

Methodological annex n°14: A new estimate of production and investment in R&D for 2020 benchmark

Since the European System of Accounts 2010 (ESA 2010), research and development (R&D) is considered a produced asset. As such, any purchase of R&D is gross fixed capital formation (GFCF). Similarly, companies' R&D expenditures contribute to the production for their own final use of an asset, and they contribute to gross fixed capital formation.

The 2010 and 2014 benchmarks revisions were already in accordance with these principles recommended by ESA 2010, but since then, European recommendations have specified more precisely the methods for estimating the production and investment in R&D. In the 2020 benchmark revision, the French national accounts follow these new recommendations, resulting in a downward revision of R&D investment by €7.5 billion in 2019, mainly related to a better distinction between the production for own final use of R&D and software.

Overall, the new estimation of the production for own final use of R&D has a downward effect on GDP (€-8.6 billion).

1. What is the Research and Development asset in national accounting?

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, or biological resources, as well as intangible assets like intellectual property rights, which mainly consist of R&D, software, and databases. As fixed assets, their production, whether for own use or sold, is counterbalanced by gross fixed capital formation (GFCF).

The "Research and Development" asset (AN.1171) is defined in the European System of Accounts (ESA 2010) as the value of expenditures devoted to systematic creative work aimed at increasing the stock of knowledge, including knowledge of humanity, culture, and society, as well as using this stock of knowledge to devise new applications.

This value is determined based on the economic benefits that it is expected to produce in the future. Except in cases where it can be reasonably estimated because it is sold, the value of R&D is, by convention, assessed at the sum of costs, including the costs of unsuccessful R&D activities.

2. The method of evaluating production and GFCF in R&D in the 2014 benchmark

The statistical service of the Ministry of Higher Education and Research (MESR) conducts an [annual survey of companies](#) on the resources dedicated to research and development, which allows for measuring the domestic expenditure on research and development by companies (DIRDE). This survey complies with European regulations. It is established according to the guidelines for data collection on R&D set out in the [Frascati manual](#). This ensures the comparability of results at the European level and has evolved little since 2000. The MESR also collects administrative data to measure the domestic expenditure on research and development by general government (DIRDA).

In the 2014 benchmark, the GFCF of non-financial companies was assumed to be equal to the DIRDE, and the GFCF of general government in R&D, excluding production for own final use, was derived from public accounting (purchases of R&D by branches not classified in R&D). Intermediate consumption in R&D constituted the residual use once total GFCF and external trade in R&D estimated by the Balance of Payments were deducted. In 2019, the GFCF of market R&D amounted to €38.7 billion and production to €40.6 billion.

3. In the 2020 benchmark, the method for evaluating gross fixed capital formation (GFCF) in R&D has been revised

The European manual on measuring R&D ("Manual on Measuring Research and Development in ESA 2010"), published in 2014, details the method for estimating production and GFCF in R&D based on enterprise expenditure on R&D (DIRDE) and government expenditure on R&D (DIRDA). The methods and accounting adjustments recommended by this manual have been adhered to for the 2020 benchmark revision.

In the 2020 benchmark revision, domestic R&D expenditure by enterprise and general government (DIRDE and DIRDA) remains the initial source for estimating R&D production. Several successive treatments are then performed to align with national accounting concepts and to avoid double-counting with other development activities.

The first adjustment involves removing DIRDE expenditures dedicated to the development of software and databases for own use. These are already accounted for in the production for own use of software and databases [► [Fiche 15](#)]. Capital expenditures (excluding depreciation) are also removed because they are not production costs; the assets are intended to be used over several years. Only the consumption of fixed capital of the assets used is included in the total costs. Additionally, subsidies on R&D production are deducted.

Conversely, production taxes are added, as well as external R&D expenditures of units classified in the research sector. For these companies or organizations, these expenditures are considered inputs into their research work. This is the only case where R&D expenditures can be accounted for as intermediate consumption rather than GFCF. Finally, for R&D conducted by market units only, this sum of costs is increased to account for the profits made and the consumption of fixed capital used in the production process. This markup corresponds to the net operating surplus derived from R&D activities.

