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**THE SPANISH SURVEY ON INTERNATIONAL TRADE -IN- SERVICES:  
A NATURAL WAY OF LINKING INDUSTRY AND PRODUCT**

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**1. Background**

**1.1 Summary of causes giving rise to the new survey on ITS**

- Banco de España (BE) is the institution responsible for compiling and disseminating BoP statistics in Spain. The information system used by BE to estimate the BoP item *Other Services* is mainly based on the reporting of foreign receipts and payments<sup>1</sup>.
- In the current context of economic and financial internationalization, all countries compiling their balance of payments data using information on foreign receipts and payments have been obliged, to a greater or lesser extent, to progressively modify their systems.
- In the case of the Europe, the changes introduced by the process of economic integration, have speeded up the search for alternative information sources. Among other reasons to investigate additional sources of information they can be mentioned: the very demanding new requirements of statistical information from international organisations and expressed in European Regulations and recommendations (Eurostat and ECB); the greater complexity of the management of liquid assets, which makes it difficult the capture and assessment of international transactions and their geographic allocation; European multinationals' demands to report on their transactions according to harmonised criteria closer to business accounting principles, etc.
- Moreover, more difficulties, can be added in the context of the European *Economic and Monetary Union (EMU)*: the integration of the international systems of payments makes it more difficult to identify residents and non-residents in bank transfers; the future *raising of the threshold (from 12,500 to 50,000 euros in 2008)* to report transfers in euros among EU-resident banks and credit institutions; the launch of the euro single currency in 2002 which made it impossible, from that year onward, to use information on currency exchange transactions as an indicator for operations between residents and non-residents in the euro zone and distorted, to a large extent, its utility to estimate transactions with non-residents in the eurozone.

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<sup>1</sup> BE receives information, basically, from deposit institutions, other financial institutions entered in official registers (BE and CNMV), holders of sight or savings accounts with non resident credit institutions, and parties to offsetting transactions with non-residents.

## 1.2 Agreement to design a new statistical operation on ITS

- In the year 2003, in line with the recommendations by competent international bodies that were already being applied by other countries, a project was launched between BE and INE to collect basic information on services through a system made up of different statistical sources, in which the surveys of companies and other resident units will perform a fundamental role.
- The idea was to use as a starting point the BE files to design a preliminary business register of companies (traders in international services) suitable to be used as a statistical framework for the new system. Another established goal for the information coming from BE was to come in useful for checking the “quality” of the new sources.
- When the suitability of the new system is ensured, the new statistical operation will replace the system of foreign receipts and payments currently used by BE. The data obtained will be used not only in the compilation of the balance of payments statistics, but also in the preparation of the National Accounts of the Spanish economy in conformity with Regulation (EC) N° 184/2005 of the European Parliament and of the Council on Community statistics concerning balance of payments, international trade in services and foreign direct investment, and ECB Guideline 2004/15 on the statistical reporting requirements of the ECB in the field of balance of payments and international investment position statistics, and the international reserves template.
- As a result of this collaboration agreement the new *Spanish Survey on International Trade in Services (SSITS)* has been jointly design by both institutions.

## 1.3 The pilot project

- In mid-2004, a monthly pilot project was launched to survey around 3000 firms. A lot of previous work was carried out with BE data coming from its settlement system, mainly stability and quantitative analysis, to identify in what industries, and, within each industry, in what range of firm size (measured by number of employees), the ITS transactions were more concentrated.
- The 3000 enterprises were selected following a stability criterion, i.e, the firms which in the BE files showed continuity in trading in services (at least one quarter a year for four consecutive years:1999-2002) were picked up to take part in the pilot sample.
- The pilot project mainly aimed at checking the monthly questionnaire and the problems of the firms in practice in providing the required information before the fixed deadline:  $m + 7$  days (seven days after the end of the reference month  $m$ ).
- The pilot monthly questionnaire was designed to collect any individual trading transaction at country level (EUROSTAT Vedemecum - BoP economic zones level 3). The respondent was in charge of matching its transactions with the most appropriate EBOPS item at the maximum level of breakdown (that required in BOP ITS  $t+9$  months,  $t=$ year). For this purpose, a complete Annex containing the duly explained EBOPS items was enclosed together with the questionnaire.
- Despite the quantitative and concentration analysis taken by industry and size, the creation of a perfect sampling design was completely secondary at this first stage, since the 3000 units

were selected only on the basis of the stability criterion mentioned above, and they represented (on average), according to BE data, around 70% of total yearly credits and debits of the item *Other Services*. These 3000 stable units were also concentrated in the higher ranges of firm size (those with more than 50 employees).

