1   Introduction

The economic restructuring can have a huge impact on the business statistics and mainly on longitudinal studies by activity sector. Due to globalization, it can have an even more significant impact on national statistics because of the delocalization of activities, tangible or intangible assets. Many years ago, to take into account the economic restructuring impacts, The French National Statistical Institute (Insee) implemented a specific business register called CITRUS. In order to improve the quality of CITRUS data and to take into account the statistical unit "enterprise" (as defined by the EU regulation of 1993), Insee has decided to set up a reengineering process of its information system. The main goals of this new project are

- to give as soon as possible the most information possible about the legal units or the enterprises involved in a restructuring process by mobilizing administrative data ;
- to manage a specific statistical unit called "envelope" which takes into account the restructuring process. Thanks to these "envelope", the statistical users can calculate new sector aggregates which neutralize the restructuring effect from one year to the other.

In the first part of this article, some examples of impacts of economic restructuring will be presented. Then CITRUS will be described in details: its administrative and statistical sources, its users etc. Finally, the last part of this paper will focus on the novel developments of CITRUS which are crucial to take into account the definition of the enterprise according to the 1993's regulation.

2   What are we talking about?

2.1   What is an economic restructuring?
Economic restructuring includes the set of operations that have an impact on the current productive activity (production and gross fixed capital formation operations) of the legal units. It relies on activity transfers including the sale or the lease of all or part of the productive assets between two or more legal units.
Are targeted:
o restructuring in the strict sense of the word: absorptions, mergers, splits, partial contributions of assets;
o sales transactions or purchases of funds trade or productive assets;
o leasing operations.

Are excluded:
- o financial transactions (including capital contributions with no other contribution);
- o internal restructuring operations (transfers between local units or reorganization of management structures).

In France, when two legal units have an economic restructuring, they have to declare it to the registry of commercial court and to publish it in the Official Bulletin of Civil and Commercial Advertisements (BODACC in French), an administrative source.

2.2   What is its impact on the business statistics?

Let's consider the case of two business sectors, each containing 3 legal units. The situation of the two sectors on 31/12/2016 was as follows:

Business Sector A	Business Sector B
Legal Unit 1: turnover= 1 000 K€	Legal Unit 4: turnover= 500 K€
Legal Unit 2: turnover= 500 K€	Legal Unit 5: turnover= 200 K€
Legal Unit 3: turnover= 100 K€	Legal Unit 6: turnover= 100 K€
Total turnover = 1 600 K€	Total turnover = 800 K€

Suppose that:
- o The 31/12/2016, the legal unit 1 bought the legal unit 4 to create the legal unit 14 in sector A;
- o Sector A legal units see their turnover fall by 10%;
- o Sector B legal units see their turnover increase by 20%;
- o No other event has occurred.

The situation on the 31/12/2017 has became as follows:

Business Sector A	Business Sector B
Legal Unit 14: turnover= 1 500 K€	
Legal Unit 2: turnover= 450 K€	Legal Unit 5: turnover= 240 K€
Legal Unit 3: turnover= 90 K€	Legal Unit 6: turnover= 120 K€
Total turnover = 2 040 K€	Total turnover = 360 K€

The apparent evolution of the two sectors between 2016 and 2017 would be:

Reference year	Total turnover of the Business Sector A	Total turnover of the Business Sector B
2016	1600	800
2017	2040	360
Evolution	21.6 %	- 122 %
Theoretical evolution of the legal units	-10 %	+ 20%

It is therefore clear that the restructuring is blurring the economic message because it may suggest that sector B is in crisis while the sustainable units of this sector see their turnover increase by 20%.
In order to tackle this issue, Insee decided to create a new statistical unit called "envelope" and a business register called CITRUS in charge of the management of this new unit.

The role of the envelope is to isolate and neutralize the effects of the restructuring for the longitudinal economic analyses between years Y-1 and Y. The envelope makes it possible to conduct studies in a comparable and coherent structure between Y-1 and Y. To do this, the envelope will regroup all the units involved in the restructuring. For the sectorial analysis, the envelope data will then be included in Y-1 and Y in the business sector of the envelope.

