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An experimental index of services production for the French ICT Industry

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1. Introduction

1. The OECD Short-term Economic Statistics Working Party (STESWP) task force on services (TFS) was created in 2002 from discussions at the STESWP meeting in June 2002. Since then, TFS has been developing guidelines embodied in a Manual that can be used by OECD Member countries to compile monthly or quarterly Index of Services Production (ISP). The index is expected to provide economic analysts with information on the short-term movement of an economy that would complement an Index of Industrial Production (IIP); and national accountants with relevant and timely information on the performance of the services sector to be used in compiling quarterly national accounts.

2. As the preparation of the guidelines is at the final stage, the TFS decided to assess the practicability and usefulness of the Manual by applying its guidelines and recommendations to the actual compilation of an ISP. The information, communication and technology (ICT) industry for France was chosen for the evaluation, as the ICT industry has been known to be more dynamic and as a consequence attracts the interest of market players and policy makers with regard to the availability of measures for short-term movements in output. At the same time, it involves various types of services activities in several fields such as wholesale, post and telecommunications, and renting.

3. This paper is organised in five Sections. Sections 2 and 3 present a definition of the ICT industry and a summary of the recommendations from the ISP Manual. Sections 4 and 5 deal with evaluation of available information and compilation strategies. Finally, results and concluding remarks are presented in Section 6.

2. The definition of ICT

4. Several references discuss economic activities that should be included in the ICT industry[1]. As the purpose of this paper is not to discuss definitions for the ICT industry but to assess the usefulness of the recommendations in the ISP Manual, this paper will use an OECD definition for ICT industry for services sector for analyses throughout this current analysis.

5. The OECD defines the ICT industry according to ISIC Rev. 3. As Table 1 below shows, the OECD defines it for both the manufacturing sector and services. For services, it includes Sector 5151 (Wholesale of computers, computer peripheral equipment and software) Sector 5152 (Wholesale of electronic and telecommunications parts and equipment), Sector 6420 (Telecommunications), Sector 7123 (Renting of office machinery and equipment including computers), and Sector 72 (Computer and related activities.).

[1] See for example, "A draft definition of the ICT sector" by Andrew Wyckoff (1997), which discusses different sectors included in the ICT services sector http://stds.statcan.ca/english/voorburg/1997%20copenhagen/papers/008327.pdf and "*The ICT activity Index*," by European Commission (2005), Brussels http://ec.europa.eu/comm/enterprise/ict/policy/ict/ict_activity_index_2005_1.pdf

Table 1: Services activities listed in definitions of OECD and European Commission

Economic activities	International Standard Industrial Classification
Manufacturing	(3000) Office, accounting and computing machinery (3130) Insulated wire and cable (3210) Electronic valves and tubes and other electronic components (3220) Television and radio transmitters and apparatus for line telephony and line telegraphy (3230) Television and radio receivers, sound or video recording or reproducing apparatus, and associated goods (3312) Instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process equipment (3313) Industrial process equipment
Services	(5151) Wholesale of computers, computer peripheral equipment and software (5152) Wholesale of electronic and telecommunications parts and equipment (6420) Telecommunications (7123) Renting of office machinery and equipment including computers (72) Computer and related activities.

Source: OECD Glossary of Statistical Terms.

3. Summary of recommendations from the ISP Manual

6. The ISP Manual presents methods (i.e. preferred, alternative and other methods) that can be used to compile an ISP for ICT activities at the 4-digit level in ISIC Revision 3. Relevant parts of the recommendations are summarised below in Table 2. The "preferred method" is to deflate gross turnover by relevant price indices. For the "alternative method", it recommends deflating gross turnover by partially representative price indices. It also considers the use of sector specific volume indicators or production output index as alternatives. For example, the number of calls made for Sector 6420 (Post and telecommunication activity, etc.) and the number of leases for Sector 7123 (Renting of machinery and equipment without operator / Renting of other machinery and equipment / Office machinery and equipment including computers) as volume indicators. For Sector 72 (Computer and related activities), use of the number of programming hours of hardware consultancy contracts can be considered. For the "other method", volume indicators such as level of employment can be used.