- After the pilot project, a lot of enterprise visits were scheduled to get directly acquainted with the main impressions and difficulties the respondents faced during the surveying period. BE and INE met the most “important” firms in each of the main EBOPS items according to BE credits and debits files.
- Main conclusions:
  1. The respondents found many problems in fulfilling and returning the monthly questionnaire in m+7 days. Most did not have the information available by that deadline.
  2. The Annex was very lengthy and demanded a lot of reading for matching the EBOPS item correctly. Some EBOPS concepts are difficult to understand and in most cases did not fit well with data stored in firm’s databases. Many respondents did not even read the general instructions and only provided information on ITS transactions related to their principal economic activity without considering other possible international transactions in services (mainly possible imports).
  3. For some respondents it was not possible to provide ITS data by geographical breakdown at level 3, countries. Some firms said they recorded the information in their databases on international transactions by geographical or business areas only.
  4. The YES/NO question included at the beginning of the questionnaire to ask the respondents whether they have performed ITS transactions during the reference period was very tempting. Many firms ticked NO (to get rid of the survey) whereas some transactions for these units were recorded by BE files for that period.
- Some solutions:
  1. Periodicity change: After an ad hoc short inquiry among a number of respondents to determine the best periodicity, a quarterly questionnaire was agreed for the future.
  2. Two questionnaires: Two quarterly questionnaires were designed: a long (LQ) and a short questionnaire (SQ). LQ is basically the same as the pilot questionnaire, with just a few questions removed. The idea is that LQ collects stable respondents’ quarterly transactions one by one at the maximum level of breakdown for EBOPS items and for countries. LQ is aimed at those firms with the highest trade figures in each EBOPS main item according to BE files. The selection was made, first of all, by sorting out the firms in terms of exports and imports values (in descending order), and selecting all those under a 60% cut-off for each item. Therefore, LQ is addressed to those stable firms (trading in services with continuity) with the highest export and import figures reported to BE by item.

However, SQ is an abbreviated questionnaire requiring exports and imports of services only for the main EBOPS items, with the exception of Travel (*Transport, Communications, Construction, Insurance, Financial services, Computer and Information, Royalties, Other business services, Personal, cultural and recreational services, Government services n.i.e.*). The geographic breakdown is only required for Total exports

and imports (not by EBOPS item but for the total sum of all of them). Moreover, regarding geographical allocation, only the percent to total exports and imports is asked for the three principal customer countries (exports) or supplier countries (imports), there being a box called 'Rest' to record the difference up to 100%.

3. Filter table for services: In order to avoid the respondents' recording only on ITS transactions linked to their main economic activity or not taking enough time to read the Annex to identify all transactions, a previous 'filter table' after the YES/NO question was included in the questionnaire. When respondents tick the YES box (they admit that they traded in services during the reference quarter), they are directly referred to the filter table. This table consists of a complete EBOPS item list where the respondents must tick the services traded (exports or imports) before recording the corresponding monetary values in other tables later. This table obliges the respondent to have a look at the full range of possible international services and identify those traded during the reference period, before providing any monetary value.

## 2. The 2005-2006 Spanish Survey on International Trade-in-Services (SSITS) : Methodology

### 2.1 Aim

To gather information on the value of imports and exports of services by residents of Spain vis-à-vis non-residents.

The item *Travel* is outside the scope of this survey. This item is estimated through an *ad hoc* border survey called the *Tourist Expenditure Survey*.

The measurement of transactions performed through mode 3 (commercial presence) are also outside the scope of the SSITS. *FATS* on services are obtained from other statistical sources (the *INE's Annual Services Survey* is used for inward *FATS* and an *ad hoc* survey is being designed to estimate outward *FATS*).

### 2.2 Scope

**-Population:** the population is composed of any resident institutional unit (legal entities: enterprises or other organisations), irrespective of its principal economic activity, which trades in services with non-residents. Therefore, the statistical units under study can work in any economic activity of NACE Rev.1.

**-Geographic scope:** All the statistical units of the population residing in Spanish territory.

**-Time scope:** The reference period is the calendar quarter.

### 2.3 Definitions included in the questionnaires

**-Resident units:** Those units having their centre of economic interest in the economic territory of Spain. An enterprise has a centre of economic interest, and thus residence in an economy, when it engages in, and intends to continue to engage in, economic activities on a significant scale either indefinitely or over a long period of time from one or more locations, not necessarily fixed, within the economic territory of Spain. A period of one year is suggested as a guideline for determining residency (same point 3.6 of MSITS).

- **Affiliates/branches/commercial intermediaries and embassies:** *Foreign affiliates/branches* located in Spain are considered as residents in Spain. However, commercial offices or representation desks located in Spain acting as trade intermediaries for non-resident enterprises are considered residents in the country where the headquarters (or enterprise they represent) is resident. Spanish embassies, consulates and international Spanish public bodies abroad are also considered residents in Spain.

