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Delineation of complex statistical units in Greece through the implementation of manual and automatic profiling

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Abstract

Economic globalisation has set new rules on the operation of Multinational Enterprise Groups (MNEs), which tend to organise themselves in a more complex way, engaging more legal units across more countries than before and frequently reorganise their internal structure. Given this development, the approach followed by the National Statistical Institutes (NSIs) for business statistics, related to the legal unit (LeU) cannot reflect properly anymore the economic reality.

Consequently, the introduction and the implementation in business statistics of a more complex and relevant to real economy unit, such as the statistical unit “enterprise” was imperative.

To this end, the Hellenic Statistical Authority (ELSTAT) is running since reference year 2018 a large project with special focus on the creation and updating of complex statistical units in Greece, through automatic and intensive (manual) profiling and the parallel implementation of the profiling results in the Statistical Business Register in Structural Business Statistics and in other business statistics, in order to ensure the harmonized and consistent use of the statistical units in the different statistical areas.

In this paper, the different sources and methods used, related both to manual and automatic profiling, are presented, along with a detailed description of the survey for the direct collection of data on the intragroup / intra-enterprise flows for main economic variables. The impact of the implementation of the statistical unit enterprise on the Structural Business Statistics results is presented in a dedicated section of the paper. Emphasis is also given on the synthesis and work of the Large Cases Unit (LCU) of ELSTAT and its interrelation with the profiling process.

Keywords: Manual and Automatic Profiling, Enterprise Group, Enterprise, Intragroup, Intra-enterprise flows, Large Cases Unit



1. Introduction

Economic globalisation has set new rules on the operation of Multinational Enterprise Groups (MNEs), which tend to organise themselves in a more complex way, across more legal units and countries than before and frequently reorganise their internal structure. Given this development, the approach followed by the National Statistical Institutes (NSIs) for business statistics, related to the legal unit (LeU) cannot reflect properly anymore the economic reality.

Consequently, the introduction and the implementation in business statistics of a more complex and relevant to real economy unit, such as the statistical unit “enterprise” was imperative.

According to Council Regulation (EEC) No 696/93, the enterprise is defined as “the smallest combination of LeUs that is an organizational unit producing goods or services, which benefits from a certain degree of autonomy in decision making, especially for the allocation of its current resources”.

Enterprise units are delineated through the process of “profiling”.

2. Definition and reasons for profiling

According to European Statistical System’s Business Registers Recommendations Manual “Profiling is a method to analyse and maintain the legal, operational and accounting structure of an enterprise group at national and world level, in order to establish the statistical units within that group, their links, and the most efficient structures for the collection of statistical data” (paragraph 19.9, pp. 165).

The main reasons for profiling are detailed below:

- Getting a better picture of the economic structure and the perimeter of the groups and the functioning of the enterprises.
- Approximating better the economic concentration, the activities in the economy and getting more relevant economic data.
- Eliminating the internal flows between group’s LeUs, for the non-additive variables.
- Defining observation units within the group.
- Getting a consistent cross-domain picture of the groups.

The process of profiling is further distinguished, according to the methods and procedures applied, to manual and automatic profiling.

In the framework of **manual profiling** a group is examined on an individual basis with the use of contemporary available information (statistical surveys, administrative data, financial statements, group's website) in order to delineate its enterprises. This method is usually applied to the largest and most significant groups. When a meeting between the profiling team and the group's representatives is involved, then the process is called **intensive manual profiling**. When the whole process does not contain communication with the group and is limited to the analysis of the group, then it is called **light manual profiling**.

The **automatic profiling** is based on certain algorithms, and it is mainly applied to small and medium sized enterprise groups.

3. Organizational structure

The latest organizational structure of ELSTAT entered into force in August 2019 and provides for the profiling process as a responsibility of the Registers and Big Enterprises Section, under the Business Statistics Division. This section is also responsible for a) the production and maintenance of the Statistical Business Register (SBR), b) the compilation of Greek data for the EuroGroups Register (EGR), c) the compilation of Annual and Quarterly Business Demography, d) the operation of the Larce Case Unit (LCU), e) the conduct of the intra-enterprise flows survey and, on the basis of the collected data from this survey, the consolidation of SBS variables and f) the European profiling as GDC and partnering country. The specific organizational model has brought many benefits for correctly maintaining an accurate and complete economic recording and understanding of groups and their constituent statistical units.