Table 2: Summary of recommendations presented in the ISP manual

ISIC Rev. 3.1 Class	Description	Preferred	Alternative	Other
5151	Wholesale trade and commission trade, except of motor vehicles / Wholesale of machinery, equipment and supplies / computers, computer peripheral equipment, software.	Gross turnover deflated by appropriate quality adjusted price indices (e.g. PPI)	Gross turnover deflated by partially representative price indices Or Production Output Index	Volume indicators (e.g. employment)

ISIC Rev. 3.1 Class	Description	Preferred	Alternative	Other
5152	Wholesale trade and commission trade, except of motor vehicles / Wholesale of machinery, equipment and supplies / Electronic and Telecommunications parts and equipment.	Gross turnover deflated by appropriate quality adjusted price indices (e.g. PPI)	Gross turnover deflated by partially representative price indices Or Production Output Index	Volume indicators (e.g. employment)
6420	Post and telecommunications / Telecommunications	Gross turnover deflated by appropriate quality adjusted price indices. (e.g. CPI: Telephone services, PPI: Telephone services, PPI: Transmission of radio and television programmes)	Gross turnover deflated by partially representative price indices Or Volume indicators (e.g. number of calls made)	Volume indicators (e.g. employment)
7123	Renting of machinery and equipment without operator / Renting of other machinery and equipment / Office machinery and equipment including computers.	Gross turnover deflated by appropriate quality adjusted price indices (e.g. PPI: Office machinery rental)	Gross turnover deflated by partially representative price indices Or Volume indicators (e.g. number of leases)	Volume indicators (e.g. employment)
72	Computer and related activities	Gross turnover deflated by appropriate quality adjusted price indices. (e.g. CPI: Telephone services, PPI: Telephone services, PPI: Transmission of radio and television programmes	Gross turnover deflated by partially representative price indices Or Volume indicators (e.g. number of programming hours, of hardware consultancy contracts)	Volume indicators (e.g. employment)

Source: Compilation Manual for an Index of Services Production.

4. Evaluation of available information (input data, deflators and weights)

7. This Section deals with the availability of three types of information that are essential for the ISP compilation: input variables, deflators and weights. Table 3 below presents the results of the review by each services activity.

8. As Table 3 shows, the INSEE database presents monthly turnover indices for most 4-digit levels or for 3-digit levels of the French ICT industries from January 1995 to September 2005 as of December 2005 except for Sector 6420. For Sector 6420, annual turnover value for telecommunication services is available in New Cronos (i.e. the Eurostat database) for a period from 1980 to 2003. At the same time, quarterly employment level (i.e. number of employees) that covers both Post and Telecommunications are contained in UNEDIC from the 1st quarter 1996 to the 3rd quarter 2005 as of December 2005.

9. The availability of deflators for ICT sectors is more heterogeneous than for turnover. A quarterly PPI is available for three sectors (i.e. Sectors 5151, 7123 and 72). As of December 2005, the PPI for 5151 is available from the 1st quarter 1988 to the 4th quarter 2002, that for 7123 from the 1st quarter 1995 to the

3rd quarter 2005, and that for 72 from the 1st or 2nd quarter 2002 to the 3rd quarter 2005. A monthly CPI, on the other hand, is used for two Sectors (i.e. Sectors 5152 and 6420): the former is available from January 1993 to November 2005 and the latter from January 1990 to November 2005. In addition, INSEE produces a monthly PPI for Sector 5151 from January 2003 to November 2005. Thus, deflators are timely but availability of historical data varies.

10 With regard to the coverage of deflators, deflators for all the ICT services, except Sectors 6420 and 72, do not cover all the activities listed for the corresponding sectors (see Table 1 above). The PPI for 5151 represents price changes of micro-computers and the CPI used for 5152 measures price changes of only telecopy and telephone equipment. In addition, the PPI for Sector 7123 reflects only price changes of printers. As a printer is one of many different types of office equipment, this can be considered as a proxy deflator.