The *Affiliates/branches of Spanish companies/groups* located abroad are considered as non-residents in Spain. However, commercial offices or representation desks located abroad acting as trade intermediaries for Spanish resident enterprises are considered residents in Spain. Foreign embassies, consulates and international organisations located in Spain are considered as non-residents in Spain. International organisations not considered as enterprises or whose members are governments are non-residents in Spain.

-**Definition of ITS transaction in the survey:** ITS transactions include *exports* (sales) or *imports* (purchases) of services, including transactions within the EU.

*Exports* refers to all services provided by resident companies to non-residents, whether directly or through subcontracted companies (whether resident or non-resident). The resident companies subcontracted by other residents to provide a service to a non-resident should not include this transaction as an export.

*Imports* refers to all services provided by non-resident companies to residents. Imports also include the services provided by non-residents when they subcontract the provision of services to other companies (whether resident or non-resident).

## 2.4 The sampling design

### - Introduction

One of the most important drawbacks, as in many other countries, to plan a sample design for SSITS was the lack of an administrative register or another source including all the units trading in services at international level to play the role of a single population frame to select a representative sample.

To prepare the aforementioned directory, the information on declarants of foreign receipts and payments to the BE was a good starting point. First, it could make up a primary register to operate as population for the survey and, second, it permitted the analysis of the target population. The analysis of the population was approached from both a static and a dynamic standpoint, that is to say, the main characteristics of the population and their stability over time, with special attention to the role of the major declarants and the participation of individuals in international trade in services. Thanks to this register enterprises were characterized in two groups according to their continuity trading in services: *stable and non-stable enterprises*.

However, the SSITS sample design should not be exclusively based on this enterprise register as population frame, for the reasons mentioned above in point 1.1 (declaration threshold increases, changes in European and international regulations on the financial system, etc.). Thus sources were studied to supplement the BE register. It was decided that the BE stable enterprises made up one of the population frames of the survey directly, while the non-stable did not. These non-stable enterprises from the BE register were replaced by three different population frames coming from other Spanish institutions (see below).

### - Sub-populations (SP) and statistical frames (F)

To sum up, three sub-populations were considered and four statistical frames derived from these sub-populations (as subsets) were agreed to select the sample:

**SP1: Register of enterprises trading in services with non-residents (BE, monthly).**  
**One frame from this SP:**

F1: Stable enterprises coming from SP1.

**SP2: Large Enterprises'2 VAT Returns (Treasury, monthly).** **Two frames:**

F2.1: Large enterprises' VAT returns on international transactions<sup>3</sup> (deliveries/acquisitions within the EU, and exports/imports out of the EU).

F2.2: Large enterprises' VAT returns on domestic transactions.

**SP3: Central Business Register<sup>4</sup> (INE-Spain, yearly).** **One frame:**

F3: Central Business Register except enterprises with NACE Rev.1 in sections A (Agriculture), B (Fishing), L (Public Administration, Defence and Social Security), P (Households employing personnel) and Q (Extraterritorial bodies), and enterprises with fewer than 10 employees.

In principle, regarding the three SP's where these frames come from, the four frames are not mutually exclusive, except F2.1 and F2.2 (mutually exclusive by definition). However, before selecting the sample, the four abovementioned frames were treated in such a way that they became mutually exclusive (independent). The step-by-step treatment was: first, F1 was determined, later F1 enterprises in common with SP2 were removed from SP2 to determine F2.1 and F2.2, and lastly F1, F2.1 and F2.2 were removed from SP3 to build F3.

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<sup>2</sup> *Large enterprises* from the *Spanish Treasury's* point of view are those reaching an annual turnover over

6,01 million euros. These enterprises have the obligation to transmit monthly data on *VAT (Value Added Tax) returns* to the Treasury in m+20 days, with m the reference month for VAT returns. This means an important advantage as to the information speed and its availability, this being the main reason to consider this administrative register as a useful sub-population (SP2) for the survey.

<sup>3</sup> It is important to mention that Spanish VAT legislation only obliges large enterprises to declare monthly VAT returns on *international transactions in goods*. So this F2.1 frame may include large enterprises trading only in goods or in goods and services or only in services. To detect those trading in services, a later matching of F2.1 against SP1 is necessary.

<sup>4</sup> The *INE's Central Business Register* is a complete enterprise directory made up and updated with administrative information mainly coming from Social Security, chambers of commerce and the Treasury's enterprise tax records. Its main use is to come in useful as a statistical frame for the economic surveys carried out by INE-Spain, which usually use a stratified random sampling procedure to select the sample. For this purpose, to each enterprise identified with a *single fiscal identity code* is assigned a principal economic activity code (at the 4-digit level) according to NACE Rev.1 and a range of enterprise size measured in number of employees, since these two variables, among others, such as geographic area, are commonly used to stratify business registers.

In this way, the resulting F's were mutually independent, and a given enterprise will never appear in two or more frames. This condition is absolutely necessary to select four independent sub-samples from each frame.