The Registers and Big Enterprises Section of ELSTAT is staffed with seven employees, having different academic and professional backgrounds. The three profilers have studied economics and have a long experience in accounting and compilation of statistics of large groups, in the framework of Structural Business Statistics (SBS), Foreign Affiliates Statistics (FATS) and Tourism Statistics.

Three of the employees have a statistical background, both at pre-graduate and postgraduate level and an in-depth knowledge of handling large databases and programming, and one employee has studied informatics and is an expert on Oracle databases.

The three profilers work close together and share experience and knowledge of accounting practices. The profiling team is also assisted by the rest of the employees of the section, mostly on IT issues. Where needed, the profilers also cooperate with colleagues from the SBS Section and the National Accounts Division of ELSTAT.

The profiling team has also received consultancy, from an external financial auditor - accountant, specialized in large groups, on the study of the structure of the groups, their consolidated financial accounts and on communication issues - practices with executives of large groups and, in parallel, it has participated in the training and coaching for the establishment and operation of LCU, in the framework of the supporting activities of ESS members, coordinated by Eurostat, with regards to the improvement of the consistency of MNEs data. The profilers of ELSTAT have attended, specialized in the profiling and handling of MNEs, seminars, part of the European Statistical Training Programme (ESTP).

4. Data sources

For the determination of the most adequate input data that could be used for the identification of enterprises consisting of more than one legal unit, ELSTAT had access in and thoroughly examined several administrative and private sources that maintain and update databases and registers containing business data, such as:

- Tax Authority (Independent Authority for Public Revenues – IAPR),
- the General Electronic Commercial Registry (G.E.MI.), which is a body supervised by the Ministry of Economy and Development,
- A private commercial data provider (the ICAP CRIF GROUP S.A.) and
- the Central Bank of Greece (Bank of Greece - BoG).

The assessment and processing of the data of the above sources resulted to the selection, as the primary input source, of the private commercial database of ICAP CRIF GROUP. This selection was justified upon specific features the private commercial database has and in particular:

1. The database is compiled by comprehensively recording publicly available data for all legal units obliged to publish a balance sheet and financial results, concerning the links between groups, enterprises and subsidiaries, and by recording data collected directly from groups.
2. The database has quality characteristics, suitable for statistical use, in terms of coverage, completeness, accuracy, constant and regular availability of information on the large multinational and national groups and on the links between their legal units.
3. The content of the database can be provided on a regular annual basis, in a specific structure and format, thus ensuring comparability over time and access to the most recent data available.



The information of this private source is complemented with data from other additional sources, namely:

1. The Statistical Business Register (SBR) of ELSTAT. The primary data drawn from the SBR refer to the economic activity class, legal activity status (active, inactive etc) of the LeUs and their employment and turnover.
2. The EuroGroups Register (EGR). Information on the LeUs constituting MNEs and the way they are linked is utilized.
3. The published financial statements of MNEs and enterprises, from which information on the LeUs constituting the MNE, the consolidation methods, the governance and activities of the group is used.
4. The output of the Large Case Unit (LCU). The examination of the MNEs in the framework of the LCU allows for the complete mapping of the operational and legal structure of the groups.

5. Profiling process and results

The first step of the profiling process is to determine which groups and enterprises will be delineated based on the input from the available data sources, i.e., the private commercial database and the other additional sources.

Initially, the information of the private commercial database is updated on the basis of the Statistical Business Register, the EuroGroups Register and the published financial statements of MNEs and enterprises, as regards the number of the groups, their structure and economic activities. The profiling process is then implemented on the groups of the updated private commercial database that have at least two legal units with fully consolidated accounts. More specifically, for the reference year 2022 out of the 382 groups included in the ICAP database, 309 were finally profiled.

