Estimation of municipal GDP

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1. Introduction

The main objective of the Annual Accounts is to offer a coherent and integrated system, in terms of national accounting, that complements and constitutes a framework for all the economic information available in Statistics Institutes.

The demand for economic information with a greater level of territorial disaggregation, specifically at municipal level, has grown considerably over the course of the last few years with the aim of quantifying the effects of different economic policies that are being adopted by local authorities.

The aim of this work is to obtain municipal and regional estimations of the Gross Domestic Product (GDP) using a wide and varied socio-economic information. What is presented here is a statistic operation that Eustat developed between 1996 and 2005 on a five-yearly basis and on an annual basis from 2008 onwards. The final objective is to incorporate all available and relevant structural, sample-based and administrative information, creating an integrated system of yearly municipal GDP estimation.

Municipal GDP estimates offers a comprehensive view of the economic reality of the Basque Country in terms of GDP per capita, GDP per person employed and distribution of gross Value added of each municipality, totally consistent with the macro-magnitudes obtained for superior levels (regions, Provinces and the entire Basque Country).

This paper briefly summarises the main sources of information that are used for the municipal estimation of GDP. A greater level of detail will be used in the case of the Construction sector, as an example of the complex estimation process of the GDP from partial estimations of economic subsectors.

2. Municipal structure of the Basque Country

The Basque Country, with slightly over 2 million inhabitants, is divided into 3 Provinces (Alava/Araba, Bizkaia and Gipuzkoa). It has a total of 251 municipalities grouped into 20 economic regions. The density and size of both the population and the size of the economy between municipalities is highly heterogeneous: there are three municipalities with more than 200,000 inhabitants whereas there are 16 with less than 200.

The region of Gran Bilbao constitutes the largest urban area (half of the combined population of the Basque Country). The Province of Gipuzkoa is relatively more homogenous, whilst in Alava, population and activity are largely concentrated in the capital, Vitoria-Gasteiz. The distribution of municipalities by Province takes the following form: 112 in Bizkaia, 88 in Gipuzkoa and 51 in Alava.

3. Estimated economic activities

To obtain the GDP of each of the 251 municipalities, a set of indicators is used for each of the 87 economic branches wherein Eustat has classified the economic activity for the Basque Country using its own A-87 classification (using the 5-digit NACE as the basis).

Once the Gross Value Added estimation of each of the 87 branches of activity has been carried out, they are grouped into 4 economic branches or sectors (Primary, Industry, Construction and Services). Finally, the municipal GVA is obtained via simple aggregation, `GDP per capita´ from the GVA and tax estimates per capita, and `GDP per person in work´ by using estimates of number of working persons by municipalities. The total number of people in work and the total population derive from the Eustat Directory of Economic Activity and the Directory of Population and Housing.

4. Information sources

The series of indicators that is employed in the estimation of municipal economic activity includes both simple and composite indicators obtained from statistical and administrative sources. In addition to Eustat's own data, information from public bodies and public and private companies is also employed. The use of external information makes it necessary a continuous research work on data availability and quality. New data sources are continuously analysed in order to increase the quality and timeliness of the estimates.

The main sources of information used in the estimation of municipal GDP in recent periods can be grouped as follows:

Annual Economic Accounts: Municipal estimations of GDP and employment are adjusted to the data from the Annual Economic Accounts of the Basque Country, estimated for each Province.

The Directory of Economic Activity (hereinafter, DIREA) gathers information from all economically active establishments and businesses within the Basque Country; it provides basic structural information regarding the economic activity by sectors. The variables used from DIREA are **employment** and **number of establishments** by municipality and economic activity (NACE 93 r1).

Directory of Population: Population by municipality at the 1st of December is employed, using the average of two consecutive years to approximate the average population of the year under study.

The Directory of Housing gathers data on occupied housing for each of the municipalities. The most recent information is always employed.

Structural surveys: Economic surveys that collect annual data from businesses and establishments. The variables of greatest interest are **employment** and **Gross Value Added** from surveys such as the Industrial Statistics, Construction Statistics, the Survey of Hotels and Services, etc. Most of these surveys are of annual, although there are some surveys in certain cases where the information is available only two or five years. In these cases, the use of auxiliary information is needed in order to update the estimates yearly.

