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Methodological annex n°15: A new estimate of investment in software and databases for 2020 benchmark

Software and databases provide an economic benefit to their owner, as they are used in the production process for several years. In national accounting, goods and services that meet these properties are considered produced assets. Their acquisition is described as fixed capital formation (investment). Similarly, the costs related to the creation of software or databases for an entity's own account are recorded as both production and gross fixed capital formation (GFCF).

However, the use of software or databases does not necessarily imply an acquisition, meaning an economic ownership transfer; only the use may be sold and purchased. Therefore, it is necessary to distinguish in the use of software between intermediate consumption and investment reflecting an economic ownership transfer. With the transition to the 2020 benchmark revision, the methods for estimating own-account production of software and databases have been revised, and the boundary between investment and intermediate consumption has been refined in accordance with European recommendations.

In the 2020 benchmark revision, the production of own-account software and databases amounts to €32.3 billion (compared to €29.0 billion in the 2014 benchmark). This upward revision is mainly due to the inclusion of IT consulting activities in the evaluation of own-account software production for final use. On the other hand, fixed capital formation (in software and databases) has been significantly revised downward: it is €62.4 billion in 2019 in the 2020 benchmark, compared to €81.5 billion in the 2014 benchmark. Generally, if the use of a service does not involve an economic ownership transfer, the associated monetary flows are considered intermediate consumption. This includes royalties paid for the use of software packages or for database hosting, as well as payments for IT consulting, particularly those for minor maintenance.

1. What are software and database assets?

In national accounting, fixed assets are produced non-financial assets used repeatedly or continuously in production processes for at least one year. They include tangible assets such as buildings, machinery, and biological resources, as well as intangible assets, including intellectual property rights, which are mainly divided into R&D, software, and databases. As fixed assets, the production of these assets, whether sold to a third party or for own use, corresponds to gross fixed capital formation (GFCF).

The "software" asset (AN.11731) is defined in the European System of Accounts (ESA) 2010 as programs, descriptions, and documentation for operating and application software. It includes the initial development, extensions, and the acquisition of copies. The "database" asset (AN.11732) consists of data files organized to allow efficient data access and usage in terms of resources. Thus, investment in software and databases includes, on the one hand, in-house software and databases developed internally (output for own final use) and, on the other hand, software and databases acquired on the market, when they are used in the production process for more than a year.

2. In the 2020 benchmark, the method of evaluating output for own final use is revised

Software and databases produced internally by a company or administration, but not intended for sale, are accounted for as output for own final use if they meet the criteria to be considered assets, particularly if they are used for more than a year in the production process. According to the European System of Accounts (ESA 2010), the output for own final use is measured as the sum of the costs incurred to produce these assets. These costs include personnel expenses, intermediate consumption (notably consulting services), net taxes on production, consumption of fixed capital (depreciation of assets), and an average return on activity. Only expenses used for the internal production of assets should be considered. For example, within personnel expenses, it is essential to distinguish those incurred for developing own-account assets (own-account software) from those incurred for other activities (routine IT management, short-term software programs, etc.).

To estimate the first component of this sum, namely the wages of IT professions in non-IT sectors, time spent coefficients on software development and internal databases are applied to the wages of different professions. Using this information, ratios are applied to estimate the other components of the sum of costs.

Methodological changes were implemented in the 2020 benchmark revision for these calculations to make the best use of available data and follow European recommendations. Thus, in the 2014 benchmark, wages were net and a ratio had to be used to convert them to gross wages. In the 2020 benchmark, the wage bill is now directly calculated from gross wages derived from the nominative social declaration (DSN). Social security contributions and other payroll taxes are added with a fixed coefficient that was reassessed in the 2020 benchmark using data from the Labour Cost and Structure of Earnings Survey [► Ecmoss]. Non-wage costs (intermediate consumption) are added by assuming that the ratio between intermediate consumption (excluding IT consulting) and wage costs is the same as that observed in the IT sector. This ratio was updated in the 2020 benchmark using data from business statistics (Esane). It also includes two additional adjustments. The first accounts for the consumption of fixed capital and a net surplus, using the ratio of gross operating surplus/personnel expenses in IT sectors. The second considers taxes and subsidies via a wage bill coefficient determined from 2019 data.

Given the importance of IT consulting in IT developments and the potential difference in the use of IT consulting between IT companies and non-IT companies developing own-account software, a specific treatment was carried out in the 2020 benchmark. External IT consulting services are added to intermediate consumption, thus contributing to own-account output and ultimately to Gross Fixed Capital Formation (GFCF). Based on the Annual Sector Survey [► ESA], it is possible to estimate this IT consulting from which subcontracted work and consulting for minor maintenance are deducted.