The second step in the process is to decide the type of profiling (manual/automated) that will be applied to each group/enterprise. The criteria used for this decision rely on the turnover and the total employment of the group. More specifically, if the total turnover of a group exceeds 1 billion euros and / or total employment exceeds 5,000 employed persons, then the group will be profiled manually. Some additional groups are also manually profiled, due to their complexity and the large number of their legal units.

On the basis of the application of the above criteria, it occurred that for the year 2022, out of the total of 309 enterprise groups 35 would be manually profiled, while the rest 274 groups would be delineated through automatic profiling.



The total turnover of the 309 enterprise groups that are profiled amounts to 135,979.18 million euro corresponding to 30.4% of the total turnover of the Greek economy, while their total employment is 276,432 persons which corresponds to 6.0% of the total employment.

The turnover and employment of the manually profiled groups amount to 90,170.77 million euro and 104,923 persons and corresponds to 20.1% and to 2.3% of the Greek economy, respectively, while the turnover and employment of the rest 274 groups delineated through automatic profiling amounts to 45,808.41 million euro and 171,509 persons corresponding to 10.3% and 3.7% of the Greek economy.

The method used for automatic profiling is based on turnover, as it was considered as more reliable variable in comparison with employment due to the accuracy of the relevant data from the available sources. A group was considered as mono-activity group (1 group = 1 enterprise) if at least 80% of the turnover is concentrated on only one economic activity at NACE four-digit level.

Around 75 manually profiled groups were further examined from the profiling team through light manual profiling (desk profiling), by examining disseminated financial statements. This was considered necessary in view of the importance of the groups at the level of specific sectors of economic activity, their more complex structure and the significant changes that have taken place in their organizational structure.

The delineation of the statistical unit “enterprise” resulted in the creation of a total of 398 enterprises, which consisted of one or more legal units as shown in the following table:

Table 1: Number of enterprises per number of legal units

Number of legal units	Number of enterprises
1	53
2	116
3	79
4	44
5	21
6	34
7	6
8	9
9	3
10	4
>10	30
Total	398



6. Intra-enterprise flows survey

For the consolidation of non-additive variables at the level of the statistical unit enterprise, several data sources were examined, however, none of them provided the information needed, therefore, ELSTAT decided to proceed to the direct collection of information from enterprises on their intra-enterprise flows through a dedicated survey. The survey is also used as a vehicle for the enterprises themselves to confirm/update their delineation, as performed by ELSTAT.

To this end, an electronic questionnaire was drafted from the profiling team, including questions on intraflows data that are necessary for the calculation of the main non-additive SBS variables.

The questionnaire was customized for each delineated “enterprise” of every group by including its individual linked legal units. Apart from the provision of the intraflows data between each combination of the linked legal units, the groups are also asked to confirm the delineation made by ELSTAT, by adding or removing linked legal units in the questionnaire and provide information on the main activity of each legal unit. The questionnaire is sent to the enterprise groups, along with an informative letter on the purpose and necessity of the intraflows survey, the relevant legal framework and the confidentiality policy of ELSTAT.

Specifically, for the reference year 2022, the questionnaire was sent to 345 enterprises. More than 210 groups-enterprises responded to the survey by providing data (response rate over 60%).

The total turnover of the responding groups-enterprises amounts to 110.076,27 million euro corresponding to 86.0% of the total turnover of groups-enterprises surveyed.

The collected data on intraflows were treated (cross-checked and confirmed, corrected where necessary) by the profiling team, and were also cross examined with the respective SBS data. In case further clarifications were needed communication with the contact point of the enterprise group took place.

It should be noted that each profiler is responsible over time for specific enterprise groups, thereby achieving a closer communication with the representative of the group. Moreover, contact information is updated on an annual basis, ensuring the receipt of the questionnaire from the competent person in the enterprise group.

