional GVA, with a public investment close to 20% of their total regional investment. Trade shares over GDP with other regions and countries are similar to Huesca, although slightly higher.

Therefore, in the light of the results obtained, the methodology used for estimating the SAMs at NUTS 3 level appears to be adequate and provide a significant contribution as a tool for obtaining such information, which is important for the assessment of regional economic development policies.

4. Conclusions

This paper describes a novel methodology for estimating non-survey-based regional Social Accounting Matrices with limited information for a selection of 12 NUTS 3 EU regions. For the first time, a modified version of the EURO method for Supply and Use Tables has been used as a method for regionalisation. The resulting SAMs can be further used for policy analysis, for example for modelling the impacts of rural development policies by using linear multipliers or computable general equilibrium (CGE)-based model approaches.

These SAMs used, as far as possible, existing regional/local data from their respective national and/or regional statistical offices, with consideration of the disaggregation of specific institutional sectors by degree of urbanisation (rural vs. urban areas).

Given the lack of official survey-based information to build regional (NUTS 2/NUTS 3) SAMs, we conclude that the methodology proposed in this paper can be useful (and replicated) to estimate non-survey-based regional SAMs with (optional) ad hoc specific considerations for certain sectors depending on the purpose of the analysis, i.e. rural/urban split for analysing rural development policies. Notwithstanding the caveats/assumptions made in our approach, we believe that sound impact analyses (e.g. using linear multipliers, CGE models, etc.) can be carried out in the future with regional SAMs estimated in the way we propose in this paper.

Annex 1. Tables and figures

Table A1: *NUTS 3 regions selected.*

	NUTS 3	Cluster	NUTS 2	NUTS 1	Member State
1	Lüneburg	(1)	Lüneburg	NIEDERSACHSEN	Germany
2	Norfolk	(1)	East Anglia	EAST OF ENGLAND	United Kingdom
3	Konstanz	(1)	Freiburg	BADEN-WÜRTTEMBERG	Germany
4	Finistère	(2)	Bretagne	OUEST	France
5	Gorenjska	(2)	Zahodna Slovenija	SLOVENIJA	Slovenia
6	Noord-Drenthe	(2)	Drenthe	NOORD-NEDERLAND	Netherlands
7	Örebro	(2)	Östra Mellansverige	ÖSTRA SVERIGE	Sweden
8	Heves	(3)	Észak-Magyarország	ALFÖLD ÉS ÉSZAK	Hungary
9	Lääne-Eesti	(3)	Eesti	EESTI	Estonia
10	Słupski	(3)	Pomorskie	REGION PÓŁNOCNY	Poland
11	Huesca	(5)	Aragón	NORESTE	Spain
12	Península de Setúbal	(6)	Área Metrop. de Lisboa	CONTINENTE	Portugal

Source: Own elaboration.

Table A2: *List of products/sectors.*

Original data source	Used in SAMs
1. Agriculture, forestry and fishing	1. Agriculture[13]
2. Manufacturing industry	2. Forestry
3. Construction	3. Fishing
4. Trade, transport and telecommunications	4. Mining
5. Finance, renting and business services	5. Food and beverages
6. Public services and other services	6. Other manufacturing activities
	7. Utilities
	8. Construction
	9. Trade
	10. Hotels and restaurants
	11. Transport and telecommunications
	12. Other private services
	13. Public services

Source: Own elaboration.

13. This industry still needs to be broken down further into arable crops, permanent crops and other agricultural products.

Table A3: *NUTS 3 basic SAM accounts.*

A.0-1	Agriculture, hunting and related services	C.0-6	Other manufacturing
A.0-2	Forestry, logging and related services	C.0-7	Utilities
A.0-3	Fish	C.0-8	Construction
A.0-4	Mining	C.0-9	Trade
A.0-5	Food industries	C.0-10	Hotels and restaurants
A.0-6	Other manufacturing	C.0-11	Transport and communication
A.0-7	Utilities	C.0-12	Other private services
A.0-8	Construction	C.0-13	Public services
A.0-9	Trade	L	Labour
A.0-10	Hotels and restaurants	K	Capital
A.0-11	Transport and communication	ANT	Activity net taxes
A.0-12	Other private services	CNT	Commodity net taxes
A.0-13	Public services	INT	Income net taxes
C.0-1	Prod. of agric., hunting and related services	H	Households
C.0-2	Prod. of forestry, logging and related services	E	Enterprises
C.0-3	Fish	G	Government
C.0-4	Mining	IS	I-S
C.0-5	Food industries	ROW	Rest of the world

Source: Own elaboration.

