

Micro-databases on securities statistics as a key issue for satisfying user needs

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1. Introduction: the dawn of item-by-item reporting system for statistics

Banco de Portugal started collecting data from financial institutions specifically for statistical purposes during the 70's. The data acquisition model relied on traditional aggregated reporting schemes, consisting typically of forms designed to answer pre-defined requirements. This model of reporting has been the standard for many years in the collection of data for statistical and supervisory purposes by *Banco de Portugal* and is still applicable for some very relevant statistics (e.g. Balance Sheet and Interest Rates of Monetary Financial Institutions, although in the latter case some partial developments in new directions have already taken place).

The first entire item-by-item reporting framework for statistical purposes developed by *Banco de Portugal* was the Securities Statistics Integrated System (SSIS) which was launched in 1999 (the system for collecting data to compile Balance of Payments statistics developed in 1993 had already a major component based on the report of individual operations with non-residents). The SSIS is managed by the Statistics Department.

2. The development of the Securities Statistics Integrated System

The SSIS was designed to store, manage and explore data on securities issues and portfolios on a security-by-security and investor-by-investor basis except for investors in the households sector, whose data are aggregated by the investor's country. The scope of financial instruments covered by the SSIS is securities other than shares (short- and long-term) and shares and other equity. The collected data include, on a monthly basis, stocks and transactions. The ISIN code is used for the identification of the securities.

In the case of issues, the SSIS assembles data on securities issued by resident entities in Portugal, irrespectively of the fact that those issuances take place in the Portuguese market or in external markets. A variety of sources are used such as the Lisbon Stock Exchange, the Portuguese Securities Market Commission, the Portuguese Treasury and Debt Management Agency, commercial databases, etc. Concerning securities portfolios, detailed information is collected on holdings by residents of domestic and foreign securities, as well as on the holdings of domestic

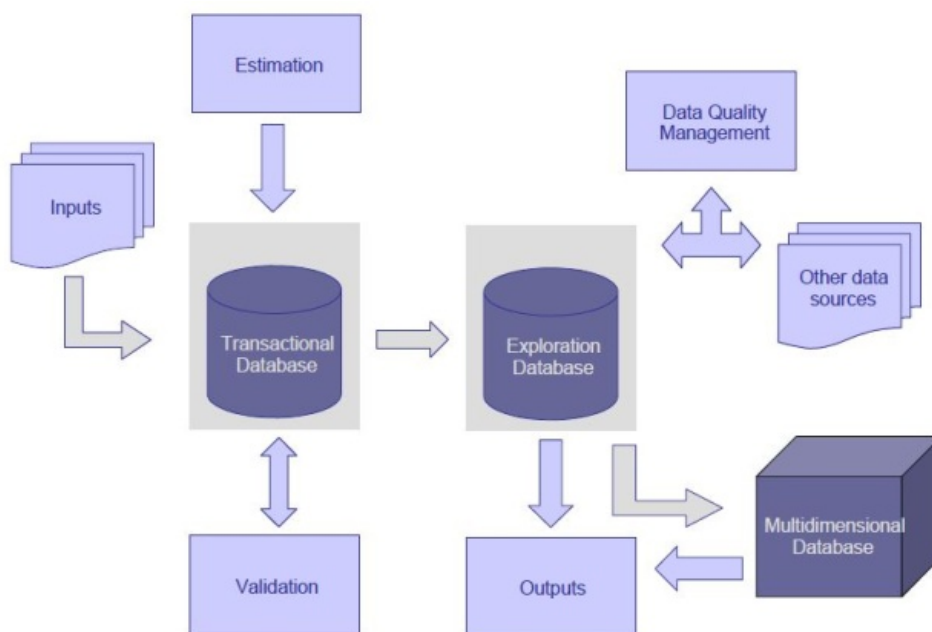
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securities by non-resident investors. These data are reported mainly by custodians, which include banks, dealers and brokers. Direct reporting by resident investors with relevant portfolios deposited outside the Portuguese financial system is also applicable.

The architecture of the SSIS is based on three databases (two relational and one multidimensional). Collected data are stored and validated in the “transactional database”. Data estimation of missing information is also done in this database. Validated and “enriched” data are copied daily to the “exploration database”. A second level of quality control is performed on aggregate data, by carrying out consistency tests and comparisons with other information sources. Statistical outputs are produced from the “exploration database” as well as from the “multidimensional database”. A graphical representation of this architecture is presented below.