Clearly, the three frames have been built in such a way to cover the complete range of the enterprise's probability of trading in services at international level. Starting from F1, where there exists a very high probability that all the enterprises trade in services periodically (because they present a great stability in ITS transactions according to BE files), to F3, where there exists an *ex ante* low probability, because there are no previous signs about the predisposition of these enterprises to trade in services, since the CBR does not provide any clue about this.

In the middle, for F2.1 we can infer that these large enterprises have, at least, an international profile, since they filed VAT returns on international transactions (in goods or services<sup>2</sup>). Thus, one can deduce they have a certain probability of having been trading in services with non-residents. This is easy to check, just by matching F2.1 file against SP1.

For F2.2 enterprises, it can only be deduced that they did not file VAT returns on international transactions (goods), but they could trade or be trading international services. This is easy to check, just by matching F2.2 file against SP1.

In any event, any enterprise belonging to F2.1 or F2.2 is a large enterprise in terms of turnover, and they could make the decision of trading international services at any time in the current context of economic globalisation.

#### **- The Sampling procedure**

The same sampling technique was applied to each frame to select the sample. The technique is a classical *stratified random sampling procedure with equal probability of selection*, but selecting more of the sample in those *strata* with a higher number of enterprises trading in services with non-residents according to BE files. The final sample size was 10,304 units.

The stratification variables are: *principal economic activity* of the enterprise at the two-digit level of NACE Rev.1 (division) and *enterprise size* measured in number of employees (size intervals).

As this additional information about the principal economic activity and size of the enterprises was not included as variables in SP1 and SP2 (populations provided by BE and Treasury, respectively), a previous step to assign these two variables to all enterprises included in the defined frames was performed by using the *INE's Central Business Register (CBR)*<sup>3</sup>.

Depending on the frame, different groups of NACE divisions and size intervals were considered to make up the strata. The reason was that before stratifying the population a study was carried out for each frame with the intention of detecting in what cells (combination of economic activity and size) the number of enterprises trading in services with non-residents was higher, according to BE information on imports and exports of services. This study helped to obtain the optimum number of strata for each frame and to identify the strata where it was necessary to select more sample.

*-Sub-samples***Stable subsample from F1 (s1):**

From close observation of SP1 quarter by quarter (the total BE population composed of about 30,000 units in average) over several years, it was deduced that the greater part of total yearly imports and exports of services was concentrated in a reduced number of enterprises (between 3000 and 4000). On the other hand, these enterprises were seen to have traded in services with non-residents with continuity (during at least 4 consecutive years). For this reason, this subset of stable units from SP1, called frame F1, was made up to select the first subsample s1.

The study on the weight of F1 units to total yearly exports and imports revealed they accounted for almost 75%, which was considered a high rate of coverage for only 4000 enterprises. The table 1 below shows this coverage for 2004 by EBOPS item:

**Table 1: Stable population. 2004 coverage (%)**

Item	Year 2004	
	Coverage exports	Coverage Imports
01 Transport	80%	78%
03 Communications	89%	74%
04 Construction	69%	69%
05 Insurance	88%	89%
06 Financial	83%	75%
07 Computers	84%	73%
08 Royalties	76%	89%
09 Other Business	75%	78%
10 Cultural	75%	82%
11 Government	56%	69%
<b>Total</b>	<b>78%</b>	<b>79%</b>

To select F1 from SP1, the following units were chosen,

1. Stable units during 1999-2002. *Stability criterion*: the firms which in the BE files showed continuity trading in services (at least one quarter a year during the four consecutive years 1999-2002) were picked up to take part in F1. These units had already been selected for the 2004 pilot project. The reason to include this set in F1 was to benefit from the experience these units had gained during the pilot project.
2. Stable units during 2002-2004 excluding 1 (the stable units during 1999-2002).

*F1 was surveyed exhaustively.* This means the number of sample units for s1 is the same as the number of frame units for F1. Thus, the theoretical gross-up coefficient assigned to these units is 1.

The sample size for s1 was 4126. The following table 2 shows the classification by economic activity and size. The 324 unclassified units correspond to the 201 Spanish embassies, consulates and other representation offices abroad whose size is unknown for all of them. These governmental institutions located abroad were allocated to s1. The remaining 123 are stable units which did not match against the INE's CBR and therefore their classification by activity-size was not possible.

**Table 2: Stable subsample (s1) by NACE Rev.1 section and size interval**

Section	< 20 employees	20-49 employees	>= 50 employees	TOTAL
A	3	1	2	6
B	0	3	10	13
C	3	1	9	13
D	44	51	539	634
E	10	1	15	26
F	61	31	106	198
G	281	115	248	644
H	3	2	32	37
I	269	150	251	670
J	63	50	150	263
K	392	164	396	952
L	0	1	26	27
M	11	6	43	60
N	3	1	5	9
O	96	59	93	248
P	1	0	0	1
Q	0	1	0	1
<b>total</b>	<b>1240</b>	<b>637</b>	<b>1925</b>	<b>3802</b>
Not classified by NACE-size				324

By type of questionnaire, 3296 out of 4126 were surveyed with the SQ and the remaining 828 used the LQ (627 units + 201 embassies, consulates, etc.).