2.3   What is the French solution to tackle this issue?

The restructuring envelope includes the legal units which participate to the restructuring for the current year and the year before. The starting point to create the envelope is the couple of legal units involved in an economic restructuring. To constitute the envelope, CITRUS has a key rule: a legal unit belongs to one and only one envelope for a given year. An envelope can also contain many legal units, and some of them can be unrelated. For instance, the legal unit A can exchange tangible assets with B, and B with C: the envelope will contain legal units A, B and C even if there is no link between A and C. The envelope is considered as a statistical unit. Its Nace code is calculated from the Nace code and the turnover of the constituting legal units of the current year. The envelope has the same Nace code for both years (Y-1 and Y). We therefore avoid too strong sector evolutions. CITRUS calculates the main characteristics of the envelope (Nace code, size, turnover etc.). Year Y data in the envelope are the sum of data of the legal units active after the restructuring. The envelope data Y-1 are estimated from the data of the active legal units before the restructuring. For example, in the case of a merger of two legal units, any turnover made in Y-1 between the two legal units disappears in Y. Thus, for the envelope, the turnover Y-1 will be equal to the sum of the turnover of both legal units, to which will be subtracted the turnover made between the two legal units in Y-1.

In the previous example of §2.2., an envelope (env1) would be created with the following composition:
  o   For the year 2016, the envelope would contain the legal units 1 and 4;
  o   For the year 2017, the envelope would contain the legal unit 14.
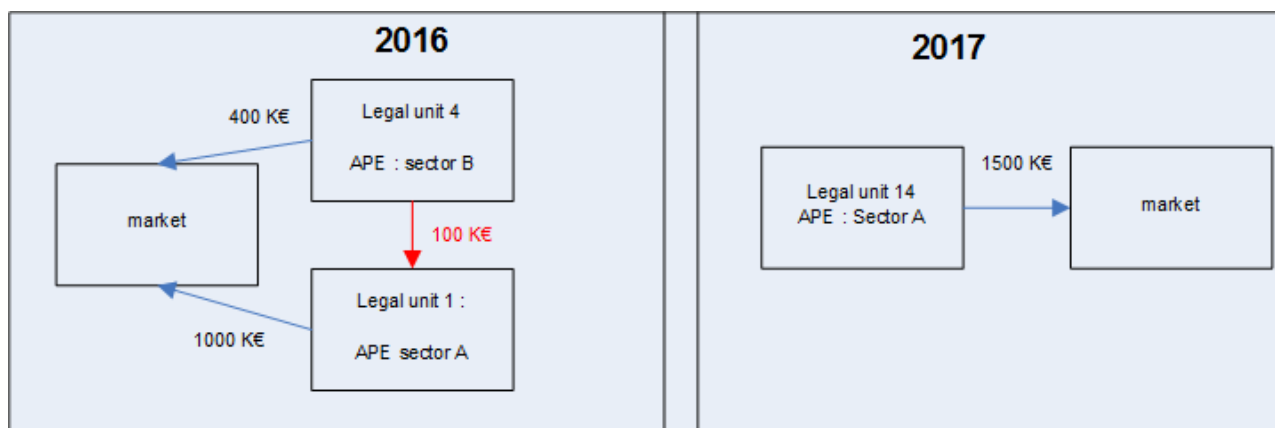
The business sector of the envelop would be A because in 2017, the envelope contains only the legal unit 14, belonging to sector A. Envelope data for the year 2017 corresponds to the data of the legal unit 14. For the year 2016, by definition the sector is the same as that of 2017. The envelope's turnover is equal to the sum of the turnover of the legal units 1 and 4, to which we subtract the 100

Kilo euros corresponding to the exchange between the two legal units. Indeed, exchanges between both legal units have disappeared in 2017 as a result of the merger.

Taking into account the envelope we thus arrive at the following situation:

Turnover of the business Sector A in 2016	*Turnover of the business Sector A in 2017*	*Turnover of the business Sector B in 2016*	*Turnover of the business Sector B in 2017*
Env1= 1 400	*Env1 = 1 500*	*LU5 = 200*	*LU5 = 240*
LU2 = 500	*LU2 = 450*	*LU6 = 100*	*LU6 = 120*
LU3 = 100	*LU3 = 90*		
Total = 2 000	*Total = 2 040*	*Total = 300*	*Total = 360*
Evolution = 2 %		*Evolution = 20 %*	

Taking the envelope into account therefore makes it possible to give an economic message more in line with the economic state of the legal units in the sectors.