Short term Surveys: Data obtained from short term surveys, with monthly or quarterly frequency, is used in some cases to update structural data and in some sectors as a reference for estimates at subsector level.

Economic information from strategic private and public enterprises that operate in the Basque Country. For example, employment, transits, sales, number of travellers by season in rail companies, both passenger and goods companies, income from tolls, etc.

Municipal indicators: Municipal information derived from surveys carried out by Eustat and other public and private institutions.

5. Estimation procedure

Estimations are carried out separately for each of the 251 municipalities and for each of the 87 branches, for Gross Value Added (GVA) and for employment.

The work carried out by Eustat is not solely based on a municipal distribution of the GDP of the Basque Country using the employment variable of the DIREA. In addition to this variable of clear importance, other indirect indicators with discriminating capacity are employed.

Given the heterogeneity of the activities to be estimated, the method of estimation for each varies according to the number, quality and availability of sources and the methodology applied in each case.

For most branches, the methodology consists of identifying the base data to be employed as indicators for municipal distribution. Depending on the type and timeliness of data, amongst other factors, the required processing methods are first analysed. Then, the **GVA** and **Employment** are estimated at municipal level by simple aggregation, calibrating the estimates at Province level with the estimates from the Annual Economic Accounts.

As an example, in what follows, we present the methodology applied to estimate the Construction branch or sector in year 2008, one of the 87 branches of activity in A87 classification.

In Appendix 1 a table summarising the variables employed as indicators is shown, along with the estimation procedure of the GVA of the branch or sector. It shows data obtained from the Basque Country, its three Provinces and a sample of representative municipalities within each Province.

Before starting the estimation procedure of municipal distribution of GVA, we need to analyse the structure of the sector, understand specific concepts and activities to be taken into account, considering both NACE classification and the European Accounts System. Once the preliminary analysis has been carried out, the construction sector is divided into two sub-activities, in accordance with international recommendations: Building and Civil Engineering.

By **Building** we understand all permanent construction, separate and independent, in a fixed location, conceived to be used for residential purposes and/or to carry out an activity (family housing and non-residential and collective buildings).

Building, according to data from the Eustat Construction Index (ICC), accounts for **65.94%** of the construction sector in 2008. To estimate this part of the sector an indicator has been devised, based on the number of licences for new buildings granted in each of the 251 municipalities (annual municipal data is available). Data smoothing is carried out, applying the average value over three consecutive years, with the objective of distributing the Value Added generated over the approximate average house building period in the Basque Country.

In addition, the DIREA provides figures of employment in trades (NACEs 93 r1 453/454) and in pure building (NACE 93 r1 45211) that is updated on a yearly basis.

A proportional distribution of GVA is carried out in each Province by municipality, in parallel, using the number of completed houses (smoothed) and employment according to trades and pure building. The Value Added estimated for each municipality is obtained as a weighted sum of both partial estimations. The weightings are similar in the three Provinces as the most relevant indicator is the number of completed new buildings.

On the other hand, **Civil Engineering** includes all construction which can be classed as property, distinct from building, destined to be used collectively, in the sense of general use or services, for example: roads, airports, ports, railways, dams, canals, telecommunication facilities, oil pipelines, gas pipelines, etc.

Civil Engineering, according to data from the Eustat Construction Index (ICC), accounts for **34.06%** of the construction sector in year 2008. In this case, a partial estimation of municipal Value Added is obtained from the values of the Provinces, using employment in the subsector (NACE 93 r1 45) as an indicator, according to DIREA. Administrative information of investments (chapter 60) carried out by each of the 251 Town Halls is added is added to this preliminary estimation.

The Value Added of the Construction sector is then obtained as a weighted sum of Value Added from Building and from Civil Engineering using the aforementioned structural weights for 2008. The estimation is carried out at municipal level and the data for Regions and Provinces are calculated as a sum of the corresponding municipalities. The estimations obtained are finally calibrated to the totals according to Province determined by the annual Economic Accounts.

In Appendix 1, Table 1, the estimation process set out above is detailed for a combination of representative municipalities, including the three provincial capitals.

6. Future Work

From 2008 onwards, the estimation of municipal GDP will be carried out yearly. This implies a greater effort in updating information from 2 or 5 yearly available data using yearly indicators or information.