*Reminder: To address the LQ to some specific stable units, first of all, the units were sorted out in terms of exports and imports values (in descending order), and all those under a 60% cut-off for each EBOPS item were selected to fulfil the LQ. The idea was to make sure that the stable enterprises surveyed by LQ were also the most important traders (in monetary value) for each international service of the EBOPS.*

#### **Subsample from F2.1 (s2.1):**

Before selecting s2.1, F1 enterprises in common with SP2 were removed from SP2 to determine F2.1. On the other hand, as said before, the units included in F2.1 filed VAT returns on international transactions in goods (and services?), but gave no idea about international transactions in services.

To identify the F2.1 units trading in services, F2.1 was matched against BE data on ITS. The resulting subset called F2.1\* was used to study where the units from F2.1 which traded in services were more concentrated by activity-size (stratum). The distribution of F2.1\* by activity and size was very useful to determine the strata to make up and the number of units to select from each strata of F2.1.

The s2.1 sample was selected by a stratified random sampling procedure on the strata of F2.1 determined by F2.1\*.

All the units selected from F2.1 (subsample s2.1) were sent a SQ.

**Table 3: Subsample (s2.1) by NACE Rev.1 section and size interval**

section	< 20 employees	20-49 employees	>= 50 employees	TOTAL
C	0	0	5	5
D	16	74	538	628
E	0	0	9	9
F	4	9	55	68
G	143	103	363	609
H	0	0	29	29
I	6	17	56	79
J	1	0	20	21
K	7	6	60	73
M	0	1	16	17
N	0	0	19	19
O	2	1	21	24
<b>TOTAL</b>	<b>179</b>	<b>211</b>	<b>1191</b>	<b>1581</b>

**Subsample from F2.2 (s2.2):**

Before selecting s2.2, F1 enterprises in common with SP2 were removed from SP2 to determine F2.2. On the other hand, as said before, the units included in F2.2 filed VAT returns on domestic transactions (probably in goods), but gave no idea about international transactions in services (*ex ante*, the probability of F2.2 units of trading in international services was lower than for F2.1).

To identify the F2.2 units trading in services, F2.2 was matched against BE data on ITS. The resulting subset called F2.2\* was used to study where the units from F2.2 which traded in services were more concentrated by activity-size (stratum). The distribution of F2.2\* by activity and size was very useful to determine the strata to make up and the number of units to select from each strata of F2.2.

The s2.2 sample was selected by a stratified random sampling procedure on the strata of F2.2 determined by F2.2\*.

All the units selected from F2.2 (subsample s2.2) were also sent a SQ.

**Table 4: Subsample (s2.2) by NACE Rev.1 section and size interval**

section	10 to 19 employees	20 to 49 employees	50 or more employees	TOTAL
C	1	1	12	14
D	7	18	68	93
E	0	0	7	7
F	10	26	130	166
G	26	46	127	199
H	0	1	16	17
I	8	18	68	94
J	4	5	67	76
K	12	11	226	249
M	0	0	31	31
N	0	11	102	103
O	3	7	43	53
<b>total</b>	<b>71</b>	<b>134</b>	<b>897</b>	<b>1102</b>

**Subsample from F3 (s3):**

For the moment, the most suitable population frames considered for this survey have been those coming from administrative registers (BE and Treasury). These frames have been able to offer some information, whether directly (BE) or indirectly (Treasury), about the units trading in services with non-residents.

However, the last frame F3, drawn from the CBR, is almost a 'blind frame' in the sense that there are no variables in this register which provide any clue about which enterprises trade in services with non-residents. The NACE code and the size (variables included in the CBR), of course, point out the large enterprises in the Services sector that may be international traders potentially, but many of these enterprises might have already been included in another frame.

As mentioned before, F3 is basically the Central Business Register (SP3) except enterprises with NACE Rev.1 in sections A, B, L, P and Q, and enterprises with fewer than 10 employees. These enterprises have not been considered in F3 since their influence on ITS transactions is not significant. However, F3 needs a final debug to become a valid frame to select the s3 sample in the same way as the previous frames. F3 needs to exclude any enterprise belonging to F1, F2.1 and F2.2. After this debug, F3 can be regarded as a useful 'residual' frame.