11. In order to collect information on weights various sources have been studied. However, the current study was unable to find any single source which provides a complete set of information on the weights required for the compilation. As a result, information provided by the OECD Directorate for Science, Technology and Information (DSTI) is used to collect weights for Sectors 51 (detailed weights for Sectors 5151 and 5152 are not readily available), 6420, 7123 and 72 from 1995 to 2003. The detailed weights for sub-Sectors of Sector 72, i.e. 721, 722, 723, 724, and 725 from 1993 to 2003, are collected from INSEE.

Table 3: Availability of useful information for an ISP of the French ICT sector (as of December 2005)

ISIC Rev. 3.1 Class	Input data	Deflator	Annual weights (gross value added)
5151	Monthly turnover index (SA) for 5151 (Commerce de gros d'ordinateurs, équipements informatiques périphérique et progiciels, valeur, CVS-CJO) are available in INSEE from January 1995 to September 2005.	Quarterly PPI for micro-computers is available from 1st quarter 1988 to 4th quarter 2002 and monthly from January 2003 to November 2005 in INSEE (partially representative price index).	DSTI/OECD provides gross value added weights for 51 as a whole from 1995 to 2003 but no detailed information for 5151
5152	Monthly turnover index (SA) for 5152 (Composants et autres équipements électroniques, CVS-CJO) is available in INSEE from January 1995 to September 2005.	Monthly CPI for telecopy and telephone equipment is available in INSEE from January 1993 to November 2005 (partially representative price index).	DSTI/OECD provides gross value added weights for 51 as a whole from 1995 to 2003 but no detailed information for 5152
6420	Annual turnover for telecommunication services is available in New Cronos for 1980-2003. Quarterly employment (SA) that cover both Post and Telecommunications in UNEDIC from 1st quarter 1996 to 3rd quarter 2005.	Monthly CPI for Telecommunication services is available in the INSEE from January 1990 to November 2005.	DSTI/OECD provides relevant gross value added weights for 6420 from 1995 to 2003.

ISIC Rev. 3.1 Class	Input data	Deflator	Annual weights (gross value added)
7123	Monthly turnover index (SA) for 7123 (Location de machines de bureau et de matériel informatique, valeur, CVS-CJO) is available from INSEE from January 1995 to September 2005.	Quarterly PPI for printer is available in INSEE from 1st quarter 1995 to 3rd quarter 2005 (partially representative price index.).	DSTI/OECD provides relevant gross value added weights for 7123 from 1995 to 2003
72	Monthly turnover index (SA) for 'Activités informatiques – Ensemble' is available in INSEE from January 1995 to September 2005, which covers: - Conseil en systèmes informatiques (721) - Réalisation de logiciels, éditions de logiciels (non personalisés), autres activités de réalisation de logiciels (722) - Traitement de données (723) - Activité de banque de données (724) - Entretien et réparation de machines de bureau et de materiel informatique (725)	Quarterly PPI are available in INSEE from 1st (723, 724 and 725) or 2nd quarter (721) 2002 to 3rd quarter 2005 for the following sectors: - Conseil et ingénierie informatique (721) - Services de traitement des données (723) - Services de banques de données (724) - Entretien et réparation de machines de bureau et de matériel informatique (725)	DSTI/OECD provides relevant gross value added weights for 72 from 1995 to 2003. INSEE provides relevant and detailed gross value added weights for 721, 722, 723, 724, and 725 from 1993 to 2003

Note: DSTI/OECD stands for OECD Directorate for Science, Technology and Information and DSTI/OECD calls the gross value added weights for 51 as 51 ICT (ICT Wholesale).
Sources: Eurostat, DSTI/OECD, INSEE and UNEDIC.

5. Compilation strategies

12. The aim of the current study is to compile a monthly ISP for the French ICT for a period from January 1995 to September 2005. A break in the ISP is expected at 2002 caused by the introduction of sub-sector (72), which is only linked to the aggregate at this time due to the short length of the PPI indexes required for deflation of this sub-sector. As mentioned in Section 5.4 of the draft ISP Manual, the compilation of an ISP for French ICT services is carried out in four stages: pre-processing stage and 4-, 3-, 2-digit levels.