Table A4: *Structure of the NUTS 3 SAM for 2007.*

Rural activities	A.0-1_1_R	Small arable crops farms_Rural
	A.0-1_2_R	Large arable crops farms_Rural
	A.0-1_3_R	Small permanent crops farms_Rural
	A.0-1_4_R	Large permanent crops farms_Rural
	A.0-1_5_R	Small other farms_Rural
	A.0-1_6_R	Large other farms_Rural
	A.0-2_R	Products of forestry, logging and related services_Rural
	A.0-3_R	Fish_Rural
	A.0-4_R	Mining_Rural
	A.0-5_R	Food industries_Rural
	A.0-6_R	Other manufacturing_Rural
	A.0-7_R	Utilities_Rural
	A.0-8_R	Construction_Rural
	A.0-9_R	Trade_Rural
	A.0-10_R	Hotels and restaurants_Rural
	A.0-11_R	Transport and communication_Rural
	A.0-12_R	Other private services_Rural
	A.0-13_R	Public services_Rural

Table A4 (cont.)

Urban activities	A.0-1_1_U	Small arable crops farms_Urban
	A.0-1_2_U	Large arable crops farms_Urban
	A.0-1_3_U	Small permanent crops farms_Urban
	A.0-1_4_U	Large permanent crops farms_Urban
	A.0-1_5_U	Small other farms_Urban
	A.0-1_6_U	Large other farms_Urban
	A.0-2_U	Products of forestry, logging and related services_Urban
	A.0-3_U	Fish_Urban
	A.0-4_U	Mining_Urban
	A.0-5_U	Food industries_Urban
	A.0-6_U	Other manufacturing_Urban
	A.0-7_U	Utilities_Urban
	A.0-8_U	Construction_Urban
	A.0-9_U	Trade_Urban
	A.0-10_U	Hotels and restaurants_Urban
	A.0-11_U	Transport and communication_Urban
	A.0-12_U	Other private services_Urban
	A.0-13_U	Public services_Urban
Commodities	C.0-1_1	Arable crops products
	C.0-1_2	Permanent crops products
	C.0-1_3	Other agricultural products
	C.0-2	Products of forestry, logging and related services
	C.0-3	Fish
	C.0-4	Mining
	C.0-5	Food industries
	C.0-6	Other manufacturing
	C.0-7	Utilities
	C.0-8	Construction
	C.0-9	Trade
	C.0-10	Hotels and restaurants
	C.0-11	Transport and communication
	C.0-12	Other private services
	C.0-13	Public services
Factors	SL	Skilled labour
	UL	Unskilled labour
	K	Capital
Taxes (net)	ANT	Activity net taxes
	CNT	Commodity net taxes
	INT	Income net taxes
Institutional sectors	RH	Rural households
	UH	Urban households
	E	Enterprises
	G	Government
Investment/Save	IS	I-S
Rest of the world	ROW	Rest of the world

Source: Own elaboration.

	Commodities	**Activities**	**Factors**	**Households**	**Enterprises**	**Government**	**Savings-Investment**	**Rest of the World**	***Total***
Commodities		Intermediate consumption (inputs)		Household consumption		Government consumption	Fixed capital formation and change in stock (Investment)	Exports	*Total demand*
Activities	Marketed output / Domestic sales								*Activity income*
Factors		Factor income from activities						Factor income from ROW	*Factor income*
Households			Labour and mixed income	(Inter Households transfers)	Distributed benefits to Households / Other transfers	Current transfers to Households		Current transfers to Households from ROW	*Household income*
Enterprises			Operating surplus / Capital income			Current transfers to Enterprises		Current transfers to Enterprises from ROW	*Enterprise income*
Government	Net taxes on products	Net taxes on production	Factor income to Government	Direct taxes	Surplus to Government / Enterprises taxes			Current transfers to Government from ROW	*Government income*
Savings-Investment				Household savings	Enterprise savings	Government savings	(Capital accounts transfers)	Capital transfers from ROW	*Savings*
Rest of the World	Imports		Factor income to ROW	Household transfers to ROW	Surplus to ROW	Government transfers to ROW	Current external balance		*Foreign exchange outflow*
Total	*Total supply*	*Cost of production activities*	*Factor income payments*	*Household expenditures*	*Enterprise expenditures*	*Government expenditures*	*Investment*	*Foreign exchange inflow*	

Figure A.1: *Structure of a Social Accounting Matrix.*

Source: Round (2003) and own elaboration.