To carry out the stratification process on F3 by activity and size and to fix the number of units to select per stratum, the distribution of the BE non-stable population by activity-size was considered. For this purpose, F3 was matched against this BE non-stable population. The resulting subset called F3\* was used to study where the units from F3 which traded in services were more concentrated by activity-size (stratum). As before, the distribution of F3\* by activity and size was very useful to determine the strata to make up and the number of units to select from each strata of F3.

The s3 sample was selected by a stratified random sampling procedure on the strata of F3 determined by F3\*.

All the units selected from F3 (subsample s3) were also sent a SQ.

**Table 5: Subsample (s3) by NACE Rev.1 section and size interval**

section	> 20 employees	20- 49 employees	>= 50 employees	TOTAL
<b>C</b>	19	14	11	<b>44</b>
<b>D</b>	156	192	261	<b>609</b>
<b>E</b>	10	8	25	<b>43</b>
<b>F</b>	96	109	177	<b>382</b>
<b>G</b>	141	116	159	<b>416</b>
<b>H</b>	33	41	98	<b>172</b>
<b>I</b>	144	138	140	<b>422</b>
<b>J</b>	29	28	47	<b>104</b>
<b>K</b>	190	193	403	<b>786</b>
<b>M</b>	14	29	99	<b>142</b>
<b>N</b>	24	12	98	<b>134</b>
<b>O</b>	61	60	120	<b>241</b>
<b>tota</b>	<b>917</b>	<b>940</b>	<b>1638</b>	<b>3495</b>

**Table 6: Sample design summary**

<b>Institution</b>	<b>Source</b>	<b>Availability</b>	<b>Sub-population (SP)</b>	<b>Frame (F)<sup>5</sup> (number of units/frame def.)</b>	<b>Study Frame used to stratify (F*)<sup>6</sup> (∩ means matching)</b>	<b>Subsample/ sample ratio (Sr)<sup>7</sup>/ Pct. to total sample (%)<sup>8</sup></b>
<b>Banco de España (BE)</b>	Register of enterprises trading in services with non-residents (settlement system)	Monthly (but agreed quarterly)	SP1	F1=4,126  (Stable units from SP1)	-	s1=F1=4,126  Sr=100% Pct.=40.04%
<b>Spanish Treasury</b>	Register of large enterprises VAT returns	Monthly	SP2	F2.1=12,094  (VAT returns on international transactions in goods or services?)	F2.1*= F2.1 ∩ (SP1-F1)	s2.1=1,581  Sr=13,07% Pct.=15,34%
				F2.2=9,370  (VAT returns on domestic transactions)	F2.2*= F2.2 ∩ (SP1-F1)	s2.2=1,102  Sr= 11,76% Pct.=10,69%
<b>National Statistical Institute (INE-Spain)</b>	INE's Central Business Register	Yearly	SP3	F3=146,402  (SP3 – enterprises with NACE: A, B, L, P, Q - enterprises with fewer than 10 employees)	F3*= F3 ∩ (SP1-F1)	s3=3,495  Sr=2,38% Pct.=33,91%
<b>TOTAL sample</b>						<b>10,304 units</b>

**-Availability of sources and sample rotation:** The survey started with quarterly periodicity in 2005. This means that before sending the 1Q2005 questionnaires to the respondents at the end of the reference quarter, the enterprises included in each subsample had to be perfectly determined and identified by stratum.

<sup>5</sup> As mentioned in the document, all the frames have been previously treated to be mutually exclusive just removing enterprises in common.

<sup>6</sup> The study frames are those obtained by matching the corresponding frame against the BE register of non-stable units (SP1-F1). This study frames are only used to know in which strata determined by the activity and size of the enterprise is more frequent to find enterprises trading services with-non residents within each frame. This analysis is very important to fix more sample in those strata with higher frequencies. However, the different subsamples are selected directly from each frame.

<sup>7</sup> Sample ratio (Sr) is the probability of selection units: Subsample size / Frame size

<sup>8</sup> Pct. to total sample (%): Subsample size / Total sample size (10,304)

In theory, the ideal situation is for the different subsamples to be selected from frames updated on the last day of the reference quarter. However, in practice, this is not very often feasible: the different availability and periodicity of the sources where the frames are derived from (see table above), the natural period of time taken to prepare the frames for the later selection of subsamples, the time consumed by the Sampling Design Unit to program the sampling procedure and select the subsamples, the organisation of the fieldwork, etc, are all factors that take up a lot of time, and make it impossible to wait until the most updated sampling frames become available.