Overall, all methodological changes lead to a revision of output for own final use in 2019, increasing from €29.0 billion to €32.3 billion between the 2014 benchmark and the 2020 benchmark. The main reason is the inclusion of IT consulting in the 2020 benchmark (€+7.2 billion in 2019). This increase is partly offset by the downward revision of the output for own final use level excluding consulting due to the wage bill (€-3.9 billion). Indeed, in the last years of the 2014 benchmark, since employment data were not available for the closing of the final account, the output for own final use was estimated by applying the same value evolution as sales. However, since the sales dynamics were higher than that of the wage bill, the output for own final use was overestimated all other things being equal.

This upward revision mainly concerns the output for own final use of databases (€+2.2 billion). The output for own final use in custom software also revises upwards (€+1.5 billion), while that of standard software slightly decreases (€-0.3 billion). This revision primarily impacts non-financial corporations (€+2.9 billion), but also general government (€+1.0 billion) and, to a lesser extent, financial enterprises (€+0.5 billion).

3. In the 2020 benchmark, the method for evaluating Gross Fixed Capital Formation (GFCF) is also revised

The output for own final use, as final output, corresponds by definition to investment and thus has a counterpart in GFCF, but a part of the sold production also contributes to GFCF. The data from the ESA survey allows for a detailed classification of products resulting from sales contributing to GFCF or intermediate consumption.

However, other elements need to be considered. Notably, the product use must exceed one year for the purchase to be considered as an asset acquisition, and the economic ownership must be transferred from the designer to the user. Thus, data processing and hosting services, previously classified under GFCF, are now considered intermediate consumption, bringing national accounts closer to business accounting principles, which makes it easier the use of tax returns.

Furthermore, consulting services in systems and software were directly recorded in GFCF in the 2014 benchmark. Now they are considered intermediate consumption but contribute to the output for own final use and ultimately to GFCF.

Among standards softwares, the purchase of system and network software is considered intermediate consumption because this software is already included in the estimation of IT equipment or machines (embedded software). On the other hand, application software and development tools and languages are considered separately sold and are recorded globally in GFCF at the client. Ultimately, about half of the standard software corresponds to GFCF.

Overall, intermediate consumption represented one-third of employment in software and databases in 2019 based on the 2014 benchmark revision. This share is revised upwards and exceeds half in the 2020 benchmark revision. It is even 60% for databases [► Table 3-1].

Table 3-1 : Amount of GFCF and share among GFCF uses and intermediate consumption -2019, in euros (billion)

	2014 Benchmark		2020 Benchmark	
	Level	Share (%)	Level	Share (%)
Other software publishing	14.6	100.0 %	6.8	48.6 %
Computer programming, consulting services and other computer service activities	60.1	65.3 %	47.6	50.4 %
Data processing, hosting and related activities- Internet portals	6.8	41.2 %	7.9	40.1 %
Total	**81.5**	**66.2 %**	**62.4**	**48.7 %**

Sources : Insee, national accounts

GFCF is revised downward (€-19.1 billion)

Overall, GFCF is revised downward by €19.1 billion in the 2020 benchmark compared to the 2014 benchmark, representing a decrease of 23%. The changes in the evaluation method of the output for own final use contribute to an increase in GFCF by €3.4 billion, while the reclassification of products and subcontracting reduces GFCF by €22.5 billion, mainly in the product programming, consulting, and other computer service activities.

All these changes also lead to a revision of GDP upward by €3.4 billion. Indeed, the revision of the output for own final use of companies (financial and non-financial) directly affects production and thus gross value added and GDP. For general government, the increase in the output for own final use in software is offset by a decrease in non-market production. However, the total production of general government is revised due to the revision of the consumption of fixed capital of software. This is revised by €1.1 billion between the two benchmarks. The reclassifications between GFCF and intermediate consumption have no direct impact on gross value added: although they modify the balancing of supply and use of software products, the changes in intermediate consumption of software are offset by changes in intermediate consumption of other products, so there is no impact on total intermediate consumption.

Table 3-2 : The main changes - 2019, in euros (billion)

	2014 Benchmark	2020 Benchmark	Revision
Production approach			
Output at basic prices	**123.4**	**129.5**	**+ 6.1**
Of which :			
Sales	98.5	100.7	+ 2.2
Output for own final use	29.0	32.3	+ 3.4
Of which Non-financial corporation and unincorporated enterprises	*24.3*	*26.2*	*+ 1.9*
Of which financial enterprises	*3.2*	*3.7*	*+ 0.5*
Of which general government	*1.5*	*2.5*	*+ 1.0*
Intermediate consumption	**41.6**	**65.7**	**+ 24.1**
Expenditure approach			
Final consumption expenditure	1.5	3.4	+ 1.9
GFCF	**81.5**	**62.4**	**- 19.1**

Sources : Insee, national accounts

While the 2020 benchmark revision differs significantly from the two previous benchmark (2010 and 2014), it aligns closely with the methodological choices of earlier benchmarks. Furthermore, comparability between France and its European neighbors should be improved with the 2020 benchmark, as the ratio between the stock of capital in software and France's GDP was atypical in the 2014 benchmark [► Figure 3-1].