Annex 2. Social accounting matrices[14]-NUTS 3 regions 2007 (mio EUR, current prices)

Lüneburg

	AgR	OtR	AgU	OtU	COM	FACT	RH	UH	ENT	GOV	I-S	ROW	Tot
AgR					280								280
OtR					2,866								2,866
AgU					50								50
OtU					3,618								3,618
COM	196	1,596	36	1,530			475	1,385		673	540	1,639	8,069
FACT	93	1,198	15	2,003								23	3,332
RH						714			140	199		2	1,055
UH						1,976			388	552		5	2,920
ENT						620						360	979
GOV	-8	73	-1	85			374	1,093	109	0	50	15	3,565
I-S							193	402	50	349			995
ROW					1,254	22	14	41	292	16	405		2,043
Tot	280	2,866	50	3,618	8,069	3,332	1,055	2,920	979	3,565	995	2,043	

14. AgR: Agricultural and food activities_Rural; OtR: Other activities_Rural; AgU: Agricultural and food activities_Urban; OtU: Other activities_Urban; COM: Commodities; FACT: Factors; RH: Rural households; UH: Urban households; ENT: Enterprises; GOV: Government (incl. taxes); I-S: I-S; ROW: Rest of the world; Tot: Total.

Norfolk

	AgR	OtR	AgU	OtU	COM	FACT	RH	UH	ENT	GOV	I-S	ROW	Tot
AgR					534								534
OtR					12,019								12,019
AgU					1,017								1,017
OtU					18,735								18,735
COM	317	5,757	728	8,784			4,282	5,082		5,387	3,394	6,842	40,574
FACT	214	5,115	320	8,139								135	13,923
RH						6,233			1,366	4,027		96	11,722
UH						7,201			1,578	4,653		111	13,544
ENT						423						4,554	4,977
GOV	3	1,147	-31	1,812			5,561	6,544	655	0	776	65	32,995
I-S							1,708	1,717	355	2,372			6,151
ROW					8,269	66	171	201	1,023	92	1,982		11,804
Tot	534	12,019	1,017	18,735	40,574	13,923	11,722	13,544	4,977	32,995	6,151	11,804	

Konstanz

	AgR	OtR	AgU	OtU	COM	FACT	RH	UH	ENT	GOV	I-S	ROW	Tot
AgR					676								676
OtR					10,104								10,104
AgU					67								67
OtU					3,721								3,721
COM	458	4,891	47	1,828			559	3,615		1,311	1,456	2,968	17,134
FACT	230	4,990	21	1,802								50	7,093
RH						660			288	214		2	1,164
UH						4,046			1,766	1,312		12	7,136
ENT						2,336						768	3,104
GOV	-12	222	0	90			398	2,579	233	0	122	52	7,329
I-S							190	840	192	810			2,032
ROW					2,567	51	16	102	625	36	454		3,851
Tot	676	10,104	67	3,721	17,134	7,093	1,164	7,136	3,104	7,329	2,032	3,851	

Finistère

	AgR	OtR	AgU	OtU	COM	FACT	RH	UH	ENT	GOV	I-S	ROW	Tot
AgR					2,621								2,621
OtR					24,450								24,450
AgU					399								399
OtU					11,637								11,637
COM	1,704	12,078	288	5,411			7,601	3,282		5,298	4,452	6,682	46,795
FACT	918	11,476	110	5,793								132	18,429
RH						10,211			1,528	3,137		78	14,954
UH						5,001			748	1,536		38	7,324
ENT						3,193						2,006	5,199
GOV	-1	896	2	432			6,018	2,637	616	0	376	61	22,033
I-S							1,063	1,286	530	879		1,070	4,828
ROW					7,689	24	272	119	1,776	187			10,066
Tot	2,621	24,450	399	11,637	46,795	18,429	14,954	7,324	5,199	22,033	4,828	10,066	

Gorenjska

	AgR	OtR	AgU	OtU	COM	FACT	RH	UH	ENT	GOV	I-S	ROW	Tot
AgR					396								396
OtR					6,264								6,264
AgU					10								10
OtU					1,722								1,722
COM	294	4,275	7	1,134			1,283	484		660	1,135	6,279	15,550
FACT	115	1,845	4	549								74	2,586
RH						1,649			48	364		29	2,090
UH						615			18	136		11	780
ENT						243						77	320
GOV	-13	144	-1	39			651	245	94	0	37	23	2,419
I-S							109	33	10	37		982	1,171
ROW					7,158	78	48	18	150	22			7,475
Tot	396	6,264	10	1,722	15,550	2,586	2,090	780	320	2,419	1,171	7,475	

Noord-Drenthe

	AgR	OtR	AgU	OtU	COM	FACT	RH	UH	ENT	GOV	I-S	ROW	Tot
AgR					168								168
OtR					633								633
AgU					673								673
OtU					9,848								9,848
COM	109	399	497	5,689			1,318	761		1,342	966	5,811	16,893
FACT	58	217	178	3,964								56	4,472
RH						2,116			476	837		26	3,455
UH						1,161			261	459		14	1,895
ENT						1,085						1,952	3,037
GOV	1	16	-2	195			1,497	868	164	0	89	27	5,695
I-S							564	223	318	164			1,269
ROW					5,572	110	76	44	1,817	54	213		7,886
Tot	168	633	673	9,848	16,893	4,472	3,455	1,895	3,037	5,695	1,269	7,886	