The profiling team also handles the programming and maintenance of the algorithm used for the automatic consolidation. More specifically, on the basis of the edited intraflows data, the main non-additive SBS variables (“Turnover”, “Production value”, “Total purchases of goods and services”, “Purchases of goods and services” and “Gross Investments in tangible goods”) are calculated at the level of enterprise as follows:



From a non-additive variable (e.g. Turnover - 250101) of a legal unit, the respective intra-enterprise flows that the specific legal unit has with the other legal units of the statistical unit "enterprise" to which it belongs are subtracted and the net value of the non-additive variable is obtained. The net value of the variable (e.g. C_250101) at the enterprise level is obtained by summing up the net values of all legal units comprising the enterprise:

$$C_{ENT} = \sum_{i=1}^a C_{LU}$$

where:

C_{ENT} : The consolidated value of a main non – additive SBS variable at enterprise level

C_{LU} : The consolidated value of a main non – additive SBS variable at legal unit level

i : The number of legal units comprising the statistical unit enterprise

The remaining non-additive SBS variables are subtotals of the main non-additive SBS ones, or they are conceptually related. To this end, the consolidated value of the former ones is calculated on the basis of the ratio of the consolidated to the initial value of the main non-additive SBS variables.

$$R = \frac{C_{LU}}{V_{LU}}$$

where:

C_{LU} : The consolidated value of a main non – additive SBS variable at legal unit level

V_{LU} : The initial value of a main non – additive SBS variable at legal unit level

The consolidated value of the remaining non-additive SBS variables is then calculated by the following formula.

$$C_{ENT} = \sum_{i=1}^a R * V_{LU}$$

where:

C_{ENT} : The consolidated value of a remaining non – additive SBS variable at enterprise level

R : The ratio of the related main non – additive SBS variable at legal unit level

V_{LU} : The initial value of a remaining non – additive SBS variable at legal unit level

7. Impact of the implementation of the statistical unit enterprise in the SBS results

The impact of the implementation of the statistical unit enterprise in the main non-additive SBS variables is presented in table 2.

Table 2: SBS results for the non-additive variables at the level of legal unit and enterprise for the reference years 2018-2021

Non-additive SBS Variables	Unit Level	2018	2019	2020	2021
Number of enterprises	Legal Unit	709,696	718,624	712,060	881,717
	SU enterprise	708,699	717,680	711,171	880,349
	Impact of the implementation of the SU enterprise	-997	-944	-889	-1,368
Net Turnover	Legal Unit	256,489,299	266,452,167	238,146,979	321,206,385
	SU enterprise	249,650,942	258,852,815	233,195,059	314,154,314
	Impact of the implementation of the SU enterprise	-6,838,357	-7,599,352	-4,951,920	-7,052,071
Production Value	Legal Unit	157,504,367	163,400,613	142,345,967	204,615,916
	SU enterprise	157,212,894	163,171,526	142,215,465	204,370,376
	Impact of the implementation of the SU enterprise	-291,473	-229,087	-130,502	-245,540
Total Purchases of Goods and Services	Legal Unit	218,130,106	225,738,406	201,014,247	261,656,436
	SU enterprise	211,216,804	217,904,441	195,932,827	254,369,109
	Impact of the implementation of the SU enterprise	-6,913,302	-7,833,965	-5,081,420	-7,287,327
Total Purchases of Goods and Services for resale at the same condition	Legal Unit	107,730,676	112,704,911	104,601,327	129,105,600
	SU enterprise	102,266,631	107,081,264	101,104,019	125,873,815
	Impact of the implementation of the SU enterprise	-5,464,045	-5,623,647	-3,497,308	-3,231,785
Total Investments	Legal Unit	6,260,861	6,621,020	7,241,057	7,969,189
	SU enterprise	6,207,807	6,611,588	7,229,174	7,962,201
	Impact of the implementation of the SU enterprise	-53,054	-9,432	-11,883	-6,988