In the case of the 2005, the subsamples selected for the 1Q2005 were the following:

1. **s1:** As said above, s1 was selected from the BE register of enterprises trading services with non-residents 1999-2002 and 2002-2004. It was not possible to add up information of the 1Q2005 because these data were not available when the sample was selected.
2. **s2.1 and s2.2:** Even though the source is available monthly, it was not possible to consider the whole monthly information for the 1Q2005. For this reason only enterprises included in the file on Large enterprises' VAT returns corresponding to Jan2005 was used. This was the only file available in 2005 when the two subsamples were selected. Although 2004 files were available, they were not used because the Treasury criterion to consider an enterprise as a *Large enterprise* is when its annual turnover *for the previous year* was over 6,01 million euros. This means that Large enterprises during 2005 are those with a 2004 turnover over 6,01 million euros. However, the complete 2004 files were not as updated as the Jan05 file, since Large enterprises during 2004 are those with a 2003 turnover over 6,01 million euros. On the other hand, not to make use of Feb and March 2005 data was not a problem because it is probable that those considered large enterprises in Jan05 will go on being large enterprises, and not many enterprises become large in the middle of the quarter.
3. **s3:** Even though the CBR is receiving information continuously from the administrative sources that feed it, this information is only added once a year. Therefore, the CBR is officially updated yearly. To select s3, the CBR updated to 1/01/2004 was used.

Regarding *sample rotation*, it was decided that the initial subsamples were kept during all quarters of 2005, if possible, despite having available frames updated quarterly (F1) and monthly (F2.1 and F2.2).

The idea is to have a yearly 'rotating panel'. That is, to make the initial subsamples permanent as long as possible and allow a yearly rotation of the subsamples (for those non-exhaustive strata) at the beginning of the year. The percent of yearly rotation established is 20%, which means the enterprises initially included in the subsamples will be wholly replaced over 5 years (except strata studied exhaustively). This yearly rotation contributes to renew the subsamples and lighten the statistical burden on respondents.

On the other hand, apart from rotating the 20%, the sample units that during the quarterly fieldwork had been labelled as 'not found', 'closures', 'duplicated', 'out of scope', 'merged', 'acquired' or 'split' will be also replaced on a yearly basis.

### - Statistical editing and non-response imputation

The statistical editing and the imputation procedures are based on the techniques stated by *Hidioglou and Berthelot*<sup>9</sup> (1986). In the case of statistical editing for detecting outliers, a contrast among the three methods mentioned by the authors has been performed using the 2005 real data from the survey. In the three methods, the idea is to build an interval for the variation rate for each unit  $i$  ( $r_i$ ) of exports and imports ( $X_i$ ) between two consecutive periods ( $r_i = X_i(t+1)/X_i(t)$ ) fixing upper and lower bounds.

These methods have the advantage of not requiring the assumption of normality and can be easily implemented by computer. The three methods differ in the way the upper and lower bounds are built: 1) Cheychev inequality edit based on the mean and the standard error of  $r_i$ , 2) an improvement of the previous method by using the median, quartiles and interquartile distances rather than mean and standard error, and, finally, 3) the procedure proposed based on two transformations of ( $r_i$ ) to ensure that outliers are detected at both tails of the distribution and in order to bring out the magnitude of the data (Berthelot, 1983).

Regarding *imputation procedures*, the ranking for imputing non-responding units is as follows: trends (quarterly or yearly) and means (medians) with the most recent trends given priority. In the case of a quarterly system like the Spanish one, quarterly trends are used for units which have data (response or imputed) in the prior quarter to the one to be imputed. Annual trends are used mostly for units which are seasonal and which fail to provide a response as they emerge from their out-of-season period for which a previous-year value existed for the quarter to be imputed. Imputations based on the trends are obtained by multiplying the trends by the unit's last-month or last-year value. In the event that trends cannot be applied, the mean (median) of the cell (stratum) is used as an imputation. The mean (median) method was used to impute non-responding units values of exports and imports during 2005, because there were no historical data available to apply trends.

### - Gross-up coefficients

In brief, gross-up coefficients are a set of numbers that allow us to calculate population estimates starting from sample estimates through an algebraic expression determined by the sample design. This process is called the grossing procedure.

In general terms, the gross-up coefficients correspond to the inverse of the probability of selection of a sample unit from the population, and it can be expressed roughly as  $N/n$  (population size/sample size). In the case of the stratifying random sampling procedure, each stratum has its own gross-up coefficient (there is a coefficient per stratum) and this coefficient is assigned to every unit included in the stratum. In some special cases where the units change from their initial stratum to another, it may happen that there are units with different gross-up coefficients within the same stratum (see below).

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<sup>9</sup> M.A. Hidioglou and J.M. Berthelot, *Statistical Editing and Imputation for Periodic Business Surveys*, Survey Methodology, June 1986, Vol.12, N° 1, pp 73-83, Statistics Canada.

If we consider,

$N_h$  = Total number of units in the population in the stratum h

$n_h$  = Total number of sample units selected in the stratum h

$X_{hi}$  = Value of the observed variable X (exports or imports) in the unit i within the stratum h

**Gross-up expressions per stratum in the SSITS**

**Gross-up coefficients for the units within the stratum h that did not change to other strata<sup>10</sup>:**

$$\frac{N_h^*}{n_h^*} = \frac{N_h \left( 1 - \frac{DU_h + FA_h}{n_h} \right) - \sum_{k \neq h} \frac{N_h}{n_h} n_h^k}{n_h - DU_h - FA_h - \sum_{k \neq h} n_h^k}$$

This is the theoretical gross-up coefficient  $\frac{N_h}{n_h}$ , but with some correcting terms in the numerator and denominator.