Production is divided into production for own final use and sales of R&D. The level of sales, determined by company statistics (Esane), does not change between the 2014 benchmark revision and the 2020

benchmark revision. Thus, the entire impact of the new method on production is reflected in the production for own final use.

Finally, GFCF is derived from R&D production, to which imports and product taxes are added, and from which exports and intermediate research consumption are deducted [► [Table 3-1](#)].

Table 3-1 : Estimation of R&D production and GFCF in 2020 benchmark - 2019, in euros (billion)

Enterprise expenditure on R&D from Frascati Manual	53.4
Double-account software for own-account	-9.0
Capital expenditure	-5.1
Production taxes	+1.2
Operating subsidies	-1.0
Intermediate consumption in research product	+5.0
Sub-total : Current expenditure	44.6
Consumption of fixed capital and mark-up in market R&D	+4.0
Total : PRODUCTION R&D	48.6
Imports	+12.9
Intermediate consumption in research	-5.0
Exports	-12.3
Exchanges between sectors	+0.9
Total : GFCF R&D	45.2

Source : Insee, national accounts

The GFCF in R&D is revised downwards by €7.5 billion in the 2020 benchmark revision

This change in estimation method results in a significant modification of the levels of GFCF and intermediate consumption. Overall, the GFCF is revised downwards by €7.5 billion between the 2014 benchmark and the 2020 benchmark for the year 2019.

The impact varies across institutional sectors. The GFCF in R&D for non-financial companies is revised downwards by €12.8 billion, while the GFCF for general government increases by €5.1 billion. Additionally, a GFCF appears for the financial sector amounting to €0.2 billion, due to improved data utilization from the Ministry of Higher Education and Research (MESR). The companies expenditures on R&D for the financial sector are now isolated, whereas in the 2014 benchmark, it was not distinguished from that of non-financial companies.

All these changes also lead to a revision of GDP. GDP is revised downwards by €8.6 billion for the year 2019 in the 2020 benchmark revision compared to the 2014 benchmark. This primarily results from the revision of the production for own final use for non-financial companies (€-10.8 billion) and the financial sector (€+0.2 billion), as well as an upward revision of the consumption of fixed capital (CFC) of general government in R&D. Indeed, the increase in the GFCF of general government leads to an upward revision of their CFC in R&D (€+3.8 billion). This latter increase contributes to the overall production of general government, calculated by the sum of costs. However, the increase in the production for own final use in R&D for general government does not have a direct effect on GDP since it results in a decrease in non-market production. One final effect contributes to the downward revision of GDP: R&D purchases declared as intermediate consumption by companies should not be counted as intermediate consumption but as GFCF in the accounts, except for R&D intended to be used in R&D production. An adjustment is therefore made to the business statistics data to reduce their

intermediate consumption: the amount of GFCF of non-financial companies excluding production for own final use in R&D is subtracted from intermediate consumption. The downward revision of this adjustment results in an upward revision of intermediate consumption, thus leading to a decrease in GDP [► [Table 3-2](#)].

Table 3-2 : Impact of revisions in production and GFCF in R&D on GDP calculation – 2019, in euros (billion)