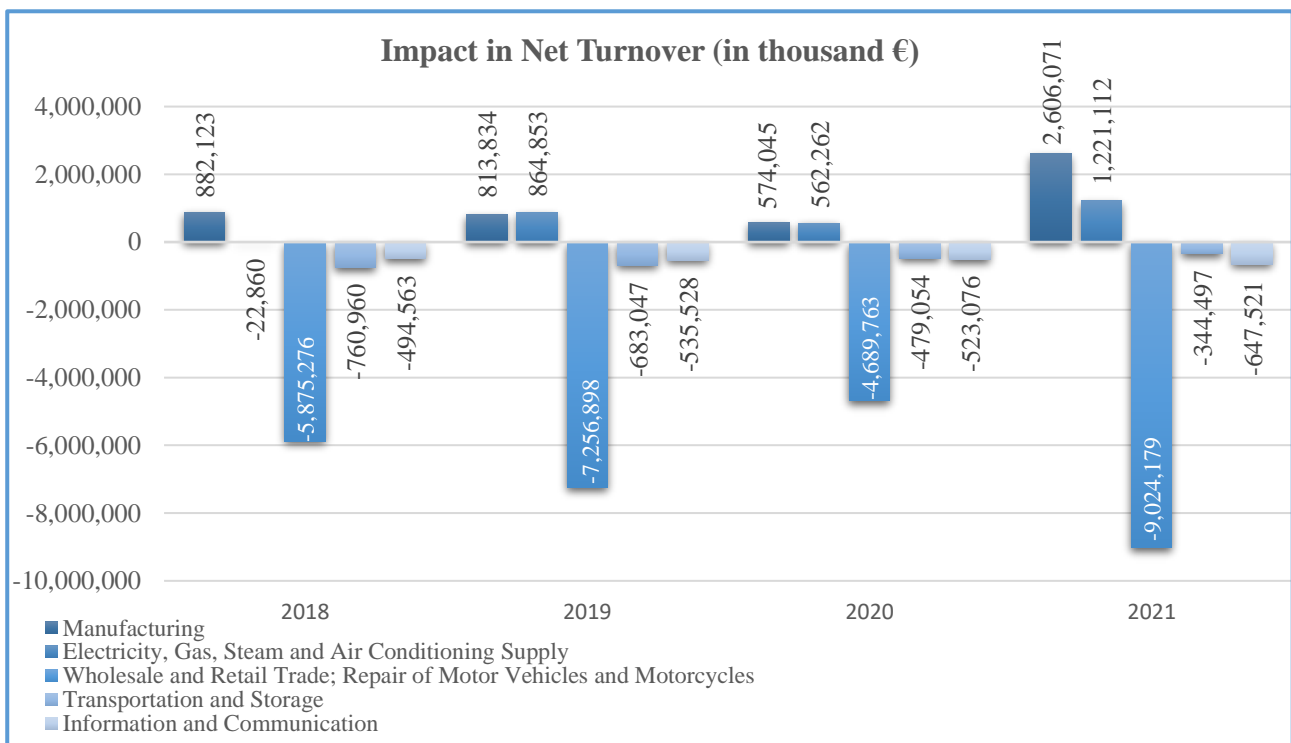
Note: The values are in thousand euro.

The economic activities mostly affected over time by the implementation of the Statistical Unit Enterprise in terms of turnover are:

- **Section C:** Manufacturing
- **Section D:** Electricity, Gas, Steam and Air Conditioning Supply
- **Section G:** Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles
- **Section H:** Transportation and Storage and
- **Section J:** Information and Communication.

The impact in SBS results, in terms of Net Turnover for the reference years 2018 – 2021 is presented in the following graph:

Graph 1. Impact of the implementation of the Statistical Unit Enterprise in terms of turnover, per section of economic activity



8. Use of data

The information resulting from the profiling process is used in the context of many different statistical domains.

First of all, the Statistical Business Register of ELSTAT is updated, so as to include all required, under EBS regulation, variables at the level of statistical unit “enterprise”, such as the legal units which comprise the enterprise, the economic activity, the turnover and the total employment of the enterprise.

The same information is also used in the context of the European statistical register on multinational enterprise groups (EuroGroups Register - EGR) and European Profiling, in order to update the LEU perimeter of the enterprise groups and of the statistical unit enterprise as well as their corresponding variables.

The results both of the profiling and the consolidation process are used from the Structural Business Statistics, so that the final data are available at the level of statistical unit “enterprise” as laid down from the EBS regulation.

As one of the main purposes of the Statistical Business Register is to provide a tool for the preparation and co-ordination of surveys and the determination of their sampling frame, the profiling information is utilized by Information and Communication Technologies (ICTs) Statistics, Trade in Goods Statistics by Enterprise Characteristics (TEC), Community Innovation Survey (CIS) and Research and Development Statistics (R&D).