The SSIS Architecture

Figure 1



The original purposes that inspired the development of the SSIS covering, in an integrated model, issues and holdings of securities were basically the following:

- the production of statistics on issues of securities by the resident sectors
- the production of statistics on securities portfolios of institutional sectors
- the development of “from-whom-to-whom” tables crossing issuers and holders
- as input data for other statistics, namely:
 - i. Monetary Financial Institutions (MFIs) and Investment Funds (IFs) statistics, allowing, for instance, the calculation of price revaluations of the portfolios of MFIs and IFs
 - ii. Balance of Payments and International Investment Position (BOP/IIP) statistics, contributing to the calculation of the Portuguese portfolio invested abroad and the foreign portfolio invested in Portugal

- iii. Financial Accounts, regarding instruments F.3 (securities other than shares) and F.5 (shares and other equity)

In recent years the SSIS was “linked” with the Centralised Securities Database (CSDB) managed by the European System of Central Banks (ESCB), acting as a contributor but also as a receiver of the data stored in the CSDB. Presently, the ESCB is developing a Securities Holdings Statistics Database (SHSDB) for which the SSIS will be also involved in a two-way communication of data.

3. Flexibility: the main advantage of item-by-item reporting models

The main benefit of statistical compilation systems based on item-by-item reporting is their flexibility. This flexibility is manifold, either for respondents or compilers:

- it increases the ability of the system to deal with changes in the statistical requirements especially in cases where further details in existing breakdowns are needed (in most cases these situations don’t imply any intervention in the reporting system);
- changes in the reporting scheme are easier to implement as they typically consist of additional granular items (new dimensions) that will not need to be transformed or aggregated by respondents;
- it prevents data redundancy, promoting in practice the principle that “data should be collected only once”;
- it enables a more efficient data quality management; and, above all,
- it improves dramatically the responsiveness to *ad hoc* requests.

One important finding in economics over the 90’s has been that the analysis of aggregate statistics does not give policy makers an accurate view of the functioning of the economy. Analysis of micro-data has become crucial allowing, for instance, analysts to calculate marginal, rather than average effects.

4. Some examples of the SSIS response to new demands

One of the most remarkable examples of the responsiveness of the SSIS happened in September 2008, one day after the announcement of the bankruptcy of Lehman Brothers. The ECB requested the Eurosystem to provide within the next 24 hours all available information regarding holdings of shares and debt of Lehman Brothers and subsidiaries with a set of details that included the country and sector breakdown (with further breakdowns for the financial sector to distinguish OFIs, IFs, FVCs, ICPFs and others) of holders. A list of relevant ISINs was distributed to facilitate the query. The request was obviously very urgent, sensitive and exceptional. In a couple of hours, Banco de Portugal was able to reply to the ECB providing the full answer to the request and even a number of relevant additional ISIN were identified and also provided. Fortunately, Portuguese institutions were minor exposed to Lehman Brothers. The security-by-security model of the SSIS and its high level of coverage (both for issues and holdings) were of paramount importance to address this important *ad hoc* request in such an effective way.

The financial crisis that affected a vast numbers of economies in the course of last 5 years was particularly severe in Portugal, leading the country to request international financial assistance from the EU/IMF in May 2011. Since then, the demand for higher detailed statistics, either on regular and also on *ad hoc* basis, has increased dramatically, namely regarding the financial sector, the public sector or the indebtedness situation of firms and households. It was a huge challenge for the Statistics Department of *Banco de Portugal* but very powerful tools were available, namely the three micro-data databases managed by the Department:

- The SSIS (already described)
- the Central Credit Register (CCR), containing information on an individual basis regarding the loans granted by the resident credit institutions to all resident legal and natural persons, based on a model very close to the loan-by-loan approach
- the Central Balance Sheet Database (CBSDB) with the balance sheet and income statement of all non-financial corporations on an individual basis

The existence of these micro-data databases was a key success factor for an efficient and effective response to the myriad of new data requests for monitoring the development of the Financial Assistance Programme to Portugal and the preparation of the quarterly review missions.

The two following cases are particularly interesting examples of what has been said in the previous paragraph about the advantages of having statistical compilation systems based on item-by-item models and to build micro-data databases from that:

- The production of “amortization plans” for banks, general government and state-owned enterprises (SOEs), with the amortisation/redemption amounts, on an annual basis until 2020 and from 2021 onwards, of debt securities, domestic loans and external loans. The contributions for this output were from the SSIS, the CCR and BOP/IIP, respectively;
- The production of a new statistical product called “non-financial sector indebtedness” aggregating the amounts of non-consolidated debt resulting from issues of debt securities (held by residents and non-residents), domestic loans, external loans and trade credits. Data are presented combining and crossing different dimensions of analysis, namely: debtor and creditor institutional sectors, type of instrument, original maturity, sector of economic activity and size of companies. This output was the result of an integrated approach of data (largely micro-data) from the SSIS, Monetary and Financial Statistics, BOP/IIP, Financial Accounts, CCR and CBSDB. It was the first time that *Banco de Portugal* has used an integrated approach with such a high number of different statistical domains. The result was an innovative achievement at international level and led to a new chapter in the monthly Statistical Bulletin.