Örebro

	AgR	OtR	AgU	OtU	COM	FACT	RH	UH	ENT	GOV	I-S	ROW	Tot
AgR					685								685
OtR					10,838								10,838
AgU					79								79
OtU					6,444								6,444
COM	420	6,083	44	3,207			1,704	1,822		2,452	1,701	6,191	23,626
FACT	289	4,388	39	2,946								53	7,715
RH						3,255			350	1,042		29	4,675
UH						3,090			332	989		27	4,438
ENT						1,303						373	1,676
GOV	-23	367	-4	290			1,929	2,062	258	0	148	27	10,090
I-S							953	459	184	515			2,111
ROW					5,579	67	89	95	552	55	262		6,700
Tot	685	10,838	79	6,444	23,626	7,715	4,675	4,438	1,676	10,090	2,111	6,700	

Heves

	AgR	OtR	AgU	OtU	COM	FACT	RH	UH	ENT	GOV	I-S	ROW	Tot
AgR					334								334
OtR					2,986								2,986
AgU					198								198
OtU					1,859								1,859
COM	216	1,878	142	1,129			659	303		483	475	2,449	7,734
FACT	132	1,059	59	697								79	2,025
RH						1,260			55	374		19	1,708
UH						515			22	153		8	698
ENT						225						178	403
GOV	-13	49	-3	33			703	314	63	0	30	25	2,406
I-S							312	65	60	175			613
ROW					2,357	25	34	15	202	17	107		2,758
Tot	334	2,986	198	1,859	7,734	2,025	1,708	698	403	2,406	613	2,758	

Lääne-Eesti

	AgR	OtR	AgU	OtU	COM	FACT	RH	UH	ENT	GOV	I-S	ROW	Tot
AgR					268								268
OtR					1,523								1,523
AgU					51								51
OtU					1,111								1,111
COM	170	905	32	625			449	255		259	546	1,094	4,334
FACT	106	590	21	466								57	1,240
RH						657			55	109		12	832
UH						359			30	59		7	455
ENT						213						77	291
GOV	-9	28	-2	19			322	176	22	0	23	12	1,172
I-S							48	17	8	163		333	569
ROW					1,383	11	14	7	176	1			1,592
Tot	268	1,523	51	1,111	4,334	1,240	832	455	291	1,172	569	1,592	

Slupski

	AgR	OtR	AgU	OtU	COM	FACT	RH	UH	ENT	GOV	I-S	ROW	Tot
AgR					503								503
OtR					2,455								2,455
AgU					316								316
OtU					3,361								3,361
COM	330	1,322	240	2,005			1,244	725		698	858	1,474	8,895
FACT	179	1,069	77	1,274								110	2,709
RH						1,551			60	236		30	1,877
UH						908			35	138		17	1,099
ENT						233						26	259
GOV	-6	63	-1	81			575	337	92	0	36	7	2,365
I-S							35	24	22	108		704	893
ROW					2,261	18	22	13	50	3			2,367
Tot	503	2,455	316	3,361	8,895	2,709	1,877	1,099	259	2,365	893	2,367	

Huesca

	AgR	OtR	AgU	OtU	COM	FACT	RH	UH	ENT	GOV	I-S	ROW	Tot
AgR					2,320								2,320
OtR					6,574								6,574
AgU					149								149
OtU					1,840								1,840
COM	1,682	3,126	107	865			998	2,558		1,307	963	2,466	14,072
FACT	690	3,061	45	870								76	4,741
RH						1,060			173	258		99	1,591
UH						2,719			445	663		254	4,081
ENT						854						357	1,211
GOV	-53	388	-3	105			409	1,049	92	0	30	259	4,361
I-S							173	442	424	33			1,072
ROW					3,189	108	11	33	77	13	79		3,511
Tot	2,320	6,574	149	1,840	14,072	4,741	1,591	4,081	1,211	4,361	1,072	3,511	

Setúbal

	AgR	OtR	AgU	OtU	COM	FACT	RH	UH	ENT	GOV	I-S	ROW	Tot
AgR					1,072								1,072
OtR					12,648								12,648
AgU					133								133
OtU					4,759								4,759
COM	751	6,954	97	2,349			1,419	4,009		2,024	2,101	4,939	24,643
FACT	311	5,302	33	2,277								874	8,797
RH						2,142			639	778		80	3,639
UH						4,614			1,377	1,675		172	7,838
ENT						2,016						689	2,705
GOV	10	392	3	133			1,149	3,201	325	0	80	-350	9,921
I-S							1,029	513		433		206	2,181
ROW					6,031	26	41	115	365	33			6,611
Tot	1,072	12,648	133	4,759	24,643	8,797	3,639	7,838	2,705	9,921	2,181	6,611	

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