Finally, in the framework of a memorandum of understanding, between ELSTAT and the Bank of Greece (BoG), there will be exchange of information on enterprise groups and their constituent statistical units, which will be exploited for the conduct of the Foreign Affiliates of EU enterprises – outward FATS (OFATS) and the International Trade in Services Statistics (ITSS).

The use of profiling results in all the above areas of business statistics allows for the emergence of a consistent and coherent cross domain recording of the groups and the statistical unit enterprise.

9. Work of the Large Case Unit (LCU) of ELSTAT

The Registers and Big Enterprises Section is responsible for the operation of the Large Case Unit (LCU). The LCU of ELSTAT examines the enterprise groups that have been determined on the basis of their total turnover and employment. Additionally, groups having a significant impact in specific economic activities at national level or having a complex operational and legal structure are also examined under LCU. Finally, extra groups might be added in LCU in order to cover needs of other divisions of ELSTAT, such as National Accounts. The total number of LCU groups amounted to 35 for the reference year 2022.

The turnover and employment of these groups amounted to 90,170.77 million euro and 104,923 persons respectively. These figures correspond to 20.1% and to 2.3% of the Greek economy.



The data needed to determine the LCU groups are mainly drawn from the private commercial database of ICAP, which has been updated with information from the Statistical Business Register, EuroGroups Register and the published financial statements of MNEs and enterprises, as regards the operational and legal structure of the groups.

The specific groups, due to their importance, are treated on an annual basis, so that they are up to date. More specifically, emphasis is put on the legal units consisting each of these enterprise groups, given the constantly emerging changes in their structure, on the consolidation methods applied and on the addition of new economic activities in the enterprise group as a whole and in its constituting legal units.

10. Challenges

One of the main targets, during the initial design of the profiling process, was the investigation of all possible data sources (administrative and commercial) that could be used for the identification of enterprises consisting of more than one legal unit, taking into account the level of coverage, completeness and accuracy of the large multinational groups, the provision of the specific data to ELSTAT on a regular basis and in a specific structure and format. This was a complex and demanding work, as there were various different sources with different characteristics that needed to be carefully evaluated.

Another challenge the profiling team had to deal with, at the beginning of the process, was the selection of the best methodology for the delineation of the statistical unit “enterprise”, among different methodologies available at that moment. The selected method should better reflect the Greek economy, ensuring that specific activities, especially productive ones, wouldn’t be absorbed and lost.

Finally, the drafting of the communication strategy with the large enterprise groups that would be profiled manually and the arrangement of physical meetings with their representatives, was a great challenge, in the view of difficulties arising from the confinement measures undertaken to limit the impact of the corona virus disease (COVID-19).

11. Way forward

Even though significant steps forward have been made with regard to the profiling, and specifically with the finalization of the profiling methodology, the selection of the data sources used, the intra-



flows survey and the consolidation process, ELSAT is planning additional actions, that will ensure the better co-ordination and the sustainability of the whole process.

In this direction, the development of a software application has been scheduled for 2024, through which the overall management of profiling (updating of groups' structure, compilation and updating of statistical unit enterprise, etc) and of the intra-flows survey will take place. This will only be a part of the software application, which will also cover the Statistical Business Register, EuroGroups Register and Business Demography Statistics needs, thus ensuring the interconnectivity of all statistical projects and the coherence of the respective data.

An internal methodological manual is being compiled containing information on the method and the procedure applied for the delineation of enterprises. The manual includes all the steps, from the detection of the available sources, the choice of the proper ones, the processing of the data provided from the sources, the criteria for the method of the profiling (manual, desk, automatic), the rules applied during the delineation of the enterprises and all the procedures followed for the delineation of enterprises, from the legal units belonging to groups.

The physical meetings with the large groups selected to be profiled manually and examined in the framework of the Large Case Unit will be launched on an intensive basis, during the forthcoming period, in order to have an in-depth knowledge of their legal and organizational structure.

Finally, a recruitment competition is under way and the Registers and Big Enterprises Section will be staffed with additional employees, which will work together with the rest profiling team.



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