An excerpt from the “non-financial sector indebtedness”, crossing the debtor and creditor sectors

Figure 2

K.1.3 DÍVIDA⁽¹⁾, POR SETOR DEVEDOR E FINANCIADOR
Posições em fim de período
Valores não consolidados

DEBT⁽¹⁾, BY DEBTOR AND CREDITOR SECTORS
End-of-period positions
Non-consolidated values

Fonte/Sourc: Banco de Portugal 10⁹euros

	Dez 09	Dez 10	Dez 11	Dez 12	Fev 13	Mar 13	
	Dec 09	Dec 10	Dec 11	Dec 12	Feb 13	Mar 13	
	1	2	3	4	5	6	
1 Administrações públicas.....	158 591	185 844	214 378	241 085	244 713	244 764	General government.....
Financiado por:							Financed by:
2 Administrações públicas.....	14 384	19 477	25 598	32 927	32 248	32 659	General government.....
3 Setor financeiro ⁽²⁾	23 943	46 518	50 243	58 314	58 035	57 953	Financial sector ⁽²⁾
4 Empresas.....	4 313	6 261	6 643	6 776	6 589	6 756	Corporations.....
5 Particulares ⁽³⁾	10 714	10 447	8 964	7 898	7 960	7 972	Private individuals ⁽³⁾
6 Exterior.....	105 238	103 140	122 930	135 170	139 881	139 424	External.....
7=[13]+[19] Empresas públicas.....	37 919	45 064	48 846	45 888	46 863	47 317	Public corporations.....
Financiado por:							Financed by:
8 Administrações públicas.....	780	675	5 409	9 062	9 302	9 765	General government.....
9 Setor financeiro ⁽²⁾	10 228	17 312	15 359	13 709	14 465	14 570	Financial sector ⁽²⁾
10 Empresas.....	5 463	5 720	6 871	5 299	5 316	5 322	Corporations.....
11 Particulares ⁽³⁾	136	134	145	143	145	152	Private individuals ⁽³⁾
12 Exterior.....	21 312	21 223	21 062	17 676	17 634	17 509	External.....
13 Empresas públicas incluídas nas administrações públicas ⁽⁴⁾	14 939	20 763	23 290	25 225	25 474	25 887	Public corporations included in the general government ⁽²⁾
Financiado por:							Financed by:
14 Administrações públicas.....	135	134	5 267	8 918	9 167	9 629	General government.....
15 Setor financeiro ⁽²⁾	3 697	9 462	7 034	6 190	6 226	6 239	Financial sector ⁽²⁾
16 Empresas.....	302	232	117	122	136	141	Corporations.....
17 Particulares ⁽³⁾	0	1	2	17	27	32	Private individuals ⁽³⁾
18 Exterior.....	10 804	10 934	10 870	9 979	9 919	9 845	External.....

5. Conclusion

The three examples presented in this paper showed that the SSIS, combining data on issues and holdings of securities, having both components based on an item-by-item model (security-by-security and investor-by-investor), was a key issue for satisfying users' needs overtime.

It is important to recall that the SSIS was launched in 1999, after a period of 2 years of development. The users' needs for statistics regarding securities have changed a lot during these years, in particular since May 2011 when the Financial Assistance Programme to Portugal began, but the SSIS remained unchanged since its inception (only a few technological improvements were made). In particular, the option of adopting a security-by-security and investor-by-investor model for holdings of securities was a very innovative solution in 1999 and proved to be the right option to introduce the maximum degree of flexibility in the system and to extend its longevity maintaining its relevance. The SSIS is presently under reformulation, triggered by technological constrains and by the need to increase the automation of a number of procedures more related to the collection of data on issuances. The model and the data requirements will remain almost unchanged.

The development of compilation systems for statistical purposes based on micro-data is a conscious strategy that *Banco de Portugal* has been following over the past years. Apart from securities, other micro-data databases were developed for loans, interest rates and individual accounts of non-financial corporations or are under study (e.g. for deposits). From the respondents point of view the strategy of requesting granular data has been clearly perceived as a way to reduce their reporting burden and to simplify their reporting procedures. For the compiler, it's a

strong investment in maximizing flexibility although incorporating higher costs in terms of data storage, computer processing and data quality management.

The use of micro-data databases and item-by-item reporting by the Statistics Department of *Banco de Portugal* has been absolutely vital to ensure a level of excellence of its statistical production. The ability to deal with the multiple new statistical demands that arose from the Financial Assistance Programme was a perfect example of the appropriateness of that strategy and a strong stimulus to pursue it even deeper in the future.