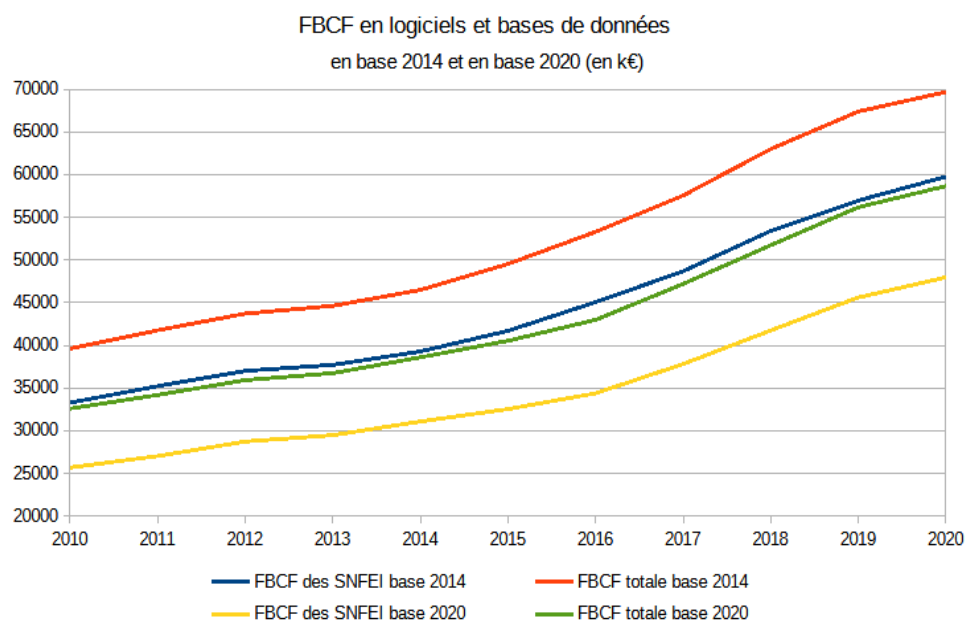**Figure 3-1 : Net software capital stock relative to GDP**
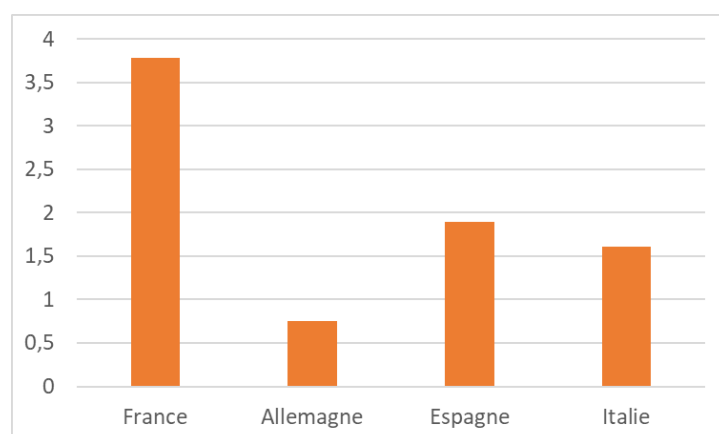
Source : Eurostat, 2014 Benchmak for France

4. Retropolation

For the years prior to 2019, the amounts of output for own final use have been re-estimated using the new method. GFCF was then recalculated by backcasting to ensure the temporal coherence of the series. The changes are relatively unaffected by the methodological change; it is primarily the base year levels that are revised [► Figure 4-1].

Figure 4-1 : GFCF in software and databases in 2014 benchmark and 2020 benchmark (in thousands €)

FBCF en logiciels et bases de données
en base 2014 et en base 2020 (en k€)

Legend:
- FBCF des SNFEI base 2014
- FBCF des SNFEI base 2020
- FBCF totale base 2014
- FBCF totale base 2020

Source : Insee, national accounts

5. Link/bibliography

Reference	Link
Ecmoss	Labour Cost and Structure of Earnings Survey: https://www.in-see.fr/fr/metadonnees/source/serie/s1221
ESA	Annual Sector Survey: https://www.insee.fr/fr/metadon-nees/source/serie/s1269

Insee