In the **numerator**, there are two correcting factors,

A deflator factor representing the % of sampling units which are duplicated (*DU*) and out of scope (*FA*) in the stratum h. As Totals are estimated and not means, it is advisable to deflate the population (numerator) by these units considered as possible frame errors. However, the numerator is not deflated by those units which have dropped out due to closures, mergers, splits or acquisitions because it is assumed that the drops for these reasons are offset by the new registered units in the population.

The second correcting factor refers to the number of units which were represented by the units that changed from stratum h to k. The number of units that changed from h to k is symbolised by ( $n_h^k$ ).

In the **denominator**,  $n_h^*$  is the number of sample units selected in stratum h that stay in h (once duplicated and out-of-scope units have been removed from h), i.e.,  $n_h^*$  refers to units that did not change to another stratum:

$$n_h^* = n_h - DU_h - FA_h - \sum_{k \neq h} n_h^k$$

<sup>10</sup> The sample units are initially allocated in a certain stratum depending on the principal economic activity and size interval they have assigned in the CBR. However, after the surveying period the unit can modify through

**Gross-up coefficients for the units within stratum h that changed to another stratum:**

$$\frac{N_h}{n_h}$$

This coefficient is supposed to be the theoretical gross-up coefficient derived from the sampling design. Although these units have been assigned their theoretical gross-up coefficient according to their original stratum h, they will be finally tabulated within the stratum where they are finally allocated by using their original gross-up coefficient.

**Note:** In order to apply these coefficients it will be necessary to impute previously all the units finally labelled during the fieldwork as leaves/drops (closures, mergers, acquisitions and splits) as well as the non-responding units (non-located and refusals). The units labelled as temporary closures or without activity during the reference quarter will be imputed by 0.

Note that quarterly leaves are not substituted till the end of the year, and for this reason they need to be imputed over the year together with non-responding units.

**- General expression for estimates**

Let X be the observed variable in the population (exports or imports of services) and  $\hat{X}$  its estimate. Then,  $\hat{X}$  will adopt the following expression,

$$\hat{X} = \sum_h \left\{ \sum_{i=1}^{n_h^*} \frac{N_h^*}{n_h^*} X_{hi} + \sum_{k \neq h} \frac{N_k}{n_k} \sum_{i=1}^{n_k^h} X_{ki} \right\}$$

Where the first addend represents the contribution to the stratum h estimate of the units that did not change to other strata, and the second addend represents the contribution of the units selected originally in stratum k but that came finally to stratum h.

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the questionnaire its principal activity or size if it considers they are wrongly assigned. INE-Spain considers these modifications, since CBR can be slightly out-of-date. This might imply some movements of some units from some strata to others what can affect the estimates if no corrections are made.

**-Strata studied exhaustively**

In the case of exhaustive strata, the general expression of the estimate will also be applicable but in the first sigma  $i=1, \dots, N_h^*$  and the grossing-up coefficient will be  $\frac{N_h^*}{n_h^*} = 1$  since  $n_h^* = N_h^*$ . The second addend of the estimate will adopt different expressions depending on whether stratum  $k$  is an exhaustive one or not. If it is, then  $\frac{N_k}{n_k} = 1$ , and, if not, it will adopt the same expression as the second addend of the general estimate.

It is important to mention that when the strata  $k$ 's have significantly high grossing coefficients, and provided that their units carry this coefficient to the exhaustive stratum  $h$ , this might significantly affect the estimate corresponding to stratum  $h$ . In this kind of case it may be advisable to change this coefficient for 1.

**3. The current situation**

In the year 2006, for the first time, there are available yearly results (2005 data) from the new survey. BE and INE are working together to check the results against those obtained from the BE settlement system, at macro and microdata level, with the aim of ensuring their "quality" before being disseminated.

Some work has still to be done in order to: a) increase the response rate, b) define criteria for validation checks and imputation and c) distribute, by item and geographically, the results obtained from SQ. Moreover, for BOP purposes, it is needed to develop an estimation method for monthly results.

The survey is intended to be an important statistical input to estimate the BoP item *Other Services* but, at the same time, it should be able to provide more information than that required in BoP regulations. In particular, the information that links industry and product. The code NACE Rev.1 assigned to the statistical units as well as the size of the unit (measured in number of employees) will enable obtaining interesting tabulations on ITS relating industry, product and size. All of this will be possible thanks to the sample design of the survey based on the stratification of the population and sample by activity and size.