Strong of this observation and to better decompose the economic evolution of an aggregate, it is broken down into three groups:
o   the evolution of sustainable enterprises;
o   the evolution due to business demography;
o   the evolution due to economic restructuring.
Insee has therefore decided to set up a statistical directory dedicated to restructuring management. The next chapter of this article details the function of CITRUS.

3   How does the French business register of the economic restructuring work?

3.1   The workflow

CITRUS collects, structures and makes available to the statistical users all information related to economic restructuring. It collects information on restructuring from administrative (BODACC) or statistical sources (SBS survey). CITRUS collects information about pairs of legal units that trade assets among themselves. The training of these couples, composed of a beneficiary legal unit and a ceding, is described as a basic restructuring operation. Each time, CITRUS seeks to collect the following information:
o   identification of the ceding and beneficiary units;
o   detailed type of restructuring;
o   date of decision;
o   date of accounting effect;
o   amount of transfer of tangible assets.
Based on the information collected at the level of the couples of legal units undergoing restructuring, a new statistical unit is created. This is the envelope. CITRUS then broadcasts this data to users:
o   on the couple of units in reconfiguration;
o   on envelopes (identifier, main activity, employment, turnover and aggregation coefficient).

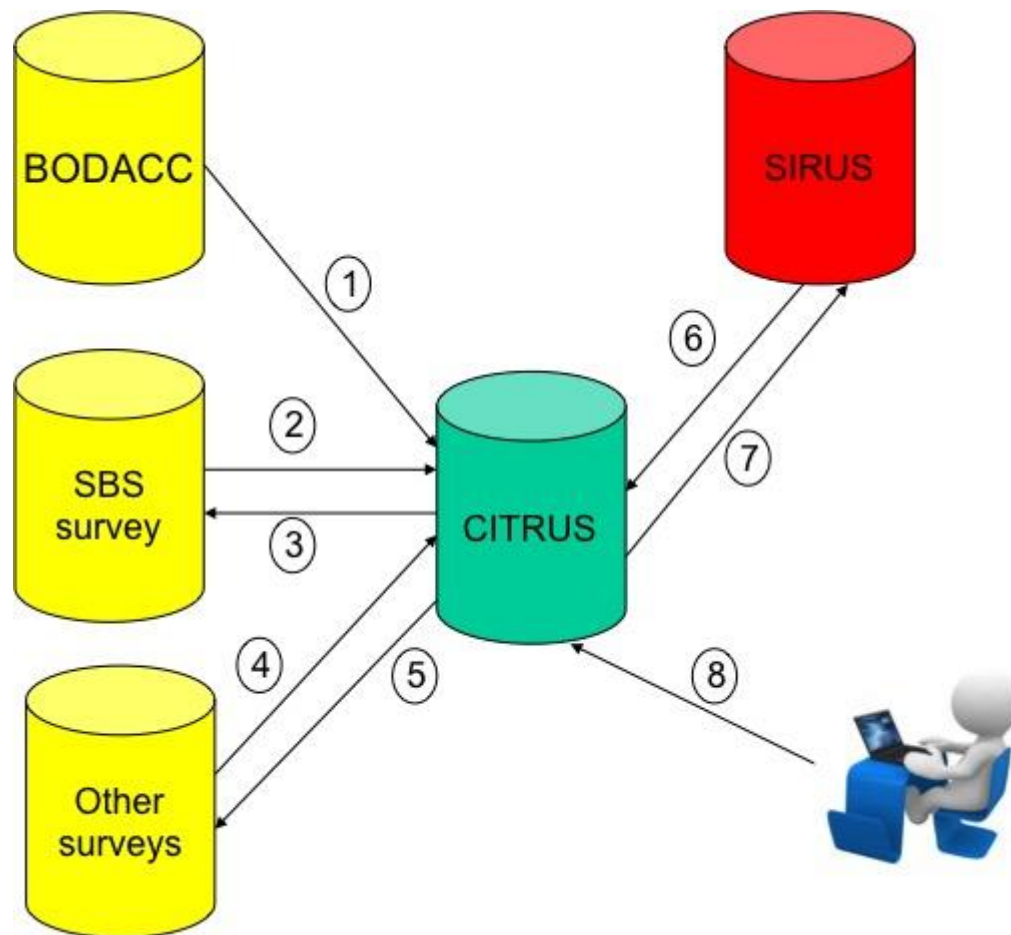The figure 1 below explains the workflow of CITRUS

Figure 1: CITRUS workflow

Flow 1 between BODACC and CITRUS: This flow will be described in detail in the next chapter

Flow 2 between SBS survey and CITRUS: This flow will be described in detail in the next chapter

Flow 3 between CITRUS and SBS survey: CITRUS sends each week to the SBS survey's database, the perimeter of the envelope and their characteristics (main activity code, turnover, etc.). This information will be used to check the quality of the data (see chapter 3.4).