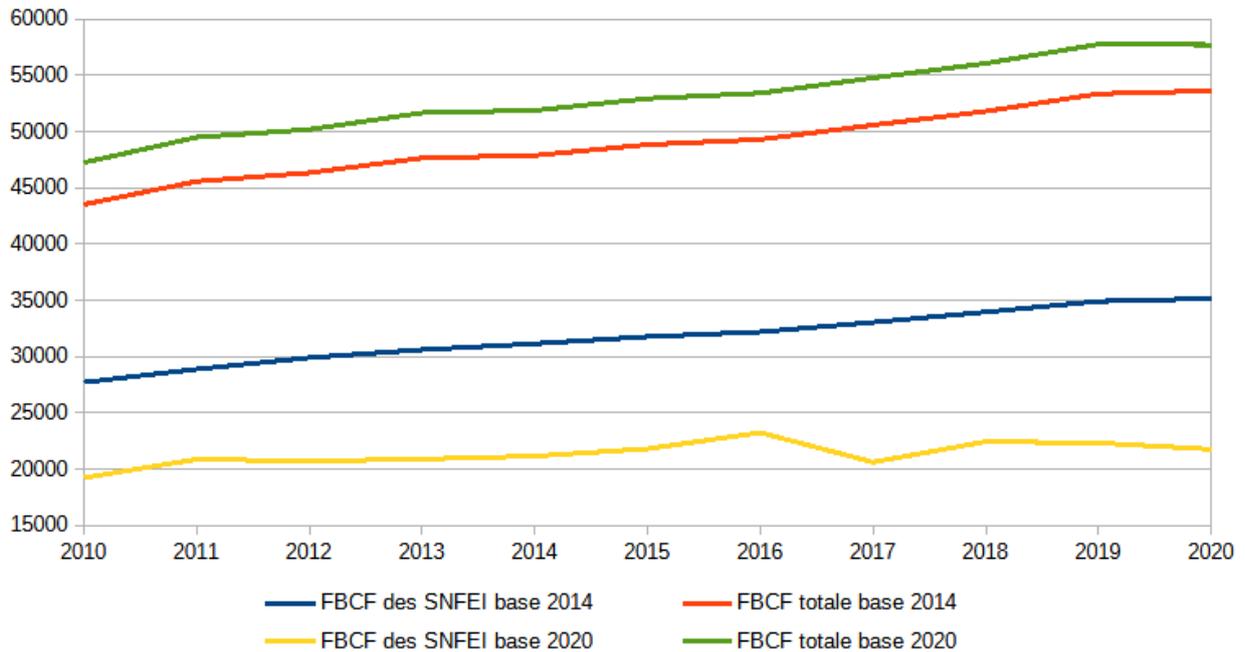
	2014 Benchmark	2020 Benchmark	Revision
Output for own final use of non-financial companies	26.6	15.8	-10.8
Output for own final use of financial enterprises	0.0	0.2	+0.2
Correction for intermediate consumption by non-financial companies	7.7	5.9	-1.8
Consumption of fixed capital of general government	14.2	18.0	+3.8
Impact GDP			-8.6

Source : Insee, national accounts

4. Retropolation

For the years prior to 2019, production amounts were re-estimated using the new method. GFCF was then recalculated by backcasting to ensure the temporal consistency of the series and the balancing of supply and use. Apart from the increase in the level, the overall trends of GFCF are little impacted by the change in method. The trends of GFCF for non-financial companies and individual enterprises (SNFEI) are more significantly modified, particularly in 2017 due to the consideration of revised import and export data from the Balance of Payments. The distribution between GFCF of SNFEI and general government is also revised. GFCF of SNFEI represented two-thirds of the total GFCF in the 2014 benchmark, but it only represents two-fifths in the 2020 benchmark revision.

FBCF en Recherche et Développement
en base 2014 et en base 2020 (en k€)



Source : Insee, national accounts

5. Links

Reference	Link
Frascati manual	This manual sets out a set of concepts and guiding principles established by the OECD with the aim of harmonizing, at the international level, "the measurement of human and financial resources devoted to research and experimental development (R&D)."
Annual survey of companies	R&D surveys conducted by the statistical research studies department of the Ministry of Higher Education and Research (MESR): https://www.enseignementsup-recherche.gouv.fr/fr/enquetes-rd-81628
ESA 2010	2010 European system accounts : https://ec.europa.eu/eurostat/documents/3859598/5925793/KS-02-13-269-FR.PDF/cfd0cb42-e51a-47ce-85da-1fbf1de5c86c