13. Table 4 below shows the compilation strategies chosen for each Sector. The main differences are due to heterogeneity in the available information for each Sector. For most Sectors, an alternative method is chosen as price indices do not cover all service activities for the Sectors. For Sector 72, input variables and their deflators match with the preferred method described in Table 2 above.

Table 4: Compilation strategies by Sector

ISIC Rev. 3.1 Class and Description	Compilation strategies and tasks undertaken for each Class
5151: Wholesale trade and commission trade, except of motor vehicles / Wholesale of machinery,	Turnover index (SA) is deflated by partially representative price index (alternative method). 1) Interpolate monthly PPI between 1995 and 2002 by using monthly information between

ISIC Rev. 3.1 Class and Description	Compilation strategies and tasks undertaken for each Class
equipment and supplies / computers, computer peripheral equipment, software	2003 and 2005. 2) Estimate monthly deflated turnover index (SA) using monthly PPI[2].
5152: Wholesale trade and commission trade, except of motor vehicles / Wholesale of machinery, equipment and supplies / Electronic and Telecommunications parts and equipment	Turnover index (SA) is deflated by partially representative price index (alternative method). 1) Estimate monthly index from deflated monthly turnover index (SA) using monthly CPI.
6420: Post and telecommunications / Telecommunications	Annual turnover is interpolated with quarterly employment (SA) until 2003 and employment (SA) is used from 20004 (preferred or other method?) 1) Backcast employment (SA) to 4th quarter of 1994. 2) Deflate annual turnover by annualised monthly CPI for 1990-2003. 3) Convert employment into an index (2000=100) 4) Estimate quarterly index of deflated turnover with employment data up to 2003. 5) Link quarterly index of deflated turnover with quarterly index of employment at 2003. 6) Estimate monthly index (SA) using cubic spline.
7123: Renting of machinery and equipment without operator / Renting of other machinery and equipment / Office machinery and equipment including computers.	Partially representative turnover index (SA) is deflated by partially representative price index (alternative method). 1) Interpolate monthly PPI from January 1995. 2) Estimate deflated monthly turnover index (SA) using monthly PPI.
72: Computer and related activities	The turnover indices (SA) for Computer and related activities are deflated by proper deflators for 721, 723, 724 and 725 (preferred method), and by proxy deflator (alternative). 1) Interpolate monthly PPI for all sub-sectors and estimate proxy PPI for 722 as an average of PPIs for other sub-sectors from January 2002. 2) Estimate monthly deflated turnover index (SA) for sub-sectors from 2002. 3) Consolidate sub turnover index into an aggregated index of Sector72 using gross value added weights from 2002.

6. Results and concluding remarks

6.1 Presentation of results

14. An ISP for French ICT services is compiled from January 1995 to September 2005. The period was chosen due to availability of information, i.e. INSEE data for turnover are available from January 1995. The ISP was revised by introducing information on Sector 72 in May 2002 as information on Sector 721 is only available from the 2nd quarter of 2002.

Tasks carried out at each stage

15. No data show breaks or missing information for all periods. Thus, the only manipulation conducted in the pre-processing stage was to estimate a PPI for Sector 722 as an average of deflators of Sectors 721, 723, 724 and 725. At the 4-digit level, quarterly deflators for Sectors 5151 and 7123, and

[2] Although it is recommended to perform the seasonal and working day adjustments on deflated series in the Manual, such adjustments were not required for this analysis as INSEE provides data with the adjustments.

turnover data for 6420 were interpolated. Then, all turnover indices except Sector 72 were deflated. At the 3-digit level, quarterly PPIs for 721, 722, 723, 724 and 725 were interpolated into monthly figures and used to deflate turnover indices of the corresponding Sectors, which were aggregated to sub-division 72 through chain-linking with a base of 2003 = 100.