Flow 4 between the other survey and CITRUS: This flow will be described in detail in the next chapter

Flow 5 between CITRUS and the other surveys: For the moment, SBS survey is the only survey using the envelope. However, CITRUS sends to the other surveys, the list of legal units which participate to an economic restructuring. This information is useful to validate some individual evolution appearing to be inconsistent. In the future it is expected that these other surveys will also use envelope characteristics to monitor and disseminate their own data.

Flow 6 between SIRUS and CITRUS: SIRUS is the French national statistical business register. It sends to CITRUS all the characteristics of the legal units and the enterprises which are needed to calculate the characteristics of the envelope

Flow 7 between CITRUS and SIRUS: CITRUS sends to SIRUS the list of legal units involved in an economic restructuring.

Flow 8: There is a man-machine interface making it possible to visualize and correct the individual data of CITRUS.

3.2   Description of the administrative and statistical sources

3.2.1   The main administrative source

The Official Bulletin of Civil and Commercial Advertisements (BODACC) is published by the Directorate of Legal and Administrative Information (DILA), as part of its public service mission of economic and financial transparency. BODACC ensures the publicity of deeds registered in the Trade and Legal units Register:
  o   sales and disposals;
  o   merger or split;
  o   registrations;
  o   local unit creations;
  o   economic liquidation;
  o   modifications;
  o   radiation;
  o   corporate tax data deposit announcements.

Published information concerning legal units registered in the Trade and Legal units Register comes from the registries of the commercial courts, the courts of first instance or of high instance with commercial competence, courts of first instance, higher courts of appeal and courts of appeal. BODACC announcements appear 5 times a week as an XML file. They are open source. Thus, Insee downloads daily XML files from this open data web site. The number of announcements is constantly increasing: on average almost two million announcements a year.

Thus, for this administrative source, the information we need, are not directly available. For this reason, a textual analysis algorithm has been developed to retrieve the useful data.

The first step is to keep only announcements that contain keywords associated with a restructuring such as "partial asset transfers", "merger", "absorption", "split" ...

Then, in the announcement text selected, we aim at identifying:
  o   the identifier of the legal unit "beneficiary" and ceding. The French ID is a 9-digit number. We check that the identifiers found are in our business register. Otherwise, the announcement is not retained;
  o   the type of restructuring: split, partial transfer of assets, absorption;
  o   the dates of the restructuring;
  o   the amounts exchanged.

At the end, less than 1% of all the announcement are considered as relevant and kept. It is sometimes necessary to read several advertisements to reconstitute a restructuring operation (merger for example). In some cases, information is missing (the amounts in particular) but the essential elements are the identifiers of the legal units and the effective date.

Although incomplete in terms of data, in 2016 for example, it provided 77% of couples of legal units undergoing restructuring. The deadlines for publication at BODACC are rather short, since about 60% of the total number of BODACC files are known no later than 30 days after the decision date of the restructuring and 92% within two months.

The main contribution of this source is to have up-to-date information, necessary for the production of short-term statistics. This novelty will improve the quality and analysis of our short-term statistics.

3.2.2   The statistical sources

3.2.2.1   The Structural Business Statistics survey

The Structural Business Statistics survey is the most important French business statistics surveys. Its questionnaire include a section dedicated to restructuring. This part contains all the information on the pairs of legal units that are useful for constituting the envelopes. Indeed, for the reference year 2017, this survey is conducted in 2018. Thus, the large legal units undergoing restructuring are automatically included in the take all strata of the sample in order to improve the quality of the CITRUS data. This survey makes it possible, in particular, to complete the missing information of the BODACC (mainly the amount of the transfers).

In the past, before systematic and automatic consideration of BODACC, this survey was almost our only source on restructuring. Today, while it remains the most complete source (especially for the amount of asset transfers), it improves CITRUS coverage very little. Indeed, the vast majority of these restructurings have been known by CITRUS for over a year through BODACC.