Currently, the impact of the change of NACE in the estimation system is being worked on, given the classification changes that are introduced. This analysis must include a complete revision of the validity of the indicators used in each of the 87 branches of activity. In parallel, the possibility of offering estimations with a greater disaggregation is being studied, particularly in the sector of Services given its heterogeneity and importance within the Basque Country.

APPENDIX 1.

TABLE 1: Estimation of the construction sector. Provincial capitals and representative municipalities. 2008.

	CONSTRUCTION 2008													
	Building (65.94%)							Civil Works (34.06 %)					TOTAL GVA CONSTRUCTION	GVA TOTAL CONSTRUCTION CALIBRATED
	Completed Housing	weight	GVA assigned	Trades employment	weight	GVA assigned	Total GVA assigned to Building	Investment Town Halls	Employment NACE 45	weight	GVA assigned	Total GVA assigned to Civil Works		
Basque Country	**11.259**	**1,00**	**2.242.764**	**71.461**	**1,00**	**1.506.279**	**3.749.042**	**507.338**	**89.818**	**1,00**	**1.429.227**	**1.936.565**	5.685.607	**5.685.699**
Province 1	4.470	0,40	339.616	10.295	0,14	208.906	548.522	45.597	12.549	0,14	237.799	283.396	831.917	**832.048**
Capital 1	3.867	0,87	293.802	8208	0,80	166.661	460.463	18.139	10.132	0,81	191.997	210.136	670.599	**670.705**
municipality	76	0,02	5.774	247	0,02	5.015	10.789	2.564	273	0,02	5.173	7.737	18.527	**18.530**
municipality	130	0,03	9.877	444	0,04	9.015	18.892	1.068	496	0,04	9.399	10.467	29.359	**29.364**
municipality	8	0,00	608	85	0,01	1.726	2.334	877	95	0,01	1.800	2.677	5.011	**5.012**
municipality	0	0,00	0	30	0,00	609	609	0	30	0,00	568	568	1.178	**1.178**
Province 2	2.927	0,26	616.406	22204	0,31	395.755	1.012.161	124.142	26.679	0,30	398.669	522.811	1.534.972	**1.534.972**
Capital 2	693	0,24	145.941	6390	0,29	113.893	259.834	43.874	7.696	0,29	115.003	158.877	418.710	**418.709**
municipality	41	0,01	8.634	652	0,03	11.621	20.255	2.824	707	0,03	10.565	13.389	33.644	**33.644**
municipality	16	0,01	3.369	259	0,01	4.616	7.986	1.540	271	0,01	4.050	5.590	13.575	**13.575**
municipality	104	0,04	21.902	356	0,02	6.345	28.247	2.770	369	0,01	5.514	8.284	36.531	**36.531**
municipality	16	0,01	3.369	435	0,02	7.753	11.123	4.867	487	0,02	7.277	12.144	23.267	**23.267**
Province 3	3.862	0,34	1.286.742	38962	0,55	901.618	2.188.360	337.599	50.590	0,56	792.759	1.130.358	3.318.718	**3.318.679**
Capital 3	435	0,11	144.933	11951	0,31	276.558	421.491	167.109	15.397	0,30	241.275	408.384	829.875	**829.863**
municipality	81	0,02	26.988	1474	0,04	34.110	61.097	7.187	1.602	0,03	25.104	32.291	93.388	**93.387**
municipality	0	0,00	0	2	0,00	46	46	196	2	0,00	31	227	274	**274**
municipality	0	0,00	0	702	0,02	16.245	16.245	1.583	917	0,02	14.370	15.953	32.198	**32.197**
municipality	41	0,01	13.660	148	0,00	3.425	17.085	666	160	0,00	2.507	3.173	20.258	**20.258**

	SECTOR NACE 93 R1	GVApb Economic Accounts 2008	GVA building 65,94%	% finished housing	% trades	GAV Civil works 34,06%
Province 1	55	832.048	548.652	61,9	38,1	283.396
Province 2	55	1.534.972	1.012.161	60,9	39,1	522.811
Province 3	55	3.318.679	2.188.337	58,8	41,2	1.130.342
BASQUE COUNTRY	55	5.685.699	3.749.150			1.936.549

GVA Unit: thousands of euros