16. Finally, an ISP for French ICT services was compiled by consolidating all deflated turnover indices obtained in 4- and 3-digit levels by chain-linking (1995 weights for period 1995-1998; 1999 weights for 1999-2002 and 2003 weights for 2003-2005). Sectors 5151 and 5152 are consolidated with equal weights as no information on their weights is readily available.

17. Procedures recommended to be carried out at the 2-digit level, such as assessing comparability with GDP and quality adjustment were not undertaken for this study. The main reason is that no information on GDP was readily available for the corresponding Sector.

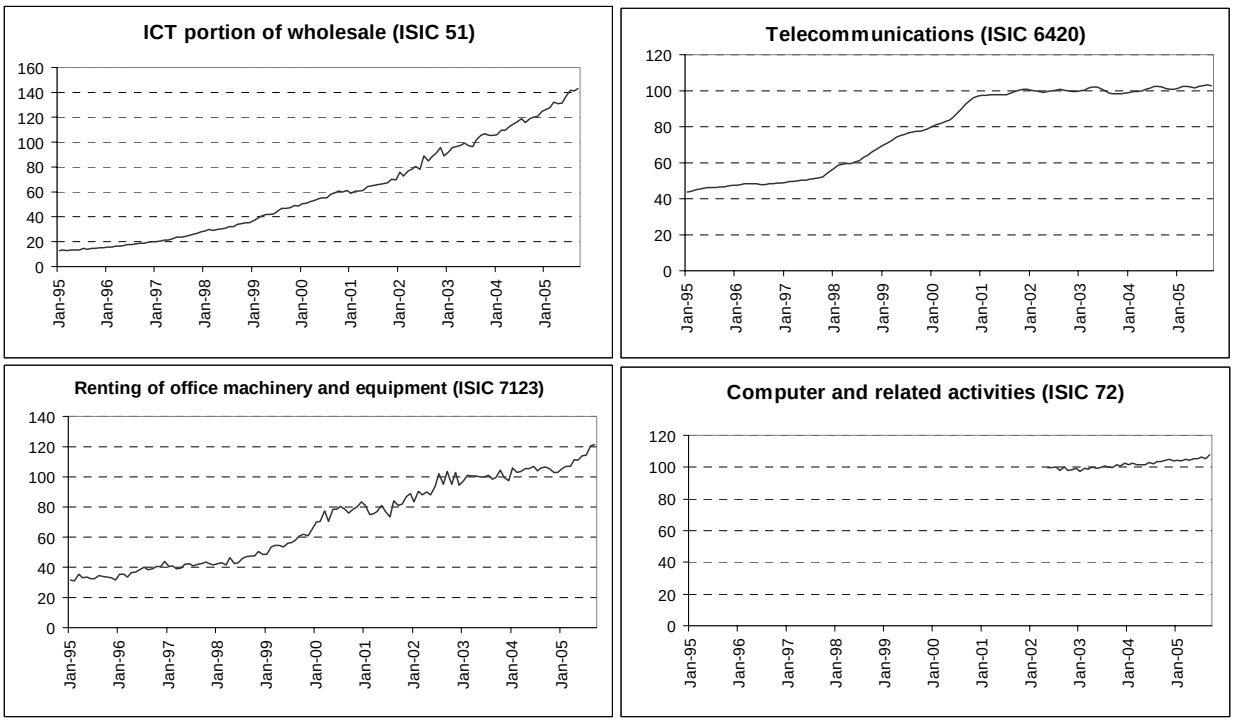
Resulting ISP for French ICT services[3]

18. Based on the procedures described in the previous Sections, deflated turnover indices for four Sectors (i.e. Sectors 51, 6420, 7123 and 72) and an ISP for French ICT services are compiled from January 1995 to September 2005. The index for Sector 72 was compiled for a shorter period from May 2002 to September 2005 because backcasting of the series was not possible due to the short length of component time series. Therefore, the resulting ISP was compiled with three components until April 2002 and with four components from May 2002.