3.2.2.2   The other business survey

Unlike the SBS survey, the other surveys conducted by INSEE do not have any specific section on restructuring. But, survey managers have to contact legal units to validate or complete their response. During these contacts, they can learn that the legal unit has undergone a restructuring in the year. In this case, they can provide this information to CITRUS.

3.3   *The output*

CITRUS provides three types of output:
   o   The list of legal units which participate to a restructuring for a given year;
   o   The amounts exchanged during the restructuring that are useful to calculate the real investment of the legal units;
   o   The envelopes data:
      o   the perimeter of the envelope is composed of two lists of legal units, those in the entry of restructuring which will be used to calculate the Y-1 data and those in exit which make it possible to calculate the Y data. A legal unit can belong to both lists;
      o   the Nace code for the envelope: its goal is to neutralize the sectorial evolutions linked to the restructuring. The Nace code is obtained from the codes of the legal units that compose one envelop the year Y. And in order to neutralize changes in sectors related to restructuring, the Nace code of the envelope in Y-1 is identical to that obtained in N;
      o   an aggregation coefficient (called Kagre): its objective is to succeed in reasoning within a constant perimeter between the two years, that is to say, to neutralize flows between units present (respectively absent) before restructuring and having disappeared (respectively appeared) after the restructuring. The comparison of Y-1 and Y envelope data will reflect a real economic evolution of the envelope sector and not a fictional evolution linked to an organizational change within a legal unit. This

neutralization of flows is done, in CITRUS, automatically, by the estimation of a coefficient of aggregation when the value of "true" flows are not known. The coefficient is based on the principle that the added value is additive and therefore independent of the structure of a legal unit. The aggregation coefficient aims to correct the N-1 turnover at the level of the envelope so that the evolution of the turnover of the envelope is identical to that of its added value.

3.4 The uses

There are three major uses of envelope data, which allow:
- o Improving the relevance of the temporal controls of the surveys data. For example, for the SBS survey, a questionnaire of the envelope is estimated for the years Y-1 and Y from the questionnaire of legal units. Then the data editing and output editing process are applied on this questionnaire. If temporal controls consider that the envelope data are atypical, the clerks will verify the legal unit data and recall it if necessary. Not using the envelope would lead to manual control of legal units with unexpected developments solely due to restructuring. An absorbing legal unit can see its turnover sharply increase by one year on the other, whereas if one compares this turnover with the sum in Y-1 of the turnover of the legal units absorbed and his own turnover, the evolution would appear much less atypical;
- o Improving the quality of the investment. When looking at business investment behaviour in economic analysis, the most relevant variable is the amount of investment outside the inflows obtained by fusion or partial absorption. These inflows correspond to the amounts exchanged during restructuring that are stored in CITRUS;
- o Calculating aggregates in a comparable evolution and at a constant field and thus making it possible to take into account restructuring as an explanatory factor for the evolution of a sector. To describe the economic evolution of an aggregate for a sector and a given variable, it is indispensable to be able to break it down according to 3 factors. The part of the evolution due to:
    - o perennial businesses;
    - o the demography of legal units (creations and terminations);
    - o restructuring.
  Taking into account the envelopes makes it possible to calculate this last contribution.

4   How does CITRUS take into account the enterprises

From recently, the economic definition of enterprise from the 1993's regulation is used to disseminate structural business statistics. The French profiling process delineates enterprises from enterprise groups:
- manual profiling can lead to delineate several enterprises within a group;
- automatic profiling considers one group as an enterprise.

Therefore, taking into account enterprise groups in business statistics through profiling makes the deal more complex. Indeed, if on one hand, the information on restructuring will always be collected at the level of legal units through the "beneficiary - ceding" couples, on the other hand, the envelopes will have to take into account the notion of profiled enterprise. Thus, CITRUS will propose two types of different restructuring envelopes:
- o envelopes in legal units;

o envelopes in enterprises. These will be deducted from the envelopes composed of legal units but may have different perimeters.

4.1   The links between envelopes in legal units and enterprises

Figure 2 shows the possible links between envelopes in Legal Unit (LU) (in red) and enterprises (in blue).
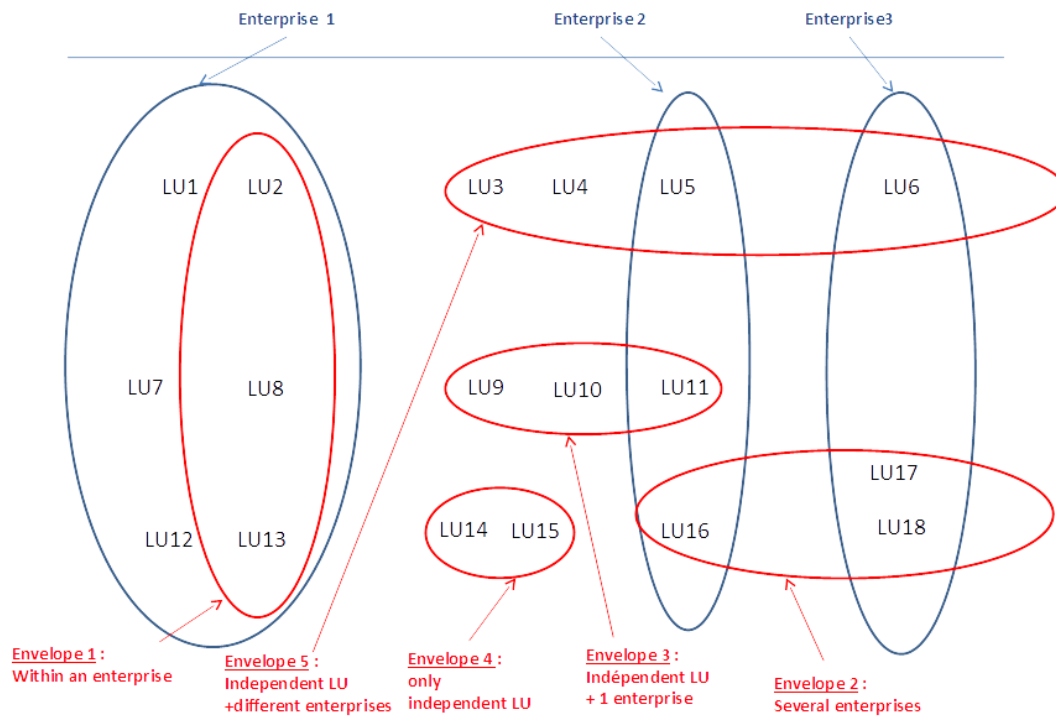

Figure 2: Exemple of link patterns between envelopes and enterprises

Reading notes: the enterprise 1 contains the legal units 1, 2, 7, 8, 12 and 13; and the envelope 1 contains the LU 2, 8 and 13.

There are 3 types of different situations:
o case 1: The restructuring only concerns LUs belonging to the same enterprise (envelope 1 in the diagram above);
o case 2: The envelope only concerns independent LUs (envelope 4 in the diagram above);
o case 3: The restructuring involves at least one independent LU and at least one LU belonging to an enterprise or at least 2 LUs belonging to 2 different enterprises (envelopes 2, 3 and 5 in the diagram above).

Most of the economic restructurings concern only independent LUs (70%). Besides, only 5.6% concern internal restructurings in the same group for which envelopes are partly doomed to disappear as shown on Figure 3.

4.2   The definition of the envelopes of enterprises

The principle of envelopes of enterprises is the same as LU in that an enterprise can belong to one envelope and only one.
The characteristics of the envelopes of enterprise (Nace code, aggregation coefficient, effective) are then calculated in the same way as the UL envelopes, taking into account the characteristics of the enterprises that compose it.
The 3 cases presented on Figure 2 will result in the following envelopes.
- o case 1: Two sub-cases must be taken into account;
    - o if the restructuring LU belongs to the Y-1 and Y enterprise's perimeter. In this case the envelope contains only the enterprise and it will not be created;
    - o otherwise, the envelope will contain the enterprise in Y and the LUs and the enterprise concerned in Y-1;
- o case 2: The envelope of enterprises and in LUs will be identical;
- o case3: The envelope will contain in Y-1 and Y the enterprises and LUs concerned. This can lead to fusions of LUs envelopes.