19. Figure 1 below presents graphs of seasonally adjusted deflated turnovers for the components of French ICT services from January 1995 (or May 2002) to September 2005. The ICT portion of wholesale shows steadier increasing trend overtime than renting of office machinery and equipments, which shows more volatile movement. The graph for Sector 6420 is smoother than the other three graphs. An explanation is the fact that it is an interpolated series from annual data. At the same time, the graph shows a possible structural change in a period between 2000 and 2001, which is considered in the interpolation.

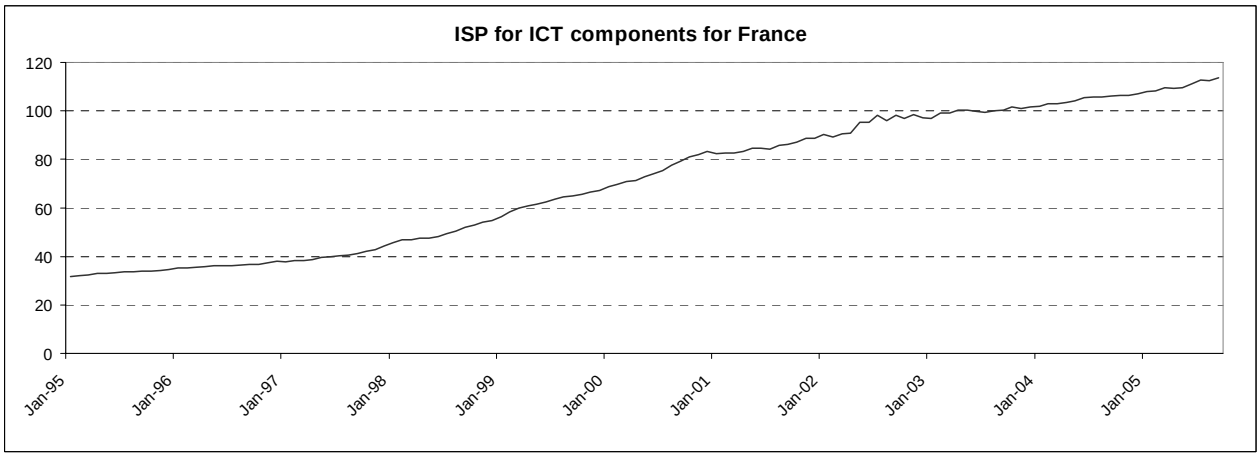
[3] As already mentioned in previous Sections, the resulting ISP may not be robust and thus its use should be limited to the purpose of the study in this paper. The main reason is that this study was executed on the basis of a limited set statistical information from sources available for users external to INSEE.

Figure 1: Deflated turnover indices for components of French ICT services (Indices, 2003=100)



20. Figure 2 presents a graph of a seasonally adjusted monthly ISP for French ICT services from January 1995 to September 2005. The ISP is a chain-linked index and links were made at 1995, 1999 and 2003. The ISP presents its strongest growth during the period between 1998 and 2001.

Figure 2: Monthly experimental ISP for French ICT services from January 1995 to September 2005 (Index, 2003=100)



6.2 Evaluation of recommendations in the ISP Manual

21. It seems that the recommendations listed in the ISP Manual are very useful and covered or dealt with most of main issues encountered during the compilation of a short-term ISP. The flowcharts presented in the Manual were also found to be very useful and provided concise remedies for various problems which occurred at various compilation stages. However, the assessment undertaken in this study suggests that the practicability of the ISP Manual can be enhanced by incorporating the following points:

- The Manual does not clearly address a preference regarding the frequency of variables used. For example, in the case of a monthly ISP for a given sector, if both a preferred input variable on a quarterly basis and an alternative input variable on a monthly basis are available, which one should be used for ISP compilation?

- The Manual provides a recommendation for the frequency of seasonal and working-day adjustments. Should this recommendation on the frequency of revision be extended to other kinds of revision caused by enhancing the available information (e.g. extended historical data, data with better coverage, or new data)?

- Should a minimum length of time series be specified for forecasting or backcasting? Or should this be left to default parameters of relevant computer programmes?

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