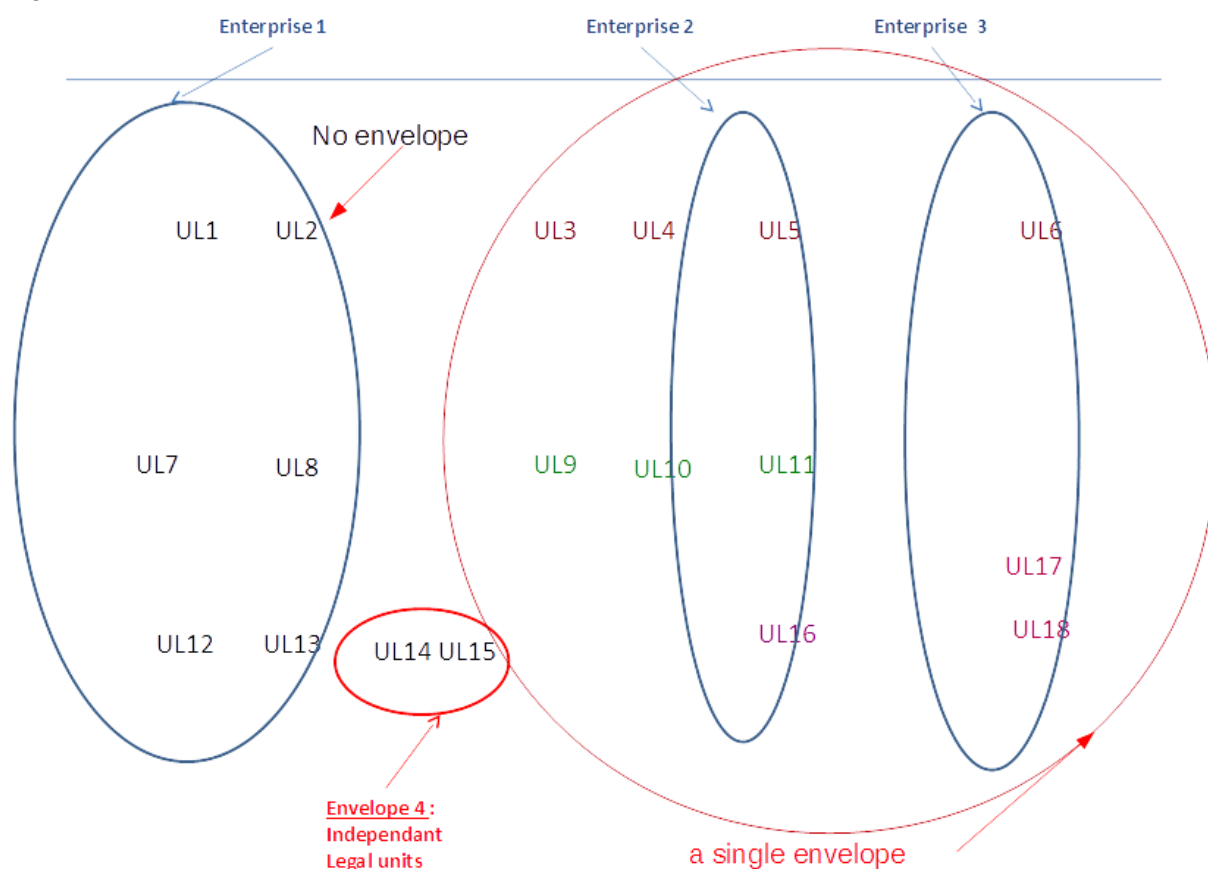So the situation of the previous example would result in the enterprises envelopes as illustrated in figure 3.

Figure 3 : Example of envelopes of enterprises

The envelope 1 disappears because it is within an enterprise in Y and Y-1. The envelope 4 is unchanged because it contains only independent LUs. The envelopes 2, 3 and 5 merge into a single envelope (in order to comply with the rule that an enterprise belongs to one envelope and only one).

5   Conclusion

This paper shows how the restructurings are taken into account in the French statistical system through a dedicated statistical business register, called CITRUS. Taking restructuring into account improves the quality of time controls and the analysis of economic developments by sector.

CITRUS is also used as part of the early warning system: it can identify restructuring that may concern multinational groups and therefore impact on European statistics. The contribution of the administrative source is undeniable at this level because it makes it possible to identify units undergoing restructuring within very short deadlines.

Finally, in order to comply with the 1993 regulation, an adaptation of CITRUS is necessary in order to move from a concept of legal units, still considered as the observation unit of restructuring, to an enterprise concept that becomes the statistical unit.